CITY OF UPLAND
460 NORTH EUCLID AVENUE
UPLAND, CALIFORNIA 91786
TEL (909) 291-2930, FAX (909) 291-2974

SPECIFICATIONS
FOR
Project No. 9128 Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR AND WATER IMPROVEMENTS

Prepared by Richard Brady & Associates
2655 Camino Del Rio North
Suite 100
San Diego, CA 92108

Bids are due at 2:00 PM, October 22, 2020, at the office of the CITY CLERK 460 N. Euclid Avenue, Upland, California

Richard Brady, P.E.

RCE No.: 36175 Exp. Date: 6/30/2022

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. BRADY
No. 36175
CIVIL
STATE OF CALIFORNIA

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Project No. 9128

Bid No. 2020-06

Replacement of 7.5 MG Reservoir and Water Improvements

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NOTICE INVITING SEALED BIDS OR PROPOSALS

NOTICE IS HEREBY GIVEN that the City of Upland ("City") will receive at the Office of the City Clerk in the City Hall of the City of Upland, 460 N. Euclid Avenue, Upland, California, on or before the hour of **2:00 o'clock P.M.** on the 22nd day of **October**, **2020**, sealed bids or proposals for the Construction of:

Project No. 9128
Bid No. 2020-06
Replacement of 7.5 MG Reservoir & Water Improvements

in said City. Bids will be opened and publicly read immediately thereafter.

Bids must be made on a form provided for the purpose, addressed to the City of Upland and marked: Bid for Construction of:

Project No. 9128
Bid No. 2020-06
Replacement of 7.5 MG Reservoir & Water Improvements

The City Clerk's Clock is the prevailing clock, and bids received after the time indicated will be returned unopened. Bids shall be valid for a period of ninety (90) calendar days from the date of the bid opening.

PREVAILING WAGE: Notice is hereby given that in accordance with the provisions of California Labor Code, Division 2, Part 7, Chapter 1, Articles 1 and 2, the Contractor is required to pay not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the public work is performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work. In that regard, the Director of the Department of Industrial Relations of the State of California is required to and has determined such general prevailing rates of per diem wages. Copies of such prevailing rates of per diem wages are on file in the office of the City Clerk, 460 North Euclid Avenue, Upland, California, and are available to any interested party on request, or online at www.dir.ca.gov/dlsr. The successful Bidder shall post these rates at the job site.

Pursuant to Labor Code § 1775, the Contractor shall forfeit, as penalty to the City, not more than fifty dollars ($50.00) for each laborer, workman, or mechanic employed for each calendar day or portion thereof, if such laborer, workman, or mechanic is paid less than the general prevailing rate of wages hereinbefore stipulated for any work done under the attached contract, by him or by any subcontractor under him, in violation of the provisions of said Labor Code.

In accordance with the provisions of § 1777.5 of the Labor Code, as amended, and in accordance with the regulations of the California Apprenticeship Council, properly indentured apprentices may be employed in the prosecution of the work.

Attention is directed to the provisions in § 1776, 1777.5, and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him.

DAVIS-BACON ACT: Notice is hereby given that Davis-Bacon compliance is required for the entirety of the construction of the project. All apprentices must be registered in a bona fide apprenticeship program recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor. Attention is directed to the Davis-Bacon Act requirements incorporated by reference in section 3 of The

California Water Boards Construction Installment Agreement in all construction contracts and subcontracts.

IRON AND STEEL PRODUCTS PURCHASE REQUIREMENTS: Attention is directed to conditions relating to purchase of "Iron and Steel Products" incorporated by reference in section C.4.3.i of The California Water Boards Construction Installment Agreement in all construction contracts and subcontracts. **Contractors and subcontractors shall not purchase "iron and steel products" produced outside of the United States.**

SUBCONTRACTED WORK: The name and location of business of any subcontractor who will perform work exceeding 1/2 of 1% of the prime contractor's total bid or ten thousand dollars ($10,000), whichever is greater, must be submitted with the bid. Any other information regarding the foregoing subcontractors that is required by City to be submitted may be submitted with the bid, or may be submitted to City up to 24 hours after the deadline established herein for receipt of bids. The additional information must be submitted by the bidder to the same address and in the same form applicable to the initial submission of bid.

DISADVANTANGE BUSINESS ENTERPRISE (DBE) REQUIREMENTS: Notice is hereby given that DBE compliance is required for the entirety of the project. Attention is directed to the Guidelines for Meeting the California State Revolving Fund (CASRF) Programs Disadvantaged Business Enterprise Requirements identified in the bidding documents. **All contractors are required to comply with the Six Good Faith Efforts.**

PREQUALIFICATION OF THE CONTRACTOR: Due to the critical nature of the project to the City of Upland, it is the intent of these Specifications and Design Drawings to obtain a first-class product with emphasis on overall safety, quality, and quality control, both during and after the construction process. Only Contractors who have constructed in their own name strand wrapped prestressed concrete reservoirs are qualified to bid on and construct the reservoir portion of this project. The Contractor shall have successfully constructed in their own name at least five (5) AWWA D110 Type I circular prestressed concrete Reservoirs located within a region with a mapped spectral response acceleration, Ss, of 1.0g or greater in the past ten years. At least two of these tanks utilized as qualifying experience must have been 4.0 million gallons (MG) or larger. If the reservoir construction is subcontracted by the Contractor, the Reservoir Subcontractor shall be required to meet the above-specified experience qualifications.

All AWWA D110 Type I prestressed concrete reservoirs listed for the Reservoir Contractor's experience requirements must have been built in the Reservoir Contractor's own name.

The proposed reservoir construction superintendent shall be currently employed by the qualified Contractor and shall have been the reservoir construction superintendent on no less than two (2) AWWA D110 Type I circular prestressed concrete reservoirs of at least 1.0 MG or larger during the last five years, within a region with a mapped spectral response acceleration, Ss, of 1.0g or greater. The qualified reservoir superintendent shall have been in the direct employment of the qualified Contractor for both of the reservoirs listed and will be required to be on the project site in responsible charge, full-time, during all reservoir concrete construction activities.

Within ten (10) calendar days of the publication of this Notice Inviting Sealed Bids or Proposals, every Contractor that wishes to bid on the reservoir portion of this contract must submit a written package of information that confirms that they possess the minimum required experience to be considered as prequalified to bid this project. The City of Upland will notify each Contractor who submits a prequalification package of their selection or rejection as a prequalified Contractor certified to bid this project within fifteen (15) calendar days of the publication of this Notice Inviting Bids. Only those Contractors deemed prequalified will be allowed to bid this contract. Bids from non-prequalified contractors will be returned unopened.

In addition, the following information is required to be submitted with the Contractor's prequalification submittal.

1. The name(s) of the proposed qualified superintendent who will be in direct charge of the reservoir construction for the full duration of the Contract.
2. An experience list of at least two AWWA D110 Type I prestressed concrete reservoir jobs successfully completed by each of the superintendents listed by the Contractor. The list shall include a reservoir description, the name and location of the Owner and the Consultant, and the approximate completion date of each reservoir while directly employed by the Contractor.
3. Descriptive literature of the strand wrapping, the vertical prestressing and the automated shotcrete machinery meeting all of these Specification requirements and a letter confirming the Tank Prestressor has two-strand wrapping and automated shotcrete machines meeting the requirements of the Prestressed Concrete Reservoir specification. Include in such data photographs or prints of the means of recording of both the circumferential and vertical prestressing applications and copies of actual photographs, print-outs or other records of applied wrapping forces (as well as force-elongation diagrams if available) taken from jobs in which the machinery has been used.

Only those Contractors deemed prequalified will be allowed to bid the reservoir portion of work on this contract. Any General Contractor submitting a bid for this project that is not prequalified themselves must list their prequalified reservoir contractor on the outside of their submission package. Bids from non-prequalified Contractors, or bids from general contractors without listing its prequalified reservoir contractor will be returned unopened.

The City of Upland will notify each Contractor who submits a prequalification package of their selection or rejection as a prequalified Contractor, and will publish a list of prequalified contractors certified to bid this project once the prequalification period has ended.

The City of Upland will publish a list of Contractors and Subcontractors who desire to be included on the bidders list. The list will be updated and published each Wednesday up until bid opening. Participation is voluntary. Those wishing to be included on the bidders list shall submit their company information via e-mail to Hector Gonzalez at hgonzalez@ci.upland.ca.us Information shall include firm name, participation interest (prime contractor or subcontractor), specialty, contact name, phone number, and e-mail address.

INELIGIBLE CONTRACTORS: The successful bidder shall be prohibited from performing work on this project with a subcontractor who is ineligible to perform work on the project pursuant to Section 1777.7 of the Labor Code.

No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement).

YOU MUST SUBMIT with your proposal cash, cashier's check, certified check, or bidder's bond, payable to the City of Upland in an amount equal to at least ten percent (10%) of the total bid price as a guarantee that the bidder will enter into the contract if the same is awarded to him, and in the event of failure to enter into such contract said cash, cashier's check, certified check, or bond shall become the property of the City of Upland. If the City of Upland awards the contract to the next lowest bidder, the amount of the lowest bidder's security shall be applied to the difference between the low bid and second lowest bid, and the surplus, if any, shall be returned to the lowest bidder.

The Contractor shall be required to post a Performance Bond in the amount of 100% of the contract price and a Payment Bond (Labor and Material Bond) equal to 100% of the contract price. The City has determined that Contractor shall possess, at time of bid, any and all contractor's licenses, in form and class as required by any and all applicable laws with respect to any and all of the work to be performed under this contract including a **Class "A" License (General Engineering Contractor).**

The work is to be performed in accordance with the plans and specifications on file in the Engineering Division of the City of Upland Public Works Department, located at 1370 N. Benson Avenue, Upland, California. All Contractors and Subcontractors interested in bidding this project will be required to download digital copies of the contract documents and print their own copies. Digital copies of the contract documents are available for download at the following website: **http://www.ci.upland.ca.us/#RFPs_&_Bids.** It is the responsibility of each perspective bidder to check the City website on a daily basis through the close of bids for any applicable addenda or updates, and to furnish the City with current perspective bidder contact information for distribution of any and all addenda or updates. A perspective bidder must provide the City with the firm's name, mailing address, telephone and facsimile numbers, a contact person, and a valid email address. Failure to provide the City with a valid email address and facsimile number may result in late notification. Addenda and Requests for Information (RFI) responses will be issued via facsimile, email, City website, standard postal mail, or any combination thereof, and only to bidders that provide the required information to the City.

A non-mandatory Preconstruction Conference for all General Contractors intending to bid will be held at the project site on September 3, 2020, at 10:00 a.m. All requests for information (RFI) shall be in written form and shall be directed and sent no later than Tuesday, October 06, 2020 at 1:00 PM to:

Richard Brady, P.E., BCEE, Engineer of Record
or Garrett Murawsky P.E.
2655 Camino Del Rio North, Suite 100
San Diego, CA 92108
(858) 496-0500
(858) 496-0505 Fax
rbrady@rbrady.net
gmurawsky@rbrady.net

With a Copy to:

Bob Critchfield, P.E., Engineering Manager
1370 N. Benson Avenue
Upland, CA 91786
(909) 291-2946
bcritchfield@ci.upland.ca.us

It shall be understood, however, that no specification interpretations will be made by telephone, nor will any "or equal" products be considered for approval prior to award of contract.

The Contractor may, upon the Contractor's written request and the Contractor's sole cost and expense, substitute authorized securities in lieu of moneys withheld (performance retention). The procedure and requirements for substituting said securities is set forth in Public Contract Code section 22300 which is incorporated by this reference as set forth herein. The successful bidder will be required to enter into a contract satisfactory to the City of Upland. The City of Upland reserves the right to reject any bid or all bids, and to waive any informality or irregularity in any bid, and to make awards in the interest of the City.

Publish: **Friday, August 14, 2020**
Friday, August 21, 2020

PROPOSAL

FOR

PROJECT NO. 9128
BID NO. 2020−06

REPLACEMENT OF 7.5 MG RESERVOIR AND WATER IMPROVEMENTS

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CONTRACTOR'S PROPOSAL

_____
Company

_____
Address

_____

_____
Telephone Number

_____
State License Number

City of Upland
460 North Euclid Avenue
Upland, California 91786

Ladies and Gentlemen:

Pursuant to the Public Notice inviting bids or proposals, the undersigned declares that the location of the proposed work, plans, profiles, and specifications for Project No. 9128, Replacement of 7.5 MG Reservoir and Water Improvements, Bid No. 2020-06, have been carefully examined and the undersigned has read the accompanying proposal requirement, and hereby proposes to furnish all materials and do all work required to complete the said work in accordance with said plans, profiles, specifications, and special provisions for the unit or lump sum price set forth in the Schedule of Work Items (Bidding Form).

All persons or parties submitting a bid proposal on the project shall complete the accompanying Bidding Form, Bid Bond, Declaration of Eligibility to Contract, Non-Collusion Affidavit, Pre-bid Site Inspection Certification, and List of Proposed Subcontractors. The list of subcontractors shall include the Item Number (as specified in the "Schedule of Work Items") to be done by the subcontractor. Unless otherwise specified by the Contractor, the listing of an Item No. of Work shall be conclusive evidence that the listed subcontractor proposed to perform the Item of Work at its entirety. All Subcontractors are required to obtain a City of Upland Business License before a Notice to Proceed may be issued.

The undersigned further agrees that in case of default in executing the required contract with necessary bonds within ten (10) calendar days after the notice of award of contract has been mailed, the proceeds of the check or bond accompanying the bid shall become the property of the City. If the City awards the contract to the next lowest bidder, the amount of the lowest bidder's security shall be applied by the City to the difference between the low bid and the second lowest bid, and the surplus, if any, shall be returned to the lowest bidder. The undersigned further agrees to complete the work within five hundred fifty (550) calendar days from the execution of the contract.

BIDDING FORM

Replacement of 7.5 MG Reservoir and Water Improvements

Name of Bidder: _____

The undersigned, having examined the proposed Contracts and having visited the site and examined the conditions affecting the work, hereby and agrees to furnish all labor, materials, equipment, and appliances, and perform operations necessary to complete the work as required by said proposed Contract Documents, excluding work of alternates for.

BASE BID – SCHEDULE A

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	SUBTOTAL
A-1	Traffic/Pedestrian Control, Public Convenience and Safety	1	LS	$
A-2	Furnish, Install, Maintain and Remove Project Identification Signs	1	LS	$
A-3	Construction Surveying	1	LS	$
A-4	Stormwater Pollution Prevention Plan & Implementation	1	LS	$
A-5	Furnish Record Drawings	1	LS	$
A-6	Potholing and Utility Verification	1	LS	$
A-7	Trench Shoring, Sheeting and Bracing	1	LS	$
A-8	Construction of the 7.5 Million Gallon (MG) Reservoir and Water Improvements and all appurtenant work as indicated by the plans and these specifications, for the lump sum amount of	1	LS	$
A-9	Reservoir overexcavation as shown on Sheet S-4 and as specified in Section 02300	1	LS	$
A-10	Placement of structural fill as shown on Sheet S-4 and as specified in Section 02300	1	LS	$
A-11	Mobilization, limited to 2.00 percent of the total basic bid breakdown amount	1	LS	$

TOTAL BASIC BID SCHEDULE A (ITEMS 1-11)	(In Figures)	$
	(In Words) _____	

ADDITIVE BID SCHEDULE B

ITEM NO.	DESCRIPTION		QUANTITY	UNIT	SUBTOTAL
B-1	All work associated with the Plant 7 Pump Station including demolition of the existing pump station and improvements as shown on Drawings M-9, 10, 11, and 12, and associated electrical work generally shown on Drawings E-4, 5, and 6		1	LS	$
TOTAL ADDITIVE BID TOTAL SCHEDULE B	(In Figures)				$
	(In Words)				

FOR LOWEST BID DETERMINATION (NOTE 1)

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	SUBTOTAL
A	PRICE FOR BASIC BID SCHEDULE A (Items 1-11)	1	LS	$
B	PRICE FOR ADDITIVE BID SCHEDULE B	1	LS	$
BASE BID TOTAL A PLUS B	(In Figures)			$
	(In Words)			

NOTES:

1. Determination of the lowest bidder will be based upon the **"TOTAL BASIC BID SCHEDULE A"** price indicated in the Bid Schedule above PLUS "ADDITIVE BID SCHEDULE B" and written words shall prevail over written figures. Late bids will not be accepted. The City reserves the right to evaluate/award bids on the basis of the Base Bid Schedule A only, or on the basis of Base Bid Schedule A and Additive Bid Schedule B, at their sole discretion.

2. All amounts and totals given in the Bid Schedules will be subject to verification by the Contractor.

3. The price bid shall include all State, Federal, and other taxes applicable to the project, and shall be a firm offer for a period of ninety (90) days after the date of bid opening.

4. Acknowledge receipt of all Addenda. The cover sheet of each addendum issued is signed by the Contractor and attached herewith.

5. Unbalanced bids will be considered sufficient grounds for rejection of the entire bid. An unbalanced bid is defined as a bid containing lump sum bid items which do not reasonably reflect actual costs, plus reasonable share of the anticipated profits, overhead costs, and other indirect costs attributable to the performance of the work in question.

ESTABLISHED ADDITIVE BID ITEMS
BID SCHEDULE C

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	ESTABLISHED ADDITIVE PRICE
C-1	Additional reservoir overexcavation as shown on Sheet S-4 and as specified in Section 02300, when ordered by the Engineer, add 2000 cubic yards at $_____/CY	2000	CY	$
C-2	Furnish, install, and place additional reservoir structural fill as shown on Sheet S-4 and as specified in Section 02300, when ordered by the Engineer, add 2000 cubic yards at $_____/CY	2000	CY	$
TOTAL ADDITIVE BID PRICE (SCHEDULE C)	(In Figures)			$
	(In Words) _____			

The undersigned, under penalty of perjury, acknowledges that they are authorized by the bidding Contractor to submit a bid for said Contractor

Respectfully submitted:

_____	_____
Signature	Address
_____	_____
Title	Date
_____	_____
Contractor's License Number	Date of Expiration

(Seal – if Bid is by a Corporation)

_____
Attest

_____
Amount of Certified Check or Bid Bond

_____
Name of Bonding Company

Bond No. _____

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS THAT:

WHEREAS the City of Upland, California ("City"), has issued an invitation for bids for the work described as follows: Project No. 9128 – Replacement of 7.5 MG Reservoir and Water Improvements, Bid No. 2020-06

WHEREAS_____

_____
(Name and address of bidder)

("Principal"), desires to submit a bid to City for the work.

WHEREAS, bidders are required to furnish a form of bidder's security with their bid.

NOW, THEREFORE, we, the undersigned Principal, and that the said Surety's Office is located at:

Name _____
Address _____
_____
Telephone _____

and the California Licensed Resident Agent for said Surety is:
Name _____
Insurance Agent's License No. _____
Address _____
_____
Telephone _____

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City in the penal sum of_____Dollars ($_____), being not less than ten percent (10%) of the total bid price, including alternates, in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bounded Principal is awarded a Contract for the work by the City and, within the time and in the manner required by the bidding specifications, enters into the written form of Contract included with bidding specifications, furnishes the required bonds, one to guarantee faithful performance and the other to guarantee payment for labor and materials, and furnishes the required insurance coverage, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

In case suit is brought upon this bond, Surety further agrees to pay all court costs incurred by the City in the suit and reasonable attorneys' fees in an amount fixed by the court.

IN WITNESS WHEREOF, this instrument has been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Date: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____	By: _____
Lts	Lts
By: _____	By: _____
Lts	Lts
(Seal)	(Seal)

Note: This bond must be dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached. Corporate seal must be impressed hereon in case of corporation.

DECLARATION OF ELIGIBILITY TO CONTRACT

[Labor Code Section 1771.1; Public Contract Code Section 6109]

The undersigned contractor certifies and declares that:

1. The undersigned contractor is aware of Sections 1771.1 and 1777.7 of the California Labor Code, which prohibit a contractor or subcontractor who has been found by the Labor Commissioner or the Director of Industrial Relations to be in violation of certain provisions of the Labor Code, from bidding on, or being awarded, or performing work as a subcontractor on a public works project for specified periods of time.

2. The undersigned contractor is not ineligible to bid on, be awarded or perform work as a subcontractor on a public works project by virtue of the foregoing provisions of Sections 1771.1 or 1777.7 of the California Labor Code or any other provision of law.

3. The undersigned contractor is aware of California Public Contract Code Section 6109, which states:

(a) A public entity, as defined in Section 1100 [of the Public Contract Code], may not permit a contractor or subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to Section 1771.1 or 1777.7 of the Labor Code to bid on, be awarded, or perform work as a subcontractor on, a public works project. Every public works project shall contain a provision prohibiting a contractor from performing work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1771.1 or 1777.7 of the Labor Code.

(b) Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a contractor on a public works contract, and any public money that may have been paid to a debarred subcontractor by a contractor on the project shall be returned to the awarding body. The contractor shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the project."

4. The undersigned contractor has investigated the eligibility of each and every subcontractor the undersigned contractor intends to use on this public works project, and determined that none of them is ineligible to perform work as a subcontractor on a public works project by virtue of the foregoing provisions of the Public Contract Code, Sections 1771.1 or 1777.7 of the Labor Code, or any other provision of law.

The undersigned declares under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this _____ day of _____, 2020,

at _____, California.
(place of execution)

Signature _____

Name (print or type) _____

Title_____

Name of company_____

NON-COLLUSION AFFIDAVIT

To: The City of Upland:

State of California)
) SS
County of _____)

_____ , being first duly sworn, deposes and says that

he or she is _____ of _____

the party making the foregoing bid that the bid is not made in the interest of or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder of any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

_____
Signature

STATE OF CALIFORNIA)
) SS
COUNTY OF_____)

Subscribed and sworn to before me this_____ day of _____, 20 _____.

_____
Notary Public in and for the County

of_____, State of California.

My Commission expires _____ , 20 _____.

LIST OF PROPOSED SUBCONTRACTORS

NAME OF BIDDER: _____

Each bidder shall set forth below:

1. The name and location of the place of business of each subcontractor who will perform work or labor or render services to the prime Contractor in or about the construction of the work of improvements, or a subcontractor licensed by the State of California, who, under subcontract to the prime Contractor, specially fabricates and installs a portion of the work or improvements according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent (1/2%) of the prime Contractor's total bid, or, if the bid is for the construction of streets or highways, including bridges, in excess of one-half of one percent (1/2%) of the prime Contractor's total bid or ten thousand dollars ($10,000.00), whichever is greater.

2. The portion and estimated dollar amount of the work which will be done by each subcontractor. The Contractor shall list only one subcontractor for each portion as is defined by the Contractor in his/her bid.

3. It is noted that if a Contractor fails to specify a subcontractor for any portion of the work to be performed under the Contract, the Contractor shall be deemed to have agreed to perform such portion themselves, and shall not be permitted to subcontract that portion of the work except by written consent of the awarding authority. The requirement of the submission of this list, the legal consequences for failure of the Contractor to do so, and other particular details concerning the same shall be as set forth in the "Subletting and Subcontracting Fair Practices Act", California Public Contract Code (§ 4100, et seq.) to which the bidder is hereby referred.

This list and subsequent changes thereto, shall be subject to the approval of the City and additionally for cause cited in the public contract code. Submit an updated and approved LIST OF SUBCONTRACTORS form prior to execution of the City-Contractor Contract. Please type or legibly print (attach additional sheets as necessary).

Subcontractor's Name and Address	Contractor License Number	Item No. of Work or Trade(s) to be Used	Estimated $ Amount

The Contractor shall not:

A. Substitute any person as subcontractor in place of the subcontractor listed in the original bid, except that the City may consent to the substitution of another person as subcontractor:

1. When the subcontractor listed in the bid, after having had a reasonable opportunity to do so, fails or refuses to execute a written Contract, based upon the general terms, conditions, Plans and Specifications for the project involved or the terms of such Contractor's written bid, is presented to him by the Contractor, or

2. When the listed subcontractor becomes bankrupt or insolvent, or

3. When the listed subcontractor fails or refuses to perform his/her subcontract, or

4. When the listed subcontractor fails or refuses to meet the bond requirements of the Contractor, or

5. When the Contractor demonstrates to the City that the name of the subcontractor was listed as the result of an inadvertent clerical error, or

6. When the listed subcontractor is not licensed pursuant to the Contractors License Law, or

7. When the City determines that the work performed by the listed subcontractor is substantially unsatisfactory and not in substantial accordance with the Plans and Specifications, or that the subcontractor is substantially delaying or disrupting the progress of the work.

B. Permit any subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original bid, without the consent of the City.

C. Other than in the performance of "change orders" causing changes or deviations from the original Contract, sublet or subcontract any portion of the work in excess of one-half of one percent of the Contractor's total bid as to which his/her original bid did not designate a subcontractor.

D. Prior to approval of a Contractor's request for a subcontractor substitution, the City will give notice in writing to the listed subcontractor of the Contractor's request to substitute and of the reason for the request. The notice will be served by certified or registered mail to the last known address of the subcontractor. The listed subcontractor who has been so notified shall have five (5) working days within which to transmit to the City written objections to the substitution. Failure to file these written objections shall constitute the listed subcontractor's consent to the substitution.

If written objections are filed, the City will give notice in writing of at least five (5) working days to the listed subcontractor of a hearing by the City on the Contractor's request for substitution.

The Contractor, as a condition to asserting a claim of inadvertent clerical error in the listing of a subcontractor, shall within two working days after the time of the bid opening by the City, give written notice to the City and copies of such notice to both the subcontractor he/she claims to have listed in error and the intended subcontractor who had bid to the Contractor prior to the bid opening.

Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the Contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the City setting forth the facts constituting the emergency or necessity. If the Contractor violates any of the above provisions the Contractor may be in breach of this Contract and the City may exercise the option, in its own discretion, of (1) canceling this Contract, or (2) assessing the Contractor a penalty in an amount not more than ten percent of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the prime Contract is awarded.

PREBID SITE INSPECTION CERTIFICATION

The bidder hereby certifies that he/she and his/her subcontractors have inspected the site and related specifications of work and fully acquainted themselves with all conditions and matters which might in any way affect the work, time of completion or the cost thereof, including, but not limited to scheduling and disclosed outside Contracts involving this work.

The bidder also certifies he/she has observed the designated Contractor work areas and access routes, if disclosed or shown, as part of work in this Contract.

BIDDER:

_____

_____

Date: _____

Persons who inspected site of the proposed work for your firm:

Name_____ Date of Inspection_____

Title _____

Name _____ Date of Inspection_____

Title_____

LIST OF VALUE ENGINEERING DEDUCTION IDEAS

Each CONTRACTOR proposal may list on the form provided as part of this RFP any value engineering deduction ideas that the CONTRACTOR thinks may benefit the project. The corresponding bid schedule name, the bid item number, and anticipated deductions marked (-) to the bid item shall be identified for each value engineering idea listed by the CONTRACTOR.

* *

VALUE ENGINEERING IDEA AND BENEFIT TO PROJECT:

____

____

____

____

Bid Schedule Name: Bid Item No.:

____

Anticipated Deductions (-):

____

____

* *

VALUE ENGINEERING IDEA AND BENEFIT TO PROJECT:

____

____

____

____

Bid Schedule Name: Bid Item No.:

____

Anticipated Deductions (-):

____

____

* *

* *

VALUE ENGINEERING IDEA AND BENEFIT TO PROJECT:

____

____

____

____

Bid Schedule Name: Bid Item No.:

____

Anticipated Deductions (-):

____

____

* *

VALUE ENGINEERING IDEA AND BENEFIT TO PROJECT:

____

____

____

____

Bid Schedule Name: Bid Item No.:

____

Anticipated Deductions (-):

____

____

* *

(add additional pages of this form if necessary)

A G R E E M E N T

KNOW ALL MEN BY THESE PRESENTS: The following Agreement is made and entered into, in duplicate, as of the date executed by the City Clerk and the Mayor, by and between _____ _____ hereinafter referred to as the "CONTRACTOR" and the CITY OF UPLAND, hereinafter referred to as "CITY."

A. Recitals.

(i) WHEREAS, Pursuant to Notice Inviting Sealed Bids or Proposals, bids were received, publicly opened, and declared on the date specified in said notice; and,

(ii) WHEREAS, CITY did accept the bid of CONTRACTOR as the lowest responsible bidder; and,

(iii) CITY has authorized the City Clerk and Mayor to enter into a written contract with CONTRACTOR for furnishing labor, equipment, and material for the construction of **Project No. 9128: Replacement of 7.5 MG Reservoir & Water Improvements, Bid No. 2020–06,** ("the project" hereinafter).

B. Terms:

NOW, THEREFORE, in consideration of the mutual covenants herein contained, it is agreed:

1. GENERAL SCOPE OF WORK: CONTRACTOR shall furnish all necessary labor, tools, materials, appliances, and equipment for construction of **Project No. 9128: Replacement of 7.5 MG Reservoir & Water Improvements, Bid No. 2020–06** ("Project"). The project shall be performed by Contractor in accordance with Notice Inviting Bids, Proposal for the Project, Specifications, General Provisions, Special Provisions, Plans, Permits, and Bidder's Response as set forth in the Exhibit A. Contractor shall complete the tasks according to the schedule of performance which is also set forth in Exhibit A.

2. INCORPORATED DOCUMENTS TO BE CONSIDERED COMPLEMENTARY: Notice Inviting Bids, Proposal for the Project, Specifications, General Provisions, Special Provisions, Plans, Permits, and Bidder's Response are incorporated herein by reference thereto and made a part hereof with like force and effect as if all of said documents were set forth in full herein. Said documents, the Resolution Inviting Bids attached hereto, together with this written Agreement, shall constitute the contract between the parties. This contract is intended to require a complete and finished piece of work and anything necessary to complete the work properly and in accordance with the law and lawful governmental regulations shall be performed by the CONTRACTOR whether set out specifically in the contract or not. Should it be ascertained that any inconsistency exists between the aforesaid documents and this written Agreement, the provisions of this written Agreement shall control.

3. TERMS OF CONTRACT:

a. The CONTRACTOR agrees to execute the contract within ten (10) calendar days from the date of notice of award of the contract and to complete his portion of the project within **five hundred fifty (550) calendar days** from the execution of the first contract. CONTRACTOR agrees further to the assessment of

liquidated damages in the amount of **$3,000.00** dollars for each calendar day the project remains incomplete beyond the expiration of the completion date. CITY may deduct the amount thereof from any moneys due or that may become due to the CONTRACTOR under this Agreement. Progress payments made after the scheduled date of completion shall not constitute a waiver of liquidated damages.

4. INSURANCE: The CONTRACTOR shall not commence work under this contract until he has obtained all insurance required hereunder in a company or companies acceptable to CITY nor shall the CONTRACTOR allow any subcontractor to commence work on his subcontract until all insurance required of the subcontractor has been obtained. The CONTRACTOR shall take out and maintain at all times during the life of this contract the following policies of insurance:

a. Compensation Insurance: Before beginning work, the CONTRACTOR shall furnish to the Engineer a policy of insurance or proper endorsement as proof that he has taken out full compensation insurance for all persons whom he may employ directly or through subcontractors in carrying out the work specified herein, in accordance with the laws of the State of California. Such insurance shall be maintained in full force and effect during the period covered by this contract.

In accordance with the provisions of § 3700 of the California Labor Code, every contractor shall secure the payment of compensation to his employees. CONTRACTOR, prior to commencing work, shall sign and file with CITY a certification as follows:

"I am aware of the provisions of § 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract."

b. For all operations of the CONTRACTOR or any subcontractor in performing the work provided for herein, insurance with the following minimum limits and coverage:

(1) Public Liability - Bodily Injury (not auto) $1,000,000 each person; $2,000,000 each accident.

(2) Public Liability - Property Damage (not auto) $500,000 each accident; $1,000,000 aggregate.

(3) Contractor's Protective - Bodily Injury $1,000,000 each person; $2,000,000 each accident.

(4) Contractor's Protective - Property Damage $500,000 each accident; $1,000,000 aggregate.

(5) Automobile - Bodily Injury $1,000,000 each person; $1,000,000 each accident.

(6) Automobile - Property Damage $500,000 each accident.

c. The policy of insurance provided for in subparagraph a. shall contain an endorsement which:

(1) Waives all right of subrogation against all persons and entities specified in subparagraph 4.d.(2) hereof to be listed as additional insured in the policy of insurance provided for in paragraph b. by reason of any claim arising out of or connected with the operations of CONTRACTOR or any subcontractor in performing the work provided for herein;

(2) Provides it shall not be canceled or altered without thirty (30) days' written notice thereof given to CITY by registered mail.

d. Each such policy of insurance provided for in paragraph b. shall:

(1) Be issued by an insurance company approved in writing by CITY, which is admitted and licensed to do business in the State of California and which is rated "A" or better according to the most recent A.M. Best Company Rating Guide;

(2) Name as additional insured the CITY, its officers, agents and employees, and any other parties specified in the bid documents to be so included;

(3) Specify it acts as primary insurance and that no insurance held or owned by the designated additional insured shall be called upon to cover a loss under said policy;

(4) Contain a clause substantially in the following words:

"It is hereby understood and agreed that this policy may not be canceled nor the amount of the coverage thereof reduced until thirty (30) days after receipt by CITY of a written notice of such cancellation or reduction of coverage as evidenced by receipt of a registered letter."

(5) Otherwise be in form satisfactory to CITY.

e. The CONTRACTOR shall at the time of the execution of the contract present the original policies of insurance required in paragraphs a. and b., hereof, or present an endorsement of the insurance company, showing the issuance of such insurance, and the additional insured and other provisions required herein.

5. PREVAILING WAGE: Notice is hereby given that in accordance with the provisions of California Labor Code, Division 2, Part 7, Chapter 1, Articles 1 and 2, the CONTRACTOR is required to pay not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the public work is performed, and not less than the general prevailing rate of per diem wages for holiday

and overtime work. In that regard, the Director of the Department of Industrial Relations of the State of California is required and has determined such general prevailing rates of per diem wages. Copies may be obtained from the California Department of Industrial Relations' Internet web site at http://www.dir.ca.gov. CONTRACTOR shall provide a copy of prevailing wage rates to any staff or sub-contractor hired, and shall pay the adopted prevailing wage rates as a minimum. CONTRACTOR also shall cause a copy of such determinations to be posted at the job site.

CONTRACTOR shall forfeit, as penalty to CITY, not more than the amount prescribed by California Labor Code Section 1775 for each laborer, workman, or mechanic employed for each calendar day or portion thereof, if such laborer, workman, or mechanic is paid less than the general prevailing rate of wages hereinbefore stipulated for any work done under the attached contract, by him or by any subcontractor under him, in violation of the provisions of said Labor Code and Davis-Bacon Act.

6. APPRENTICESHIP EMPLOYMENT: In accordance with the provisions of § 1777.5 of the Labor Code, as amended, and in accordance with the regulations of the California Apprenticeship Council, properly indentured apprentices may be employed in the prosecution of the work.

Attention is directed to the provisions in §§ 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the CONTRACTOR or any subcontractor under him.

§ 1777.5, as amended, requires the CONTRACTOR or subcontractor employing tradesmen in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the public works project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate will also fix the ratio of apprentices to journeymen that will be used in the performance of the contract. The ratio of apprentices to journeymen in such cases shall not be less than one to five except:

a. When unemployment in the area of coverage by the joint apprenticeship committee has exceeded an average of 15 percent in the 90 days prior to the request for certificate, or

b. When the number of apprentices in training in the area exceeds a ratio of one to five, or

c. When the trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis statewide or locally, or

d. When the CONTRACTOR provides evidence that he employs registered apprentices on all of his contracts on an annual average of not less than one apprentice to eight journeymen.

The CONTRACTOR is required to make contributions to funds established for the administration of apprenticeship programs if he employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions.

The CONTRACTOR and subcontractors under him shall comply with the requirements of § 1777.5 and § 1777.6 in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, *ex-officio* the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

7. LEGAL HOURS OF WORK: Eight (8) hours of labor shall constitute a legal day's work for all workmen employed in the execution of this contract, and the CONTRACTOR and any subcontractor under him shall comply with and be governed by the laws of the State of California having to do with working hours set forth in Division 2, Part 7, Chapter 1, Article 3 of the Labor Code of the State of California as amended.

The CONTRACTOR shall forfeit, as a penalty to CITY, twenty-five dollars ($25.00) for each laborer, workman, or mechanic employed in the execution of the contract, by him or any subcontractor under him, upon any of the work hereinbefore mentioned, for each calendar day during which said laborer, workman, or mechanic is required or permitted to labor more than eight (8) hours in violation of said Labor Code.

8. TRAVEL AND SUBSISTENCE PAY: CONTRACTOR agrees to pay travel and subsistence pay to each workman needed to execute the work required by this contract as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Labor Code § 1773.8.

9. CONTRACTOR'S LIABILITY: The City of Upland and its respective officers, agents and employees shall not be answerable or accountable in any manner for any loss or damage that may happen to the project or any part thereof, or for any of the materials or other things used or employed in performing the project; or for injury or damage to any person or persons, either workmen, employees of the CONTRACTOR or his subcontractors or the public, whatsoever arising out of or in connection with the performance of the Project. The CONTRACTOR shall be responsible for any damage or injury to any person or property resulting from defects or obstructions or from any cause whatsoever, except the sole negligence or willful misconduct of CITY, or its employees, servants, or independent contractors who are directly responsible to CITY during the progress of the Project or at any time before its completion and final acceptance.

The CONTRACTOR will indemnify CITY against and will hold and save CITY, its officers, officials, employees and volunteers harmless from any and all actions, claims, demands, losses, damages to persons or property, penalties, obligations, or liabilities including attorneys' fees and expert witness expenses that may be asserted or claimed by any person, firm, entity, corporation, political subdivision, or other organization arising out of or in connection with the work, operation, or activities of the CONTRACTOR, his agents, employees, subcontractors, or invitees provided for herein, whether or not there is concurrent passive or active negligence on the part of CITY, but excluding such actions, claims, damages to persons or property, penalties, obligations, or liabilities arising from the sole negligence or willful misconduct of CITY, its employees, servants, or independent contractors who are directly responsible to CITY, and in connection therewith:

a. The CONTRACTOR will defend any action or actions filed in connection with any of said claims, damages, penalties, obligations, or liabilities and will pay all costs and expenses, including attorneys' fees incurred in connection therewith.

b. The CONTRACTOR will promptly pay any judgment or award rendered against the CONTRACTOR or CITY covering such claims, damages, penalties, obligations, and liabilities arising out of or in connection with such work, operations, or activities of the CONTRACTOR hereunder or reasonable settlement in lieu of judgment or award, and the CONTRACTOR agrees to save and hold the CITY harmless therefrom.

c. In the event CITY is made a party to any action or proceeding filed or prosecuted against the CONTRACTOR for damages or other claims arising out of or in connection with the project, operation, or activities of the CONTRACTOR hereunder, the CONTRACTOR agrees to pay to CITY any and all costs and expenses incurred by CITY in such action or proceeding together with reasonable attorneys' fees.

Any money due to the CONTRACTOR under and by virtue of this Agreement as shall be considered necessary by CITY may be retained by CITY until disposition has been made of such actions or claims for damage as aforesaid.

10. DEFAULT BY CONTRACTOR: In addition to any other remedy provided by law, the City may require CONTRACTOR to obtain a bond in the amount determined by the City for completion of the Project.

11. INDEPENDENT CONTRACTOR:

a. CONTRACTOR is and shall at all times remain as to the City a wholly independent contractor. The personnel performing the services under this Agreement on behalf of CONTRACTOR shall at all times be under CONTRACTOR's exclusive direction and control. Neither City nor any of its officers, employees, agents, or volunteers shall have control over the conduct of CONTRACTOR or any of CONTRACTOR's officers, employees, or agents except as set forth in this Agreement. CONTRACTOR shall not at any time or in any manner represent that it or any of its officers, employees or agents are in any manner officers, employees or agents of the City. CONTRACTOR shall not incur or have the power to incur any debt, obligation or liability whatever against City, or bind City in any manner.

b. No employee benefits shall be available to CONTRACTOR in connection with the performance of this Agreement. Except for the fees paid to CONTRACTOR as provided in the Agreement, City shall not pay salaries, wages, or other compensation to CONTRACTOR for performing services hereunder for City. City shall not be liable for compensation or indemnification to

CONTRACTOR for injury or sickness arising out of performing services hereunder.

c. PERS Eligibility Indemnification: In the event that CONTRACTOR or any employee, agent, or subcontractor of CONTRACTOR providing services under this Agreement claims or is determined by a court of competent jurisdiction or the California Public Employees Retirement System (PERS) to be eligible for enrollment in PERS as an employee of the City, CONTRACTOR shall indemnify, defend, and hold harmless City for the payment of any employee and/or employer contributions for PERS benefits on behalf of CONTRACTOR or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of City.

Notwithstanding any other agency, state or federal policy, rule, regulation, law or ordinance to the contrary, CONTRACTOR and any of its employees, agents, and subcontractors providing service under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any claims to, any compensation, benefit, or any incident of employment by City, including but not limited to eligibility to enroll in PERS as an employee of City and entitlement to any contribution to be paid by City for employer contribution and/or employee contributions for PERS benefits.

12. NONDISCRIMINATION: No discrimination shall be made in the employment of persons upon public works because of the race, color, sex, sexual preference, sexual orientation, or religion of such persons, and every contractor for public works violating this section is subject to all the penalties imposed for a violation of Division 2, Part 7, Chapter 1 of the Labor Code in accordance with the provisions of § 1735 of said Code.

13. INELIGIBLE SUBCONTRACTORS: The CONTRACTOR shall be prohibited from performing work on this project with a subcontractor who is ineligible to perform on the project pursuant to § 1771.1 and § 1777.7 of the Labor Code.

14. CONTRACT PRICE AND PAYMENT: CITY shall pay to the CONTRACTOR for furnishing the material and doing the prescribed work the lump sum prices set forth in accordance with Contractor's Proposal.

15. WAIVER: The delay or failure of either party at any time to require performance or compliance by the other of any of its obligations or agreements shall in no way be deemed a waiver of those rights to require such performance or compliance. No waiver of any provision of this Agreement shall be effective unless in writing and signed by a duly authorized representative of the party against whom enforcement of a waiver is sought. The waiver of any right or remedy in respect to any occurrence or event shall not be deemed a waiver of any right or remedy in respect to any other occurrence or event, nor shall any waiver constitute a continuing waiver.

16. CONSTRUCTION: The parties have participated jointly in the negotiation and drafting of this Agreement. In the event an ambiguity or question of intent or interpretation arises with respect to this Agreement, this Agreement shall be construed

as if drafted jointly by the parties and in accordance with its fair meaning. There shall be no presumption or burden of proof favoring or disfavoring any party by virtue of the authorship of any of the provisions of this Agreement.

17. COSTS: Each party shall bear its own costs and fees incurred in the preparation and negotiation of this Agreement and in the performance of its obligations hereunder except as expressly provided herein.

18. ATTORNEYS' FEES: In the event that any action or proceeding is brought by either party to enforce any term or provision of this Agreement, the prevailing party shall recover its reasonable attorneys' fees and costs incurred with respect thereto.

19. RELEASE OF INFORMATION:

a. All information gained by CONTRACTOR in performance of this Agreement shall be considered confidential and shall not be released by CONTRACTOR without City's prior written authorization. CONTRACTOR, its officers, employees, agents or subcontractors, shall not without written authorization from the City Manager or unless requested by the City Attorney, voluntarily provide declarations, letters of support, testimony at depositions, response to interrogatories or other information concerning the work performed under this Agreement or relating to any project or property located within the City. Response to a subpoena or court order shall not be considered "voluntary" provided CONTRACTOR gives City notice of such court order or subpoena.

b. CONTRACTOR shall promptly notify City should CONTRACTOR, its officers, employees, agents or subcontractors be served with any summons, complaint, subpoena, notice of deposition, request for documents, interrogatories, request for admissions or other discovery request, court order or subpoena from any party regarding this Agreement and the work performed there under or with respect to any project or property located within the City. City retains the right, but has no obligation, to represent CONTRACTOR and/or be present at any deposition, hearing or similar proceeding. CONTRACTOR agrees to cooperate fully with City and to provide City with the opportunity to review any response to discovery requests provided by CONTRACTOR. However, City's right to review any such response does not imply or mean the right by City to control, direct, or rewrite said response.

20. NOTICES. Any notices which either party may desire to give to the other party under this Agreement must be in writing and may be given either by (I) personal service, (ii) delivery by a reputable document delivery service, such as but not limited to, Federal Express, that provides a receipt showing date and time of delivery, or (iii) mailing in the United States Mail, certified mail, postage prepaid, return receipt requested, addressed to the address of the party as set forth below or at any other address as that party may later designate by Notice. Notice shall be effective upon delivery to the addresses specified below or on the third business day following deposit with the document delivery service or United States Mail as provided above.

To City: City of Upland
Mailing Address:
460 North Euclid
Avenue Upland,
California 91785
Attention: City Manager

To CONTRACTOR: ***Place Company Name***
Address

Contact Person Info Here

Additionally, CONTRACTOR shall provide an emergency phone number to the City where its point of contact may be reached at any time by City in the event of an emergency.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be duly executed with all the formalities required by law on the respective dates set forth opposite their signatures.

State of California
Contractor's License No. _____

_____

_____

_____

_____
Date

By:_____
Title

_____
Title

Contractor's
Business Phone _____

Emergency Phone at which
Contractor can be reached
at any time _____

CITY OF UPLAND,
A Municipal Corporation

_____
Date

By: _____
Mayor

By: _____
City Clerk

Approved as to form:

_____
City Attorney

GENERAL PROVISIONS

FOR

PROJECT NO. 9128
BID No. 2020−06

REPLACEMENT OF 7.5 MG RESERVOIR & WATER IMPROVEMENTS

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CITY OF UPLAND
GENERAL PROVISIONS

The Standard Specifications for the City of Upland shall be the latest edition of the STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (SSPWC), 2018 EDITION (sometimes hereinafter referred to as the *Greenbook*), written and promulgated by the Southern California Chapter, American Public Works Association, and Southern California Districts Associated General Contractors of California Joint Cooperative Committee, including all published amendments thereto except for the following amendments, deletions and modifications.

Any conflict arising between these modifications and the Standard Specifications for Public Works Construction shall be resolved by the Engineer, whose decision shall be final.

Modifications to the Standard Specifications for Public Works Construction.

The following amendments, additions and deletions shall be incorporated into the Green Book:

SECTION 1 - TERMS, DEFINITIONS, ABBREVIATIONS AND SYMBOLS

1-2 Definitions.

Agency or City - The City of Upland.

Board - The City Council of the City of Upland or the Board of Directors of Successor Agency to the Upland Community Redevelopment Agency.

Clerk or City Clerk - The City Clerk of the City of Upland.

City Engineer - The City Engineer of the City of Upland or his or her designee.

Engineer/Design Consultant – Richard Brady & Associates, Inc.

Laboratory - The official testing laboratory of the Agency or other laboratories designated, in writing, by the Engineer.

Contract Documents - Specifications, Plans, Notice Inviting Bids, Project Proposal, General Provisions, Special Provisions, Technical Provisions, Appendices and the Contract/Agreement.

1-3.3 Institutions

A.P.W.A. - The latest American Public Works Association

A.S.C.E. - The latest American Society of Civil Engineers

A.S.M.E. - The latest American Society of Mechanical Engineers

1-6 Proposal Requirements and Conditions

A new Section 1-6 hereby is added to Section 1 of the Greenbook, as follows:

1-6.1 Availability of Plans and Specifications: Plans and specifications may be examined at the Office of the Purchasing Coordinator. Copies of the plans and specifications are available at the Office of the Purchasing Coordinator. Copies of the Notice to Bidders and proposal forms may be obtained from the Purchasing Coordinator.

1-6.2 Approximate Estimate: The quantities given in the Notice to Bidders, proposal and contract forms are approximate only, being given as a basis for the comparison of bids, and the Agency does not, expressly or by implication, agree that the actual amount of work will correspond therewith. For work bid on a lump sum price basis, any estimate of quantities is provided for the convenience of Bidders and for comparison of bids and is not guaranteed to be correct by the Agency to be the entire amount.

1-6.3 Examination of Plans, Specifications and Site of the Work. Prior to the submittal of a bid response, the Bidder shall examine the Site of the Work along with reviewing the Specifications, Plans, Notice Inviting Bids, Project Proposal, General Provisions, Special Provisions, and the Contract/Agreement.

1-6.4 Proposal Form: All proposals must be submitted on forms for that purpose furnished by the Agency. Letters of transmittal will be considered a non-responsive bid. All proposals shall give the prices proposed, both in writing and figures, and shall be signed by the Bidder, who must give his address. The Bidder shall fill out all blanks in the proposal form as therein required. In case of error, unit prices will govern over extensions, and written words will govern over numerals, unless it can be established that an obviously incorrect entry has been made.

No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

1-6.5 Rejection of Proposals Containing Alterations or Irregularities: Proposals may be rejected if they show any alterations of form, additions not called for, conditional bids, incomplete bids, or irregularities of any kind. When proposals are signed by an agent, other than an officer or manager of a corporation or a member of a partnership, a power of attorney or written authorization must be on file with the Agency prior to opening bids or shall be submitted with the proposal; otherwise, the proposal will be rejected as irregular and unauthorized.

1-6.6 Proposal Guaranty: All bids shall be presented in a sealed envelope and shall be accompanied by "Proposal Guaranty" made payable to the Agency and for an amount equal to at least ten percent (10%) of the bid unless otherwise specified on the "Notice Inviting Sealed Bids or Proposals." Said guaranty shall be cash, an unconditional certified or cashier's check, a bank or postal money order, or bid bond executed as surety by a corporation authorized to issue surety bonds in the State of California.

1-6.7 Withdrawal of Proposals: Any bid may be withdrawn at any time prior to, but not after, the hour fixed in the public notice for the opening of bids, provided that a request in writing executed by the Bidder or his duly authorized representative, for the withdrawal of such bid is filed with the Clerk. The withdrawal of a bid shall not prejudice the right of a Bidder to file a new bid.

1-6.8 Disqualification of Bidders: More than one proposal from an individual, a firm or partnership, a Corporation or an association under the same or different names will not be considered. Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such Bidder is interested. If there is reason for believing that collusion exists among the bidders, none of the participants in such collusion will be considered in this or future proposals. Proposals in which the prices are unbalanced may be rejected.

1-6.9 Competency of Bidders: Prior to the submission of bids, the Contractor shall be licensed in accordance with the provisions of Chapter 9 of Division III of the Business and Professional Code of the State of California and evidence of such license shall be presented to the Engineer on request. The Engineer may require the Bidder to present satisfactory evidence that he has sufficient experience and that he is fully prepared with the necessary capital, materials, machinery and skilled workmen to carry out the contract.

1-6.10 Material Guaranty: Before any contract is awarded, Bidders may be required to furnish a complete statement of the origin, composition and manufacture of any or all materials to be used in the construction of the work, together with samples, which samples may be subjected to the tests provided for in these specifications to determine their quality and fitness for the work.

1-6.11 Progress Schedule: The successful bidder shall submit a progress schedule showing thereon the time he proposes to occupy in prosecuting the various major divisions of the work and his proposed sequence of operations.

SECTION 2 - SCOPE AND CONTROL OF THE WORK

Section 2-1 of the *Greenbook* hereby is amended to read as follows:

2-1 Award and Execution of Contract

2-1.1 Consideration of Bids: Bids will be opened publicly by the Purchasing Coordinator or a designated representative on the date and at the time set forth in the "Notice Inviting Sealed Bids or Proposals." The right is reserved by the Agency by action of the Board to reject any or all bids, to advertise for new proposals, to negotiate in the open market for a contract at a reasonable price, to purchase in the open market, or to have the work performed by Agency employees, or to abandon the work if, in the judgment of the Board, the best interest of the Agency will be promoted thereby.

2-1.2 Award of Contract: The award of the contract, if it be awarded, will be to the lowest responsible Bidder whose proposal complies with all the requirements prescribed. The award, if made, will be made within forty-five (45) calendar days after the opening of the proposals.

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

All bids will be compared on the basis of the Agency's estimate of the quantities of work to be done.

2-1.3 Return of Proposal Guarantees: All proposal guarantees will be held by the Agency until the contract has been signed, after which they will be returned to the respective bidders whose proposals they accompany. If bids are rejected, the proposal guarantees will be returned after the date of the rejection.

2-1.4 Execution of Contract: The contract shall be signed by the successful Bidder and returned together with the contract bonds, within ten (10) calendar days after the Notice of Award of Contract has been mailed, unless otherwise specified by the Agency.

2-4 Contractor Bonds

Section 2-4 of the Greenbook dealing with the "Payment Bond" (Labor and Material Bond) is hereby amended as follows. Payment bond shall be:

1. One hundred percent of the total amount payable by the terms of the contract when the total amount payable does not equal or exceed five million dollars ($5,000,000).

2. Fifty percent of the total amount payable by the terms of the contract when the total amount payable is not less than five million dollars ($5,000,000) and does not exceed ten million dollars ($10,000,000).

3. Twenty-five percent of the total amount payable by the terms of the contract if the contract exceeds ten million dollars ($10,000,000).

In all other respects, Subsection 2-4 shall remain unchanged.

2-9 Surveying

2-9.1 Permanent Survey Markers: Section 2-9.1 of the *Greenbook* shall be replaced with the following:

The Contractor shall notify the Engineer, or the owner on a Private Contract, at least 7 days before starting work to allow for the preservation of survey monuments, lot stakes (tagged), and bench marks. The Contractor's Registered Land Surveyor, or Registered Civil Engineer authorized to practice land surveying, shall file a Corner Record Form referencing survey monuments subject to disturbance in the Office of the County Surveyor prior to the start of construction, and also prior to the completion of construction for the replacement of survey monuments. The Contractor shall not disturb survey monuments, lot stakes (tagged), or bench marks without the consent of the Engineer, or the owner on Private Contracts. The Contractor shall bear the expense of replacing any that may be disturbed without permission. Replacement shall be done only under the direction of the Engineer by Registered (licensed) Licensed Land Surveyor or a Registered Civil Engineer authorized to practice land surveying within the State of California. The Contractor's surveyor shall file all Corner records with the County of San Bernardino, with all costs paid by the Contractor.

When a change is made in the finished elevation of the pavement of any roadway in which a permanent survey monument is located, the Contractor shall adjust the monument cover to the new grade within seven (7) days of finished paving unless otherwise required by the Agency.

2-9.2 Survey Service: Section 2-9.2 of the Greenbook shall be amended to include the following paragraph:

The Contractor is responsible to hire a Registered Civil Engineer or a Licensed Land Surveyor authorized to practice land surveying within the State of California to provide construction surveying and staking at the expense of the Contractor.

2-11 Inspection

Section 2-11 of the Greenbook shall be amended to include the following:

The Contractor shall give the Engineer notice of the time when he or his subcontractors will start the various units of operations of the work. Notice shall be given at least forty-eight (48) hours in advance of starting or resumption time exclusive of Saturdays, Sundays or holidays, for the purpose of permitting the Engineer to make the necessary assignment of his representative or inspector on the work. Any work performed by the Contractor or his subcontractors in conflict with said notice shall be removed if so ordered by the Engineer or his representative or inspector on the work.

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill the contract as prescribed. Defective work shall be made good, and unsuitable materials may be rejected, notwithstanding the fact that such defective work or unsuitable materials may have been previously overlooked by the Engineer and accepted or estimated for payment.

Any project undertaken by the Agency in cooperation with, or under the control or supervision of, another public or quasi-public entity shall be subject, at all times, to inspection by the participating entity.

SECTION 3. CHANGES IN WORK

Section 3-3.2.3 of the Greenbook shall be replaced in its entirety with the following:

3-3.2.3 Markup

(a) Work by Contractor. The following percentages shall be added to the Contractor's costs and shall constitute the entire markup for all overhead and profits:

1. Labor 15%
2. Materials..... 10%
3. Equipment Rental..... 8%
4. Other Items and Expenditures..... 5%

To the sum of the costs and markups provided for in this subsection, 1% shall be added as compensation for bonding.

(b) Work by Subcontractor. When all or part of the extra work is performed by a Subcontractor, the markup established in 3-3.2.3(a) shall be applied to the Subcontractor's actual cost of such work. A markup of 10 percent on the first $5,000 of the subcontracted portion of the extra work and a markup of 5 percent on the work added in excess of $5,000 of the subcontracted portion of the extra work may be added by the Contractor.

SECTION 4. CONTROL OF MATERIALS - [No Changes]

SECTION 5. UTILITIES - [No Changes]

SECTION 6. PROSECUTION, PROGRESS AND ACCEPTANCE OF WORK

6-7.2 Working Hours

A new Section 6-7.2.1 is added to the Greenbook:

6-7.2.1 Working Hours: Working hours shall be limited to 7:00 a.m. and 3:30 p.m. unless otherwise authorized, in writing, by the Construction Manager.

SECTION 7. RESPONSIBILITIES OF THE CONTRACTOR

Section 7.0 of the Greenboo*k* is hereby added to read as follows:

7.0 All references in Section 7 to the Division of Industrial Safety shall mean the State Division of Occupational Safety and Health, or its successor agency or agencies.

Section 7-2.1 of the Greenbook is hereby amended to include the following paragraphs as follows:

7-2.1 General: The Contractor shall keep himself fully informed of all State and National laws and all municipal ordinances and regulations of the Agency which in any manner affect those engaged or employed in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

The Contractor shall at all times observe and comply with, and shall cause all his agents and employees to observe and comply with all such laws, ordinances, regulations, orders and decrees; and shall protect and indemnify the Agency, the Board and the Engineer, and all of its and their officers and agents and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees. If any such discrepancy or inconsistency is discovered in the plans, drawings, specifications or contract for the work in relation to any such law, ordinance, regulation, murder or decree, the Contractor shall forthwith report the same in writing to the Engineer.

Section 7-2.1.2 of the Greenbook is amended to read as follows:

7-2.1.2 Apprentices: In accordance with the provisions of § 1777.5 of the Labor Code as amended by Chapter 971, Statutes of 1939, and in accordance with the regulations of the

California apprenticeship Council, properly indentured apprentices may be employed in the prosecution of the work.

Attention is directed to the provisions in §§ 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him.

Section 1777.5, as amended, requires the Contractor or subcontractor employing tradesmen in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the public works project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate will also fix the ratio of apprentices to journeymen that will be used in the performance of the contract. The ratio of apprentices to journeymen in such cases shall not be less than one to five except:

a. When unemployment in the area of coverage by the joint apprenticeship committee has exceeded an average of fifteen percent (15%) in the ninety (90) days prior to the request for certificate, or

b. When the number of apprentices in training in the area exceeds a ratio of one to five, or

c. When the trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis statewide or locally, or

d. When the Contractor provides evidence that he employs registered apprentices on all of his contracts on an annual average of not less than one apprentice to eight journeymen.

The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if he employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions.

The Contractor and subcontractor under him shall comply with the requirements of §§ 1777.5 and 1777.6 in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the director of Industrial Relations, *ex-officio* the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

Section 7-2.2 of the Greenbook is amended to read as follows:

7-2.2 **Prevailing Wage**: Notice is hereby given that in accordance with the provisions of California Labor Code, Part 7, Chapter 1, Articles 1 and 2, the Contractor is required to pay not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the public work is performed, and not less than the general prevailing rate of per diem wages for holidays and overtime work. In that regard, the Director of the Department of Industrial Relations of the State of California is required to and has determined such general prevailing rates of per diem wages. Copies may be obtained from the California Department of Industrial Relations' Internet web site at http://www.dir.ca.gov. Contractor shall provide a copy of prevailing wage rates to any

staff or sub-contractor hired, and shall pay the adopted prevailing wage rates as a minimum. The Contractor also shall cause a copy of such determinations to be posted at the job site.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement).

The Contractor shall forfeit, as penalty to the Agency, not more than the amount prescribed by Labor Code Section 1775 for each laborer, worker or mechanic employed for each calendar day or portion thereof such laborer, worker or mechanic is paid less than the general prevailing rate of wages hereinbefore stipulated for any work done under the attached contract, by him or by any subcontractor under him, in violation of the provisions of said Labor Code.

Section 7-2.2.1 through 7-2.2.5 of the Greenbook is added to read as follows:

7-2.2.1 Taxes: Bidder shall include all applicable taxes in the amount bid, including, but not limited to, State Sales Tax, Federal Excise Tax, and any other applicable taxes collected by the City and/or County.

The Agency is exempt from the Federal Excise Tax and exception certificates will be furnished. In certain instances, the bidder and subcontractor may be liable for Federal Excise Tax. Bidder must determine whether Federal Excise Tax is chargeable to him and, if so, the amount of the tax should be included in the amount bid.

Any new or additional taxes levied after the adoption of these specifications that are payable by the Agency are not to be included in the price bid, but added thereto when invoiced.

7-2.2.2 Responsibility for Damage: The Agency, the Board and the Engineer shall not be answerable or accountable in any manner for any loss or damage that may happen to the work or any part thereof; or for any materials or equipment used in performing the work; or for injury or damage to person or persons, either workmen or the public; or for damage to adjoining property from any cause whatsoever during the progress of the work or at any time before final acceptance.

The Contractor shall be held responsible for any and all loss, accidents, injury or damage to persons or property which may be the result of this contract and for which the Agency might be held liable. He shall protect and indemnify the Agency and save it harmless in every way from all claims, suits, or acts of law for damage or injury to persons or property that may arise or be occasioned in any way because of this contract. The Board may retain so much of the money due the Contractor as shall be considered necessary, until disposition has been made of such suits or claims for damages as aforesaid.

7-2.2.3 Contractor's Responsibility for Work: Until the formal acceptance of the work by the Engineer, the Contractor shall have the charge and care thereof except as provided in § 7-2.2.2 and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the nonexecution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any cause before final

acceptance and shall bear the expense thereof, except such injuries or damages as occasioned by acts of war.

7.2.2.4 Correction for Errors, Recovery for Errors, Dishonesty or Collusion: The Agency reserves the right to correct any error that may have been made in any estimate that has been paid. The Agency also reserves the right to claim and recover by process of law, any sums sufficient to correct any error or make good any deficiency in the work resulting from such error or from dishonesty or collusion between any of the parties or individuals having dealings pursuant to the construction of the work, regardless of when such error, dishonesty or collusion shall be discovered.

7.2.2.5 Rights in Materials and Salvage: Ownership of material incorporated in the work is vested in the name of the Agency. Any material delivered and paid for in part by the Agency or any material furnished by the Agency to be incorporated in the work, is or becomes the property of the Agency. Any salvageable materials or installations existing at the site of the work (such as manhole rings and covers, catch basin gratings, angle iron, pipe railings, valve boxes and lamp pole boxes, and other steel, cast iron or metallic materials) that are the property of the Agency if they are to be removed shall be delivered F.O.B. the storage yard designated by the Agency. The salvageable materials shall be cleaned of clinging concrete and debris and delivered to the storage yard in the same condition as it existed prior to removal, unless the Contractor is instructed otherwise by the Engineer.

Section 7-2.4 of the Greenbook is amended to read as follows:

7-2.4 Hours of Labor: Eight (8) hours of labor shall constitute a legal day's work for all workers employed in the execution of this contract and this Contractor and any subcontractor under him shall comply with and be governed by the laws of the State of California having to do with working hours as set forth in Division 2, Part 7, Chapter 1, Article 3 of the Labor Code of the State of California as amended.

The Contractor shall forfeit, as a penalty to the Agency, the maximum amount authorized under California Labor Code Section 1813 for each laborer, worker or mechanic employed in the execution of the contract, by him or any subcontractor under him, upon any of the work hereinbefore mentioned, for each calendar day during which said laborer, worker or mechanic is required or permitted to labor more than eight (8) hours in violation of said Labor Code.

Contractor agrees to pay travel and subsistence pay to each worker needed to execute the work required by this contract as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Labor Code § 1773

7-3 Section 7-3 of the Greenbook hereby is deleted, in its entirety. The provisions set forth in the Agreement executed between the Agency and the Contractor shall govern the Insurance requirements required by the Agency.

Section 7-10.1.1.3 of the Greenbook is added to read as follows:

7-10.1.1.3 Street Closures, Detours, Barricades:
Flagmen and guards, while on duty and assigned to give warning to the public that the highway is under construction and of any dangerous conditions to be encountered as a result thereof, shall perform their duties and shall be provided with the necessary

equipment by the Contractor in accordance with the current "Instructions to Flagmen," contained in the State of California, Department of Transportation, Traffic Manual. The equipment shall be furnished and kept clean and in good repair by the Contractor at his own expense. Signs, lights, flags and other warning and safety devices shall conform to the requirements as set forth in the current "Manual of Traffic Controls for Construction and Maintenance Work Zones," or "Work Area Traffic Control Handbook."

Should the Contractor appear to be neglectful or negligent in furnishing warning and protective measures, the Engineer may direct attention to the existence of a hazard; and the necessary warning and protective measures shall be furnished and installed immediately by the Contractor, at his expense. Should the Engineer point out the inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety or abrogate his obligation to furnish and pay for these devices.

If attention is directed to the existence of a hazard, and the Contractor fails to provide such devices, said devices will be placed, or cause to be placed, by the Agency. The cost of placement of these devices shall be the sole responsibility of the Contractor and shall be paid for at the rate of $135.00 per hour for regular time, $202.50 per hour for overtime for labor and pickup truck, $15.00 per day per barricade and any other costs incurred by the Agency relative to traffic control. Said costs shall be deducted from the total contract price for the work.

SECTION 8- FACILITIES FOR AGENCY PERSONNEL [No Changes]

SECTION 9 MEASUREMENT AND PAYMENT

A new Section 9-3.5 hereby is added to the *Green Book* as follows:

9-3.5 Resolution of Construction Claims: Pursuant to the requirements of California Public Contract Code § 20104(c), set forth below is the procedure for resolution of construction claims by the contractor. This provision shall only apply to those claims specified in § 20104 of the California Public Contract Code:

§ 20104. Application of article; inclusion of article in plans and specifications.

(a)(1) This article applies to all public works claims of three hundred seventy-five thousand dollars ($375,000.00) or less which arise between a contractor and a local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with § 10240) of Chapter 1 or Part 2.

(b)(1) "Public work" means a public work contract as defined in §§ 1101, 3100 and 3106 of the Public Contract Code, but does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the Contractor for (A) a time extension, (B) payment of money of damages arising from work done by or on behalf of the contractor

pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (c) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

§ 20104.2 Claims; Requirements; Tort Claims Excluded

For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b)(1) For claims of less than fifty thousand dollars ($50,000.00), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c)(1) For claims of over fifty thousand dollars ($50,000.00) and less than or equal to three hundred seventy-five thousand dollars ($375,000.00), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information or requested documents, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a

demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim pursuant to Chapter 1 (commencing with § 900) and Chapter 2 (commencing with § 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with § 900) and Chapter 2 (commencing with § 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

§ 20104.4 Civil action procedures; mediation and arbitration; trial de novo; witnesses

The following procedures are established for all civil actions filed to resolve claims subject to this article:

(a) Within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the fifteen (15) day period, any party may petition the court to appoint the mediator.

(b)(1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with § 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding § 11411.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with § 2016) of Chapter 3 of Title 3 of Part 4 of the code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expense shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with § 1411.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party arising out of the trial de novo.

(c) The court may, upon request by any party, order any witness to participate in the mediation or arbitration process.

§ 20104.6 Payment on undisputed portion of claim; interest on arbitration awards or judgments

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under § 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

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SPECIAL PROVISIONS

FOR

PROJECT NO. 9128
BID No. 2020−06

REPLACEMENT OF 7.5 MG RESERVOIR & WATER IMPROVEMENTS

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CITY OF UPLAND
SPECIAL PROVISIONS

SECTION I - GENERAL REQUIREMENTS

1.0 GENERAL

The Contractor shall furnish in accordance with the plans and specifications, all labor, materials, tools, equipment, time, and incidentals required for the construction of all work as outlined herein.

2.0 DESCRIPTION OF WORK

Replacement of the 7.5 MG Reservoir 15 at 17th Street and Benson Avenue will require construction of a new circular pre-stressed concrete reservoir, built to AWWA D110 Type 1 Standard, machine wrapped on approximately 2.1 acres of land adjacent to Reservoir 15. The roof will be concrete, column supported with 24-inch diameter columns. Interior baffles will be used to provide improved circulation within the reservoir.

Generally, this project includes construction of new reservoir to current standards; site improvements including excavation, grading and paving; construction of an impoundment area; construction of new pipelines and piping relocations; and construction of a landscaping improvements. Other water improvements to incorporate in the project include, stairs for reservoir roof access for inspection and maintenance, a new chlorine solution storage tank and injection pumps, and a water sampling pump with online analyzers for chlorine residual, pH, and turbidity. The existing Reservoir 15 must remain in service throughout the duration of this project.

In addition to the 7.5 MG Reservoir construction and its appurtenances, the work shall include the demolition and reconstruction of the Plant 7 Pump Station. This pump station is critical to the City of Upland's potable water distribution system, therefore, each of the five (5) pumps must be replaced one pump, motor, piping with appurtenances at a time. Each replaced pump will be tested and accepted before another pump is replaced.

Other cast-in-place concrete structures include a vault on the 36-inch reservoir outlet pipeline, underdrain pump station, valve vault on the 48-inch plant pipeline and chlorine containment basin.

Yard piping and valve components of the Work include the connection to an existing 48-inch welded steel pipeline and new 36-inch reservoir inlet pipeline with isolation valves, flow meter, modulating ball valve and connections to two well pipelines; a 36-inch outlet pipeline with isolation valves and flow meter; new 10-inch pressure reducing valve with a connection to the Plant 7 pump station discharge header and 20-inch connection to the suction header; a 36-inch reservoir overflow pipeline; and 12-inch reservoir drain line and 4-inch reservoir underdrain lines connected to a new duplex submersible pump station. In addition, the Work includes:

- Erosion control and drainage structures, site grading and earthwork import/export, construction of improvements to adjacent properties and streets.
- Construction of earthen infiltration basin and bio-swale to contain storm water runoff and reservoir overflows.
- New site fencing and modifications to existing fencing at Well 25.
- Temporary facilities, mobilization, storage areas, site access and accessibility restrictions with existing electrical power facilities.
- Street improvements fronting the site along 17th Street.

- Reservoir architectural features and treatments.
- Permits as required.
- Installation of security systems.
- Power and communication systems.
- Landscaping around the site.

3.0 UTILITIES

Existing utilities shown on the plans are based on available records and surface features; however, neither the City nor the Engineer assumes any responsibility for having completely and precisely shown all such existing utilities. The Contractor shall notify all utility companies and agencies serving the project area before beginning any excavations, and shall coordinate all work with them.

The Contractor shall notify Underground Service Alert (USA) by calling 1-800-227-2600, two (2) working days prior to beginning any excavations. Following such notice, the Contractor shall submit to the Engineer the date of notice and corresponding assigned ticket number.

Full compensation for satisfying the requirements of this section and all subsections shall be considered as included in the contract prices bid for the various items of work involved and no additional compensation will be allowed therefor.

3.1 Utility Contacts

The following is a list of individuals or entities, which may have facilities that may be affected by the proposed improvements. This list is merely for the Contractor's information and may or may not be complete or inclusive. It is the Contractor's responsibility to coordinate his work with affected utility companies or agencies.

Company / Entity	Contact	Phone Number
City of Upland (Engineering Division)	Bob Critchfield	(909) 291-2946
City of Upland (Water Division)	John Robles	(909) 376-1206
City of Upland (Sewer & Storm Drain)	Nicole deMoet	(909) 291-2970
AT&T	John Bradley	(909) 381-7385
Frontier Communications	Mario Orlino	(909) 469-6336
Metropolitan Water District (MWD)	John Osornia Mike Rubio	(909) 392-5095 (951) 776-2675
Monte Vista Water District	Justin Scott-Coe	(909) 624-0035
San Antonio Water Company	Brian Lee Teri Layton	(909) 982-4107
Southern California Edison Company	Catherine Walker	(909) 930-8439
Spectrum Communications	Customer Service	(888) 892-2253
Sprint		(909) 873-8022
Southern California Gas Company	David Castellanos	(909) 335-7508
Time Warner Cable	Keith Klump	(909) 975-3405

Company / Entity	Contact	Phone Number
Underground Service Alert		(800) 227-2600
Verizon (General Telephone)	Amin Abouelhouda	(909) 469-6369
Water Facilities Authority	Terry Katlin	(909) 981-9454

It is the Contractor's responsibility to contact all utility agencies affected by the work to be completed, verify all utility information, and coordinate all work with respect to the utilities' possible obstructions and/or interference.

The Contractor shall contact the City of Upland, Engineering Office, at least two working days prior to pavement sawcutting, grinding, or trenching near inductive loop detectors, in order to allow sufficient time for disconnection of vehicle detection and reprogramming of the traffic signal timing.

Prior to the paving operation, the Contractor shall notify all utility companies who have facilities, (vaults, valves, etc.), on the street to be resurfaced in order that they may schedule their work accordingly in adjusting their vaults or valves to the new grade. The Contractor may be required to assist them during their adjusting operation.

3.2 Location and Protection

The provisions of Section 5 "Utilities" of the Standard Specifications shall apply, except as modified and supplemented below:

The Contractor shall verify the existence and location of any underground utility pipes or structures that may be affected during the course of work. The Contractor will take due precautionary measures to protect the utilities shown, and other utilities or structures not shown on the plans that might be discovered during the process of the job.

Where underground main distribution conduits such as water, gas, sewer, electric power, telephone, cable television or traffic signal are shown on the Plans, the Contractor, for the purpose of preparing a Bid, shall assume that every property parcel will be served by a service connection for each type of utility.

The City of Upland Water Operations Division has water services and mains in the vicinity of where construction operations will be conducted by the Contractor. Care shall be taken by the Contractor not to disturb the water mains, services, meters, valves, etc. during construction operations. In the event that a water facility is damaged, the Contractor shall notify the Water Division and the Engineering Division immediately. The Contractor shall also arrange for the immediate repair of the water facility by a licensed plumbing contractor, at no cost to the City. The Contractor will not be compensated for any damages or delays as a result of water facility repairs.

Payment for location and protection of utilities shall be considered to be included in the prices paid for the various contract items of work, and no additional compensation will be allowed or paid for, and shall include repair of damaged utilities caused by the Contractor's operations.

3.3 Removal

The provisions of Section 5-3 "Removal" of the Standard Specifications shall apply, except as modified and supplemented below:

Unless otherwise specified, the Contractor shall remove or abandon all interfering portions of utilities shown on the Plans, or indicated in the Bid documents as "abandoned" or "to be abandoned in place". Before starting

removal operations, the Contractor shall ascertain from the Agency that the abandonment is complete. The costs involved in the removal and disposal, or abandonment, shall be included in the various bid items or work, and no additional compensation will be allowed or paid for.

3.4 Compensation for Damage or Relocation

In accordance with Section 4215 of the California Government Code, the Contractor shall be compensated for the cost of locating and repairing damage to main or trunk line utility facilities located on the job site, not due to the failure of the Contractor to exercise reasonable care; for costs of removing or relocating such utility facilities not indicated in the Contract Documents with reasonable accuracy; and for the operating costs for equipment on the project necessarily idled during such work.

If the Contractor wishes to have any utility located, he should contact the owner at least 48 hours prior to construction in the immediate vicinity of the utility. Potholing to locate existing underground utilities shall be the responsibility of the utility owner or the contractor, and no further compensation shall be allowed therefor.

4.0 COMPLETION AND ACCEPTANCE

4.1 Guarantee of Work and Materials

The Contractor shall guarantee that all work performed by him under this contract fully meets the requirements thereof as to quality of workmanship and materials furnished. If any defects in materials or workmanship become evident within a period of one (1) year from the date of acceptance of the work by the City Council, the Contractor shall, at his own expense, make any repair or replacement necessary to restore the work to full compliance with these Special Provisions, including repair of settled backfill and resurfacing.

Such repair and replacement shall be made promptly upon receipt of written notice from the City. If the contractor fails to make such repair and replacement promptly, the City may cause the work to be done and the cost incurred thereby shall become the liability of the Contractor and his surety.

If, in the opinion of the Engineer, defective work creates a dangerous condition or requires immediate attention to prevent further loss to the City or to prevent interruption of operations of the City, the City will attempt to give the notice required by this article.

If the Contractor cannot be contacted or does not comply with the Engineer's request for correction within a reasonable time as determined by the Engineer, the City may, notwithstanding the provisions of this article, proceed to make such correction and the costs of such correction shall be charged against the Contractor. Such action by the City will not relieve the Contractor of the guarantees provided in this article or elsewhere in this contract.

This article does not, in any way, limit the guarantee on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period, nor does it limit other remedies of the City in respect to latent defect, fraud, or implied warranties. Contractor's bonds shall remain in force during the warranty period.

Payment for fulfilling the requirements of this section shall be considered as included in the prices for the various Contract items of work, and no additional compensation will be allowed therefore.

4.2 Liquidated Damages

Liquidated Damages shall be in the amount of *Three Thousand Dollars*, ($3,000.00) per calendar day in excess of the time allowed under this Contract. This amount shall be deducted from any compensation due the Contractor should he fail to complete the work required by the terms of his contract within the time specified herein, plus any authorized time extension.

5.0 CONSTRUCTION START DATE AND TIME OF COMPLETION

The City is anticipating award of the construction Contract on Monday, November 9, 2020. Contractor shall execute all required documents in an expeditious manner (i.e. Agreement, Insurance, Bonds, etc.) so that cconstruction can begin no later than two weeks after the award of bid. The Contract Time shall commence on the date of issuance of the City's written Notice to Proceed (NTP). The Contractor undertaking the work hereinafter specified will be required to complete all work within *Five Hundred Fifty (550) calendar days* following date of issuance of the City's written NTP. The ninety (90) calendar days shall include lead time for the delivery of pipe and other materials required on this project.

The Contractor shall submit to the City for approval, a construction schedule at least 10 days prior to starting work.

6.0 WORK HOURS

Permitted work hours shall be 7:00 a.m. to 3:30 p.m., Monday through Friday. The Contractor shall take all necessary steps to minimize inconvenience to residents, businesses, and the public.

Work in excess of eight (8) hours per day, on Saturdays, Sundays, or legal holidays, requires prior consent of the City Engineer and is subject to Cost of Overtime Construction Inspection. Should the Contractor desire to perform work during these periods, he must submit his written request to the Construction Manager at least forty-eight (48) hours prior to the anticipated start of such work. No work outside the permitted work hours stated above shall proceed without the approval of the City Engineer.

7.0 NOTIFICATION OF RESIDENTS AND BUSINESSES

All adjacent homeowners, business owners, and occupants shall be duly notified by the Contractor, in writing, of his proposed operation. Notice shall be delivered at least ten (10) working days prior to the start of construction. The City will provide a copy of the letter and the Contractor shall be responsible for reproduction and distribution of the letters. The City will provide a map showing the limits for distribution of the above-mentioned notice.

Renotification will be required if the Contractor's schedule is altered or other delays occur, which significantly affects the scheduled work. Renotification shall be at the Contractor's expense.

Prior to the actual start of the operation the Contractor shall inform the residents, tenants, business owners or occupants regarding the construction to preclude entrapment of cars and vehicles in driveways, garages, or parking areas. All costs involved in notification of residents and businesses shall be included in the various contract items of work and no additional compensation will be allowed therefore.

8.0 TRAFFIC CONTROL

Traffic controls, including but not limited to vehicular and pedestrian traffic controls, maintenance of vehicular and pedestrian access, detours and street closures, shall be in accordance with Subsection 7-10 of the latest edition of the Standard Specifications for Public Works Construction (SSPWC), including all its subsequent amendments; the latest edition of the Manual of Traffic Controls for Construction and Maintenance Work Zones, as published by the Department of Transportation of the State of California, and the following Special Provisions. In the event of conflict, the Special Provisions shall take precedence over the Manual of Traffic Controls, and the Manual of Traffic Controls shall take precedence over the Standard Specifications. The contractor is also advised of City of Upland Ordinance 1495 for other specific street closure requirements. Contractor shall prepare and submit for approval a traffic control plan prepared by a registered engineer for all project work. Construction will not be allowed to begin until an approved traffic control plan is completed.

1. Contractor shall have exclusive control and responsibility for traffic control and safety devices, all signage and roadway markings, all equipment and materials, and the ongoing construction at all times.

   The Contractor will be responsible for obtaining all partial street closure permits from the City of Upland prior to the start of any work. The partial street closure permits will identify additional signing requirements, work hours and other conditions as may be necessary to minimize inconvenience to motorists, school traffic, and businesses.

   Ingress and egress to all local residents, schools, commercial and industrial properties must be accessible at all times.

2. All traffic control and safety devices, equipment and materials, including but not limited to cones, delineators, flashing warning lights, barricades, high level warning devices (flag trees), flags, signs, markers, portable barriers, flashing arrow signs, markings and flagging equipment, shall be provided and maintained in “like new” condition.

3. The Contractor shall furnish and properly install, construct, erect, use and continuously inspect and maintain, twenty-four (24) hours per day, seven (7) days per week, all said devices, equipment and materials, and all temporary and permanent pedestrian and driving surfaces as necessary to provide for the safety and convenience of and to properly warn, guide, control, regulate and channelize project workers and the public beyond said limits as necessary to include areas affecting or affected by the work, from the start of work to the completion of the work.

4. All barricades shall be equipped with flashing warning lights and all traffic cones shall be no less than 28 inches in height except that shorter cones, 12 inches high or higher, may be used during striping maintenance operations where the only function of the cones is to protect the wet paint from traffic.

5. Contractor shall have exclusive control and responsibility for all flaggers at all times. Properly trained and experienced flaggers shall be provided at all times when Contractor’s operations encroach into the public right of way. Flaggers shall also be provided to direct traffic when said traffic is to be interrupted, when two-way traffic is to be reduced to one-way traffic at such time as is necessary to safely pass the traffic through or around the work area, and when so directed by the City.

6. Any traffic control and safety devices and equipment being used which becomes damaged, destroyed, faded, soiled, misplaced, worn out, inoperative, lost or stolen shall be promptly repaired or refurbished

and/or replaced, and any traffic control and safety devices and equipment being used which are displaced or not in an upright position from any cause, shall be promptly returned or restored to their proper position.

7. Contractor shall have exclusive control and responsibility for all signs and warning devices, and all trucks, equipment and materials at all times. An unobstructed view of all signs and warning devices including, but not limited to, stop signs, stop ahead signs, street name signs and other regulatory, warning and construction signs, markers and warning devices shall be maintained at all times. No trucks or other equipment or materials shall be stopped, parked or otherwise placed in such a manner as to block signs from the view of vehicular and/or pedestrian traffic to which it applies.

8. When entering or leaving roadways carrying public traffic, the Contractor's equipment, whether empty or loaded, shall yield to said public traffic at all times, except where the traffic is being controlled by Police officers, Fire officers, or at traffic signalized intersections or the aforementioned construction traffic signal.

9. Contractor shall have exclusive control and responsibility for stockpile and/or storage areas at all times. Stockpiling and/or storage of materials on any public right of way or parking areas, or immediately adjacent to all such areas, will not be allowed without specific permission of the City. Materials spilled along or on said right of way or parking area shall be removed completely and promptly. All stockpile and/or storage areas shall be kept in a safe, neat, clean and orderly fashion, and shall be restored to equal or better than original condition upon completion of the work.

10. On projects involving work on, closure of or partial closure of existing streets and where vehicular access to the abutting property must be restricted, the work shall be so selected, arranged and scheduled that the persons requiring access to said abutting property and/or residents along said streets affected will be able to park within a reasonable distance of not more than 500 feet from their homes and/or destination; and in addition, no two (2) adjoining streets shall be closed at the same time, except as otherwise authorized by the City.

11. When work has been completed on a particular street or has been suspended or rescheduled and said street is to be opened to vehicular traffic, all equipment, "NO PARKING" signs, other obstructions and unnecessary traffic control devices and equipment shall be promptly removed from the street, except as otherwise authorized or directed by the City Engineer. Temporary traffic striping shall be applied prior to opening any newly paved area to traffic. This includes lane and centerlines.

12. Should the Contractor be neglectful, negligent or refuse, fail or otherwise be unavailable to promptly, satisfactorily and fully comply with the provisions specified and referred to hereinabove, the City reserves the right to correct and/or mitigate any situation, which in the sole opinion of the Engineer constitutes a serious deficiency and/or serious case of noncompliance, by any means at its disposal at the Contractor and/or permittee's expense, and in the case of a contract City project, to deduct the cost therefore from the Contractor's progress and/or final payments. Such corrective actions taken by the City shall not reduce or abrogate the Contractor's legal obligations and liability for proper traffic control and safety measures and shall not serve to transfer said obligations and liability from the Contractor to the City or the City's agent.

13. Violations of any of the above provisions and/or provisions of the referenced publications, unless promptly and completely corrected to the satisfaction of the Engineer, shall, at the sole discretion of the City, be grounds for termination of the Contract or shut down or partial shutdown of the work without compensation to the Contractor and/or permittee, or liability to the City, all as prescribed by contractual obligations or State law, whichever is applicable.

14. Pedestrians – A minimum walkway of 48 inches in width must be maintained at all times for safe pedestrian passage through all parkway work areas. Crosswalks shall remain unobstructed at all times.

Obstructions within the walkway areas shall be illuminated during the hours of darkness and marked with Type II barricades with flashing warning lights.

Where construction prohibits pedestrian access, alternate crossing areas shall be established with appropriate signing and other devices as required by the Engineer. Pedestrian access facilities shall be provided through construction area within the right-of-way. Pedestrian walkways shall be provided with surfacing as required to maintain safe and accessible pathways. Surface shall be skid resistant and free of irregularities.

The Contractor shall keep the areas adjacent to the project site clear of any objects that may be hazardous to pedestrians and motorists. Provisions to reroute pedestrians, including the disabled, around the work area must be clearly delineated and maintained. If the Contractor's operations require the closure of a walkway, then another walkway shall be provided nearby, off the traveled roadway, along the general path of travel.

15. Temporary Surfacing – Temporary A.C. paving shall be placed and maintained at locations determined by the Engineer wherever excavation is made through pavement, sidewalk or driveways, in accordance with Section 306-1.5.1 "Temporary Resurfacing" of the SSPWC.

    The Contractor shall maintain the temporary surfacing throughout the duration of the project until permanent pavement has been restored.

16. Steel Plating – The Contractor shall furnish, install and maintain steel plates as necessary to obtain minimum lane requirements specified herein and/or to maintain access to private property.

    Steel trench plates shall be employed to bridge across open excavations and newly poured concrete (if applicable). The Contractor shall be responsible to ascertain the appropriate size and placement of the steel plates and other devices to support vehicular traffic loading across open excavations and newly poured concrete without sustaining damage to the new improvements.

    All steel plates shall be recessed into the roadway and shall be textured for skid-resistance. Steel plates shall be secured in place to prevent their movement, sliding or shifting.

17. Pavement Transitions – The Contractor shall construct pavement transitions at all lateral and transverse join lines, created by trenching, base paving, temporary paving or any combination of each. A vertical drop-off or step between the lateral edges of the pavement under construction and the adjacent pavement shall not be permitted during non-working hours.

18. Driveways – Vehicular access to driveways shall be maintained at all times, except when necessary construction precludes such access for temporary periods, as follows:

    Driveway approaches shall be poured within 48 hours of the adjacent curb and gutter.

    Curb and gutter shall be poured within 24 hours from the time access is blocked by formwork.

    Driveway approaches shall cure for three days before being reopened to vehicular access.

    Driveways shall not be closed over weekends, except for curing of concrete.

    Driveways closed due to placement of bituminous pavement shall be reopened as the new pavement has cooled sufficiently to carry the traffic without damage.

The Contractor shall notify all residents and businesses at least 72 hours in advance of driveway closure.

During the time driveways are closed, a minimum of two Type II barricades with flashing warning lights shall be used to affect the closure.

Driveways shall be kept open at all other times, and if necessary, temporary A.C. ramps and/or steel plates shall be provided.

19. Parking – On-street parking may be restricted within the project limits. Temporary "NO PARKING – TOW AWAY" signs shall be provided and posted by the Contractor not less than forty-eight (48) hours in advance of the start of construction.

20. Street Lighting – The Contractor shall maintain illumination of the traveled roadway after hours of darkness throughout the duration of the project, as follows:

    The street lighting system shall be installed and removed in phases such that not less than one-half of the street lights are operable each evening.

    A minimum illumination level of 0.4 foot-candles with a 6:1 uniformity ratio shall be provided, unless otherwise approved by the Engineer.

21. Lane Closures – The Contractor shall comply with the following general lane closure requirements:

    Flashing arrow signs (sequential arrow boards) shall be utilized for all closures of through travel lanes on North Benson Avenue and West 17th Street and all signalized cross streets, as designated by the Engineer.

    Left turns shall be maintained at all times to the fullest extent possible. Under extenuating circumstances and when permitted by the Engineer, left turn lanes may be closed with R-17, "NO LEFT TURN" signs placed both at the beginning and end of each left turn lane closed.

    Right turns shall be maintained at all times to the fullest extent possible. When permitted by the Engineer, right-turn lanes may be closed with R-16, "NO RIGHT TURN" signs placed both at the beginning and end of each right turn lane closed.

    To allow for equipment movement and cleanup during various construction operations, momentary stoppage of traffic and turn movements will be permitted, using flagging procedures.

22. Road Closures – Road closures shall be prohibited unless explicitly approved by the Engineer.

23. Temporary Striping – The Contractor shall provide temporary traffic restriping at the conclusion of any working day for any centerline or lane line which is obliterated by construction.

24. Shutdowns – Traffic signal shutdowns shall be restricted to two hours maximum during one 24-hour period. All signal work, including but not limited to shutdowns, shall require coordination and/or approval by the City Engineer.

    Where traffic signal shutdowns are required, the Contractor shall furnish and install temporary stop signs for each travel lane at 24"x24" in size securely mounted and placed in clear view to all approaching traffic. Stop signs shall be placed pursuant to Section 86-1.06 of the Caltrans Standard Specifications.

The presence of two uniform police officers to direct traffic during shutdown period is required during any peak hour work and as directed by the Engineer. All related expenses and wages of the police officers shall be borne by the Contractor.

The Contractor shall provide the Engineer five (5) working days advance notice prior to any traffic signal shutdown for the purpose of scheduling police traffic control. All shutdowns shall be scheduled pursuant to Section 86-1.06 of the Caltrans Standard Specifications. No signal shutdowns will be allowed on Fridays.

25. Emergency Response – The Contractor shall provide the Engineer with names and telephone numbers of at least three people responsible for emergency service response. Upon notification, Contractor shall respond to City emergency requests. In the event these people do not promptly respond when notified, or it becomes necessary to call other forces to accomplish emergency service, the Contractor will be held liable for any costs incurred. A fee of $400/hour, at 4 hours minimum, will be charged to the Contractor.

    A. During Working Hours:
    In case of an emergency that threatens loss or injury of property, and or safety of life during working hours, the Contractor shall act, without previous instructions from the City, as the situation may warrant. He/She shall notify the Engineer of the emergency and the action taken immediately thereafter. Any compensation claimed by the Contractor, together with substantiating documents in regard to expense, shall be submitted to the Engineer within 15 calendar days after the emergency. Compensation, if allowed, will be paid for as extra work.

    B. Outside of Working Hours:
    Whenever, in the opinion of the City, an emergency arises outside of the regular working hours which threatens loss or injury of property, or danger to public safety, the Contractor shall act, without previous instructions from the City as the situation may warrant. He/She shall notify the Engineer of the emergency and the action taken immediately thereafter. Any compensation claimed by the Contractor, together with substantiating documents in regard to expense, shall be submitted to the Engineer within 15 calendar days after the emergency. Compensation, if allowed, will be paid for as extra work.

    In the event the Contractor is unable to respond to an emergency outside of regular working hours, the City's forces will handle such emergency work. If such emergency arises out of, or is the result of, operations by the Contractor, the cost of the corrective measures will be billed to the Contractor and deducted from his/her payment as provided in the Contract documents. The performance of emergency work by City forces will not relieve the Contractor of any of his/her responsibilities, obligations, or liabilities under the Contract.

Full compensation for compliance with the provisions specified and referred to hereinabove under Traffic Control shall be considered as being fully included in the contract LUMP SUM bid item for Traffic / Pedestrian Control, Public Convenience and Safety, and no additional compensation will be allowed or paid for.

9.0 STORAGE OF MATERIALS AND EQUIPMENT

The storage of materials and equipment will not be allowed on public streets or in the public right of way unless prior arrangements have been made with the Engineer. The Contractor shall be responsible for obtaining a storage site at the Contractor's sole expense. The Contractor shall provide the City with a copy of the written permission from the property owner for the use of the site, if the property is not owned by the Contractor or the City.

10.0 SAFEGUARDING OF EQUIPMENT, MATERIALS, AND WORK

The Contractor shall properly safeguard all equipment, materials, and work against loss, damage, malicious mischief, or tampering by unauthorized persons until acceptance of the work by the City. Locked and covered storage or continuous surveillance by a watchman shall be provided by the Contractor if required to accomplish this task.

11.0 NEW MATERIALS AND EQUIPMENT

Unless otherwise specified, shown, or permitted by the Engineer, all materials and equipment incorporated in the work shall be new and of current manufacture. The Engineer may request the Contractor to furnish the manufacturer's certificates to this effect.

12.0 MATERIAL TESTING

All tests of materials furnished by the Contractor shall be made in accordance with commonly recognized standards of national organizations and such special methods and tests as are prescribed in these specifications.

No materials shall be used until they have been approved by the Engineer.

The Contractor shall at his expense furnish the City, in triplicate, certified copies of all required factory and mill test reports. Any materials shipped by the Contractor from a factory or mill prior to having satisfactorily passed such testing and inspection by a representative of the City shall not be incorporated in the work, unless the Engineer shall have notified the Contractor, in writing, that such testing and inspection will not be required.

At the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before delivery is started and before such material is used in the work.

The soil and material testing lab/firm will be directly contracted to the Engineer. Any subsequent soil and material tests deemed necessary due to the failure of initial tests will be at the Contractor's sole expense.

All materials furnished and all work performed under the Contract shall be subject to inspection by the Engineer. The Contractor shall be held strictly to the true intent of the Specifications and Drawings in regard to quality of materials, workmanship, and diligent execution of the Contract. Such inspection may include mill, plant, shop, or field inspection as required. The Engineer shall be permitted access to all parts of the work, including plants where materials or equipment are manufactured or fabricated. The Engineer shall be furnished with such materials, information, and assistance by the Contractor, subcontractors, and suppliers as is required to make a complete and detailed inspection.

The Engineer will make, or have made, such tests as he deems necessary to assure that the work is being accomplished in accordance with the requirements of the Contract. In circumstances where it is suspected that proper procedures and/or materials are not being followed or used, any testing required by the Engineer shall be at the Contractor's expense. It is understood and agreed that the making of tests shall not constitute an acceptance of any portion of the work nor relieve the Contractor from compliance with the terms of the Contract.

13.0 ORDER OF WORK

The Contractor shall perform construction operations in accordance with specification Section 01115 – Sequence of Construction.

14.0 CHANGES IN WORK

The City reserves the right to make such alterations, deviations, additions to or omissions from, the Plans and Specifications, including the right to increase or decrease the quantity of any item or portion of the work to match the funding available for the project, or to omit any item or portion of the work, as may be deemed by the Engineer to be necessary or advisable, and to require such extra work as may be determined by the Engineer to be required for the proper completion or construction of the whole work contemplated.

15.0 SUSPENSION OF WORK

The Engineer acting on behalf of the City may, by written notice to the Contractor, suspend the work in whole or in part for such period or periods as the Engineer may deem necessary, due to unsuitable weather, delay in delivery of City-furnished equipment or materials, or such other conditions as are considered unfavorable for prosecution of the work, or failure on the part of the Contractor to carry out the provisions of the Contract or to provide materials or workmanship meeting the requirements of the Specifications. Suspended work shall be resumed by the Contractor within 10 calendar days of receipt from the Engineer of written Notice to Proceed. The Contractor shall have no claim for damages alleged to have been suffered by reasons of any suspension of the work without termination of the Contract, and Contractor shall receive no additional compensation because of any such suspension.

16.0 USE OF COMPLETED PORTIONS

The City shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions as may not have expired; but such taking possession and use shall not be deemed an acceptance of the work not completed in accordance with the Contract Documents.

17.0 FAILURE TO COMPLY

If the Contractor should refuse or neglect to comply with the provisions of the Contract or the orders of the Engineer, the City may have such provision or orders carried out by others at the expense of the Contractor.

18.0 NONCOMPLIANCE WITH PLANS AND SPECIFICATIONS

Failure of the Contractor to comply with any requirement of the Specifications and Drawings, or failure to immediately remedy any noncompliance upon notice from the Engineer, may result in suspension of contract progress payments. Any progress payments so suspended shall remain in suspension until the Contractor's operations are brought into compliance to the satisfaction of the Engineer in accordance with the Contract Documents and Specifications. No additional compensation will be allowed as a result of suspension of progress payments due to Contractor's noncompliance with the Plans and Specifications.

19.0 SITE ACCESS

The City Engineer or his representative, testing agencies, and government agencies with jurisdictional interests shall be allowed access to the work at all times for their observation, inspection, and testing. The Contractor will provide proper and safe conditions for such access.

20.0 WATER ON THE JOB

The Contractor shall be responsible for furnishing all necessary water for compaction, cleaning, flushing, dust control, etc. The Contractor shall obtain a hydrant meter from the City of Upland if the Contractor intends to use city water. The Contractor will not be allowed to use water from individual residences or businesses. The cost of obtaining a hydrant meter from the City and the usage of the water is considered incidental to the job and shall be included in contract lump sum price. No additional compensation will be allowed therefore.

City does not expressly or by implication; guarantee that water will be available for construction use. The City reserves the right to cease delivery of water for construction use should the need arise. Contractor will not be compensated for any damages or delays as a result of the unavailability of construction water.

21.0 SAFETY

All Construction will be performed in compliance with the standards as established by OSHA and in accordance with the appropriate State of California regulations. It will be the Contractor's responsibility to acquaint himself or herself, and abide by these regulations during all phases of construction. The Contractor will hold harmless and indemnify the City and its agents for any damages caused by failure to abide by said regulations.

22.0 ENGINEER'S ESTIMATE

The quantities of work to be done and materials to be furnished are approximate as shown and listed in these Specifications and are given as a basis of comparison of bids only. The City does not expressly or by implication agree that the actual amount of work will correspond therewith.

23.0 SHOP DRAWINGS

The Contractor shall furnish and receive a reviewed copy of a submittal prior to bringing materials onsite. Submittals shall be 3 copies of detail drawings, catalog sheets, cuts or descriptive lists of all material to be used on the job. The submittals shall include the name and location of the supplier and manufacturer, trade name, catalog reference, size, finish, and all pertinent data, and shall be reviewed by the City within 10 working days and returned marked with one of the following:

1) NO EXCEPTIONS TAKEN
2) MAKE CORRECTIONS NOTED
3) REVISE AND RESUBMIT
4) REJECTED

24.0 RECORD DRAWINGS (AS-BUILT DRAWINGS)

The Contractor shall maintain, on the job site, a set of full-size reproducible contract drawings, or a set of full-size blueline or blackline prints. On these he shall mark all as-built conditions, locations, configurations, and other details, which may vary from the details represented on the original drawings. This master record of as-built conditions, including all revisions made necessary by addenda, change orders, and the like, shall be maintained up-to-date during the progress of the work.

On a monthly basis, the Contractor shall submit progress record drawing(s) clearly delineating the improvements completed, for the purpose of review and processing progress payments. The City's ability to process the progress payments is contingent upon the timely submittals of the progress record drawing(s).

Upon completion of the work and prior to final acceptance, the complete set of contract drawings (size D, 24x36 in.), marked up to show as-built conditions, shall be delivered to the Engineer. These drawings shall be known as "Record Drawings".

Full compensation for compliance with the provisions specified and referred to hereinabove shall be considered as included in the contract LUMP SUM price bid for the item "Furnish As-Built Record Drawings" in these Special Provisions. No additional compensation will be allowed therefore.

25.0 FINAL CLEANUP

Prior to final acceptance, the Contractor shall restore the entire project site to a condition equal or better than the pre-construction condition as evidenced by film, notes, sketches and other construction records.

25.1 Cleaning and Dust Control

Clean-up and dust control shall conform to Subsection 7-8.1 of the Standard Specifications. During execution of work, the Contractor will daily clean the site, adjacent properties, and public roads, and dispose of waste materials, debris, and rubbish to assure that all affected properties and roadways are maintained free from accumulations of water, materials and rubbish. Watering for dust control shall consist of developing a water supply and furnishing and placing all water required for dust control.

Contractor will provide containers for collection and disposal of waste materials, debris, and rubbish.

Contractor will cover all loads of excavated material leaving the site or of material being imported, to prevent excessive dust from being created.

25.2 Cleanup

At the end of each day, Contractor shall be responsible for the clean-up of all job sites. All job sites must be left in a safe and orderly condition. The Contractor will perform additional clean-up as directed by the Engineer. The cost for all clean-up shall be considered incidental to the cost of the work and no additional compensation will be allowed therefore.

26.0 PERMITS AND LICENSES

26.1 Construction Permit

The Contractor will be required to obtain a no-fee Construction Permit from the City. No compensation for expenses of the Contractor incidental to obtaining the Construction Permit will be allowed or paid for. The Contractor shall comply will the requirements of all City and other public agency permits. No compensation for expenses of the Contractor incidental to obtaining the required construction permits for this project will be allowed or paid for.

26.2 Partial Street or Lane Closure Permit

The Contractor will be required to obtain a no-fee Partial Street or Lane Closure Permit from the City. No compensation for expenses of the Contractor incidental to obtaining the Street Closure Permit will be allowed or paid for. There may be additional restrictions due to a public school within the project area.

26.3 Excavation Permit

In accordance with Section 6500 of the Labor Code, the Contractor is required to obtain a permit from the Division of Occupational Safety and Health of the State of California, Department of Industrial Relations for any excavations five feet (5') or more in depth and into which a person is required to descend. Contractor shall submit a copy of said permit to the Engineer prior to any excavations. No compensation for expenses of the Contractor incidental to obtaining the excavation permit will be allowed or paid for.

26.4 City of Upland Business License

The Contractor and all sub-contractors are required to obtain City of Upland Business Licenses. The cost for all business licenses shall be the Contractor and/or sub-contractor's responsibility, and no additional compensation will be allowed or paid for.

Effective June 2, 2014, the City's Finance Department will no longer be accepting payments for business license renewals or processing new business license applications. To apply for a City business license, Contractor and subcontractors shall contact HdL Companies at (888) 602-0239 or go to:

UPLAND.HDLCOMPANIES.COM

If you wish to renew a current business license by mail, please remit payments to:

HdL Companies
1142 S. Diamond Bar Blvd. #502
Diamond Bar, CA 91765
(888) 602-0239

26.5 Contractor's License

Contractor must possess a valid Class "A" Contractor's License from the California Contractors State License Board at the time of bid, and must maintain the Class "A" license in good standing with the California Contractors State License Board throughout the duration of the project.

26.6 South Coast Air Quality Management District (SCAQMD)

South Coast Air Quality Management District Project guidelines are provided in Appendix "C". Contractor's operations shall be in accordance with all current SCAQMD requirements and laws. The Contractor is responsible for compliance with Fugitive Dust Regulations issued by the Air Quality Management District (AQMD). The Engineer shall have the authority to shut down the operations of the Contractor in the event of non-compliance with AQMD regulations. No compensation or expenses of the Contractor incidental to obtaining AQMD permits, or for adhering to AQMD requirements, will be allowed or paid for. Any fines or penalties levied by the AQMD shall be the Contractor's sole and complete responsibility.

27.0 PRECONSTRUCTION MEETING

The Contractor to whom the contract is awarded shall attend a preconstruction meeting at a location and time set by the Construction Manager.

28.0 PROTECTION OF IMPROVEMENTS

28.1 Removals

Removals shall include excavation, removing, hauling and disposing of all materials to the subgrade elevations indicated on the plans, as required to construct the new improvements. This item involves sawcut, removal and disposal of all existing improvements required for construction of the project including asphalt concrete, Portland cement concrete, macadam, pavement reinforcing fabric (petromat), slurry backfill, base materials, rock, soils, trees and roots, parkway culverts, and miscellaneous items (including loose or dumped materials) which are within the grading and excavation section. All roots and stumps shall be removed and/or ground to eight (8) inches below subgrade within the roadway section. The locations and dimensions of excavation areas are as shown on the plans and/or directed in the field by the Engineer. Roadway excavation shall be done in accordance with Subsection 300-2 of the Standard Specifications.

The Contractor shall be responsible for obtaining a suitable disposal site for this excavated material, and pursuant to Subsection 300-2.6 of the Standard Specifications, shall, upon request, file with the Engineer the written consent of the owner of the property upon which he intends to dispose of such material. No additional compensation will be allowed for special handling, hauling or disposal of any excavated material from the project site.

The Contractor is advised that the City of Upland geology is an alluvial fan. These soil conditions are such that larger rocks, cobbles and boulders will be encountered during construction. The Contractor shall be responsible for the removal and disposal of all rocks and excavated materials that are within the limits of excavation, as well as for all costs associated in working with rock cobble and boulder soil conditions.

Subgrade preparation for the roadway improvements shall be done in accordance with Subsection 301-1 of the Standard Specifications and these Special Provisions.

Subsections 301-1.2 and 301-1.3 of the Standard Specifications shall be revised as follows:

Payment for all sawcut, removal and disposal of existing materials required for the construction of miscellaneous concrete improvements, such as driveways, curb and gutters, sidewalks, cross gutters, etc., and miscellaneous water improvements shall be included in the contract unit prices bid for the various items of work involved, and no additional compensation will be allowed therefore.

28.2 Protection of Existing Improvements

The Contractor shall be responsible for protecting all existing manhole covers, water valve covers, raised pavement markings, gutters, cross gutters, etc. during construction to prevent the new treatment from getting on and adhering to them.

Payment for protecting all manhole covers, water valve covers, raised pavement markers, gutters, cross gutters, etc. and all other appurtenant work shall be included in the contract lump sum price bid for the various items of work involved, and shall be considered as full compensation for doing all work as specified and no additional compensation will be paid therefore.

28.3 Protection of New Improvements

The Contractor shall be responsible for the protection of the new improvements and shall provide sufficient barricades, delineators, and personnel at each location to adequately protect the new surface from cars, motorcycles, pedestrians, bikes, skate boards, etc., until the new improvements, such as asphalt concrete and portland cement concrete, have cured and the foreman authorizes the street to be opened to traffic.

Any damage caused to the new improvements as a result of insufficient barricades, delineators, personnel, or the street being opened to traffic too soon is the Contractor's responsibility and shall be repaired at the Contractor's expense.

The Engineer may ask the traffic lane or roadway to remain closed if, in his opinion, the street is not yet cured enough to allow traffic on it. The Contractor shall pay all costs associated with any extension of a street closure.

All costs for protecting the new surfaces and any corrective measures necessary shall be considered incidental to the cost of the work and shall be included in the contract unit price bid for the various items of work involved. No additional compensation will be allowed therefore.

29.0 PATENTS AND COPYRIGHTS

The Contractor shall indemnify and save harmless the City and Engineer and their officers, agents, and employees against all claims or liability arising from the use of any patented or copyrighted design, device, material, or process by the Contractor or any of his subcontractors in the performance of the work.

30.0 NPDES REQUIREMENTS

The Contractor shall conform to the requirements of General Construction Activity Storm Water NPDES Permit No. CAS000002 and Order No. 2009-0009-DWQ issued by the State Water Resources Control Board. This General Permit, hereafter referred to as the "Permit", regulates storm water discharges associated with construction activities.

The Contractor shall also conform to the requirements of NPDES Permit No. CAS6180036 and Order No. R8-2010-0036 issued by the Santa Ana Regional Water Quality Control Board. This permit, hereafter referred to as the 'Permit", regulates storm water discharges that enter the City's municipal storm drain systems (MS4). Contractor is not responsible for filing a Notice of Intent (NOI) for Permit coverage or a Notice of Termination (NOT) at project end. City staff will file a NOI for permit coverage and file a (NOT) at the end of the project.

Water pollution control work shall conform to the requirements in the Construction Contractor's Guide and Specifications of the Storm Water Quality Handbooks, dated November 2009, and addenda thereto issued up to and including the date of advertisement of the project, hereafter referred to as the "Handbook". Copies of the Handbook may be obtained from CASQA website at: http://www.cabmphandbooks.com; Telephone: (650) 366-1042; or email at: info@casqa.org. Copies of the Handbook and the Permit are also available for review only, at the City of Upland Public Works Facility.

The Contractor shall become fully informed of, and comply with, the applicable provisions of the Handbook, Permit, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain a copy of the Permit at the project site, and shall make the Permit available during

construction activities.

30.1 Storm Water Pollution Prevention

Storm Water Pollution Prevention shall include control of all waters entering the project site, erosion control, and any dewatering in accordance with California Regional Water Quality Control Board, Santa Ana Region requirements.
Storm, surface and/or nuisance water may be encountered at various times and locations during performance of the Work. Such waters may interfere with Contractor's operation and may cause damage to adjacent or downstream private and/or public property by flooding, lateral erosion, sedimentation, or pollution if not properly controlled by Contractor. Contractor, by entering into the Contract, assumes all risk and responsibility for water control. Contractor's responsibility includes, at a minimum, handling any nuisance and/or storm waters that may result during the term of the Contract in a manner which will protect construction throughout the various stages of work up to the point of final acceptance by Owner (City). The Contractor shall install and maintain all required or necessary erosion control measures to cover the entire duration of the term of the Contract.

The Contractor is responsible to protect the Project site from erosion damage at all times by utilizing interim erosion control measures which, due to the site's ever-changing condition during construction, is achieved by implementing Best Management Practices (BMPs). The Contractor shall ensure that Best Management Practices (BMPs) within the SWPPP are implemented by a Qualified SWPPP Practitioner (QSP). A Rain Event Action Plan (REAP) shall be submitted to the City 24 hours prior to any likely precipitation event. Failure to provide a REAP document to the city will result in a halt to activity until a REAP document has been submitted and implementation has started. All costs for preparation of REAPs and associated implementation shall be considered included in the various items of work and shall be considered as full compensation for furnishing all labor, materials, tools, equipment, time, and incidentals for all costs related to REAPs and associated implementation, and no additional compensation will be allowed or paid for.

30.2 Storm Water Pollution Prevention Plan

The Contractor shall provide a site-specific Storm Water Pollution Prevention Plan (SWPPP) to the City prior to commencing construction. The Contractor shall ensure that the SWPPP for all sites are developed and amended or revised by a Qualified SWPPP Developer (QSD). The SWPPP shall conform to the requirements in the Permit, and these Special Provisions.

The objectives of the SWPPP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and to identify, construct, implement, and maintain water pollution control measures, hereafter referred to as control measures, to reduce to the maximum extent practicable (MEP, as defined in Title 33 CFR of the United States Code) pollutants in storm water discharges from the construction site both during and after construction is completed under this contract.

The SWPPP shall incorporate control measures in the following categories:

1) All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity is controlled;

2) Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3) Site Best Management Practices (BMPs) are effective and result in the reduction or elimination of

pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology standard BAT/BCT standard);

4) Calculations and design details as well as BMP controls for site run-on are complete and correct

5) Stabilization BMPs installed to reduce or eliminate pollutants before, during and after construction commencement.

6) Sediment tracking control practices

7) Wind erosion control practices and,

8) Non-storm water management and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of control measures are contained in the Handbook. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

The SWPPP shall include, but not be limited to, the following items as described in the Handbook and Permit:

1) Proper handling, storage, and disposal of materials.

2) Scheduling of excavation and grading to avoid open excavations or unprotected grading operations during wet weather.

3) Diversion of surface runoff water around work sites.

4) Means of preventing wind-blown dust or water borne erosion from escaping stockpiles and excavated soil.

5) Implementation of erosion control plans.

6) Inspection and repair of leaking equipment away from the construction site.

7) Location of equipment refueling sites and means of preventing fuel spillage and/or discharge of spilled fuel to storm drains or waterways.

8) Means of ensuring that debris, sediment, and pollutants will be prevented from entering catch basins, storm drains, or waterways.

The QSD, shall amend the SWPPP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems (MS4), or when deemed necessary by the City. The SWPPP shall also be amended if it is in violation of any condition of the Permit, or has not effectively achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially submitted SWPPP, which are required on the project to control water pollution effectively. Amendments to the SWPPP shall be submitted to the City and implemented by the Contractor.

The Contractor shall keep a copy of the SWPPP and all amendments at the project site, The SWPPP shall be made available upon request of a representative of the Regional Water Quality Control Board, State Water Resources Control Board, U.S. Environmental Protection Agency, or City of Upland storm water management team. Requests by the public shall be directed to the City.

When the original SWPPP is retained by a contractor's employee in a company vehicle and is not currently at the construction site, current copies of the BMPs and map/ drawings documents will be left with the onsite field crew. The original SWPPP shall be made available the same day, via a request by cellular phone, radio or other means of rapid communication.

Notes:
The Permit requires Qualified SWPPP Developers (QSD) and Qualified SWPPP Practitioners (QSP) to obtain appropriate training, and makes this curriculum mandatory Before September 2, 2011, to allow time for course completion.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer (QSD) and Qualified SWPPP Practitioners (QSP) responsible for creating, revising, overseeing, and implementing the SWPPP must attend a State Water Board sponsored or approved Qualified SWPPP Developer and Qualified SWPPP Practitioner training course.

Fact Sheet

Table 9 - Qualified SWPPP Developer/ Qualified SWPPP Practitioner Certification Criteria

Certification/ Title	Registered By	QSD/QSP	Certification Criteria
Professional Civil Engineer	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Geologist or Engineering Geologist	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Landscape Architect	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Hydrologist	American Institute of Hydrology	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Inspector of Sediment and Erosion Control™ (CISEC)	Certified Inspector of Sediment and Erosion Control, Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Erosion, Sediment and Storm Water Inspector™ (CESSWI)	Enviro Cert International Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education

30.3 Rain Event Action Plan

1. The discharger shall ensure a QSP (after July 1, 2010) develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation (POP) in the project area. The discharger shall ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:
   a. Site Address
   b. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   c. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   d. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:
   a. Activities associated with each construction phase
   b. Trades active on the construction site during each construction phase
   c. Trade contractor information
   d. Suggested actions for each project phase

5. The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

6. The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in the General Permit.

7. All "Pre, During and Post Rain Event" inspections shall be submitted via fax to 909-291-2974 within 48 hours from the end of rain event. (Alternately, check with project manager if email submittal is also acceptable for this project)

Payment for fulfilling the requirements of this Section and all Subsections shall be considered included in the price under the Bid Item "Storm Water Pollution Prevention/Erosion Control" and no additional compensation will be allowed therefor.

31.0 MOBILIZATION

Mobilization shall consist of preparatory work and operations for the water system and street rehabilitation improvements, including, but not limited to, those necessary for the movement of personnel, equipment, materials, and incidentals to the project site necessary for work on the project, coordination with utility companies and for all other work and operations which must be performed or costs incurred including bonds, insurance and financing prior to beginning work on the various contract items, and for obtaining all business licenses and permits, including permit fees, as required for entire project, from all related agencies including, but not limited to, utility companies, regulatory agencies and the City. Mobilization shall also include the time, materials, and labor to move the necessary construction equipment to and from the job site, supervisory time on the job by the Contractor's personnel to keep the construction site in a safe condition, and all other related work as required at all times and for all non-working days during construction period. The Contractor is responsible for securing an adequate storage site for equipment and materials.

The Contractor shall have on the work site at all times, as his agent, an English-speaking superintendent or

foreman capable of reading and thoroughly understanding the plans, specifications, and other related documents

Full compensation for compliance with the provisions specified and referred to hereinabove shall be considered incidental to the cost of the work and shall be included in the contract lump sum price bid for the various items of work involved. No additional compensation will be allowed therefore.

SECTION 2 – DEFINITION OF BID ITEMS

The unit prices and lump sum amounts to be paid for the Items listed in the Proposal shall include full compensation for furnishing all labor, materials, tools, equipment, time, and incidentals necessary to complete the work, and for performing all work contemplated and embraced under the Contract, in accordance with the Plans and Specifications. This shall include the Contractor's costs involved with bonding, insurance, worker's compensation, overhead, financing, obtaining required permits and permit fees, mobilization, traffic control, public convenience and safety, protective barricading, sanitary facilities, storage of equipment and materials, security against theft and vandalism, project site maintenance, dust and runoff control, clean-up and all other items incidental to the work.

BASIC BID

Each respective bid item and bid schedule as shown on the proposal form shall comply with all respective sections of the 2018 Edition of the Standard Specifications for Public Works Construction (Green Book), its supplements, and any other publications as specified, except as modified herein. If there is a conflict between these inclusions and the Standard Specifications, these inclusions shall have precedence.

PART A – GENERAL (ITEMS 1-7):

1. Traffic/Pedestrian Control, Public Convenience and Safety:

This Item shall include all work, materials, and equipment necessary to prepare traffic control plans and to comply with the requirements of Subsection 7-10, “Public Convenience and Safety,” of the Standard Specifications for Public Works Construction (SSPWC), the Caltrans' Manual of Traffic Controls in Construction and Maintenance Zones (latest edition), the standards contained in the "Work Area Traffic Control Handbook" (WATCH) published by Building News, Inc.; (latest edition); Section 1-8.0, “Traffic Control,” of these Special Provisions. In the case of a conflict, the highest standard shall prevail.

Ten working days prior to the start of construction work, the Contractor is required to submit to the Construction Manager a traffic control plan prepared and signed by a licensed Traffic or Civil Engineer.

The Contractor shall conduct his operations so as to offer the least possible obstruction and inconvenience to the public, and shall have under construction, no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public. The Contractor shall furnish and maintain all construction signs, channelizing devices, barricades, k-rail, temporary traffic striping and pavement markings, lighting devices, etc., to safely guide the traffic through the project limits, as described herein, and as directed by the Engineer.

One lane of traffic in each direction, with a minimum lane width of 12 feet, shall be provided by the Contractor at all times for local access to all businesses and residents. It is desirable to maintain two traffic lanes in each direction as much as possible. Contractor may close one half of the street at a time along 22nd Street, no full street closure is allowed on this project. When it becomes necessary to block access to driveways for a short period of time during construction, the Contractor shall notify the affected property owners/occupants 48 hrs. In advance of such driveway closure. Contactor shall facilitate work in front of driveways so that these driveways may be opened for use immediately.

To allow for equipment movement and cleanup during various construction operations, momentary stoppage of traffic and turn movements will be permitted, using trained flagging procedures. During work at the intersections, the Contractor shall maintain a minimum of one 12' wide northbound and southbound lane on Euclid Avenue, San Antonio Avenue, and Mountain Avenue.

If at any time during the course of construction the City Engineer, or his representative, deems traffic control measures are inadequate, or construction impacts to traffic are too great, the Engineer may require changes be made to the traffic control. Any and all costs as a result of traffic control modifications/ changes shall be borne solely by the Contractor.

Payment for this item shall be made at the contract LUMP SUM price bid for Traffic/Pedestrian Control, Public Convenience and Safety, and shall include handing out of construction notices to residents and businesses as described under Section 8.0 of these Special Provisions. No additional compensation will be allowed therefore.

Progress payments shall be pro-rated in proportion to the total value of work completed to date as a function of the total awarded contract amount.

2. Furnish, Install, Maintain and Remove Project Identification Signs:

This item shall include furnishing and installing project identification signs at both approaches to the project in accordance with Appendix "E". Exact locations of these signs shall be determined by the Engineer. The Contractor shall install the project identification signs prior to the start of construction. The 4' x 8' sign panels shall be mounted on 2- 4" x 4" nominal size, redwood posts and shall be placed in holes excavated in the ground. The space around the wood posts shall be backfilled and compacted to finished ground surface with native soil. Sign panels shall be attached to wood posts, with a minimum of 4 bolts or screws of sizes sufficient to carry the imposed load.

Payment for this item shall be made at the price bid per each project identification sign furnished and installed, and shall include maintenance of these signs (including graffiti removal) for the entire duration of the project, removal of the same after completion of the project, and restoration of the parkway affected by the installation and removal of such signs. The above payment shall include full compensation for furnishing all labor, materials, tools, equipment, time, and incidentals, and for doing all the work involved in furnishing, installing, and removing the signs as specified herein.

3. Construction Surveying:

This item includes, but is not limited to, surveying and construction staking in order to provide vertical and horizontal control necessary for this project. The Contractor shall hire a licensed land surveyor to inspect the project limits and identify all survey monuments found. The project shall be inspected following the City's Notice to Proceed and prior to beginning construction. The Contractor's surveyor shall submit to the City a letter stating that a reasonable and diligent field search was conducted and list the monuments found. The letter shall be submitted to the City prior to construction.

Contractor shall perform construction staking as required on this project. Construction stakes or marks shall be set and maintained as necessary to achieve the required accuracy set forth on the Plans and Specifications.

The Contractor shall assist the Engineer for final elevation checks, if necessary. Such checks shall be made at randomly selected points.

Any questionable grade, elevation, location or design shall be brought to the immediate attention of the Engineer in writing for clarification prior to construction. Any additional survey required to correct such construction shall be at the sole expense of the Contractor, and no additional compensation will be made therefor.

The City reserves the right to verify all staking and monumentation for horizontal and vertical accuracy. Any staking, monuments or reference points (centerline ties) found to exceed allowable error shall be reset at the sole expense of the Contractor, and no additional compensation will be made therefore. All work shall be done by or under the direction of a Professional Land Surveyor or a Registered Civil Engineer licensed to practice land surveying. Copies of all grades sheets and corner records shall be provided to the Engineer.

Full compensation for conforming to the requirements of this item, including furnishing all labor, tools, equipment, documentation and materials for doing the work and resetting monuments shall be included in the contract LUMP SUM price bid, and no additional compensation will be allowed.

4. Storm Water Pollution Prevention Plan & Implementation:

As part of this project, the Contractor shall provide a site-specific Storm Water Pollution Prevention Plan (SWPPP) to the City prior to commencing construction. The Contractor shall ensure that the SWPPP for all work is developed and amended or revised by a Qualified SWPPP Developer (QSD). The SWPPP shall conform to the requirements in the Permits, and these Special Provisions.

The objectives of the SWPPP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and to identify, construct, implement, and maintain water pollution control measures, hereafter referred to as control measures, to reduce to the maximum extent practicable (MEP, as defined in Title 33 CFR of the United States Code) pollutants in storm water discharges from the construction site both during and after construction is completed under this contract.

This item shall include all work involve in compliance with the requirements of Section 30.0, “NPDES Requirements,” including Subsections 30.1 thru 30.3 of the General Requirements of these Special Provisions.

Payment for this item shall be at the contract LUMP SUM price bid for Storm Water Pollution Prevention Plan & Implementation, and shall be considered as full compensation for preparing and implementing the SWPPP, furnishing all labor, materials, tools, equipment, time, and incidentals for doing all work involved in construction of this item, and no additional compensation will be allowed therefore. Payment shall be based on progress of the work completed at the City’s discretion.

5. Furnish Record Drawings:

This item shall include furnishing the City with a set of “Record Drawings” or “red-lined” plans for this project showing all changes and/or modifications made to the original plans during construction, in accordance with Section 1-25.0, “Record Drawings (As-Built Drawings),” of these Special Provisions. These changes shall be noted with a red pen and may be made directly on the set of plans given to the Contractor. This work shall be done as work in the field progresses, and not at the end of the project, in order to document changes more accurately.

Payment for this item shall be made at the contract LUMP SUM price bid for Furnish Record Drawings, and shall include all labor, materials, tools, equipment, time, and incidentals necessary to complete this work. No additional compensation will be allowed or paid for.

6. Potholing and Utility Verification:

This item shall include potholing as required on this project for the construction of the project. Potholing shall include excavating and exposing connection points and any potential interfering utilities (including interfering utilities for appurtenance laterals), noting depth and utility characteristics, and providing data to the City. The horizontal and vertical position of existing underground utilities, including existing water mains, as shown on the drawings, has been determined by record. The Contractor shall excavate the utilities shown to be within the construction area, and verify their position before excavating for improvements. This excavation shall be coordinated with the City. Any variation from the positions shown on the drawings with the position determined by verification shall be immediately reported to the Construction Manager.

Adjustments to the alignment and depth of the proposed water main to the connection details as shown on the drawings shall be made based on the actual position and condition of the exiting utilities as determined from the above verification.

Where underground main distribution conduits such as water, gas, sewer, electric power, telephone or cable television are shown on the Plans, the Contractor, for the purpose of preparing a Bid, shall assume that reservoir property will be served by a service connection for each type of utility.

As provided in Section 4216 of the California Government Code, at least two (2) working days prior to commencing any excavation, the Contractor shall contact the regional notification center (Underground Service Alert of Southern California) and obtain an inquiry identification number.

The Contractor's attention is directed to Section 5, "Utilities," Subsection 5-1, "Location'" of the SSPWC, and Section 1-3.0, "Utility Location," of these Special Provisions.

Contractor shall submit potholing data on a set of plans showing date and depths of all utilities to the Construction Manager at least 7 working days prior to beginning any construction.

Payment for this item shall be made at the contract LUMP SUM price bid for Potholing and Utility Verification, and shall include all labor, materials, tools, equipment, time, and incidentals necessary to complete this work, and no additional compensation will be allowed or paid for.

7. Trench Shoring, Sheeting, and Bracing:

This item shall include designing, furnishing, installing and removing temporary trench shoring systems for the construction of water improvements, in accordance with Subsections 7-10.4.1, "Safety Orders," and 306-1.1.6, "Bracing Excavations," of the SSPWC; and State of California Division of Occupational Safety and Health (Cal/OSHA) Construction Safety Orders. Full compensation for compliance with the provisions specified and referred to hereinabove shall be considered as included in the contract LUMP SUM price bid for Trench Shoring for Water Improvements, and shall be paid based on the percentage of completed work to date. No additional compensation will be allowed therefore.

Payment for Trench Shoring for Water Improvements shall be considered full compensation for obtaining all permits, as required for the entire project, from all related agencies including, but not limited to, private and public agencies. The compensation shall include the compliance with the requirements specified in those permits; payment of all required fees; all clearing, grubbing, removals, adjustments, and relocations required to complete the work and not covered by separate bid items; all labor, tools, equipment, time, personnel, materials, and incidentals necessary to perform all related items of work, including preparation of shoring plans by a Professional Engineer, licensed in the State of California, and processing of shoring plans for approval by the Engineer and other agencies, as required. No additional compensation shall be allowed.

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SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 GENERAL

The work to be performed under this/her contract shall consist of furnishing all plant, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the City of Upland (Agency).

1.2 DEFINITIONS APPLICABLE TO TECHNICAL SPECIFICATIONS

The following words have the meaning defined in the Technical Portions of the work:

A. Indicated - A word used to direct the Contractor to information contained on the drawings or in the specifications. Terms such as “shown” “noted” “scheduled” and “specified” also may be used to assist in locating information but no limitation of location is implied or intended.

B. Furnish - To supply and deliver to the site, to unload and unpack and install.

C. Install - Defines operations at the site including assembly, erection, placing, anchoring, applying, shaping to dimension, finishing, curing, protecting, testing, startup, and cleaning, ready for the City’s use.

D. Provide - Furnish and install, ready for the intended use.

E. Installer - A person or firm engaged by the Contractor or its subcontract or any subcontractor for the performance of installation, erection, or application work at the site. Installers must be expert in the operations they are engaged to perform.

F. Owner, City, or Agency – City of Upland.

G. Construction Manager and Engineer – Richard Brady & Associates.

1.3 CONTRACT DOCUMENTS

A. The Contract requires, but is not limited to, completion of all work in accordance with the Contract Documents and the following: The Standard Specifications for Public Works Construction (SSPWC), 2018 edition.

B. Cross References to portions of the specifications is made for clarifications only, and lack of such references shall not limit the enforcement of all applicable specifications.

C. The Contract documents are complementary, and what is required by one shall be binding as if required by all, in accordance with the order of precedence set forth herein. The intention of the Documents is to include all labor, materials, equipment, services, and other items necessary for the proper execution and completion of the work. Unless otherwise specifically noted, the Contractor shall provide and pay for all labor, materials, equipment, services, tools, construction equipment and machinery, utilities, transportation, and other facilities and services including temporary piping, pumping, power generating, dewatering equipment and all other equipment, materials and labor necessary for the proper execution and completion of the work.

D. The organization of the specifications into divisions, sections, parts, and paragraphs, and the arrangement of drawings shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade.

E. The Contract Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. The Contractor shall field verify all dimensions. Do not scale the drawings. The architectural, structural, civil, mechanical, electrical, instrumentation and landscape drawings and details shall be consulted in connection with the mechanical installations. Where the exact locations of fixtures and equipment are not definitely established, the Contractor shall field verify and shall confirm his/her information with the Engineer. The Contractor shall follow the Contract Drawings in laying out the work and shall continually check the various trades to verify that sufficient space is available for the installation of the work. Maximum headroom and space conditions shall be maintained at all points. Where headroom and space conditions appear inadequate, the Engineer shall be notified before proceeding with installations.

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall carefully investigate the structural and finish conditions affecting his/her work including existing materials and dimensions and shall arrange his/her work accordingly, furnishing such formwork, structural members, fittings, valves, transitions, pull or junction boxes, and accessories as may be required to meet such conditions, at no additional cost to the City.

The Contract Drawings and specifications are intended to be fully cooperative and to agree but should any discrepancy or apparent differences between plans and specifications come to the attention of the Contractor, or should errors of other affect the work, the Contractor shall notify the Engineer immediately. If the Contractor is aware the work is affected and proceeds with the work without instructions from the Engineer, the Contractor shall make good any resultant damage or defects. All questions regarding the interpretation of plans and specifications shall be clarified by the Engineer whose decision shall be final. Any work called for by the plans which are not mentioned in the specifications, or vice versa, is to be furnished as though

fully set forth by both. Where not specifically stated otherwise, all work and materials necessary for each unit of construction, including special construction for any specific brand or shape of materials called for, even though only briefly mentioned or indicated, shall be furnished and installed fully and completely as part of this/her Contract. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in performing the Contract.

Bidders shall read each and every clause of the specifications, examine the drawings, and shall satisfy themselves by personal investigation of the site as to local conditions including the locations of utilities and other structures. Information derived from record plans, specifications, drawings, or from the Engineer or his/her assistants should be regarded as approximate only and should be approached with caution. A soils report has been prepared by American Geotechnical, Inc. for the project, and is included in Appendix G. The Bidder shall determine the actual conditions and requirements of the work, the character and amount of all classes of labor and materials that may be required, and all circumstances and conditions that may affect the cost of the work. The Bidder in the bid shall include prices, any and all expenses and costs that may be necessary to complete the project in accord with the requirements of the Contract.

1.4 WORK BY OTHERS

A. The Contractor's attention is directed to the fact that work may be conducted at or adjacent to the site by other Contractors during the performance of the Work under this/her Contract. The Contractor shall conduct his/her operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform work under their respective contracts.

B. Interference with Work on Utilities: The Contractor shall cooperate fully with all utility forces of the City or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the work, and shall schedule the Work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

C. The Contractor shall coordinate his/her work so as to not interfere with Water Facility Authority (WFA) Water Treatment Plant operations; the San Antonio Water Company (SAW Co.) well operations; West End well operations and City of Upland wells. Connections to other facilities shall be coordinated in advance to ensure only short duration interruptions of facilities.

1.5 PROJECT DESCRIPTION/SCOPE OF WORK

Replacement of the 7.5 MG Reservoir 15 at 17th Street and Benson Avenue will require construction of a new circular pre-stressed concrete reservoir, built to AWWA D110 Type 1 Standard, machine wrapped on approximately 2.1 acres of land adjacent to Reservoir 15. The roof will be concrete, column supported with 24-inch diameter columns. Interior baffles will be used to provide improved circulation within the reservoir.

Generally, this/her project includes construction of new reservoir to current standards; site improvements including excavation, grading and paving; construction of an impoundment area; construction of new pipelines and piping relocations; and construction of a landscaping improvements. Other water improvements to incorporate in the project include, stairs for reservoir roof access for inspection and maintenance, a new chlorine solution storage tank and injection pumps, and a water sampling pump with online analyzers for chlorine residual, pH, and turbidity. The existing Reservoir 15 must remain in service throughout the duration of this/her project.

In addition to the 7.5 MG Reservoir construction and its appurtenances, the work shall include the demolition and reconstruction of the Plant 7 Pump Station. This/her pump station is critical to the City of Upland's potable water distribution system, therefore, each of the five (5) pumps must be replaced one pump, motor, piping with appurtenances at a time. Each replaced pump will be tested and accepted by the City before another pump is replaced.

Other cast-in-place concrete structures include a vault on the 36-inch reservoir outlet pipeline, underdrain pump station, valve vault on the 48-inch plant pipeline and chlorine containment basin.

Yard piping and valve components of the Work include the connection to an existing 48-inch welded steel pipeline and new 36-inch reservoir inlet pipeline with isolation valves, flow meter, modulating ball valve and connections to two well pipelines; a 36-inch outlet pipeline with isolation valves and flow meter; new 10-inch pressure reducing valve with a connection to the Plant 7 pump station discharge header and 20-inch connection to the suction header; a 36-inch reservoir overflow pipeline; and 12-inch reservoir drain line and 4-inch reservoir underdrain lines connected to a new duplex submersible pump station. In addition, the Work includes:

- Erosion control and drainage structures, site grading and earthwork import/export, construction of improvements to adjacent properties and streets.
- Construction of earthen infiltration basin and bio-swale to contain storm water runoff and reservoir overflows.
- New site fencing and modifications to existing fencing at Well 25.
- Temporary facilities, mobilization, storage areas, site access and accessibility restrictions with existing electrical power facilities.
- Street improvements fronting the site along 17th Street.
- Reservoir architectural features and treatments.
- Permits as required.
- Installation of security systems.
- Power and communication systems.

- Landscaping around the site.

1.6 SEQUENCE OF WORK

1.6.1 Prior to demolition or construction activities, the Contractor shall submit a construction phasing plan conforming to the requirements of Section 01115 – Construction Sequence for the Engineer's review and approval prior to commencing work. The phasing plan shall identify utility shutdown requirements for the Agency as well as other agencies, coordination with WFA and SAW Co., coordination with the power company and phone company, and all other major milestone activities and environmental compliance requirements.

1.6.2 The City will, at all times, make the decision of the appropriateness and readiness for any shutdown. The City may cancel a shutdown, up to the last minute at no additional cost to the City if:

1.6.2.1 The Contractor is not ready at the designated time with all required labor, materials, and equipment to perform the work.

1.6.2.2 In the opinion of the City, the weather will severely impact the length of the shutdown, quality of the finished work product or ability of the Contractor to perform the work.

1.6.2.3 City's operational personnel have determined that the shutdown is not timely due to operational circumstances or due to unforeseen circumstances.

1.7 STORMWATER POLLUTION PROGRAM

Contractor shall comply with the requirements of the San Bernardino County Storm Water Program – Construction Run-Off Manual. The Contractor, prior to beginning any construction activities, shall have all Best Management Practices required by this/her manual in place. The Contractor shall be responsible for maintaining all of these BMP's throughout the construction period

1.8 ENVIRONMENTAL PROVISIONS

The following mitigation measures are required by the Contractor as part of the Project:

1. Contractor shall install temporary construction light fixtures that direct lighting downward to prevent any spill and glare on neighboring properties.

2. Contractor shall operate all construction equipment, and any electrical generator(s) for construction activities in accordance with SCAQMD rules and regulations.

3. Contractor shall comply with all City policies pertaining to short term construction emissions, including periodic watering of the site and prohibiting grading during second stage smog alerts and when wind velocities exceed 15 miles per hour.

4. Contractor's grading operations shall be conducted in compliance with SCAQMD Rule 403 (Fugitive Dust).

5. Contractor shall implement dust control measures during site disturbance activity, including, for example, regular watering in accordance with SCAQMD Rule 403.

6. In case of an accidental discovery of historical or unique archaeological resources, the Contractor shall immediately halt construction activity and promptly notify the City of the discovery. The City shall then retain a qualified archaeologist to evaluate the discovery. If the find is determined to be a unique historical or archaeological resource, appropriate protection and preservation measures shall be taken in accordance with Section 15064.5 of the California Environmental Quality Act (CEQA) and Public Resources Code Section 21082.

The cost for complying with the mitigation measures listed above shall be included in the appurtenant items of the Bid Proposal and no additional compensation shall be allowed.

1.9 TRAFFIC ACCESS

The Contractor shall perform all operations so that public traffic is maintained (traffic access to all local streets throughout construction). Closing of City streets (including temporary closures) will not be permitted by the City.

1.10 POWER AND TELEPHONE SERVICE

The Contractor is responsible for coordinating power and telephone service to the project site, and all installing conduit, pull rope, transformer slab box, and other required project elements in accord with Southern California Edison Company and AT&T requirements. The work may require abandonment of existing power, telephone, and cable TV services. The Contractor is responsible for the abandonment of these facilities, including coordination with the utility companies.

1.11 GEOTECHNICAL STUDIES

A geotechnical study was prepared by American Geotechnical Inc., Yorba Linda, CA and is included in Appendix C. The report was developed for design purposes and is based upon a limited number of observations. Actual field conditions may differ. The Contractor is responsible for providing supplemental geotechnical information, that the Contractor determines is necessary for proper prosecution of work.

1.12 CONTRACTOR YARD

The Contractor may use the adjacent property north of the gravel road from Benson Avenue to Well 25 as a yard for construction operations, as shown on the Drawings. The Contractor may not store material or equipment outside the property limits of this/her parcel.

1.13 GROUNDWATER

Groundwater is not anticipated on this/her site per the geotechnical study. However, if groundwater is found or saturated soil conditions occur in excavations, the Contractor shall make provisions as required for handling and disposing of groundwater.

1.14 SURVEYS

The Contractor is responsible for conducting all surveys necessary to construct the project. The cost of all survey work will be included in the Contractor's bid proposal for the project.

1.15 PROJECT MEETINGS

A. Preconstruction Conference:

1. Seven days prior to the commencement of Work at the site, a preconstruction conference will be held at the City and shall be attended by the Contractor's project manager, his/her Superintendent, and his/her subcontractors as the Contractor deems appropriate.

2. Unless previously submitted to the Engineer, the Contractor shall bring to the conference a copy of each of the following:

   a. Procurement schedule of major equipment and materials and items requiring long lead time

   b. Shop Drawing/Sample submittal schedule

   c. Preliminary schedule of values (lump sum price breakdown) for progress payment purposes

3. The purpose of the conference is to designate responsible personnel, establish a working relationship and to clarify communication protocol between the Construction Manager and the Contractor. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date. However, the Contractor shall be prepared to discuss all of the items listed below.

   a. Community relations

   b. Contractor's tentative schedules

   c. Transmittal, review, and distribution of Contractor's submittals

   d. Processing applications for payment

   e. Maintaining record documents

   f. Critical work sequencing. Delivery schedule for long lead time items.

   g. Connections to existing facilities and shutdown coordination

   h. Field decisions and change orders

   i. Use of project site, office and storage areas, security, housekeeping, and City's needs

   j. Major equipment deliveries and priorities

   k. Equipment access to site

l. Storm water pollution prevention

m. Site maintenance and cleanliness

4. The Construction Manager will preside over the preconstruction conference and will arrange for the keeping and distribution of minutes to all persons in attendance. Attendance by the Contractor is mandatory.

5. The Construction Manager will conduct weekly or bi-weekly construction progress meetings. Attendance by the Contractor or his/her representative (Superintendent) and all subcontractors actively engaged in work on the site is mandatory. The minutes of such meetings will be distributed for comments.

PART 2 – NOT USED

PART 3 – NOT USED

*** END OF SECTION ***

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. Payment for the various items of the Bid Proposal, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor and services, operations, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work in accordance with the requirements of the Contract Documents and all appurtenances thereto, including testing of the work, to produce complete and properly operating facilities, and including all costs of permits. Compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Proposal, and all costs therefore shall be included in the prices named in the Bid Proposal for the various appurtenant items of Work.

B. Work related to these Contract Documents shall include, but not be limited to mobilization/demobilization, demolition, dewatering, traffic and pedestrian control, construction surveying, storm water pollution prevention plan, furnish record drawings, excavation and backfill, select material structural backfill, pavement, cast in place concrete, new 7.5 million gallon pre-stressed concrete reservoir, yard piping, miscellaneous valves, pipe supports, coupling and appurtenances, new chlorine facilities, demolition and reconstruction of the Plant 7 Pump Station, painting and coating, landscape restoration, fencing, and electrical controls and instrumentation.

1.2 MEASUREMENT AND COMPENSATION

The lump sum amount to be paid for the Work in the Proposal shall include full compensation for furnishing all labor, materials, tools, equipment, time, and incidentals necessary to complete the work, and for performing all work contemplated and embraced under the Contract, in accordance with the Plans and Specifications. This shall include the Contractor's costs involved with bonding, insurance, worker's compensation, overhead, financing, obtaining required permits and permit fees, public convenience and safety, protective barricading, sheeting and shoring, sanitary facilities, storage of equipment and materials, security against theft and vandalism, project site maintenance, dust and runoff control, clean-up and all other items incidental to the work.

1.3 BREAKDOWN OF CONTRACT PRICE OF LUMP SUM CONTRACTS/SCHEDULE OF VALUES

Prior to execution of a lump sum contract, the Contractor shall submit a detailed price breakdown showing the allocated portion of the total bid price to the various items of work. The Contractor must submit a preliminary price breakdown for the review and approval of the Engineer. The Engineer reserves the right to reject any breakdown submitted by the Contractor which the Engineer judges is insufficient to allow for the preparation of accurate monthly progress payment estimates. The detailed price breakdown shall be listed by specification section number and shall include a separate cost item for all items of equipment and work. The price breakdown shall typically be a unit price type breakdown and shall include quantities, unit prices and total bid cost for each cost item. Where a unit price breakdown is judged impractical, the Engineer may allow a breakdown by lump sum for certain cost items. This information will be used by the Engineer in preparing monthly progress payment estimates.

PART 2 – NOT USED

PART 3 – NOT USED

*** END OF SECTION ***

SECTION 01115

CONSTRUCTION SEQUENCE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The Contractor shall participate in regularly scheduled meetings to develop and implement the work described herein, and for all other work items that affect the water facility operations at the City of Upland, water wells operated by West End Consolidated Water Company (WECW Co.) and San Antonio Water Company (SAW Co.) and the Water Treatment Authority (WFA) Agua De Lejos Water Treatment Plant.

B. Contractor shall perform all construction activities so as to avoid interference with operations of the facility and the work of others.

1.2 DEFINITIONS

A. The term winter period is defined as November 1 through April 30.

B. Owner - City of Upland.

C. Engineer – Richard Brady & Associates

D. Construction Manager – City of Upland Authorized Agent (Richard Brady & Associates).

1.3 RELATED SECTIONS

A. The work of the following sections applies to the work of this section. Work of other sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1. 01010 Summary of Work
2. 01025 Measurement and Payment
3. 02050 Demolition
4. 02667 Hydraulic Structures Testing and Disinfection
5. 11214 Vertical Turbine Can Type Pumps
6. 15050 Piping, Valves, and Accessories
7. 16950 Electrical Testing

1.4 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish the following submittals in accordance with specific requirements in each specification section and Section 23.0 – Shop Drawings as described in the Special Provisions.

1.5 PLANT AND WELL SHUTDOWNS

A. The plant and well shutdowns will be permitted, subject to the requirements specified herein. Continuous operation of the water treatment plant shall be maintained throughout construction except for approved scheduled shutdowns.

1.6 SEQUENCING AND OPERATIONS

A. Work under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption to the operation of existing reservoir, water treatment facilities and wells. The Contractor shall submit to the Construction Manager a construction schedule covering the reservoir and yard piping construction sequence activities before any work begins. Any work requiring a plant, pipeline, process, or electrical shutdown can only be attempted during winter months (November 1 to April 30). The Owner shall be the sole judge of the ability to temporarily remove the plant, pump station or well from service, while concurrently maintaining adequate water supply. The Owner has the right to approve or disapprove all requests by the Contractor for facility shutdowns. At any time, the Owner has the right to cancel all previously approved shutdowns if the Owner deems that due to water delivery requirements, the facility in question must remain in operation.

B. In order to maintain a continuous water delivery operation during construction, a construction sequence schedule will be developed for all construction activities associated with constructing and placing the new reservoir into operation. Procedural steps, time and scheduling constraints will be outlined within each activity to assist the Contractor in developing a sequence of work and timing in order to maintain continuous operation of all existing water supply facilities.

C. The Contractor shall develop a detailed description of the complete sequence of construction for all of the construction events contained in the Contract Documents. At the sole discretion of the Construction Manager and the Owner, deviation from these suggested sequences is permitted if techniques and methods known to the Contractor will result in reducing the disruption of the facility operation and is concurred with the Construction Manager and the Owner. The detailed plan shall describe the Contractor's length of time required to complete the temporary power, controls, instrumentation or alarms required to maintain control, and the labor, materials, and equipment which the Contractor shall provide to ensure proper operation of the affected facilities. The detailed plan shall be submitted to the Construction Manager for review and approval sixty (60) calendar days before the specific work begins. In addition, the construction sequence plan shall describe the Contractor's contingency plan that shall be initiated in the event that the temporary facilities fail or it becomes apparent that the time constraints cannot be met. The contingency plan shall conform to all specified outage requirements. All costs for preparing and implementing both the outage and contingency plans shall be borne by the Contractor.

The Contractor shall notify the Owner in writing at least seven (7) calendar days in advance of the required outage if the schedule for performing the work has

changed or if revisions to the construction sequence plan are required. Materials, equipment and tools necessary to complete each construction sequence plan shall be on-site and verified by the Construction Manager seven (7) calendar days prior to any construction sequence activity.

D. The Contractor shall provide written confirmation of the outage date and time seven (7) calendar days prior to the actual outage. The Contractor, at his/her own expense, shall provide temporary power generators whenever and wherever necessary to ensure a continuous power supply to all plant facilities.

E. No work relating to plant shutdowns will be allowed until all new piping, valves, etc., have accepted shop drawings and have been delivered to the project site. Plant, pipeline, process, or electrical shutdowns can only be allowed during the winter months (November 1 to April 30). All stored materials to be utilized in the construction sequence plan related work shall be approved by the Construction Manager prior to installation.

F. Several major connections to existing piping will be necessary to complete the work. Shutdown(s) not exceeding eight (8) hours will be allowed to complete the connections to existing piping, unless specified otherwise. The shutdown time will be measured from the time the pipeline, pump station, etc. is dewatered by the Contractor. The Contractor shall combine as many connections as possible into a single shutdown. The Contractor will be responsible for controlling any and all leakage resulting from or integral to making all piping connections, and will provide any and all devices required to control, stop, divert, or dispose of any and all leakage, including dechlorination.

G. All new electrical equipment must be in place and operational before existing electrical equipment can be removed from service. All work required for electrical switchovers must be accomplished during plant shutdowns.

H. All existing automatic and manual control systems and all recording and indicating instruments shall be maintained in continuous operation for the entire construction period. The Contractor shall supply any temporary wiring, instrumentation, or other facilities necessary to maintain continuous operation.

I. The Contractor must maintain the accessibility to Upland's existing reservoir and its appurtenances, the Colony Pump Station and Plant 7 Pump Station primary access road at all times. The Contractor shall schedule his/her activities to avoid potential conflicts with chemical truck deliveries. Chemical truck deliveries will always take precedence over any construction activities.

J. The Contractor shall maintain all plant security features (i.e., perimeter security fencing, cameras, etc.) operational at all times throughout the duration of the project. All area lighting, fencing, and other security measures must be continuously maintained. The Contractor shall provide all additional necessary utilities, facilities, or security personnel that are required to maintain the security of the project site and adjacent areas due to his/her operations.

K. The Contractor shall maintain all existing water systems in service until the new facilities are operational.

L. All operations of existing valves and gates required for the work shall be done by the Owner. No valve, gate nor other item of equipment shall be operated without the Owner's knowledge.

1.7 CONSTRUCTION SEQUENCE PLAN

The detailed construction sequence plan for construction, acceptance testing, and commissioning of the new facilities must be developed by the CONTRACTOR for the following major areas of work, per the guidelines presented herein. A suggested work sequence is included at the end of this section.

A. CONSTRUCTION SEQUENCE PLAN - New 7.5 MG Reservoir and associated yard piping and partial demolition and reconstruction of the Plant 7 Pump Station.

1. The following construction constraints and requirements must be used as a guideline in preparing the construction schedule:

   a. Mobilization.
   b. Confirm the survey datum.
   c. Demolition of existing facilities as shown on Drawing D-1.
   d. Pothole all connections and pipeline crossings to obtain information needed for shop drawing preparation and pipe fabrication.
   e. Mass excavation and export of unsuitable materials.
   f. Construct the new reservoir.
   g. Completion of other necessary items of Work, including railing installations; sample pumps; all piping systems, including overflow, drainage structures; lighting; and accessibility systems (stairs, ladders, etc.).
   h. Construct the reservoir metering turnout structure as shown on Drawing M-5.
   i. Make the 36"x48" cross connection as shown on Drawing M-2, including the 36-inch valve as shown. Do not construct the vault at this time.
   j. Connect the new 36-inch reservoir outlet pipeline to the existing 20-inch reservoir outlet pipeline.
   k. Pressure testing. All piping shall be tested and approved.
   l. Testing of the new reservoir (including all remedial work such as crack repairs, concrete surface repairs, applications of coatings, etc.) and disinfection shall be satisfactorily completed.
   m. Place the new reservoir into service.
   n. The Owner will drain the existing reservoir once the new reservoir is in service and has been beneficially accepted by the Owner.
   o. Construct the valve vault as shown on Drawing M-2.
   p. Connect the 20-inch Colony Booster to the 36-inch reservoir outlet pipeline.

1.8 INVESTIGATION OF EXISTING FACILITIES AND UTILITIES

The Contractor's attention is directed to the major connections to existing pipelines and structures that are required for this project. All work described in this Section must be reflected in the Contractor's original lump sum bid amount. This work includes, but is not

limited to, the work identified above, and miscellaneous other facilities including all water piping, drainage piping, and electrical conduits.

The Contractor will be required to locate all affected facilities prior to the fabrication and ordering of any materials and shall notify the Construction Manager of any deviations from the anticipated conditions. Specifically, the Contractor must accurately locate all existing major pipelines and new points of connection. Also, each new pipeline route must be potholed prior to the fabrication of new pipe to determine if existing conditions conflict with the proposed layout. Information such as vertical elevations, pipe outside diameters, joints, materials of construction, shape, and pipe conditions must be obtained prior to beginning work in the affected area and this information shall be transmitted to the Construction Manager. The Engineer shall make any necessary adjustments to the drawings to reflect the actual field conditions. No additional payments will be made to the Contractor for any required adjustments in the drawings unless the Contractor can prove his effort has been significantly impacted by the necessary changes. Pipe deviations requiring less than three (3) feet of additional pipe in any direction will be not considered for extra payment. No payment will be allowed for special transition couplings or jointing materials required for connections to existing pipelines.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION

3.1 EXAMINATION

Contractor shall visit the site and become aware of existing conditions that may affect the sequencing of the work, and include provision in the bid price for same.

3.2 PARTIAL UTILIZATION/BENEFICIAL USE

Incremental acceptance of portions of the work identified in Part 1 of this Section is required to allow selected systems and/or equipment to be put into operation during construction. Operation and maintenance information, start-up requirements, training, and partial utilization issues will be addressed by the contractor for each task in the special construction sequence.

1. Coordinate Operation and Maintenance Information requirements, as specified in Section 01730, Operation and Maintenance Manuals, with construction sequencing requirements.
2. Coordinate Facilities Start-up requirements, as specified in Section 01800, Testing, Training and Facility Start Up with construction sequencing requirements.
3. Coordinate reservoir and pipeline system testing and disinfection, as specified in Section 02267, Hydraulic Structures Testing and Disinfection, with construction sequencing requirements.
4. Coordinate Project Closeout requirements, as specified in Section 01700, Project Closeout, with construction sequencing requirements.

END OF SECTION

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SECTION 01200

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowances.

C. Testing and inspection allowances.

D. Schedule of Values.

E. Application for Payment.

F. Change procedures.

G. Defect assessment.

H. Unit prices.

I. Alternates.

1.2 SCHEDULE OF VALUES

A. Submit printed schedule on Progress Estimate schedule on EJCDC C-620 or Contractor's standard form or electronic media printout will be considered for this use.

B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.

C. Format: Use Table of Contents of these Specifications. Identify each line item with number and title of major Specification Section. Also identify Site mobilization, bonds and insurance, and major work elements.

D. Revise schedule to list approved Change Orders with each Application for Payment.

1.3 APPLICATION FOR PAYMENT

A. Submit 4 copies of each Application for Payment on Contractor's electronic media driven form or EJCDC C-620 - Contractor's Application for Payment.

B. Content and Format: Use Schedule of Values for listing items in Application for Payment.

C. Submit updated monthly construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement.

E. Submit submittals with transmittal letter as specified in Section 01300 – Contractor Submittals.

F. Substantiating Data: When Construction Manager requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Current construction photographs specified in Section 01300 – Contractor Submittals.

2. Partial release of liens from major Subcontractors and vendors.

3. Record Documents as specified in Section 01300 – Contractor Submittals, for review by the Construction Manager, which will be returned to Contractor.

4. Affidavits attesting to off-Site stored products.

5. Construction Progress Schedule, revised and current as specified in Section 01300 – Contractor Submittals.

1.4 CHANGE PROCEDURES

A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.

1. Use CSI Form 13.2A - Request for Interpretation for requesting interpretations.

2. Engineer may respond with a direct answer on the Request for Interpretation form, Clarification Notice, CSI Form 13.3A Clarification

Notice, or Proposal Request CSI Form 13/6A - Change Order Request (Proposal).

D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions.

E. Engineer may issue Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime work required and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 10 days.

F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Engineer.

D. Defective Work will be partially repaired according to instructions of Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Engineer.

E. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of Engineer to assess defects and identify payment adjustments is final.

G. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:

1. Products wasted or disposed of in a manner that is not acceptable.

2. Products determined as unacceptable before or after placement.

3. Products not completely unloaded from transporting vehicle.

4. Products placed beyond lines and levels of the required Work.

5. Products remaining on hand after completion of the Work.

6. Loading, hauling, and disposing of rejected products.

1.6 UNIT PRICES

A. Authority: Measurement methods are delineated in individual Specification Sections.

B. Measurement methods delineated in individual Specification Sections complement criteria of this Section.

C. Take measurements and compute quantities. Engineer will verify measurements and quantities.

1.7 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.

1. Coordinate related requirements among Specification Sections as required.

2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.

3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01300

CONTRACTOR SUBMITTALS

PART 1 – GENERAL

1.1 GENERAL

A. All submittals by the Contractor shall be submitted to the Construction Manager/Engineer.

B. Unless otherwise noted, within 14 calendar days after the date of commencement as stated in the Notice to Proceed, the Contractor shall submit the following items to the Engineer for review:

1. A list of submittals with scheduled submission dates. This list shall include specification section number, description of the submittal, scheduled submission date, and anticipated approval date. The Contractor's schedule shall be based on a minimum of one resubmittal for each shop drawing and sample.

2. A list of all permits and licenses the Contractor is required to obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

C. The Contractor shall be responsible for identifying and delivering all submittals and/or permits required by the Contract Documents.

D. The Contractor shall submit a Storm Water Pollution Plan (SWPPP), where applicable, in accordance with the National Pollution Discharge Elimination System General Permit for storm water discharge associated with construction activities prior to commencing clearing and grubbing operations.

1.2 SHOP DRAWINGS

A. The term "Shop Drawings" as used herein shall be understood to include detailed design calculations, shop drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items.

B. Wherever called for in the Contract Documents, the Contractor shall furnish to the Engineer for review, 4 copies, plus a reproducible copy of each shop drawing submittal.

C. The Contractor shall submit, as applicable, the following for all prefabricated or manufactured structural, and mechanical systems and equipment.

1. Complete manufacturer's specifications, including materials descriptions and paint system.

2. Samples of finish colors for selection.

3. Requirements for storage and protection prior to installation.

4. Installation procedures.

5. List of all requested exceptions to the Contract Documents and/or variations from the specified equipment.

D. All shop drawing submittals shall be accompanied by a transmittal form. Any submittal not accompanied by such a form, or wherever all applicable items on the form are not completed, will be returned for resubmittal.

1. The transmittal forms shall be sequentially numbered. Resubmittals shall have the original submittal number with an alphabetic suffix.

2. Contractor, Subcontractor and/or Supplier shall be identified; pertinent drawing sheet and detail number(s) and specification section number shall be identified on the transmittal forms, as appropriate. On standard drawings or data sheets, clearly indicate model and option being proposed and strike out all non-relevant data.

3. All submittals must be capable of being scanned electronically for filing on a computer file.

E. A separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required.

F. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole.

G. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.

H. Except as may otherwise be indicated herein, the Engineer will return two (2) prints of each submittal to the Contractor with comments noted thereon, within 30 calendar days following their receipt by the Engineer. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item.

I. The Agency reserves the right to withhold monies due the Contractor to cover additional costs of the Design Consultant's review beyond the second submittal.

J. The Design Consultant's maximum review period for each submittal, will be 10 working days. Therefore, for a submittal that requires a second submittal before it is complete, the maximum period for that submittal could be 20 days.

K. If 2 copies of a submittal are returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will

not be required.

L. If 2 copies of a submittal are returned to the Contractor marked “AMEND AS NOTED”, formal revision and resubmission of said submittal will not be required, unless specifically required.

M. If a submittal is returned to the Contractor marked either “AMEND AND RESUBMIT” or “REJECTED-RESUBMIT,” the Contractor shall revise said resubmittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

N. Fabrication of an item shall be commenced only after the Design Consultant has reviewed the pertinent submittals and the Engineer has returned copies to the Contractor marked either “NO EXCEPTIONS TAKEN” or “AMEND AS NOTED.”

O. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

P. All Contractor shop drawing submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the Engineer.

Q. Each submittal shall be dated, signed, and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.

R. The Design Consultant’s review of Contractor shop drawing submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions.

S. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

T. The Engineer may schedule a submittal conference to provide for a rapid review of a submittal, should the project schedule warrant such a review. The Engineer, Design Consultant, Contractor, and a qualified manufacturer’s representative shall attend the submittal conference.

1.3 CONTRACTOR’S SCHEDULE

A. The Contractor’s construction schedules and reports shall be prepared and submitted to the Engineer.

1.4 SAMPLES

A. Whenever, in the Specifications, samples are required, the Contractor shall submit not less than four (4) samples of each such item or material to the Engineer for review by the Design Consultant.

B. Samples, as required herein, shall be submitted for acceptance a minimum of 5 working days prior to ordering such material for delivery to the job site, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in work.

C. All samples submitted to the Engineer shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and the manufacturer's name for identification. Upon receiving acceptance by the Design Consultant, 2 sets of the samples will be returned to the Contractor by the Engineer. One set of samples will be retained by the Design Consultant, and one set of samples shall remain at the job site with the Engineer until completion of the work.

D. Unless indicated otherwise, all colors and textures of specified items presented in sample submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time or price, the Contractor will clearly indicate same on the transmittal page of the submittal.

1.5 OWNER'S MANUAL

A. The Contractor shall submit technical operation and maintenance information for each valve in an organized manner in the Owner's Manual. The manual shall be written so that it can be used and understood by the Owner's operation and maintenance staff. The Design Consultant shall review the manual for completeness, provide comments for correction, and recommend final acceptance of the manual.

B. The Contractor shall furnish to the Engineer seven (7) identical Owner's Manual. Each set shall be labeled and bound in a standard size, 3-ring, loose leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches. A table of contents indicating all equipment in the manuals shall be prepared.

C. Owner's Manuals shall be submitted in final form to the Engineer not later than the 75 percent of construction completion date. All discrepancies found by the Construction Manager in the manuals shall be corrected by the Contractor within working 10 days from the date or written notification by the Construction Manager.

D. Incomplete or unacceptable Owner's Manuals at the 75 percent construction point shall constitute sufficient justification to withhold the amount stipulated in the Contract Documents from any monies due the Contractor.

E. When available from the equipment vendor, the Contractor shall submit one copy of available sections of the final Owner's Manual in an electronic media format. The information shall be provided on a 3-1/2 inch disk in either Word for Windows or ASCII files.

1.6 RECORD DRAWINGS

A. The Contractor shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings.

B. Record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate fully, the work as actually constructed.

C. Record drawings shall be accessible to the Engineer at all times during the construction period.

D. Final payment will not be acted upon until the Contractor-prepared record drawings have been delivered to the Engineer. Said up-to-date record drawings shall be in form of a set of prints with carefully plotted information overlaid in red.

E. Upon substantial completion of the work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Engineer for transmittal to the Owner, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings on mylar reproducibles showing the reported location of the work. The information submitted by the Contractor in the Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Record Drawings as a result.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 SCHEDULE FOR SUBMITTING

A. The Contractor is to recognize the time and sequence related to the submittals required by the Contract Documents. Therefore, the Contractor shall demonstrate competency in preparing and delivering submittals.

B. The Contractor will not be granted additional contract time or compensation due to delays associated with submittals. In addition, the costs associated with expedited review of a submittal or a submittal conference may be withheld from monies due the Contractor by the Owner to cover additional costs of the Engineer's and Design Consultant's review.

END OF SECTION

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SECTION 01500

TEMPORARY FACILITIES

PART 1 – GENERAL

1.1 PRECAUTIONS AGAINST WEATHER

During adverse weather conditions and against the possibility of such conditions, the Contractor shall take all necessary precautions so that the work shall be properly protected in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other approved means. All means of protection shall be approved by the City prior to their use.

1.2 WATER SUPPLY

The Contractor, at his own expense, shall provide all water necessary for his operations. The Contractor shall coordinate all efforts necessary to obtain water for use during the execution of the work.

1.3 ELECTRICAL ENERGY

A. The Contractor shall be responsible for all coordination efforts, submittal of all required applications, and payment of all fees and assessed charges to obtain electrical energy for power and lighting during the execution of the work. All costs for power supplied to the Contractor during the completion of the work shall be borne by the Contractor. All costs for temporary facilities including wiring, switches, connections and meters shall be borne by the Contractor.

B. The Contractor shall provide sufficient electric lighting so that all work may be properly conducted when there is not adequate daylight in the work area.

C. The use of portable generators shall not be allowed for providing electrical energy on this project.

1.4 SANITARY FACILITIES

A. The Contractor shall provide adequate sanitary conveniences for the use of those employed in the completion of the work. Such conveniences shall be made available when the first employees arrive on the work, shall be properly secluded from public observation, and shall be constructed, maintained in suitable numbers, and at such points as may be required or approved.

B. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the work, on the lands of the City, or on adjacent property.

1.5 FIELD OFFICE

An office trailer, if desired by the Contractor, may be located with the Contractor staging area as shown on Drawing C-1.

1.6 FIELD OFFICE FOR ENGINEER/CONSTRUCTION MANAGER

An office trailer shall be provided for the Engineer/Construction Manager for the duration of the project. The office shall be at least 12-feet wide and 40-feet in length. It shall be wired for electricity and include air-conditioning, overhead lighting, and windows. The office trailer shall include a restroom and contractor shall include a cleaning service at twice per month for the duration of the project. The trailer will be positioned inside the Contractor's allocated staging area as shown on Drawing C-1. Equipment to be provided:

2 each - Standard 30x60-inch desk with not less than 3 drawers with office chairs.

1 each - Plan table, 36x72-ich top; 36 inches high.

1 each - Plan rack, capable of holding 6 sets of plans, complete with 6 standards all all metal plan-hold clamps.

1 each - File cabinet, legal size, 4-5 drawers with lock and 3 keys

1 each - Drafting stool with backrest.

2 each - Waste basket.

1 each - Tack board, 36x42-inches.

1 each - White board, 48x60-inches.

2 each - Bookshelves, four shelves, 30x60-inches.

1 each - 4.5 cubic foot Mini Fridge with Freezer

1 each - 2.0 cubic foot Microwave oven

1.7 DEWATERING SYSTEM

Dewatering of local groundwater will be required to construct this project. Requirements for dewatering are included in Section 02140 of this specification.

PART 2 – NOT USED

PART 3 – NOT USED

*** END OF SECTION ***

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Mobilization shall include the obtaining of all permits, licenses, bonds and insurance; moving on to the site of all plant and equipment; furnishing and erecting temporary facilities; all as required for the proper performance and completion of the work. Mobilization shall include, but not be limited to, the following principal items:

1. Moving on to the site of all Contractor's plant and equipment required for operations.
2. Developing/obtaining construction water supply, electrical service, and sanitary facilities.
3. Providing and maintaining a field office for the Contractor.
4. Providing and maintaining a work and storage yard for the Contractor and subcontractors.
5. Obtaining and maintaining all required permits, insurances and bonds.
6. Posting all OSHA required notices and establishment of safety programs.
7. Having the Contractor's Field Superintendent at the job site full time (at all times when construction is in progress).
8. Submitting an acceptable Construction Schedule.
9. Maintaining the site in a clean, safe and orderly condition.
10. Video and photographic documentation of the site conditions prior to the start of construction activities.
11. Having BMP's in place prior to start of construction activities.

B. Demobilization shall include but not be limited to the following principal items/events:

1. Removal of all construction equipment from the site.
2. Removal of all excess construction materials and debris from site.
3. Final projects site clean-up.
4. Restoring any damaged property and obtaining concurrence that the property owners/agencies are satisfied with the way their property was left at the completion of the project.
5. Submitting acceptable "AS BUILT" red line drawings to the owner.
6. Submitting acceptable post construction video inspection DVD's to the Owner.
7. Attending final inspection walk-through with the Owner's staff, Design Engineer and Project Inspection staff.
8. Completion of all items on final "Punch List".

9. Resolving any outstanding claims and agreeing with final pay quantities for project close out.

PART 2 - NOT USED

PART 3 - NOT USED

*** END SECTION ***

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section describes the procedures for locating, protecting and relocating existing underground utilities and surface improvements.

B. Do not perform work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, cable TV, or electric transmission line; any fence; or any other structure, until authorization had been obtained from the Owner of the improvement. Provide the Owner of the improvement due notice of the beginning of work, and remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace in kind.

1.2 UNDERGROUND SERVICE ALERT

A. Except in an emergency, contact the Underground Service Alert at least two working days, but not more than fourteen (14) calendar days prior to commencing any excavation if the excavation will be conducted in an area which is known, or reasonably should be known, to contain subsurface installations, including underground facilities, and obtain an inquiry identification number from that notification center. Do not commence excavation without a current inquiry identification number assigned to the Contractor or any subcontractor of the Contractor, and until the Engineer has been given the number by the Contractor. Comply with all applicable laws and regulations in locating subsurface installations and in excavating.

1. An emergency is defined as a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. An emergency includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.

2. Subsurface installation means any underground pipeline, conduit, duct, wire or other structure.

1.3 EXISTING UTILITIES AND IMPROVEMENTS

A. The Engineer has endeavored to determine the existence of utilities at the site of the work from the records of the Owners of known utilities in the vicinity of the work. The

positions of these utilities, as derived from such records, are shown in the contract documents.

B. No excavations were made to verify the locations shown for underground utilities, unless specifically stated in the contract documents.

C. Prior to submittal of shop drawings, and prior to the commencing of any excavations for new pipelines or structures, conduct investigations, including exploratory excavations and borings, to determine the locations and type of underground utilities and service connections which could result in damage to such utilities. Prepare a report (i.e. potholing report) identifying each utility by its size, elevation, station and material of construction. Immediately notify the Engineer and the utility in writing as to any utility discovered in a different position than as marked in the field or shown in the contract documents, or any utility, which is not marked in the field or shown in the contract documents.

D. Prepare a support plan for each utility crossing detailing the intended support method. Obtain approval from the Owner of the utility prior to excavation of the utility.

E. The number of exploratory excavations required shall be that number, which is sufficient to determine the alignment and grade of the utility. Conform to local agency requirements for backfill and pavement repair subsequent to performing exploratory excavations.

F. Protect all underground utilities and other improvements, which may be impaired during construction operations. Take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

G. Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement, which is at the location shown on the Plans, remove and temporarily replace the utility or improvement in a manner satisfactory to the Engineer and the Owner of the facility. Restore or replace the utility or improvement as nearly as possible to its former locations and to as good, or better condition than found prior to removal.

H. Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility which is not shown on the Plans, or which is not shown in the location indicated on the Plans, work on the utility and payment for such work will be as described below. It shall be the Contractor's responsibility to submit a method for correcting such utility interferences.

1. Main or Trunk Line Facilities

a. Compensation by the Owner or others will be provided for the costs of locating and repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing, relocating, protecting or temporarily maintaining main or trunk line utility facilities not indicated with reasonable accuracy in the contract documents, and for equipment in the project necessarily idled during such work.

b. Alternatively, the Engineer may make changes in the alignment and grade of the work to eliminate the necessity to remove, relocate, or temporarily maintain the utility, or the Engineer may make arrangements with the Owner of the utility for such work to be done at no cost to the Contractor.

c. The Owner of the utility shall have the sole discretion to perform repairs or relocation work or to permit the Contractor to do such repairs or relocation work at a mutually agreed price.

2. Other Utilities

a. When it is necessary to remove, relocate, or temporarily maintain a service connection, the cost of which is not required to be borne by the Owner thereof, the Contractor shall bear all the expenses incidental to the work on the service connection. The work on the service connection shall be done in a manner satisfactory to the Owner thereof; it being understood that the Owner of the service connection has the option of doing such work with his own forces or permitting the work to be done by the Contractor.

b. When it is necessary to remove, relocate, or temporarily maintain a utility which is not shown on the Plans, or is in a position different than that shown on the Plans, and were it in the position shown on the Plans would not need to be removed, relocated, or temporarily maintained, and the cost of which is not required to be borne by the Owner thereof, the Engineer will make arrangements with the Owner of the utility for such work to be done at no cost to the Contractor, or will require the Contractor to do necessary work at no cost to the Owner, or will make changes in the alignment and grade of the work to eliminate the necessity to remove, relocate, or temporarily maintain the utility. Changes in alignment and grade will be ordered at the discretion of the City.

I. No representations are made that the obligations to move or temporarily maintain the utility and to pay the cost thereof is or is not required to be borne by the Owner of

such utility, and it shall be the responsibility of the Contractor to investigate to find out whether or not said cost is required to be borne by the Owner of the utility.

J. The right is reserved to governmental agencies and to Owners of utilities to enter at any time upon any street, alley, right of way, or easement for the purpose of making changes in their property made necessary by the work and for the purpose of maintaining and making repairs to their property.

K. The Contractor shall take precautions to prevent damage to all pavement and other surfaces outside the limits of necessary excavation, whether on public streets, rights-of-way, or private property and roads. All damaged pavement or surfaces on public streets, rights-of-way, or private property shall be replaced or repaired in accordance with accepted standards of the jurisdictional agency. Where the foregoing standards are silent, replace pavement to the existing thickness plus one inch. For the purposes of this section, the terms pavement and surfaces shall be deemed to include base materials.

L. The Contractor is to maintain reasonable access from public and private streets to all adjacent properties at all times during construction. Prior to restricting normal access from public or private streets to adjacent properties, the Contractor shall notify each property Owner or responsible person, informing him of the nature of the access restriction, the approximate duration of the restriction, and the alternate access available for that particular property. All restrictions of normal access shall be approved by the Owner prior to implementing the restriction.

M. To minimize access restrictions to driveways, either backfill, compact and provide temporary pavement or provide steel plates or bridging sufficient to support vehicular traffic across the trench in front of the driveway during nonworking hours. Single access driveways may be closed only during construction activity within the driveway area.

1.4 STREET OR ROADWAY MARKERS

Do not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. Do not perform any pavement breaking or excavation until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for restoration. The Contractor shall be responsible for accurately restoring all survey bench marks, markers or points disturbed by the construction activities after all surface restoration has been completed.

1.5 Approval of Repairs

All repairs to a damaged improvement are subject to inspection and written approval by an authorized representative of the improvement Owner before being concealed by backfill or other work.

1.6 MAINTAINING IN SERVICE

All utilities, including oil and gasoline pipelines, power, and telephone or communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles and overhead power and communication wires and cables encountered along the line of work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the Owner of said utility. The Contractor shall be responsible for and shall repair all damage to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of backfilling.

1.7 NOTIFICATION BY THE CONTRACTOR

Prior to commencing any excavation in the vicinity of any existing underground facilities, the Contractor shall notify the respective authorities representing the Owners or agencies responsible for such facilities not less than 2 working days, and no more than 14 calendar days prior to excavation so that a representative of said Owners or agencies can be present during such work if they so desire.

1.8 PRECONSTRUCTION VIDEO

A. Prior to commencing any work, the Contractor shall prepare a pre-construction video in DVD format to illustrate all areas that may be disrupted by the work. Include on the video right-of-ways, construction access roads, all public and private streets used for access to and from the work site, environmentally sensitive areas, and other such areas as directed by the City that may be disturbed or which are to be protected from the Contractor s operations. Notify the City so that the City may accompany the Contractor during the videotaping. Deliver one (1) copy of the videodisc to the Owner at the pre-construction meeting.

B. The City will review the videodisc for content, coverage and quality prior to the beginning of construction. Retake any portion of the videodisc not of clear focus, color, or adequate coverage, as determined by the City, with a 35 millimeter camera or videodisc. Deliver one (1) copy of the final videodisc and 35 millimeter photographs to the City prior to the commencement of work.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

SECTION 01550

VEHICULAR ACCESS AND PARKING

PART 1 – GENERAL

1.0 CONTRACTOR PARKING

The construction yard shall be used for Contractor parking. The contractor may also park (4) four vehicles on the 17th street if needed. Contractor construction vehicles may not be parked on public streets. Overnight parking of Contractor vehicles on public streets is not allowed.

1.1 Contractor shall follow the "Public Convenience and Safety 7-10 of the Standard Specification for Public Works Construction

A. Add to Subsection 7-10.1 "Traffic and Access", of the Standard Specifications the following:

When entering or leaving roadways carrying public traffic, the Contractor equipment, whether empty or loaded, shall in all cases yield to public traffic. No excavation within five feet of the traveled way shall remain open longer than is necessary to perform the work, and in no case shall remain unfenced or unplated overnight or on weekends.

1.2 The Contractor shall provide and maintain all signs, barricades, pedestals, flashers, delineators and other necessary facilities for the protection of the motoring public within the limits of the construction area and all its approaches, including advanced signing and barricades. Contractor shall also post signs to notify the public regarding the conditions of the roadway.

1.3 This shall be in accordance with the provisions of the Vehicle Code, "California Manual of Temporary Traffic Controls for Construction and Maintenance Work Zones", as published by the State of California, Business, Transportation and Housing Agency, Department of Transportation, and the Work Area Traffic Control Handbook (WATCH) latest edition.

The Contractor may be required to obtain City permit(s) or approvals regarding hauling and traffic control. The contractor will be required to submit a traffic detour plan for approval when temporary traffic lane closures are necessary. The Contractor shall be responsible for coordinating all approvals, paying for and acquiring all traffic related permits with the affected agencies.

1.4 Contractor shall not park any construction equipment or store any building material or supplies on any City street at any time.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 Access to private properties will be maintained at all times during the construction where practical. Prior to restricting normal access to private properties Contractor shall provide notification to each impacted homeowner or business a minimum of 3 working days in advance. In no case, shall access to private property be restricted longer than 24 hours unless otherwise approved by the City.

3.2 The Contractor shall maintain 12-foot lanes of traffic in each direction at all times.

Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related Work.

3.3 Portable delineators shall be spaced as necessary for proper delineation of the travel way. The maximum spacing between delineators should be approximately equal in feet to the speed limit, except that the minimum spacing shall not exceed 50 feet.

3.4 If the traffic cones or portable delineators are damaged, displaced, or are not in an upright position, from any cause, said cones or portable delineators shall immediately be replaced or restored to their original location in an upright position, by the Contractor.

3.5 A flashing arrow sign shall be used for each lane closed on an arterial highway.

3.6 Lane closures may be prohibited by the City on arterial highways, Monday through Friday during peak traffic hours.

3.7 The contractor shall furnish flagmen as necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered. Flagmen, while on duty and assigned to give warning to the public of any dangerous conditions to be encountered, shall perform their duties and shall be provided with the necessary equipment in accordance with the current “Instructions to Flagmen” of the Department of Transportation. The equipment shall be furnished and kept clean and in good repair by the Contractor, at his expense.

3.8 Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately by the Contractor, at Contractor expense.

3.9 Should the Contractor furnish insufficient warning and protective measures as above provided, the City may direct that the necessary warning and protective measures be furnished and installed by the Contractor, at Contractor expense. However, the City shall not be responsible for detecting inadequacies of the Contractor warnings and protective measures. Maintaining public safety by furnishing proper warning and protective devices shall be the sole responsibility of the Contractor.

3.10 <u>PARKING</u>

The Contractor may park vehicles and equipment inside the construction area.

If additional parking is needed, Contractor shall provide off-site parking for Contractor and subcontractor employees as necessary. A total of 4 spaces for parking on Contractor

vehicles may be used on 17th Street. Contractor's equipment is not to be parked on the street, and overnight parking is prohibited. Contractor shall provide transportation (shuttling) for employees to and from the project site as required.

The requirements above, includes delivery vehicles, Contractor/subcontractor vehicles, Contractor/subcontractor employees, vendors and other site visitors.

*** END OF SECTION ***

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SECTION 01630

PRODUCT SUBSTITUTION

PART 1 – GENERAL

1.1 DESCRIPTION

This section describes the procedural requirements for requests for material and equipment substitutions.

1.2 SUBSTITUTION

A. The contract, if awarded, will be on the basis of materials and equipment described in the contract documents without the consideration of possible substitute or "or equal" items. Whenever it is indicated in the contract documents that a substitute or "or equal" item of material or equipment may be furnished or used by the Contractor if acceptable to the Engineer, application for such acceptance will not be considered by the Engineer until after the execution of the contract.

B. The use of approved substitutes or "or equals" shall in no way relieve the Contractor from compliance with the contract documents. The Contractor shall bear all extra cost resulting from providing or using approved substitutes.

C. The listing of any manufacturer or supplier in the contract documents does not, and is not intended to; grant any right, title or interest in the contract for the benefit of the named manufacturer or supplier.

D. Where a material or equipment item is specified by two or more manufacturer or supplier names, the Contractor may provide either one of the materials or equipment so specified, providing that all requirements of the contract documents are met. Only one brand, kind or make of material or equipment shall be used or installed throughout the work, notwithstanding that material or equipment from two or more manufacturers may be specified for the same purpose.

E. For convenience in designation in the specifications, equipment or materials to be incorporated on the work may be designated under a trade name or the name of a manufacturer and his catalog information. The use of alternative equipment or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the following:

1. The burden of proof as to the comparative quality and suitability of alternative equipment or materials shall be upon the Contractor and he shall furnish, at

his own expense, three copies of complete description, information, and performance data, showing the equality of the material or equipment offered to those specified, and such other necessary or related information as may be required by the Engineer. Where appropriate, at Contractor's expense, independent testing or evaluation at qualified test facilities, including destructive testing, may be required as a condition of acceptance.

2. The Engineer will be sole judge as to the comparative quality and suitability of the alternative equipment or materials, and his decision shall be final.

F. The Contractor's application of the substitution request shall contain the following statements and/or information which shall be considered by the Engineer in evaluating the proposed substitution:

1. The evaluation and acceptance of the proposed substitute will not prejudice the Contractor's achievement of substantial completion on time.

2. Whether or not acceptance of the substitute for use in the work will require a change in any of the contract documents to adopt the design to the proposed substitute.

3. All variations of the proposed substitute from that specified will be identified.

4. Available maintenance, repair, and replacement service will be indicated.

5. Itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change.

G. The Owner may require the Contractor to furnish a special performance guarantee or other surety with respect to any substitute.

H. The Contractor shall have 30 calendar days after the date of receipt of the Notice to proceed for submission of any and all or equal items. Submission of or equal items after this date will not be accepted by the City, and the Contractor will be required to furnish and install the specific equipment named in the contract documents.

I. If substitute materials or equipment are installed without the Engineer's approval, remove the unauthorized materials and equipment and replace with items required by the contract documents at no additional cost to the Owner.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION

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SECTION 01700

PROJECT CLOSEOUT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Contract closeout is the process that commences as the Work nears Substantial Completion. It continues through Substantial Completion, and Final Acceptance of the Work.

B. This specification section defines the overall change-over process from construction (by the Contractor) to reservoir operations (by the City). This section defines the terms in this process, and outlines the responsibilities of the Contractor, the Engineer, and the City.

1.02 CONTRACT CLOSEOUT SEQUENCE OF EVENTS

A. The sequence of events and their description listed below represent the suggested order of activities as the Contract proceeds from construction, through checkout, testing, Substantial Completion, and the Notice of Completion. Not all work will proceed in this exact order. Adjustments may be made, after approval by the Engineer, for the mutual benefit of the Contractor and the City, if the situation so warrants. Any adjustments made in the sequence of events, to accommodate the Contractor, shall be at no additional cost to the City.

B. Closeout Sequence of Events and Description:

1. Contract Closeout Deliverables: The Contractor shall provide the following:
   a. Final Redline Record Drawings, in accordance with the Special Provisions, Section 24.0 – Record Drawings.
   b. Written guarantees, where required.
   c. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
2. Pre-Final Inspection and Discrepancy List: The Engineer will conduct a pre-final inspection of the Work prior to substantial completion. The Engineer will prepare a discrepancy list (punch list) upon written request from the Contractor. The discrepancy list includes items of work which do not conform to the Contract Documents, plus any additional items found to be missing, incomplete, damaged, incorrect, or constructed in an un-workmanlike manner. The Contractor shall correct all items on the discrepancy list.
3. Substantial Completion: Following correction of items on the discrepancy list, and successful completion of the operation demonstration, the Contractor shall notify the City Representative that the Work is substantially complete. Refer to the contract documents for other requirements for Substantial Completion.
4. Final Inspection: Following written notice from the Contractor that the entire Work is complete, the Engineer, the City, the Contractor, and the Design Contractor will

conduct a final inspection to verify that the Work is complete. The Engineer will prepare a final punch list of all outstanding items.

5. Final Payment: After the Contractor has completed all final punch list items, and completed all other requirements, the Contractor shall submit a final application for payment to the Engineer. The final payment application will include all necessary documentation, in addition to waivers or releases of all liens filed in connection with the Work. The Contractor shall specifically release the City from any claims not specifically renewed on the final application for payment. After acceptance by the Engineer and the City, the City will make final payment to the Contractor after deducting all amounts to be retained under the provisions of the Contract Documents.
6. Notice of Completion: After acceptance, the City will file a Notice of Completion with the County Recorder to begin the 30-day stop notice filing period.
7. Release of Retention: Thirty five (35) days after recordation of the Notice of Completion, the Contractor shall be paid, less any deductions to cover pending third party claims against the City.

1.03 SUBSTANTIAL COMPLETION

A. Substantial Completion includes compliance with the following requirements:

1. The Contractor has substantially completed the construction and erection of the Work in conformance with the Contract Documents.
2. The Contractor has installed, adjusted, and successfully tested products, equipment, and systems. The facilities are constructed as indicated by the contract document and in conformance with the erection, installation, and operations and maintenance instruction of the suppliers.
3. The Contractor has provided and completed the following items as approved by the Engineer:
   a. Contract Closeout Deliverables.
   b. Special Manufacturer's or Supplier's Warranties.

1.04 PRE-FINAL AND FINAL INSPECTIONS

A. Pre-final and final inspections are surveys of the Contractor's work by the Engineer, the City, and the Design Contractor in order to create the list of incomplete or unsatisfactory items of work.

B. Prior to the pre-final and final inspections, the Contractor must complete the following:

1. Clean equipment and fixtures by removing temporary labels, stains, dirt, and other foreign substances.
2. Clean debris from galleries, pipes, roofs, gutters, basins, pump wet wells, down spouts, tank, drainage systems, and HVAC ducting.
3. Clean site; sweep paved areas, rake clean unpaved surfaces.
4. Remove waste and surplus materials, rubbish, fencing, equipment, temporary utilities, and construction facilities from the site.

C. The discrepancy list(s) and punch list will include all items of work found to be unsatisfactory, missing, incomplete, damaged, incorrect, or improperly installed or constructed. Prior to Final Acceptance, the Contractor shall correct the punch list items by re-work, modification, or replacement, at the option of the City Representative and at no additional cost to the City. The Engineer will re-inspect punch list items upon notice by the Contractor that they are complete.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the City will be withheld until the Contractor has satisfactorily complied with the forgoing requirements for final cleanup of the project site.

3.02 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with the maintenance and guarantee requirements contained in the contract documents.

B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public City releasing the City from further responsibility in connection with such repair of resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the City. If the Contractor fails to make such repairs or replacements promptly, the City reserves the right to do the work and the Contractor and his surety shall be liable to the City for the cost thereof.

*** END OF SECTION ***

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SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 – GENERAL

1.1 OPERATION AND MAINTENANCE MANUALS

A. Operation and maintenance manuals shall be furnished for the equipment provided under this contract. Hardcopy versions of the Manuals shall be prepared specifically for this installation and, as a minimum requirement, shall contain the following information:

1. Tracing, photocopy or other suitable reproduction of the equipment nameplates.

2. Complete installation, operation and maintenance instructions.

3. Troubleshooting guide.

4. Lubrication guide and charts.

5. Equipment performance curves.

6. Typical equipment drawings and layouts.

7. Name, address and telephone number of the manufacturer.

8. Name, address and telephone number of the nearest source of replacement parts and service to the project site.

9. Recommended spare parts list.

10. Copies of all shop drawings and other information required by the specifications.

In addition, contractor shall submit electronic versions of Operation and Maintenance manuals in pdf format.

B. Three preliminary copies of each manual shall be submitted to the Agency's representative for review within one month of receipt of approved shop drawings by the Contractor.

C. Drawings or diagrams bound in the manuals shall be 8-1/2 inches by 11 inches or 11 inches by 17 inches size. Larger drawings shall be folded separately and placed in envelopes which are bound into the manuals. Suitable identification shall be placed on the outside of each envelope, as well as the drawing. All manuals shall be printed

on 8-1/2 inches by 11 inch size paper and bound in standard 3-ring, loose-leaf, vinyl covered binders with the equipment name on the cover and spine.

D. Upon receipt of approval of the manuals by the Agency, the Contractor shall submit six (6) copies of the operation and maintenance manuals prior to the delivery of the equipment to the project site. These manuals shall be in addition to any instructions.

E. No partial payments for equipment delivered under this contract nor acceptance of equipment will be made until the required operation and maintenance manuals have been received by the Agency.

PART 2 - NOT USED

PART 3 - NOT USED

*** END OF SECTION ***

SECTION 01800

TESTING, TRAINING, AND FACILITY START-UP

PART 1 – GENERAL

1.1 SUMMARY

Section Includes: Equipment and system testing and start-up, services of manufacturer's representatives, training of City's personnel, and final testing requirements for the complete facility.

1.2 CONTRACT REQUIREMENTS

A. Testing, training, and start-up are requisite to the satisfactory completion of the Contract.

B. Complete testing, training, and start-up within the Contract Time.

C. Allow realistic durations in the Progress Schedule for testing, training, and start-up activities.

D. Furnish labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.

E. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation and testing guidance, and operator training.

1.3 START-UP/TESTING PROCESS OVERVIEW

A. This specification describes a process. The following definitions are provided for terms that are used in this specification and which describe the steps of the process.

B. Start-up Plan: A complete outline and schedule of the work that will be performed to meet the requirements of this specification.

C. Factory/Source Performance Testing: Testing which takes place at the supplier's facility to test equipment performance prior to shipment of the equipment to the job site. Factory pump test, or a control panel test, for example.

D. General Start-up and Testing: Initial adjustments, alignments, inspections, testing, etc., which are performed to confirm equipment is installed correctly and ready to be operated. Line flush, lubrication check, electrical integrity tests, instrument calibrations, for example.

E. Individual Equipment Functional Testing: Individual equipment operating tests which verify proper operation of the equipment. An individual pump functional test would include testing flow, pressure, amps, vibration, motor controls, associated instrument loops, and remote controls, for example.

F. Certification of Proper Installation: A written report from the equipment supplier and the equipment installer which certifies that the equipment tests are complete and the equipment performs satisfactorily.

G. Equipment/System Operational Testing: A test of the entire facility which demonstrates the individual equipment operates as a system and meets the operational requirements of the facility design. Operational requirements to test shall include system control features, station performance requirements such as flow and pressure for example.

1.4 START-UP PLAN

A. Submit start-up plan for each piece of equipment and each system not less than 3 weeks prior to planned initial equipment or system start-up.

B. Provide a Schedule with the Following Activities Identified:

1. Manufacturers services
2. Installation certifications
3. Operator training
4. Submission of Operation and Maintenance Manual
5. Performance testing
6. Functional testing
7. Operational testing

C. Provide testing plan with test logs for each item of equipment and each system when specified. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.

D. Provide summary of shutdown requirements for existing systems, which are necessary to complete start-up of new equipment, and systems.

E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.5 FACTORY/SOURCE PERFORMANCE TESTING

A. Test equipment for proper performance at point of manufacture or assembly when specified.

B. Demonstrate equipment meets specified performance requirements.

C. Provide certified copies of test results.

D. Do not ship equipment until certified copies have received written acceptance from City. Written acceptance does not constitute final acceptance.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 GENERAL START-UP AND TESTING

A. Mechanical Systems

1. Remove rust preventatives and oils applied to protect equipment during construction.

2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by manufacturer.

3. Flush fuel system and provide fuel for testing and start-up. At completion of test, fill fuel tank.

4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.

5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.

6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.

7. Perform cold alignment and hot alignment to manufacturer's tolerances.

8. Adjust V-belt tension and variable pitch sheaves.

9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to ensure no leakage, but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.

10. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.

11. Install gratings, safety chains, handrails, shaft guards, and sidewalks prior to operational testing.

B. Electrical Systems

1. Perform insulation resistance tests on wiring except 120-volt lighting, wiring, and control wiring inside electrical panels.

2. Perform continuity tests on grounding systems.

3. Test and set switchgear and circuit breaker relays for proper operation.

4. Perform direct current high potential tests on all cables that will operate at more than 2,000 volts. Obtain services of an approved, certified independent testing lab to perform tests.

5. Check motors for actual full load amperage draw. Compare to nameplate value.

C. Instrumentation Systems

1. Bench or field calibrate instruments and make required adjustments and control point settings.

2. Leak test pneumatic controls and instrument air piping.

3. Energize transmitting and control signal systems, verify proper operation, ranges and settings.

3.2 INDIVIDUAL EQUIPMENT FUNCTIONAL TESTING

A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.

B. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the manufacturer s representative.

C. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.

D. Conduct continuous 8-hour test under full load conditions. Replace parts which operate improperly.

3.3 CERTIFICATE OF PROPER INSTALLATION

A. At Completion of Functional Testing, Furnish Written Report Prepared and Signed by Manufacturer's Authorized Representative, Certifying Equipment:

1. Has been properly installed, adjusted, aligned, and lubricated.

2. Is free of any stresses imposed by connecting piping or anchor bolts.

3. Is suitable for satisfactory full-time operation under full load conditions.

4. Operates within the allowable limits for vibration.

5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.

6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.

B. Furnish Written Report Prepared and Signed by the Electrical and/or Instrumentation Subcontractor Certifying:

1. Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.

2. Control logic for equipment start-up, shutdown, sequencing, interlocks and emergency shutdown has been tested and is properly operating.

C. Co-sign the reports along with the manufacturer's representative and subcontractors.

3.4 TRAINING OF CITY PERSONNEL

A. Provide operations and maintenance training for items of mechanical, electrical and instrumentation equipment. Utilize manufacturer's representatives to conduct training sessions. Coordinate with the City to develop content for training sessions.

B. Coordinate training sessions to prevent overlapping sessions. Arrange sessions so that individual operators and maintenance technicians do not attend more than 2 sessions per week.

C. Provide Operation and Maintenance Manual for specific pieces of equipment or systems one month prior to training session for that piece of equipment or system.

D. Satisfactorily complete functional testing before beginning operator training.

E. Contractor shall coordinate the training periods with City personnel and manufacturer s representatives, and shall submit a training schedule for each piece of equipment or system for which training is to be provided. Such training schedule shall be submitted not less than 21 calendar days prior to the time that the associated training is to be provided and shall be based on the current plan of operation.

3.5 EQUIPMENT/SYSTEM OPERATIONAL TESTING

A. Contractor and Engineer shall jointly develop and coordinate equipment system operational testing.

B. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation.

C. Conduct operational test for continuous 7-day period.

D. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.

E. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

F. In the event an item of equipment cannot be tested continuously for seven (7) days, provide information for an alternative test, or modify the seven (7) day test period. For high horsepower equipment where testing will impact Time of Use (TOU) energy limitations, describe an intermittent test procedure. Identify TOU constraints.

3.6 RECORD KEEPING

A. Maintain and Submit Following Records Generated During Start-up and Testing Phase of Project:

1. Daily logs of equipment testing identifying all tests conducted and outcome.

2. Logs of time spent by manufacturer's representatives performing services on the job site.

3. Equipment lubrication records.

4. Electrical phase, voltage, and amperage measurements.

5. Insulation resistance measurements.

6. Data sheets of control loop testing including testing and calibration instrumentation devices and setpoints.

*** END OF SECTION ***

SECTION 02050

DEMOLITION AND SALVAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all materials, equipment and labor necessary to perform complete demolition and salvage operations as shown on the contract drawings and as specified by this section.

B. Do not begin demolition until authorization has been received from the Engineer.

C. The Contractor shall cut back flush and remove exposed framing, roofing, piping, conduits, fixtures, junction boxes, light fixtures, water fixtures, and supports per demolition plans and/or as interfering with new construction. Concealed or buried piping or conduits shall be removed or capped and abandoned as necessary to facilitate new construction.

D. Before completion of the Work, the Contractor shall submit an Affidavit of Legal Disposal attesting to the lawful disposal of all demolished materials.

E. Contractor shall remove and dispose of all items designated for demolition and/or removal.

1.02 QUALITY ASSURANCE

A. General: All work shall be performed in accordance with the local building codes, State Industrial Safety Orders and requirements of the Occupational Safety and Health Act requirements.

B. Demolition must be scheduled to allow facilities to remain in continuous operation. No interruption in operation will be permitted without previous authorization from the Engineer.

C. Protection: Demolition shall be performed in such manner as to not harm adjacent structures, utilities, systems, equipment, existing landscaping or natural vegetation. The Contractor shall assume full responsibility for such disturbance. All costs for such repair, rehabilitation, or modifications shall be incurred by the Contractor at no additional cost to the City.

D. Contractor shall provide safeguards, including warning signs, barricades, temporary fences, warning lights, interior or exterior shoring, bracing, or supports, and other similar items that are required for the protection of all personnel during the demolition and removal activities.

E. Contractor shall maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

F. Prevent spread of flying particles and dust. Contractor shall sprinkle rubbish and debris with water to keep dust to a minimum.

1.03 UTILITY SERVICES

A. Demolish and remove outside utility service lines shown to be removed.

B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

PART 2 - NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall notify the Construction Manager when demolition and removal activities are complete.

3.02 PERFORMANCE

A. Demolition: Completely demolish and remove equipment shown, including all appurtenances related or connected thereto, as noted below:

1. All equipment, material, and piping, within the limits of the demolition, excavations, backfills and construction debris, will become the property of the Contractor and shall be removed from the project site and shall be disposed of off the property in suitable depositories, in conformance with regulatory requirements and permits (if any are required). The salvage value of any equipment, materials, and piping shall be reflected in the contract price of the demolition work.
2. Where adjoining structures are to be kept in place, the demolition limit lines shall be neatly saw-cut. Sections to be removed shall be broken out, and the remaining face shall be chipped back to the saw-cut line. The Contractor shall do the necessary work to provide the remaining face with a finish compatible with the surrounding surfaces, unless otherwise indicated.
3. Existing buildings, structures, boxes, pipes, pavements, curbs, and other items are to be removed, altered, and disposed of as specified herein or indicated on the drawings. Remove and dispose of all portions of these items which interfere with project construction.
4. Remove and dispose offsite, facilities to be demolished in their entirety including all below ground footings, foundations, and other associated appurtenances. Backfill and compact all site areas disturbed by demolition work with earth backfill material in accordance with Earthwork Section 02350.
5. No blasting will be permitted.

B. Equipment and Piping Removal: All equipment and piping to be removed shall be properly disconnected from structures, piping, electrical and instrumentation systems. The Contractor shall do all resurfacing and other work as necessary to comply with the above requirements.

C. Pavement Removal: All pavements shall be saw-cut on a neat line at right angles to the curb face.

D. Utility Interference: Where existing utilities interfere with the prosecution of the work, Contractor shall relocate them.

E. Electrical Equipment Removal: All electrical equipment, conduit, wiring, etc. to be removed shall be properly de-energized, made safe, and disconnected from all sources of power prior to demolition. All remaining electrical equipment, located within the demolition area, shall be labeled and indicated as energized.

F. Unless otherwise noted, remove existing electrical materials and equipment from areas indicated for demolition or where equipment is relocated. Remove materials no longer used, such as studs, straps, and conduits. Remove or cut off concealed or embedded conduit, boxes, or other materials and equipment to a point at least 3/4-inch below the final finished surface. Remove existing unused wires.

3.03 SALVAGE

A. The City does not wish salvage anything from this demolition project.

3.04 BACKFILL

A. Holes, trenches or depressions in the ground remaining after demolition of structures, pipelines, or equipment shall be filled with compacted backfill materials as specified in Section 02350. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

3.05 PATCHING AND REPAIRING

A. The Contractor shall provide patching, repaving, and refinishing of damaged areas involved in demolition as necessary to match the existing adjacent surfaces and in compliance with Section 02500 Asphalt Paving.

B. The Contractor shall repair all damages caused to adjacent facilities by demolition at no additional cost to the City.

C. After patching and repairing has been completed, the Contractor shall carefully remove splatterings of concrete or shotcrete from adjoining work (plumbing fixtures, trim, tile, and finished metal surfaces) and repair any damage caused by such cleaning operations.

3.06 CLEAN-UP

A. The Contractor shall leave site in clean condition satisfactory to the Engineer. Clean-up shall include but not be limited to disposal of all items, materials, debris and rubbish.. Contractor shall remove items, material, debris, and rubbish to a legal off-site landfill.

*** END OF SECTION ***

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SECTION 02110

SITE PREPARATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This work shall consist of clearing, grubbing, removal and disposal of existing Portland Cement Concrete (PCC) pavement, A.C. pavement, and miscellaneous items including, but not limited to concrete driveway aprons, curb and gutter, tree roots, shrubs, planters, reinforced concrete masonry wall, trash and other items within the limits of construction to facilitate construction of the new facility.

B. This work shall also include, but not be limited to grading, subgrade preparation, backfilling and protecting of all facilities as shown on the plans and/or as directed by the Engineer, which are not included in other bid items.

PART 2 - PRODUCTS

2.01 MATERIALS

Materials shall conform to the applicable provisions of the Standard Specifications. Backfill adjacent to new driveway aprons and behind new curb and gutter shall be clean native selected material from project excavation, or imported clean sand, SE 30 minimum, as directed by the Contractor.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Construction shall conform to the applicable provisions of the Standard Specifications and these Special Provisions. The Contractor shall protect all existing structures and facilities which are adjacent to the work to be done under this contract, in accordance with Sections 7-9 and 300-1 of the Standard Specifications. Any structure or facility, which is damaged as a result of the Contractor's construction operation, shall be replaced or repaired by the Contractor, at the Contractor’s cost, to the satisfaction of the Engineer.

B. Backfilling, grading, subgrade preparation and compaction shall conform to the applicable provisions of the standard specifications and these special provisions.

C. The sub-grade for pavement shall be backfilled as needed and graded to subgrade plane as shown on the plans and the top 12 inches of sub-grade shall be compacted to relative compaction of not less than 95% of maximum density at optimum moisture.

D. Any re-testing required due to first test failures shall be made by the Contractor. Furnishing and applying water as directed by the Contractor shall be considered incidental work, cost of which shall be included in the contract lump sum price. The finished surface of the subgrade plane at any one point shall not vary more than 0.02 foot above or below the grading plane established by the Contractor and/or as shown on the plans.

E. All excess excavated material shall be immediately removed from the project site and disposed of at the Contractor's expense at a legal dumpsite.

3.02 DUST AND DEBRIS CONTROL

A. Contractor shall implement dust control measures during demolition, construction, and grading activities in compliance with SCAQMD Rule 403.

B. Contractor shall protect neighboring properties from dust and debris during demolition, construction and grading operations.

3.03 CLEARING AND GRUBBING

A. Clearing and grubbing shall comply with SSPWC Subsection 300-1.

3.04 SALVAGE AND DISPOSAL

A. City does not wish salvage anything from this project.

B. Disposal: Waste material shall be disposed of in accordance with SSPWC Subsection 300-1.3

*** END OF SECTION ***

SECTION 02300

EXCAVATION AND STRUCTURAL FILL

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The CONTRACTOR shall perform all earthwork required for construction of the Work. The Work includes the loosening, removing, loading, transporting, depositing, and compacting in their final locations of all in-situ and select materials, wet and dry. The CONTRACTOR shall comply with all local, state, and federal safety and health standards, laws, and regulations.

1.2 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work:

1. Section 03300 Cast-in-Place Concrete

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this Section, the CONTRACTOR shall comply with the 2018 edition of the Standard Specifications for Public Works Construction (SSPWC).

B. The Work of this Section shall comply with current versions, with revisions, of the following:

1. International Building Code (IBC)
2. Construction Safety Orders, Division of Industrial Safety, State of California
3. California Department of Transportation Traffic Manual
4. California Test Methods
5. California Code of Regulations, Title 8, Section 1541

1.4 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall submit the following in compliance with Section 3-8 of the SSPWC:

1. The CONTRACTOR's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The CONTRACTOR's detailed plan showing the design and calculations for all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of trenches or structure excavation. The CONTRACTOR's detailed plan shall include a description of the methods used, schedule and equipment, including trench shields, to be used for earthwork operations. The CONTRACTOR's plan shall identify the locations of temporary soil

stockpiles. The CONTRACTOR's detailed plan shall be submitted before starting any trench or structure excavation 5-feet deep or over. The CONTRACTOR's plan shall be prepared and signed and sealed by a Professional Engineer experienced in the field of geotechnical engineering and licensed in the State of California. The CONTRACTOR shall be in possession of the AGENCY's written acceptance of the detailed plan before starting any trench or structure excavation 5-feet deep or over. If the CONTRACTOR'S detailed plan varies from the shoring system established in the Construction Safety Orders of the State of California, the CONTRACTOR's detailed plan shall be prepared and signed by a civil or structural engineer licensed in the State of California.

2. A copy of the excavation permit issued by the California Department of Industrial Safety.

3. Samples of imported material in accordance with SSPWC Subsection 300-5.2.

4. Such other samples of materials as the CONSTRUCTION MANAGER may require.

1.5 FIELD TESTING

A. General: Field soils testing will be done by a testing laboratory of the Construction Manager's choice.

B. Where fill is to be placed, the upper 6 to 8 inches of the surface exposed by the excavation should be scarified, moisture-conditioned to 2 to 3 percent over optimum moisture content, and compacted to 95 percent relative compaction. If localized areas of relatively loose soil prevent proper compaction, over-excavation and re-compaction will be necessary. The on-site soil is generally suitable for use as compacted fill and backfill, provided that any cobbles or rock fragments greater than 4 inches are screened and removed from the soil prior to placement and compaction. A limitation of particle size to 2 inches is preferred. Compaction testing will be facilitated by a smaller, maximum particle size.

C. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D4253 and D4254. Field density in-place tests will be performed in accordance with ASTM D1556 – Standard Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method or by such other means acceptable to Division of Safety of Dam (DSOD). The minimum frequency of density testing shall be one test per lift, with a minimum of 1 test per 50 square feet of excavation. Additional testing may also be required as directed by the Engineer.

D. In case the test of the fill or backfill show non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the CONSTRUCTION MANAGER and paid by the CONTRACTOR.

E. The CONTRACTOR shall provide test trenches and excavations including

excavation, trench support, and groundwater removal for the CONSTRUCTION MANAGER's field testing operations. The trenches and excavations shall be provided at the locations and to the depths required by the CONSTRUCTION MANAGER.

1.6 DEFINITIONS

A. Fill material is defined as material used to raise the level of a portion of the site to the line and grade indicated.

B. Backfill material is defined as material used to refill an excavation. Backfill material is defined as starting 1 foot above the top of the pipe or conduit, or at the subgrade for cast-in-place structures such as vaults and valve boxes.

C. Bedding material is defined as material within the pipe zone that supports and surrounds pipe or conduit.

D. The pipe zone is generally defined as the area that extends from 6 inches below the bottom of the pipe to 1 foot above the top of the pipe. For steel pipe, the pipe zone begins 4 inches below the bottom of the pipe.

PART 2 -- PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

A. General: Fill and backfill material shall consist of select material obtained from the excavation, imported material, bedding material, or unclassified material. The CONTRACTOR shall import at its expense materials in excess of the approved material obtained from excavation as required to complete the fill, backfill, and grading Work as indicated. Fill and backfill materials to be placed within 6-inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3-inches.

B. Unsuitable materials include the materials listed below:

1. Primarily fine-grained soils which, when classified under ASTM D2487 – Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), fall in the classifications of Pt, OH, CH, MH, OL, CL or ML.
2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.
5. Topsoil, except as specified herein.
6. Gravelly/rocky material in excess of 30 percent retained on a ¾-inch size sieve.

C. Select Material: Select material shall consist of primarily granular material obtained from the excavation which is free of vegetation, organic matter, rubbish, debris, rocks larger than 3-inches in diameter and other unsuitable material, has an expansion index less than 20 (less than 20 for footings and floor slabs) as determined by UBC Standard No. 18-2, has a plasticity index of 20 or less, has a liquid limit of 40 or less, and is approved as select material by the CONSTRUCTION MANAGER.

Imported Material: Imported material shall conform to the same specifications as select material defined above. In addition, the imported materials shall comply with SSPWC subsection 300-5.2 and shall have a minimum resistivity greater than 2,000 ohm-cm when tested in accordance with California Test method 643. The Geotechnical Engineer shall evaluate materials before importation. Imported material placed in areas to be planted shall be able to support normal plant growth. The CONTRACTOR shall obtain approval by the CONSTRUCTION MANAGER before transporting imported material.

D. Bedding Material: Bedding material shall be sand, gravel, crushed aggregate or free draining material in accordance with SSPWC Subsection 217-1, including the Regional and City Supplemental Amendments.

E. Unclassified Material: Unclassified material shall conform to SSPWC Subsection 300-4.

F. Structure Backfill: Structure backfill shall conform to SSPWC Subsection 300-3.5.

G. Drainrock (Caltrans Class 2 Permeable) shall be clean, crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements:

H.

Sieve Size	Percentage passing
1-inch	100
¾-inch	90-100
3/8-inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

The drainrock shall have a sand equivalent value of not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs. The CONTRACTOR shall use, at its option, one of the asphalt types listed below:

	Type 1	Type 2	Type 3
Designation	SC-800	SC-250	RS-1
Spray Temperature, deg F	175-255	165-200	70-120
Coverage, gal/sq yd	0.50	0.50	0.50

If the surface remains tacky, sufficient sand shall be applied to absorb the excess asphalt.

2.2 ROCK PRODUCTS

A. Rock products, consisting of crushed rock, rock dust, gravel, sand, and stone for riprap shall be clean, hard, sound, durable, uniform in quality and free of disintegrated material, organic matter, oil, alkali, or other deleterious substance, and shall, unless otherwise specified, conform to the requirements of SSPWC Subsection 200-1, including the Regional Supplement Amendments.

2.3 UNTREATED BASE MATERIALS

A. Untreated base materials shall conform to the requirements of SSPWC Subsection 200-2.

B. Materials for use as untreated base or subbase shall be crushed aggregate base.

2.4 TOPSOIL

A. Topsoil shall be designated as Class B (selected) or Class C (unclassified), and shall conform to the requirements of SSPWC Subsection 212-1.1.

PART 3 – EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall perform earthwork as necessary to complete the Work as shown on the Contract Drawings and specified herein. The CONTRACTOR shall take the necessary precautionary measures to prevent dust or other nuisances which might be created by reasons of his activities. The necessary precautionary measures shall conform to the requirements of SSPWC Subsection 3-12.2. The requirements specified in Subsection 3-12.2 shall be extended to include paved surfaces.

B. All types of earthwork, including trench, structural and general excavation, fill, backfill and compaction, shall conform to applicable requirements of the SSPWC Section 300 and to the requirements specified herein.

C. Pursuant to California Code of Regulations, Title 8, Section 1541, at least two working days before the start of excavation, the CONTRACTOR shall notify the Regional Notification Center and known owners of underground facilities in the area who are not members of the Regional Notification Center of the proposed excavation.

3.2 SITE PREPARATION

A. Areas to be excavated, filled, graded, and to be occupied by permanent construction or embankments shall be prepared by clearing, grubbing and stripping. Clearing, grubbing and stripping shall conform to the applicable requirements of SSPWC Subsection 300-1.

3.3 EXCAVATION

A. General:

1. Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. Unless otherwise directed, the removal of said materials shall conform to the lines and grades shown. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The CONTRACTOR shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measures for the removal or exclusion of water. Excavations shall be sloped or otherwise supported in a safe manner in accordance with the rules, orders, and regulations of the Division of Industrial Safety of the State of California.

2. The quantity of excavation material in the project is greater than the quantities of fill and backfill material required by the project. The area of the site limits the available space on-site for temporary stockpiling. The Contractor shall provide for off-site temporary storage of soils materials that the earthwork operations may require. To the extent that existing on-site soils materials meet the specified requirements for fill and backfill, existing on-site materials may be used for fill and backfill. All unsuitable soils materials and all surplus soils materials shall be disposed of off-site at any legal disposal site in compliance with all federal, state, county, and city regulations. The CONTRACTOR shall provide all testing of soils materials that may be required for off-site disposal.

B. Unclassified Excavation: Unclassified excavation shall consist of all excavation, including roadways, unless separately designated.

1. Unsuitable material shall be excavated and disposed of in accordance with the requirements of SSPWC Subsection 300-2.2.

2. Wet material, if unsatisfactory for the specified use on the project solely because of high moisture content, may be processed to reduce the moisture content, or may be required to be removed and replaced with suitable material in accordance with the requirements of SSPWC Subsection 300-2.2.2.

3. The removal and disposal of slide and slipout material shall be in accordance with SSPWC Subsection 300-2.4.

4. Excavation slopes shall be finished in conformance with the lines and grades shown, and in accordance with SSPWC Subsection 300-2.5.

5. Surplus material shall be disposed of off-site, and in accordance with SSPWC Subsection 300-2.6.

C. Structure Excavation: Structure excavation shall consist of the removal of material for the construction of foundations for retaining walls, headwalls, culverts,

buildings, or other structures, and shall be in accordance with SSPWC Subsection 300-3.

1. The treatment of foundation material shall be in accordance with SSPWC Subsection 300-3.3.

D. Underground Conduit Excavation:

1. General: Excavation for underground conduits shall be in accordance with SSPWC Subsection 306-3 and the requirements contained herein. Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the CONTRACTOR.

2. Sheeting, Shoring, and Bracing of Excavations: The manner of sheeting, shoring, and bracing excavations shall be as set forth in the rules, orders and regulations of the Division of Industrial Safety of the State of California, and in accordance with the requirements of SSPWC Subsection 306-4. Sheeting, shoring, and bracing shall be provided for the protection of life and limb, for the protection of existing underground and above-ground structures and improvements, and shall conform to applicable safety orders. Sheeting, shoring, and bracing shall be provided to prevent trench sluffing, pavement separation and similar problems during construction, and shall include furnishing, installation, maintenance, and removal.

3. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required.

4. Open Trench: The maximum length of open trench permitted in any one location is 200 feet. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The top of the steel plates shall be set flush with the top of the adjacent pavement, and the plates shall be surfaced for improved vehicular traction.

5. Trench Over-Excavation: Where the Drawings indicate that trenches shall be over-excavated, they shall be excavated to the depth required, and then backfilled to the grade of the bottom of the pipe.

6. Where pipelines are to be installed in embankment fills, the fill shall be constructed to a level at least one-foot above the top of the pipe before the trench is excavated.

E. Over-Excavation Ordered by CONSTRUCTION MANAGER: Trenches shall be over-excavated beyond the depth shown when required by the CONSTRUCTION MANAGER. Such over-excavation shall be to the depth ordered by the CONSTRUCTION MANAGER. The over-excavation shall then be backfilled using 3/4-inch crushed rock underlain by an approved woven geotextile. The

CONTRACTOR shall then place bedding material over the crushed aggregate. All work specified in the Section shall be performed by the CONTRACTOR at no additional cost to the AGENCY when the over-excavation ordered by the CONSTRUCTION MANAGER is within 6 inches of the limit shown on the Drawings. When the over-excavation ordered by the CONSTRUCTION MANAGER is 6 inches more than the limit shown on the Drawings, additional payment will be made to the CONTRACTOR for the portion that exceeds the said 6-inch distance.

F. Structure Over-Excavation Ordered by CONSTRUCTION MANAGER: Structure excavations shall be over-excavated beyond the depth shown when required by the CONSTRUCTION MANAGER. Such over-excavation shall be to the depth ordered by the CONSTRUCTION MANAGER.

G. Excavation in Lawn Areas:

1. Where excavation occurs in lawn areas, the sod shall be carefully removed and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn; provided, that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling [and testing of the pipeline], the sod shall be replaced in a manner so as to restore the lawn as near as possible to its original condition. CONTRACTOR shall provide new sod if removed sod has remained stockpiled for more than 72 hours.

   The CONTRACTOR shall restore the lawn irrigation system removed or damaged due to excavation operations to a condition equal to the previous condition.

H. Rock Excavation:

1. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which can be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned.

2. Rock excavation shall be performed by the CONTRACTOR, however, should the quantity of rock excavation be affected by any change in the scope of Work, an appropriate adjustment of the contract price will be made.

I. Over-excavation and Removal of Unsuitable Soils Materials:

1. Excavate and remove all soils below the reservoir as shown on the drawings The actual removal depth may be locally increased based on the soil conditions encountered during grading. The maximum differential fill thickness should not exceed more than 5 feet across the pad. The over-excavation should also provide for a minimum of 5 feet of a properly compacted fill blanket below the bottom of the foundation system. In areas where less critical improvements such as walkways, patio slabs, and pavements, minimum depth of over-excavation and re-compaction is 2 feet.

2. Excavate below the limits of subgrades shown where unsuitable materials are found.

3. Provide over-excavation and disposal to the limits directed by the CONSTRUCTION MANAGER. Unsuitable materials include expansive soils, oversize materials, existing fills, topsoil, soft and disturbed materials, and other materials that may be deemed to be unsuitable by the CONSTRUCTION MANAGER.

4. The excavation and removal of the unsuitable soils materials shall extend outward from the bottom of the foundation along a projected 1.5:1 maximum plane a distance equal to or greater than the depth of the removal below the foundation.

5. The excavation shall be benched prior to placement of the new soil fill. The benches shall be a minimum of 10 feet in width and spaced at no more than 2-foot vertical height intervals.

6. Observation: The CONSTRUCTION MANAGER may be assisted by a Geotechnical Engineer, in particular with the suitability of subgrades, the determination of unsuitable soils materials, the approval of fill materials, and compaction testing. If a Geotechnical Engineer is so utilized, the Contractor shall provide full access to the work and prior notices of work to be done so the Geotechnical Engineer may be present at the proper times.

J. Exploratory Excavation: The CONTRACTOR shall excavate and expose buried points of connection to existing utilities and structures as indicated on the Drawings. Excavations shall be performed prior to preparation of Shop Drawing Submittals for connections and prior to fabrication of pipe. The data obtained from excavation shall be used in preparing Shop Drawings. Data, including dates, locations excavated, and dimensioned sketches, shall be submitted to the CONSTRUCTION MANAGER within one week of excavation. Damage to utilities or structures from excavation activities shall be repaired by the CONTRACTOR.

3.4 FILL AND BACKFILL

A. General:

1. Fill and backfill shall be placed in accordance with the applicable provisions of SSPWC Section 300 and the requirements stated herein.

2. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any concrete structure until the concrete has cured in accordance with the requirements of Section 33000 – Cast-in-Place Concrete and has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

3. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the excavation sidewalls and bottom have been dried to a moisture content suitable for compaction.

B. Placing and Spreading of Materials:

1. Materials shall be placed and spread evenly in layers. Compaction shall be achieved using mechanical equipment and the layers shall be evenly spread so that when compacted each layer shall not exceed 8 inches in thickness.
2. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Bedding materials shall be brought up evenly around the pipe so that when compacted, the material will provide uniform bearing and side support.
3. Where the material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.
4. Where the material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

C. Compaction Requirements

1. The Construction Manager will perform density and compaction tests in accordance with SSPWC Subsection 211-1.
2. The relative compaction of fill, backfill, and base material shall be in accordance with SSPWC Section 300, with the following exceptions:
   a. Subgrade where trench has been over-excavated: 95%
   b. Fill beneath structures, including water-containing structures: 95%
3. In case the tests of the backfill show non-compliance with the required compaction or density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the AGENCYER and shall be at the CONTRACTOR's expense.

D. Unclassified Fill: All fill shall be of unclassified material unless separately designated. Construction and unclassified fill, including preparing the area on which fill is to be placed, and the depositing, conditioning, and compacting of fill material shall be in accordance with SSPWC Subsection 300-4. Unclassified fill shall not be used within 5 feet of any structural wall or foundation, shall be 5 feet from utility trenches, and shall not be used as backfill for utility trenches.

E. Structure Backfill: Backfill at structures shall be select material placed in accordance with SSPWC Subsections 300-3.5 and 300-4.5. Backfill under hydraulic or water retaining structures with underdrains shall be drainrock on top of select material.

F. Underground Conduit Bedding and Backfill:

1. Bedding around pipe shall be bedding material placed in accordance with the requirements of SSPWC Subsection 306-3 except as noted. Water pipes shall be bedded in accordance with the City of Upland Standard Drawings. Bedding material shall be sand, gravel, crushed rock, or native free-draining granular material having a sand equivalent of not less than 50

and an expansion when saturated with water of not more than 0.5 percent. Bedding material shall be mechanically compacted. The relative compaction of the conduit bedding shall be 90 percent. Neither flooding nor jetting will be allowed for compaction of the bedding.

2. If bedding material consists primarily of gravel or crushed rock, the bedding material shall be wrapped using an approved nonwoven geotextile filter fabric. Geotextile filter fabric will not be required where sand is used for bedding material or where the excavation is through rock.

3. Upon completion of the bedding and following placement of the pipe or conduit, trench backfill shall be placed and mechanically densified in accordance with SSPWC Subsection 306-6.5. Backfill shall be select imported material. Water densified compaction in accordance with the requirements of SSPWC Subsection 306-6.5 shall not be used, all trench backfill shall be mechanically compacted. Mechanically-compacted trenched backfill shall be placed in accordance with the requirements of SSPWC Subsection 306-6.5.

4. Trench backfill shall be compacted to obtain a minimum 90 percent relative compaction. The top foot of the trench backfill shall be densified to a minimum of 95 percent relative compaction except in unimproved areas. Only lightweight tamping equipment shall be used within 3 feet of the pipe, conduit, or appurtenance. Testing of compaction will be performed by the AGENCY's Materials and Testing Lab.

3.5 PREPARATION OF SUBGRADE

A. The preparation of subgrade for pavement, curbs and gutters, driveways, sidewalks and other roadway structures shall be in accordance with SSPWC Subsection 301-1.

3.6 UNTREATED BASE

A. Aggregate base material shall be spread and compacted in accordance with SSPWC subsection 301-2.

3.7 TEMPORARY STOCKPILES

A. Locations of temporary stockpiles shall be approved by the CONSTRUCTION MANAGER.

B. Temporary stockpiles shall not surcharge buried pipe, conduits or other structures.

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SECTION 02350

EARTHWORK – PIPELINE AND MISCELLANEOUS STRUCTURES

PART 1 – GENERAL

1.01 DESCRIPTION

Contractor shall provide all tools, equipment, materials, labor, traffic control, excavating, shoring, dewatering, subgrade preparation, backfilling, compacting, grading and temporary resurfacing required for the construction of the work shown on the Contract Drawings and/or required in the Specifications.

Earthwork shall include, without classification, the removal and disposal of all materials of whatever nature encountered that interfere with the proper construction and completion of the Work.

Where any permit requirements exceed the requirements of this Section, the permit requirements shall govern.

1.02 SYSTEM

The Work of this Section shall include the excavation, backfill, temporary resurfacing and traffic control for proper completion of the Work.

1.03 STANDARD SPECIFICATION

Except as specifically modified herein or shown otherwise on the Contract Drawings, the work under this Section shall be in compliance with the provisions in the applicable Sections of the Standard Specifications for Public Works Construction (SSPWC) also known as the “Green Book” (Edition 2018 including all Supplements issued prior to the date of execution of the Contract).

In case of conflict between any requirements set forth in this Section, the Contract Drawings and any provisions of the foregoing Standard Specifications the requirements shown on the Contract Drawings shall govern over the requirements set forth herein and the requirements set forth herein shall govern over the SSPWC.

PART 2 - PRODUCTS

2.01 CRUSHED ROCK

Crushed rock material used for pipe bedding and/or trench backfill shall conform to SSPWC Sections 200-1.1 and 200-1.2 (Crushed Rock and Rock Dust). Gradation shall be 1-inch unless otherwise shown on the Contract Drawings.

2.02 SAND

Sand used for pipe bedding and/or trench backfill shall conform to SSPWC Section 200-1.5 (Sand for Asphalt Concrete).

2.03 SELECT SUBBASE

Material used for select subbase/subgrade shall conform to SSPWC Section 200-2.6.

2.04 TRENCH BACKFILL SLURRY

Trench backfill slurry used for pipe bedding and/or trench backfill shall conform to SSPWC Sections 201-1.1.1 and 201-1.2.1 (Trench Backfill Slurry - Class100-E-100). Controlled low strength material (CLSM) conforming to 201-6 may be used for trench backfill and pipe bedding.

2.05 TEMPORARY RESURFACING

Trench temporary resurfacing used for streets, parking areas, driveways and sidewalks shall conform to SSPWC Section 306-13.1.

2.06 PERMANENT RESURFACING

Permanent resurfacing shall be in conformance with Section 02740 of these Specifications.

2.07 DETECTION TAPE

Detection tape shall be a plastic metallic type consisting of a blue color coded polyethylene or melinex film, a solid core aluminum foil detection layer and other layers as required. Type shall be resistant to acids, alkalines and other components likely to be encountered in soils. Tape shall be imprinted with “CAUTION WATER PIPELINE BELOW”. Tape shall be Terra Tape “D” by Griffolyn Company, Detectatape by Allen Systems, or approved equal.

2.08 FILTER FABRIC

Non-woven geotextile fabric conforming to Caltrans Standard Specification Section 88.

PART 3 - EXECUTION

3.01 GENERAL

Conform to the requirements of SSPWC Sections 306-1, 306-1.5, the Contract Drawings and as stated herein.

3.02 REMOVAL AND REPLACEMENT OF SURFACE IMPROVEMENTS

A. Removal and replacement of surface improvements shall conform to SSPWC Section 300-1.3 and reconstruction in accordance with 302 or 303-5 unless otherwise shown on the Contract Drawings or stated herein.

B. Asphalt paving replacement shall be as shown on the Contract Drawings and shall conform to Section 02740.

3.03 PROTECTION OF EXISTING UTILITIES/FACILITIES

A. Contractor shall be responsible for the protection of all existing utilities/facilities in accordance with SSPWC Section 5. Any method of construction chosen which necessitates heavy equipment imposing loads on existing utilities/facilities requires approval by the Owner and the utility.

B. Contractor shall be responsible for complying with SSPWC Section 5-1 and Section 4216 of the California Government Code for the proper notification of the regional notification center (Underground Service Alert of Southern California) and shall obtain an inquire identification number.

3.04 SHORING AND BRACING

The Contractor shall prepare detailed excavation shoring, bracing, sloping plans or other provisions to be made for worker and public protection from the hazard of caving ground during the excavation. All plans shall include a statement that the plan complies with all Division of Industrial Safety of the State of California (CAL/OSHA) Construction Safety Orders requirements

The Contractor shall submit, in advance (minimum of 5-working days) of any excavation operation, a copy of their plan(s).

3.05 CONTROL OF SURFACE AND GROUND WATER

A. Contractor shall be responsible for furnishing/placing all temporary drainage facilities required to protect the Contractor's excavations from surface waters (including rainfall) by grading, sandbags, temporary berms, etc. to ensure that excavations remain dry at all times and also to ensure that construction water and/or storm water does not create or contribute to water pollution. In channels, storm drains, drainage courses and bodies of water.

B. All excavations shall be maintained free of ground water at all times to a minimum elevation of 1-foot below all foundation or pipeline construction.

3.06 MAXIMUM LENGTH OF OPEN TRENCH OR EXCAVATION

A. Maximum length of open trench in public streets shall be limited to 250 feet for each pipeline heading during the Contractor's working hours. Trenches in public streets shall be protected by trench bridging (steel trench plates) to allow public vehicular and pedestrian traffic during working hours and during all nonworking hours (including nonworking days, weekends and holidays). Steel trench plates shall be in accordance with Section 13 of the "Work Area Traffic Control Handbook" (WATCH MANUAL), Edition in effect on the date of execution of the Contract) and shall have a nonskid surface.

B Maximum length of open trench in open areas (restricted public access areas) shall be limited to 500 feet for each pipeline heading during the Contractor's working hours. All trenches in open areas shall be protected by trench bridging (steel trench plates) or by secure temporary fencing surrounding the entire open trench during all nonworking hours (including nonworking days, weekends and holidays). Temporary fencing shall be 6 feet high chain link fencing

C All open excavations shall be protected by trench bridging or temporary fencing (6-feet high) during all nonworking hours (including nonworking days, weekends and holidays).

3.07 TRENCH WIDTH

A. Trench widths shall conform to SSPWC Section 306-3.4 except as follows:

Unless otherwise shown on the Contract Drawings, maximum and minimum width of sewer and water pipeline trenches shall be as follows:

1. Maximum width shall be no more than 24-inches wider than the widest dimension of the pipe (not including fittings), unless otherwise shown on the Contract Drawings. Width shall be measured at the top of pipe.

2. Minimum width shall not be less than 12-inches wider than the widest dimension of the pipe (not including fittings), unless otherwise shown on the Contract Drawings. Width shall be measured at the top of pipe.

3. Deep trench excavations requiring shoring shall have a trench width that included the shoring system and maximum and minimum widths per items 1 and 2 above.

B. All trenches in public streets shall have vertical walls.

C. Trenches in open areas may have vertical walls or be sloped back as appropriate with site and soil conditions.

3.08 ACCESS TO TRENCHES AND EXCAVATIONS

Ingress and egress to all trenches and excavations shall be in accord with SWPWC Section 306-3.6.

3.09 SUBGRADE/SUBBASE PREPARATION

A. Subgrade/subbase depth shall extend to 12-inches below pipelines and structures and shall be firm, unyielding, and free of rock(s) and debris. This is the area below the pipe foundation, and shall only be excavated and refilled under the direction of the Engineer or when control of groundwater is required.

Removal and replacement of any unsuitable subgrade/subbase material, shall be as determined by the Engineer. The Contractor shall over-excavate the trench

bottom and backfill the trench subgrade with 1 ½-inch crushed rock when directed by the Engineer. The Contractor shall also install a geofabric under 1-inch, over 4-inch crushed rock, and 4-inch crushed rock on the sides of the rock base. Joints shall be overlapped a minimum of 8 inches. Geofabric shall be woven geotextile, made of 100% polypropylene silt film yarns. Geofabric shall be Mirafi 140N or equal. Payment for over-excavation, 1 ½-inch crushed rock, and geofabric will be at the unit price per ton of crushed rock installed, included in the bid schedule, and no additional compensation shall be allowed.

B. All "UNAUTHORIZED" over excavation by the Contractor shall be replaced and compacted to a minimum relative compaction of 90% in conformance with the State of California, Division of Highways (Caltrans) Test Method No. 216. All cost associated with "UNAUTHORIZED" over excavation, material replacement and testing shall be at the Contractor's expense.

3.10 PIPELINE BEDDING AND SUBBASE FOR STRUCTURES

Pipeline bedding and subbase for structures shall conform to these specifications and Agency of Standard Drawings unless otherwise shown on the Contract Drawings.

3.11 BACKFILL AND COMPACTION

A. Trench backfill material shall be clean, free from organic material, trash, debris, rubbish, broken portland cement concrete, asphalt concrete, rocks over 3-inches in size or other objectionable material and shall have a minimum sand equivalent of 30 as determined by the State of California, Division of Highways (Caltrans) Test Method No. Calif. 217, and not more than 20 percent of the backfill material will pass through a 200 mesh sieve.

B. Structures backfill material shall be clean, free from organic material, trash, debris, rubbish, broken portland cement concrete, asphalt concrete, rocks over 3-inches in size or other objectionable material and shall have a minimum sand equivalent of 30 as determined by the State of California, Division of Highways (Caltrans) Test Method No. Calif. 217, and not more than 20 percent of the backfill material will pass through a 200 mesh sieve.

C. Place bedding and backfill materials true to the lines, grades, cross-sections and compact in accord with the requirements shown on the Contract Drawings.

D. Trench backfill shall not be placed over pipe until after the pipe has been inspected by the Contractor.

E. Backfill shall not be placed against structures until the 28-day compressive strength is obtained.

F. Trench backfill material shall be in vertical lifts and shall not exceed the thickness specified for various types of equipment (SSPWC Section 306-12.3.1 (uncompacted lifts) horizontal lifts. The difference in compacted backfill material on

each side of pipe shall not exceed 4-inches.

G. Impact, free falling, or “stomping” equipment shall not be used within 3-feet of top of pipe of for structures backfill compaction.

H. Jetting (water densifying) methods for compaction shall not be permitted for trench or structures backfill.

I. Compaction requirements shall be as shown on the Contract Drawings.

J. Compaction testing shall conform to the State of California, Division of Highways (Caltrans) Test Method No. 216.

K. Frequency and depth of all compaction tests will be as determined by the Contractor.

L. Compaction testing shall be conducted by a California Registered Geotechnical Engineering Company to be hired by the Contractor, subject to approval of the Agency. The number of compaction tests to be taken shall be at the discretion of the Agency. All costs associated with providing compaction testing shall be borne by the Contractor.

M. Any re-testing required due to compaction test failures shall be made by the Contractor hired geotechnical engineering company at no additional cost to the Agency.

*** END OF SECTION ***

SECTION 02500

ASPHALT PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section provides specifications for construction of base material and asphalt roadway surfacing as indicated on the Drawings.

1.02 STANDARDS

A. Paving shall be in conformance with the requirements of Standard Specifications for Public Works (SSPWC) Construction, 2012 Edition, including supplement amendments and the amendments set forth herein.

PART 2 - PRODUCTS

2.01 SSPWC SECTION 203 – BITUMINOUS MATERIALS

A. 203-6.1 General. [Add the following to the end of the subsection]:

Asphalt concrete shall conform to the provisions of Subsection 400-1, "Rock Products," and Subsection 400-4, "Asphalt Concrete". The viscosity grade of paving asphalt shall be PG64-10. The following asphalt concrete classifications shall be used.

Asphalt Base Course	Type B	3/4" Max. Medium
Asphalt Surface Course	Type C2	1/2" Max Medium

The Contractor shall submit final asphalt mix designs to the Engineer for review prior to paving.

2.02 SSPWC SECTION 211 – SOILS AND AGGREGATE TESTS

A. 211-1.1 Laboratory Maximum Density. [Replace with the following]: Laboratory maximum density tests shall be performed in accordance with Test Method No. Calif. 216G, Part II. The correction for oversized material as stated in Test Method No. Calif. 216 shall be replaced with Note 2 of ASTM D1557.

B. 211-1.2 Field Density. [Add the following Paragraph]: Field density tests will be made by the City Representative during the course of construction at the expense of the Agency. If field density tests indicate that any portion of the compacted subgrade has density lower than that specified, the Contractor shall rework that portion until the specified density is obtained. Retest of areas, which have failed compaction, will be performed by the Agency at the Contractor's expense.

PART 3 - EXECUTION

3.01 CRUSHED AGGREGATE BASE

A. Install base material to 12-inch thickness; compacted to 95% relative density minimum.

3.02 SSPWC SECTION 302 – ROADWAY SURFACING

A. Asphalt shall be a minimum depth of 4.5 inches.

B. 302-5.1 General [Replace the first paragraph with the following]: Asphalt Concrete may include full depth sections in narrow width situations where approved by the Engineer and shall conform to the requirements of Subsection 203-6 and Section 302-5 of the Standard Specifications, as modified by the Contract Documents.

C. 302-5.4 Tack Coat: Prior to paving over existing asphalt concrete, the surface shall be cleaned, cracks shall be sealed as shown below, and the surface shall have a tack coat of SS-1h emulsion at a rate of 0.10 gallon per square yard applied.

D. 302-5.5 Distribution and Spreading [Add the following]: The finish course shall be ½" Max Medium Type C2 as specified in Section 203-6.3.2, with an aggregate size conforming to Table 203-6.3.2(A), with PG64-10 oil.

3.03 CUTTING EXISTING PAVEMENT

A. The Contractor shall assume all costs for cutting and disposing of existing asphalt and concrete paving and base regardless of variations in depth.

*** END OF SECTION ***

SECTION 02740

ASPHALT CONCRETE PAVING (TRENCHING)

PART 1 – GENERAL

1.01 DESCRIPTION

Contractor shall provide all tools, equipment, materials, labor and services for furnishing, placing and compacting of asphalt concrete pavement and aggregate base to the lines, grades and dimensions shown on the Contract Drawings and as specified herein. Where any permit requirements exceed the requirements of this Section, the permit requirements shall govern.

1.02 SYSTEM

The Work of this Section shall include the construction of asphalt concrete pavement for pavement replacement areas (trenches and other pavement cuts and repairs) and includes all asphaltic tack coats, prime coats, seal coats and traffic markings, pavement markings and pavement markers as required, specified herein, or shown on the Contract Drawings.

Subgrade preparation is included elsewhere in Division 2 of these specifications.

1.03 STANDARD SPECIFICATION

Except as supplemented or specifically modified herein or shown otherwise on the Contract Drawings, the entire work under this Section shall be in compliance with the provisions in the applicable Sections of the 2019 Edition and includes all Supplement(s) of the Standard Specifications for Public Works Construction (SSPWC) also known as the “Green Book”.

In case of conflict between any requirements set forth in this Section, the Contract Drawings and any provisions of the foregoing Standard Specifications, the requirements shown on the Contract Drawings shall govern over the requirements set forth herein and the requirements set forth herein shall govern over the SSPWC.

1.04 TESTING

Pavement compaction testing shall be performed by the Contractor at the Contractor’s cost. Location and frequency of tests will be at the discretion of the Engineer.

PART 2 - PRODUCTS

2.01 AGGREGATE BASE

Aggregate base material shall conform to SSPWC Section 200-2.2 (Crushed Aggregate Base).

2.02 ASPHALT CONCRETE

Asphalt Concrete (AC) shall conform to the requirements of Section SSPWC 203 and shall be PG 64-10, unless otherwise shown on the Contract Drawings or required by local conditions.

A. AC Base course(s) material shall be B gradation.

B. AC finish course (wearing course) material shall be C-1 gradation.

C. Asphalt Rubber Hot Mix (ARHM) shall comply with SSPWC Section 203.11.

D. Prime Coat shall be Grade SC-250 liquid asphalt.

E. Tack Coat shall be SS-1h emulsified asphalt.

F. Seal Coat shall be SS-1h emulsified asphalt.

2.03 TRAFFIC MARKINGS AND PAVEMENT MARKINGS

Traffic Markings and Pavement Markings shall conform to the requirements of SSPWC Sections 214.

2.04 PAVEMENT MARKERS

Pavement Markers shall conform to the requirements of SSPWC Section 214-6

PART 3 - EXECUTION

3.01 GENERAL

Conform to the requirements of SSPWC Sections 203-6, 302.5 and 306-13, the Contract Drawings, and as stated herein.

A. Pavement Thickness. Asphalt concrete shall be spread and compacted in conformance with SSPWC Table 302-5.5 and shall be the thickness shown on the Contract Drawings, or 1-inch thicker than the existing paving if not otherwise shown.

B. Pavement Width. Asphalt Concrete and Base Course width, for trench repair, shall be a minimum of 18-inches (9-inches each side) wider than the trench width at the existing grade or as shown on the Contract Drawings, or Agency's standard drawing, whichever is greater.

C. Trench Resurfacing shall be spread and compacted in conformance with SSPWC Table 306-13.

D. Driveways and site areas paving shall be placed and compacted in conformance with the requirements of SSPWC Section 302-5.

E. Immediately prior to placing permanent asphalt paving, all existing pavement that is to remain (joined) shall be saw cut to provide a clean and vertical joint for the new

asphalt paving. Any other means to provide a clean and vertical joint shall not be acceptable.

3.02 A.C. PAVEMENT

A.C. Pavement shall be placed in compliance with SSPWC Section 302-5. Unless otherwise shown on the contract drawings, A.C. pavement compacted thickness shall be 1-inch thicker than the existing A.C. pavement thickness.

3.03 BASE COURSE

Unless shown otherwise on the Contract Drawings the minimum Base Course compacted thickness shall be 1-inch thicker than the existing base.

Aggregate base shall be graded and compacted to provide the designated uniform grades and cross sections to receive asphalt concrete paving and shall conform to the applicable requirements of SSPWC Section 301-1.

3.04 PRIME COAT

Prime Coat shall be required when shown on the Contract Drawings.

Application of prime coat shall comply with the applicable requirements of SSPWC Sections 203-2 and 302-5.3. Prime coat shall be uniformly distributed over completed subgrade and/or aggregate base course at the application rate of 0.25-gallons per square yard, unless the Owner specifies a different application rate at the time the work is performed.

3.05 TACK COAT

In conformance with the applicable requirements specified in SSPWC Sections 203-3 and 302-5.4, tack coat shall be applied to all vertical surfaces of concrete gutters, concrete and masonry walls, permanent headers, concrete slabs, pavement joints, and similar faces against which asphalt concrete pavement is to be placed. Tack coat shall be applied at a rate of 0.02 to 0.10 gallons-per-square-yard.

3.06 PAVEMENT TRAFFIC STRIPING

Following completion of all paving operations, the Contractor shall apply and/or replace all pavement striping, markings and markers, as shown on the Contract Drawings or that are disturbed, damaged or destroyed during construction. All replaced striping, markings and markers are to match the original that were in place at the start of construction. Striping, markings and markers shall conform to SSPWC Section 314.

*** END OF SECTION ***

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SECTION 02840

PLANTING IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. 02900 Landscaping

1.2 SUMMARY

A. Section Includes:

1. Piping and sleeves.
2. Automatic control valves.
3. Flow sensors.
4. Low voltage wires and wire connectors.
5. Manual valves.
6. Drip flush valves (Manual operation).
7. Transition fittings.
8. Dielectric fittings.
9. Miscellaneous piping specialties (Electrical Conduit).
10. Sprinklers.
11. Drip irrigation specialties.
12. Quick couplers.
13. Controllers.
14. Boxes for automatic control valves.
15. Trenching and backfilling for irrigation systems.
16. Backflow preventers and enclosures.

1.3 SCOPE OF WORK

A. The scope of work includes the construction of an irrigation system for landscape planting areas. The extent of the irrigation system is shown on the drawings. The work includes all services, labor, materials, transportation and equipment necessary to perform the work as shown and/or noted on the drawings and/or as specified. Irrigation system shall be fully functional with all capabilities met.

B. Contractor is responsible for close coordination with other contractors involved with grading, drainage and construction of site elements. For the project to be successful, it is the responsibility of Contractor to coordinate his work with other trades, as well as with the City Engineer (hereinafter called “The Engineer”) prior to, and throughout the construction period to avoid conflicts which may interrupt another’s work progress.

C. In the event of conflict between the Plans and Specifications, the City’s Trees/Parks Division shall be consulted.

1.4 DEFINITIONS

A. Lateral Piping: Downstream from control valves to sprinklers and specialties. Piping is under pressure during flow.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

C. Mainline Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

1.5 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves, unless indicated otherwise on Drawings.

B. Location of Sprinklers and Specialties: Design location is diagrammatic and approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Provide complete irrigation coverage of areas indicated.

C. Maximum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. ¾" to 1-1/2" SCH 40 – Lateral and Mainline Piping: 289 to 198 psi @ 73 degrees F.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Wiring Diagrams: For power, signal, and control wiring.

C. Hydrostatic Pressure Testing of the Pressure Supply Line. In the presence of the authorized Engineer, verify available (static) water pressure at the existing backflow preventer (or point of connection) prior to ordering materials or beginning construction and promptly report to the Engineer that pressure is the same, or is any different from water pressure noted on plans. Provide a written report the name/s of who was present at the time of pressure verification, measurement time of day, and duration of test. Measurement must be on the upstream side of the backflow preventer. In the case of difference in water pressure, contact the Engineer to provide further direction.

1.7 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.

B. Qualification Data: For qualified Installer.

C. Field quality-control reports.

D. Equipment Orders:

1. At least two (2) weeks prior to placing orders to purchase Controller Assembly, submit purchase order to controller manufacturer for verification.

2. Prior to placing order to purchase Rain Sensor and mounting equipment, submit purchase order for verification.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For all system components to include in operation and maintenance manuals.

1. Operation and maintenance manuals shall include large-scale drawings of all installed equipment showing the manufacturer's name and address and component catalog numbers.

a. Caution!! Be aware that Substantial Completion for Planting and Planting Irrigation may differ from Substantial Completion of entire Project because of seasonal planting requirements or other unforeseen reasons. This may require Schedule adjustment during construction.

B. Record Documents: Submit Record Drawings and Specifications at least 15 days prior to requesting inspection for Substantial Completion. After review, the Engineer will either return the Record Documents to the Contractor requesting further information or will notify Contractor that the Record Documents are acceptable. After the Engineer has accepted the Record Documents, an inspection for Substantial Completion may be scheduled.

1. Record Documents for this purpose shall be black line prints marked in red ink. Record Drawings shall indicate the following:

a. Zoning changes.
b. Controller changes.
c. Dimensions from two permanent points of reference (i.e. building corners, fixed hardscape corners, road intersections, permanent existing utilities, etc.), to the location of the following items as applicable:

1) Water meters.
2) Backflow preventers.
3) Connection to existing water lines. Note size of existing connection and type/material of fittings utilized.
4) Routing of pressure supply lines at every 25 feet along routing, and at every change in direction. Show all pipe sizes.
5) Pressure supply line and control wire stub-outs.
6) Any below grade, non-removable obstacle/s encountered during construction affecting the installation.

7) Backflow prevention devices.
8) Isolation ball valves.
9) Quick coupling valves.
10) Drip system flush valves and air vacuum relief valves.
11) Electric remote control valves.
12) Controllers.
13) Sleeves and Conduits (size and number, depth of cover if different than noted on construction documents).
14) Control wire routing (if routed separately from pressure supply line).
15) Wire splice boxes and stub-outs.
16) Modifications to existing irrigation systems.

2. As an exception to the requirements of Section 01 78 39 “Project Record Documents” submit final corrected set of Record Documents prior to requesting inspection for Final Completion. Record Drawings for this purpose shall be professionally drafted documents utilizing AutoCAD® 2018. Electronic digital data files of the Contract Drawings will be provided by the Engineer for Contractor's use in preparing these drawings. Submit these drawings as electronic submittals in accordance with the requirements of Section 01 33 00 “Submittal Procedures.” Maintenance Period will not commence until after submittal of final Record Documents.

C. Controller Charts:

1. Provide reduced scaled drawings for each controller unit installed. The controller drawings shall be a scaled drawing of the area covered by that controller unit and shall be at the maximum scale that will fit inside the controller enclosure door without folding the drawing. The chart shall consist of a site plan, entire or partial, showing building(s), walks, roadways, and walls. Drawings shall show valves and sprinkler heads serviced by that particular controller, identifying each station by separate color. Valve numbers shall match the operation schedule and the drawings. All zones controlled by a controller shall be included on a single sheet, use as many sheets as required for each controller. Only those areas controlled by that controller shall be shown. Provide draft for the Engineer review prior to submittal. Drawing shall be laminated in plastic, and placed inside the door of the controller pedestal enclosure. Contact the Engineer for wall-mounted controllers and the format approved for these. Confirm whether use of single-sided or front and reverse side format approved.
2. Submit additional copies of color coded controller drawings as follows: two 11 inch x 17 inch laminated copies; one 8 inch x 11 inch plastic laminated copy; and one 11 inch x 17 inch non-laminated copy.
3. Submit controller charts prior to requesting an inspection for Substantial Completion.

D. Equipment Certifications:

1. Submit the following prior to requesting an inspection for Substantial Completion:

a. All manufacturers' rebate certificates, if any.

b. All manufacturers' warranty information stating length of warranty and how to exercise warranty on all valves, irrigation controllers, sprinklers, and other components.

1.9 WARRANTY

A. Special Warranty: Contractor agrees to repair or replace irrigation system components and appurtenances that are defective, faulty, or fail in materials, workmanship, or operation within specified warranty period.

1. Defects and failures include, but are not limited to, the following:

a. Leaks and breaks on valves, piping, fittings, or other components.
b. Cracks in plastic valves, sprinklers, fittings, or other components.
c. Electrical disconnects and short-circuits.
d. Faulty performance of remote control valves, quick coupler valves, and manual valves.
e. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
f. Settlement of trenches, valve boxes, and other components.

1) Repair shall include replacement and repair of soil, finish grades, mulch (organic and inorganic), plant materials, hardscape elements, paving surfaces, etc.

2. Warranty Period: One (1) year from the date of completion and project acceptance at the end of the Maintenance Period.

1.10 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Five (5) pop-up spray sprinklers with nozzles and screens of each type used, for each pop-up spray sprinkler installed on the project. Five (5) pop-up spray/rotary stream sprinklers with nozzles and screens of each type, minimum. Ten (10) bubblers with screens, minimum.
2. 100' Sub Surface Dripline of the type installed.
3. Ten (10) dripline connectors, minimum.
4. 50 dripline staples, minimum.
5. Two (2) - 1" quick coupler keys with one (2) - 1" - swivel hose ell attachment, as described within these specifications, for quick coupler valve installed.
6. Two (2) sets of the required equipment specific specialty tools for removing, disassembling and adjusting each type of sprinkler and nozzle, isolation valve, and electric control valve used on the project. This shall include, but not be limited to; nozzle adjustment/removal tool, small screwdriver for spray nozzle adjustment, arc adjustment key/screwdriver, locking cover key for quick coupler valves, channel lock pliers, universal screwdriver, and nut driver and sockets for valve box bolts.
7. Four (4) keys for opening and locking each automatic controller and backflow preventer enclosure lock.

8. Solid, hardened steel or brass padlocks with spare keys that fit backflow preventer enclosure locking mechanisms installed.

1.11 QUALITY ASSURANCE

A. Installer Qualifications: A qualified irrigation system Contractor whose work has resulted in successful installation and operation of planting irrigation systems.
   1. Company Specialization. Professional Contractor must have at a minimum, a C-27 license.
   2. Professional Membership: Installer shall be a member in good standing of the Professional Landcare Network
   3. Experience: Five years' experience in landscape irrigation system installation.
   4. Contractor's Field Supervision: Maintain an experienced full-time supervisor on Project site when work is in progress.
   5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
   6. Personnel Certifications: Installer's field supervisor shall have certification in the following categories from the following organizations at a minimum:

      a. Landscape Industry Certified Technician – Exterior.

      b. Certified Irrigation Contractor (by the Irrigation Association) or equivalent certified Contractor with CLCA (California Landscape Contractor's Association), specializing in commercial irrigation system installation and maintenance. A review of a current copy of each Contractor's license is required.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support pipe to prevent sagging and bending.

C. Protect valves, fittings, and appurtenances from moisture, dirt, grease, and other possible contaminants.

1.13 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by The City of Upland or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify the Engineer no fewer than seven (7) days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without the Engineer's written permission.
3. Obtain the Engineer's written approval of exact length of time for each shut-off or work session.
4. Notify the Engineer when temporary interruption of watr service has been completed.

B. The scope of work includes the construction of an irrigation system for planting areas. The extent of the irrigation system is shown on the drawings. The work includes all services, labor, materials, transportation and equipment necessary to perform the work as shown and/or noted on the drawings and/or as specified. Irrigation system shall be fully functional with all capabilities met.

C. Contractor is responsible for close coordination with contractors involved with grading, drainage and construction of site elements. It is the responsibility of the Contractor to coordinate his work with other trades, as well as with Orange Glen Elementary School (hereafter referred to as "The Engineer") prior to, and throughout the construction period, to avoid conflicts which may interrupt work progress.

D. Contractor shall coordinate directly with the Engineer for access to existing controllers, coordinating and providing watering schedules, close monitoring and adjustment of watering schedules to maintain appropriate soil moisture content for each landscape area. Should natural precipitation be absent or ineffective, between 1 to 2 weeks prior to planting, coordinate to schedule irrigation systems to apply moisture to a depth of 18" throughout landscape area. Cycle and soak every other day, or as required to reach depth with moisture to eliminate run-off conditions. Observe each system operate until just before the point of runoff; this is how system run times shall be determined.

E. For all shrubs, upon planting and during the plant establishment period, provide hand-held hose watering for a deep, minimum watering of the tree root ball and adjacent soil. Do not rely on the overhead irrigation system for establishment of shrubs. Ensure applied water percolates well into the surrounding soil and root ball; do not allow a perched watering zone condition. If found in a perched watering zone condition, promptly notify the Engineer for further direction. Monitor soil moisture weekly to ensure under- and over- application of water does not occur, and adjust watering as required. Work closely with the Engineer on all watering schedules.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. General:

1. Pipe sizes shall be nominal inside diameter unless otherwise noted.
2. Pipe shall be identified with indelible markings including manufacturer's name, nominal pipe size, schedule or class, pressure rating, NSF (National Sanitation Foundation) seal of approval, and date of extrusion.

B. Pressure Supply Line:

1. Pipe, Solvent Weld:

   a. ¾" to 1-1/2-Inch Size Pipe: PVC Schedule 40 conforming to ASTM D1785.
   b. 2" to 3" Inch Size Pipe: PVC Class 315 BE (SDR 13.5) conforming to ASTM D 2241.
   c. Pipe Sleeves: PVC Schedule 40.
   d. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B.
   e. Type 1, Grade 1.
   f. Recycled Water irrigation systems shall be with Purple Piping. Potable water irirgation systems shall be with standard white piping.
   g. Domestic water piping: copper for all upstream water meter and backflow preventer piping.

2. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.
3. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.
4. Unions: PVC SCH 80 threaded inlet and outlet.

C. Non-Pressure Lateral Lines:

1. PVC Schedule 40, conforming to ASTM D1785-83.
2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.
3. Threads: Injection molded type (where required).
4. Tees and Ells: Side gated.
5. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.
6. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.
7. Recycled Water irrigation systems shall be with Purple Piping. Potable water irirgation systems shall be with standard white piping.

D. PVC: Sleeves and Conduit:

1. Sleeves for *pressure* supply line up to 3 inch size pipe and *non-pressure* supply lines shall be <u>twice</u> the nominal size of the pipe to accommodate any joints unless indicated otherwise on Drawings.
2. Sleeves for pressure supply lines 4 inch size and larger shall be 2-1/2 times the nominal size of the pipe to accommodate any joints and joint restraints inside the sleeve unless indicated otherwise on Drawings.
3. Sleeve Material (Provide size specified unless indicated otherwise on Drawings):

   a. PVC SCH 40 for pressure supply mainline
   b. PVC SCH 40 for non-pressure lines.
   c. One 2 inch PVC SCH 40 sleeve for up to 30 direct burial control wires.
   d. One 3 inch PVC SCH 40 sleeve for between 31 and 50 direct burial control wires.

4. Wire Conduit Material (Provide size specified unless indicated otherwise on Drawings):

   a. One ¾ inch PVC SCH 40 electrical conduit for up to 5 wires.
   b. One 1 inch PVC SCH 40 electrical conduit for up to 8 wires.
   c. One 1¼ inch PVC SCH 40 electrical conduit for up to 15 wires.
   d. One 1½ inch PVC SCH 40 electrical conduit for up to 20 wires.
   e. One 1 inch PVC SCH 40 electrical conduit for each Rain Sensor

E. Brass Pipe and Fittings:

1. Pressure Supply Line (for quick coupling valve): Brass pipe, regular weight, 85 percent red brass, ANSI Schedule 40 screwed pipe.
2. Fittings: Medium brass, screwed at 125 pound class.

F. Copper Pipe and Fittings:

1. Pressure Supply Line (meter service lateral, and between water meter and backflow preventer): Copper sweated pipe, Type 'K'.
2. Fittings: Copper, sweated and screwed threads.
3. Solder: Silver solder, lead-free, for potable water use.

2.2 ISOLATION VALVES

A. Isolation Ball Valve - Pipe1/2" Size to 4" Size: Brass, FIPT threaded inlet and outlet connection valve as follows:

1. UL listed, FM approved
2. Body and handle: Brass.
3. 600 psi 1/2 -2", 400 psi 3 & 4" at 73°F non-shock water.
4. Model: Nibco T-FP-600A – Brass Full Port Ball Valve.

2.3 BACKFLOW PREVENTERS AND ENCLOSURES

A. The backflow preventer shall be an integral part of an assembly including two ball valves. Backflow preventers shall be brass, bronze, or epoxy coated cast iron bodies with all bronze or stainless steel trim and all moving parts of non-corrosive materials, and shall completely and positively prevent back-siphoning of water. The backflow preventer assembly shall include inlet and discharge shutoff ball valves with all risers, connectors, and appurtenances of Class 1 red brass pipe, conforming to WW-P-351 and red brass fittings with pressure rating 1 conforming to WW-P-460. Backflow preventers shall be of the type and size designated in the irrigation legend, no substitution.

B. The backflow preventer enclosure shall be sized according to the backflow preventer assembly, and shall be as specified in the irrigation legend, no substitution.

2.4 FLOW METERS

A. Flow Meters:

1. Manufacturer and Model: Calsense FM1B

2.5 AUTOMATIC CONTROL VALVES

A. Bronze Electronic Remote Control Valves:
   1. 220 PSI rating
   2. S24B high-efficiency solenoid for positive opening at high pressures; includes stainless steel actuator and brass threads for long life
   3. Bronze body and cover with stainless steal bolts
   4. Reverse flow design for water conservation in the event of failure
   5. Brass shock cone for smooth operation and reduction of water hammer
   6. High-strength glass-filled body and cover with ¼" stainless steel cover bolts and mating brass body inserts
   7. Brass non-rising flow control stem throttles valve from full open to closed position
   8. Contamination-resistant (CR)
   9. Chlorine and chloramine-resistant EPDM diaphragm material

2.6 TRENCH WARNING TAPES AND VALVE WARNING TAGS

A. Recycled water systems: Recycled warning tape for mainline shall be detectable purple color marking tape with the words "Caution – Recycled Irrigation Line Buried Below" in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

B. Potable water warning tape for potable water irrigation supply line shall be detectable blue color marking tape with the words "Caution – Irrigation Line Buried Below" in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

C. Wire trench warning tape for direct burial wires shall be non-detectable red color marking tape with the words "Caution – Electrical Wires Buried Below" in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

D. Valve identification tags shall be pre-printed, yellow, single-sided, yellow tags made of polyurethane with reinforced attachment hole. Lettering shall be black color, hot-stamped with alpha-numeric numbering matching controller station, minimum of 1 inch height.

2.7 QUICK COUPLER VALVES:

A. Quick Coupler Assembly: Factory-fabricated, bronze or brass, two-piece assembly. Include quick coupler water-seal valve and a removable operating key designed to allow spring and key track to be serviced without shutdown of main piping; removable upper body with spring-loaded, rubber-covered cap. A positive, watertight connection shall be made between quick coupler valve and operating key:

1. Quick Coupler Valve: Acme thread type, 3/4-inch size, designed to withstand a working pressure of 150 psi. Bodies of valves shall be red brass. Provide valves with vandal-resistant, purple lockable hinged covers with springs for positive closure on key removal. Include two matching cover keys. Covers shall be red brass with a permanently bonded rubber like vinyl cover, yellow in color.
2. Operating Key and Hose Ell: Brass or bronze 3/4-inch size, slotted key, designed to fit quick coupler valve installed. Supplied with ¾" swivel hose ell, hose bibb assembly 3/4 inch inlet by 3/4-inch hose thread, inverted nozzle, and removable key.

2.8 PRESSURE REGULATORS AND WYE STRAINERS:

A. Pressure regulator and wye strainer shall be as noted in the drawings.

2.9 CHECK VALVES

A. Inline Check Valves – Durable plastic: To prevent low sprinkler head drainage. 1/2 in. MPT Inline Spring Check Valve shall be as noted in the drawings, Netafim TLCV 050M1-B for dripline systems; Hunter HCV, Valcon ADV-threaded or equivalent for sprinkler systems.

2.10 VALVE BOXES

A. Valve Boxes and Lids: Box shall be integral green color, with lockable bolt-down, overlapping lid, integral green color, with stainless steel hex bolt, size and type to secure lid to each size box. Carson/Oldcastle, no substitutions.

B. Valve Boxes for irrigation systems shall be as follows:

1. For quick coupler valves, isolation ball valves up to 2" size, wire splice boxes, spare wire boxes, in-line check valves, drip air vacuum relief valves and flush valves, 10 inch diameter round valve box.
2. For flow meters, master valves, electric remote control valves and 2-1/2" and larger ball valves: 12x19 inch valve box.
3. For drip system electric remote control valves: 17x30 inch valve box.

2.11 TRANSITION FITTINGS

A. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings:

1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

C. Plastic-to-Metal Transition Fittings:

1. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.

D. Plastic-to-Metal Transition Unions:

1. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

2.12 MISCELLANEOUS PIPING SPECIALTIES

A. Pressure Gages: ASME B40.1. Include 4-1/2-inch-diameter dial, dial range of two times system operating pressure (or 200 psi), 5 psi increments minimum, and bottom outlet.

2.13 SPRINKLER HEADS:

A. Pop-up Spray and Bubbler Type: Full or part circle pop up spray type sprinkler body, stem, nozzle and screen constructed of heavy-duty plastic. The sprinkler shall have a soft wiper seal and cover for cleaning debris from pop up stem as it retracts into case to prevent sprinkler from sticking up. The sprinkler shall have a matched precipitation rate plastic nozzle with an adjusting screw capable of regulating the radius and flow. The sprinkler shall have a strong stainless steel retract spring for positive pop down. Pop up height shall be as indicated on plans. The sprinkler head shall have a screen under the nozzle to protect it from clogging and for easy removal for cleaning and flushing system. The sprinkler head shall have a bottom inlet. Use only the bottom inlet for sprinkler heads. Sprinkler shall be as noted in the legend, manufactured with preset pressure regulating body compatible with selected nozzle. Model: Hunter PROS-12-PRS40 series with Hunter nozzles.

1. Swing joint assemblies:
   a. For 1/2” sprinklers shall be with (4) marlex street ells and PVC SCH 80 nipple.

B. Pop up Rotator Type sprinkler. Nozzles shall be available for true matched precipitation rates:

1. The sprinkler shall be available in adjustable arc and fixed arc configuration. The adjustable arc sprinkler shall be adjustable from 40 degrees to 360 degrees in 1 degree increments. Adjustments shall be made from the top of the riser assembly in either the up or down position.
2. The pop up sprinkler shall be of height as indicated on Drawings. Nozzle shall be integrally molded multiple orifice type that can be changed with tools included. Radius shall be adjustable by means of an exchangeable nozzles or a movable

diffuser pin. Nozzle turret shall be molded with a service indentation to accept a tool for raising nozzle piston for service.

3. The sprinkler shall have a ½ inch size NPT inlet and shall be accessible by a threaded cap for easy service.
4. The body of the sprinkler shall be constructed of non-corrosive heavy duty ABS. The sprinkler shall be equipped with a filter screen for debris stoppage. The sprinkler shall also be available in shrub model with adapter with the same nozzle package. The sprinkler shall carry a 5-year unconditional warranty.
5. All sprinklers with similar functions shall be of common manufacture and, with the exception of shrubbery heads, shall be marked with the manufacturer's name and identification in a position where they may be identified without being removed from the system.

    a. Subject to compliance with requirements, provide products by:
        1) Hunter Industries: PROS-00-PRS40

6. Swing joint assemblies:
    a. For 1/2" sprinklers shall be with (4) marlex street ells and PVC SCH 80 nipple.

2.14 DRIP IRRIGATION SPECIALTIES

A. Sub Surface Dripline: Device to deliver water from a range 8 to 60psi.

1. Body Material: flexible polyethylene tubing.
2. Drip irrigation tubing, equipment and accessories shall be as specified in the irrigation legend and details.
3. Tubing fittings: barbed connections, size compatible with tubing.
4. Stakes for tubing: as noted in the drawings.
5. Air Relief Valves: Polyethylene housing, with corrosion-resistant internal parts.
6. Flush Valves: with components as noted in the drawings.

2.15 PRE-ASSEMBLED AUTOMATIC CONTROLLER UNITS

A. Satellite Controller:

1. The satellite controller and options shall be as specified on the drawings, no substitutions.
2. The satellite controller shall be with options noted in the drawings.
3. The satellite assembly shall have connection for remote operation of the satellite controller noted in the drawings.
4. The satellite controller shall be covered by a manufacturer's limited warranty from the date of purchase. Warranty service shall be performed in the field on the site where the equipment is located.

B. Control Equipment Wall-Mount Enclosures:

1. Wall mount enclosure shall be of a vandal and weather resistant nature manufactured entirely of stainless steel. Wall mount enclosure is as indicated in the drawings, no substitutions.

2.16 ELECTRIC REMOTE CONTROL VALVE WIRE AND SENSOR WIRE

A. All control valve conductors shall be the same type and shall be of the sizes indicated on the Drawings as required for proper operation of the systems.

B. All wire for control of valves shall be #14AWG, insulated solid, single copper conductor with polyethylene (PE) jacket, of a type approved for direct burial. Common wire for each controller shall be white with stripe of same color as controller wires. Wire shall be P7079D – as manufactured by Paige Electric, Inc. Extra wires shall be of color noted in the drawings, at a minimum one (1) extra wire from controller to each valve manifold.

C. All wire for master valves and flow meters shall be #14AWG, insulated solid, single copper conductor with polyethylene (PE) jacket, of a type approved for direct burial. Wire colors for each flow meter and master valves shall be of same color throughout project, and as noted in the drawings. Wire shall be P7079D – as manufactured by Paige Electric, Inc.

2.17 WIRE CONNECTOR

A. For direct burial waterproof connectors. Kit shall include a high impact polypropylene tube, with wire nut, pre-filled with moisture-resistant dielectric silicone sealant material, to moisture-seal wire connections for direct burial. Wire connector shall be Spears #400 pre-filled connectors, no substitutions.

2.18 TRENCH WARNING TAPES AND VALVE WARNING TAGS

A. Recycled warning tape for mainline shall be detectable purple color marking tape with the words “Caution – Recycled Irrigation Line Buried Below” in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

B. Recycled Warning tags for valves and mainline stub-outs shall be pre-manufactured purple color with black text, double-sided tags with the warning “Recycled Water – Do not Drink” in English and Spanish. Remote control valve tags shall have the controller letter/number and station number on one side of the tag, the warning “Recycled Water – Do not Drink” in English and Spanish on the opposite side.

C. Potable warning tape for domestic water supply line shall be detectable blue color marking tape with the words “Caution –Water Line Buried Below” in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

D. Wire trench warning tape for direct burial wires shall be non-detectable red color marking tape with the words “Caution – Electrical Wires Buried Below” in 1 inch size minimum letters. The warning message shall be encased within the tape to prevent ink

rub-off and be impervious to acid, alkali, and other destructive elements typically found in soil. Minimum thickness 4.5 mil, with 0.0035 mil solid aluminum foil core. Widths shall be at least three-fourths of the diameter of the pipe being protected, 3 inch size minimum.

2.19 SAND BEDDING

A. Sand bedding material shall be clean, washed, construction grade type.

B. Sand bedding material shall be free of rocks, clay, organic matter, trash or other objectionable material.

C. Sand bedding material shall not contain angular material, as described in ASTM D2488.

2.20 CONCRETE FOOTINGS AND THRUST BLOCKS

A. Concrete footings and thrust blocks shall be 2,000 P.S.I. concrete at 28 days, 5 sack minimum mix, natural color.

2.21 FILTER FABRIC

A. Filter fabric for all valve boxes shall be non-woven type, fully stabilized UV-resistant and shall prevent soil particles from clogging and entering valve box pits. Mirafi 140N or approved equivalent.

2.22 GRAVEL

A. Clean rock gravel free from organic material, clay or loam; ½ to 3/4 inch in size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine field conditions with installer present prior to beginning the work of this Section. Grading operations shall be completed and approved prior to beginning work.

B. Verify all sleeve locations prior to beginning work of this Section. Flag all existing sleeves and conduits installed by other trades.

C. Verify location of existing underground utilities, valves, manholes, catch basins, and other appurtenances that will affect the layout of the sprinkler system and connection to power service. Verify location of existing shrubs, new specimen shrubs, and other obstructions that will affect the layout of the sprinkler system. Verify location of stub outs and points of connection to the water supply system. Verify location of all new and existing architectural elements.

D. Report any conflicts and discrepancies to the Engineer immediately. Do not begin work until conflicts and other unsatisfactory conditions have been discussed, direction given and addressed.

3.2 PREPARATION

A. Locations of piping and equipment indicated on Drawings is diagrammatic and approximate for drawing clarity purposes and shall be adjusted as necessary and as directed to meet existing conditions and obtain complete water coverage.

B. Preserve and protect all existing shrubs, plants, monuments, structures, hardscape and architectural elements to remain from damage due to work in this section. In the event that damage does occur to inanimate objects and structures, repair or replace such damage to the satisfaction of the Engineer. Contractor, at Contractor's expense, shall replace damaged or injured living plant material.

C. Sprinkler lines shall have a minimum clearance of 12 inches from each other and from other utility lines. Do not install parallel lines directly over one another.

D. Construct irrigation system to the sizes and grades at the locations indicated. Mark with powdered agricultural gypsum or marking paint routing of pressure supply line and stake the location of each spray head, rotor, flush valve assembly, electric control valve and other related equipment for the first three zones. Project Engineer shall review staking with Contractor and direct any necessary changes prior to proceeding to other zones. This review does not in any way alleviate Contractor from the responsibilities associated with proper uniformity and distribution of head placement after staking.

E. Install sleeves to accommodate pipes and wires under paving, hardscape areas, sidewalks, and paths prior to asphalt and concrete operations. Compact backfill around sleeves to 95 percent Modified Proctor Density within 2 percent of optimum moisture content in accordance with ASTM D1557. Where not yet utilized, close sleeve ends with dry fitted PVC caps.

F. Install headers, sidewalks, roadways, curbs, walls, concrete bands, mowing strips, and other permanent hardscape elements before installation of sprinkler system.

3.3 EXCAVATION AND BACKFILLING OF TRENCHES FOR IRRIGATION

A. Follow layout indicated on Drawings as closely as possible in excavating trenches. Trenches shall be straight in alignment and support pipe continuously on bottom of trench. Remove rocks and debris greater than 1 inch in diameter. Over excavate as required for bedding material.

B. Specified depths of pressure supply lines, laterals and pitch of pipes as stated in this Section are minimums. Settlement of trenches lower than grades indicated on Drawings is cause for removal of finish grade treatment, refilling trenches, re-compacting and repairing of finish grade treatment.

C. Trenching or other work required in this section under the limb spread of existing shrubs shall be done by hand or by other methods so as to prevent damage or harm to limbs, branches, and roots.

D. Trenching in areas where root diameter of existing shrubs exceeds 1 inch shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in

proximity to roots that are less than 1 inch, the wall of the trench shall be hand trimmed, making clean cuts through roots.

E. Trenches adjacent to or under existing shrubs shall be closed within 24 hours. When this is not possible, the side of trench closest to the tree or shrubs affected shall be covered with moistened burlap.

F. Protect, maintain, and coordinate work with other contracts, trades, and utilities. Exercise extreme care in excavating and working in areas where utilities exist. Repair damaged caused by Contractor operations at no cost to the Owner.

G. Use caution where trenches and piping cross existing roadways, sidewalks, hardscape, paths, or curbs. Repair damaged caused by Contractor operations at no cost to the Owner.

H. Depth of Trench in Landscape Areas (unless indicated otherwise on Drawings):

1. Pressure Supply Line: 18 inch from top of pipe to finish grade.
2. Non-Pressure Line (for all rotor sprinkler heads and 12 inch pop-up heads): 18 inch from top of pipe to finish grade.
3. Non-Pressure Line (for all non-rotor sprinkler heads and 6 inch pop-up heads): 12 inch from top of pipe to finish grade.
4. Control Wiring: Directly at side and bottom of pressure supply line.
5. Communication Cable: Opposite side of control wiring.
6. Pressure Supply line Locator Tape: 6 inch above top of pipe, at a maximum depth of 12 inch below finish grade.

I. Depth of Trench Under Asphalt Paving or Concrete, With Pipe or Wires in Sleeves (unless indicated otherwise on Drawings):

1. Pressure Supply Line: 36 inch from top of finish grade to top of sleeve.
2. Non-Pressure Line: 36 inch from top of finish grade to top of sleeve.
3. Control Wiring: 36 inch from top of finish grade to top of sleeve.
4. Communication Cable: 36 inch from top of finish grade to top of sleeve.
5. Pressure Supply Line Locater Tape: 6 inch above top of pipe, at a maximum depth of 30 inch below finish grade, but above pipe.
6. Non-pressure Supply Line Locater Tape: 6 inch above top of pipe, at a maximum depth of 30 inch below finish grade.
7. Piping located under asphalt paving or concrete shall be installed with the appropriate sized sleeve. Backfill with sand bedding (6 inch below pipe and 6 inch above pipe.)

J. Width of Trench (unless indicated otherwise on Drawings):

1. Pipe greater than 3 inch: 14 inch minimum.
2. Pipe less than 3 inch: 7 inch minimum.

K. Distance Between Trenches:

1. Irrigation trench to irrigation trench: 6 inch minimum.
2. Irrigation trench to other trade trenches: 12 inch minimum.

L. Sleeves:
   1. Provide specified sized sleeves for piping located under asphalt paving or concrete.
   2. Consult with the Engineer for direction when sleeve runs exceed 20 feet in length.

M. Boring: Boring is only permitted where pipe must pass under an obstruction that cannot be avoided or removed. Backfill shall match surrounding soil density and grain. Boring under existing paving, sidewalks, or hardscape shall be permitted at Contractor's risk. Contractor shall repair all damage to such items caused by Contractor operations at its own expense.

N. Backfilling: Backfilling of trenches shall not be done until all required testing for the irrigation system has been completed:

   1. Soil Backfill Material: Excavated material is generally considered to be adequate for backfilling operations. Before beginning the backfilling operation, insure that backfill material is free from debris and rocks greater than 1 inch in diameter, and is not mixed with topsoil. Legally dispose of these materials after being separated from backfill.
   2. Bed pressure supply line with construction grade sand 6 inch above and 6 inch below pipe. Remaining backfill shall be as described above.
   3. Bed all electrical control wire and communication cable wire, trenched separate from pressure supply line, with construction grade sand 6 inch above and 6 inch below wires.
   4. Bed all sleeves with sand bedding with construction grade sand 6 inches above and 6 inches below pipe sleeves.
   5. Set in place, cap and pressure test piping in the presence of the Project Inspector prior to backfilling.
   6. Compact backfill to a 90 percent maximum density in accordance with ASTM D1557 with a mechanical tamper. Do not leave trenches open for a period greater than 48 hours. Open trenches shall be protected in accordance with current OSHA regulations. Slightly mound filled trenches for settlement after backfilling is compacted.
   7. Smooth trenches to match surrounding finish grade prior to requesting inspection for Substantial Completion.

3.4 POINT(S) OF CONNECTION

A. Point(s) of connection shall be approximately as indicated on Drawings. Connect new underground piping and valves, and provide all flanges, adapters, or other necessary fittings.

3.5 SOLVENT WELDED POLYVINYL CHLORIDE (PVC) PIPE INSTALLATION

A. Polyvinyl chloride pipe shall be cut with an approved PVC pipe cutter designed only for that purpose.

B. All plastic-to-plastic solvent weld joints shall use solvent recommended by the pipe manufacturer. Do not install solvent weld pipe when temperature is below 40 deg F.

C. Wipe pipe ends and fittings clean before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.

D. Snake pipe from side-to-side on trench bottom to allow for expansion and contraction.

E. All changes of direction over 15 degrees shall be made with appropriate fittings.

F. When pipe laying is not completed by the end of the workday, close pipe ends with tight plug or cap.

G. Install pressure supply line locating tape along the entire length of pressure supply line.

H. Coordinate pressure supply line with sand bedding operations.

I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.

J. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

3.6 BRASS PIPE INSTALLATION

A. Brass piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Project Inspector.

C. Carefully and smoothly place joint compound on the male thread only. All screwed joints shall be tightened with tongs or wrenches. Caulking of any kind is not permitted.

D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot intervals in black permanent ink lettering, 3/4 inch size minimum.

3.7 COPPER PIPE INSTALLATION

A. Copper piping shall be cut by a circular cutting machine. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Project Inspector.

C. Carefully and smoothly place joint compound on the male thread only. All screwed joints shall be tightened with tongs or wrenches. Caulking of any kind is not permitted.

3.8 ISOLATION BALL VALVE INSTALLATION

A. Install isolation ball valves in round valve boxes, or in shared valve boxes as indicated on Drawings.

B. Fit each valve with a round valve box and ensure clearances will allow full and complete operation of valve and valve handle within box.

3.9 BACKFLOW PREVENTER INSTALLATION

A. Locate backflow preventers in the landscape with the direction of the Engineer. Provide sufficient room around enclosure for maintenance access to other irrigation and serviceable equipment. Coordinate with the Engineer with any existing backflow preventer how far apart it needs to be from any new equipment or structure

B. Plumb legs on backflow preventer with metal fittings and nipples. Provide reducing fittings directly upstream and downstream of backflow device assembly as needed.

C. Fit with enclosure where specified. Install enclosure so that it swings free and clear of backflow preventer assembly and surrounding obstacles. Provide solid, case hardened, keyed lock for each enclosure.

D. Following installation and prior to final inspection, provide written certification of installation and testing by certified backflow preventer tester approved by the local Water District. A copy of the certification for each backflow preventer assembly is to be provided to the City Inspector immediately upon certification, to be provided to the City.

3.10 FLOW METER INSTALLATION

A. Install flow meters in valve boxes as indicated on Drawings.

B. Install specified flow meter wire inside watertight conduit between controller, master valve and flow meter.

C. Perform operational test with the Engineer is present.

3.11 QUICK COUPLING VALVE INSTALLATION

A. Install quick coupling valves with brass riser set in a 1 cubic foot concrete footing. Set plumb and true in center of box with QCV top 3 inch below box lid. Ensure that proper quick coupling key operation is provided with each installation.

B. Install in separate round valve box as indicated on the Drawings.

C. Fit each valve with a round valve box and ensure clearances will allow full and complete operation of valve and valve handle within box.

3.12 PRESSURE REGULATOR AND WYE STRAINER INSTALLATION

A. Install pressure regulator and wye strainer on the backflow preventer risers per the drawings, and as directed with the Engineer. Set pressure delivery on pressure regulator as noted on the drawings

3.13 ELECTRIC REMOTE CONTROL VALVE INSTALLATION

A. Install master valve wire inside watertight conduit and fittings the entire distance between the controller, master valve and flow meter. Run wire conduit from master valve to flow meter, flow meter to controller.

B. Install each electric control valve in a separate valve box so that cross handle is 3 inch minimum below valve box cover. Install with union type connection. Fit each valve with a rectangular valve box, set over 3/4 inch gravel with filter fabric.

C. Group electric remote control valves together with no more than 3 per cluster. Allow a maximum of 12 inch between each valve boxes. Install valve boxes in the same direction and parallel with one another and perpendicular to paving, hardscape, sidewalks and paths. Install each manifold group with a ball valve sized equal to the largest non-pressure lateral line in the manifold.

D. Connection of electric remote control valve wires shall only be made within the valve box of the electric remote control valve. Wire connections on electric remote control valve 24-volt wire shall be made with direct burial waterproof connector, installed per manufacturer's specifications.

E. After final wiring and approval of controller station sequencing, secure valve identification tag to valve solenoid wires.

3.14 CHECK VALVE INSTALLATION

A. Install check valves in a separate round valve boxes at a maximum of 10 inch below valve box cover. Plastic valve boxes shall be secured with a stainless steel locking bolt mechanism, and set over 3/4-inch gravel with filter fabric.

3.15 VALVE BOX INSTALLATION

A. Install valve boxes with each type of irrigation equipment so that top of valve box is above finish grade as shown on details. Valve box extensions are not acceptable except for mainline isolation gate valves.

B. Place filter fabric below and around each valve box prior to installing valve box as specified on the detail drawings. Place gravel inside valve box, to a minimum 4 inch depth, allowing full access in and around all fittings. Valve box shall be fully supported by brick supports.

C. Brand the valve box lid of associated equipment as follows:

1. Electric remote control valve box lid with "Controller Letter and Station Number(s)." Coordinate with City Inspector the labeling of multiple valves per box prior to heat branding.
2. Quick coupling valve box lid with the letters "QCV."
3. Isolation ball valve box lid with the letters "BV."
4. Manifold Isolation ball valve box lid and drip line ball valve with the letters "BV."
5. Spare Wire box lids with the letters "SW."
6. Wire Splice box lid with the letters "WS."

7. Master valve box lid with the letters “MV”.
8. Flow meter box lid with the letters “FM”.
9. Grounding rod valve box lid with the letters "GR."
10. Air release valve box lid with the letters “ARV.”
11. Check valve box lid with the letters “CV”.
12. Drip flush valve assembly box lid with the letters “FV.”

D. Letter and number size of brands shall be no less than 1 inch and no greater than 1½ inch in height and shall be 1/8-inch maximum in depth. Submit sample branding to the the Engineer prior to commencement of work. Coordinate with the Engineer for any non-listed equipment box identification required.

E. Inspection for Substantial Completion shall not be allowed until all branding is complete and approved by the Engineer .

F. Plastic valve box covers shall be secured with a stainless steel locking bolt mechanism.

3.16 SPRINKLER INSTALLATION

A. Flush circuit piping with full water pressure and install sprinklers after hydrostatic test is completed.

B. Locate part circle sprinklers to maintain a minimum distance of 24 inches between paving, hardscape, sidewalks, and paths and a minimum distance of 12 inches from walls. Center bubbler heads in planters.

C. Spray head rotators shall not exceed the maximum head spacing recommended by manufacturer and as indicated on Drawings or staked in the field unless approved by the Project Inspector. In no case shall spray heads or rotors be installed at a distance between heads that exceeds the manufacturer's recommended distance.

D. Angled nipples on swing joints below spray heads or any sprinkler type, where applies, shall not exceed 45 degrees nor be less than 10 degrees.

E. After installation adjust nozzle sizes, arcs and radius of throw to allow head to head uniform distribution. Adjust all spray heads and rotors to correct height above sod as indicated on Drawings. No overspray will be allowed on electrical equipment, controllers, junction boxes, paving, hardscape, sidewalks, and paths.

F. Adjust adjacent new plant material placement or trim existing plants so that they do not interfere with uniform distribution of each spray head.

G. Project Inspector may request nozzle changes and/or adjustments without additional cost to he Engineer.

3.17 DRIP IRRIGATION SPECIALTY INSTALLATION

A. Install subsurface driplines as noted in the Drawings and as directed by the Engineer .

B. Install drip line ball valves, flush valves and in-line check valves below ground in control valve boxes.

3.18 AUTOMATIC CONTROLLER UNIT INSTALLATION

A. Verify electrical power at location of automatic controller unit prior to its installation. Coordinate exact location of each controller with the Engineer . Control unit shall have a dedicated separate circuit on the panel. Electrical panel and circuit number serving the irrigation control equipment shall be labeled inside the controller enclosure.

B. Hardwire controller to the on/off switch and existing power source. Controller shall not be plugged into socket provided for other equipment.

C. Equipment Mounting: Install automatic controller unit where indicated on Drawings on custom poured-in-place concrete base, plumb and true per manufacturer's requirements. Verify exact location in the field with the Project Inspector.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Controller shall be tested with complete electrical connections.

E. Connect electric remote control valve assembly wiring to controller unit in the same numerical sequence as indicated on the Drawings, or as directed by the Project Inspector in the field.

F. Where a part of project, connect flow sensing and master valve wiring to controller unit into proper terminals for their purpose.

G. Install a separate ground wire for each controller unit as indicated on the Drawings and per manufacturer’s requirements. Each Satellite Controller shall be grounded as required by the California Electrical Code and the manufacturer’s written instructions. Provide 5/8 inch by 8-foot long solid copper ground rod. No solder connections will be allowed. Resistance to ground shall be no greater than 5 ohms, or as specified by controller manufacturer.

H. Above ground conduit shall be rigid SCH 40 galvanized pipe with the appropriate watertight threaded fittings. Below ground conduit shall be PVC SCH 40 electrical conduit with appropriate sweeps and fittings. Conduit sweeps shall extend a minimum of 3 inch above concrete controller base.

I. Label each automatic controller unit with the letter or number designated on the drawings. Letter or number shall be located in a visible location on the inside panel cover with 3 inch high vinyl letters.

J. Each automatic controller unit shall be completely operable and sequence tested prior to scheduling an inspection for Substantial Completion.

3.19 RAIN SENSOR INSTALLATION

A. Install Mini Clik Sensor and equipment base/equipment following coordination with and determination of exact mounting parts and Mini Clik location with the Engineer . Comply with manufacturer's recommendations. Comply with local Electrical Code requirements for wire, conduit and wire connections.

B. Sensor shall be mounted securely to structure using stainless steel hardware and pipe clamps. All exposed materials (except top of sensor) shall be painted with three (3) coats of spray paint to match color of structure mounting to.

C. Mini Clik Sensor operational test shall be performed as required by Contractor in the presence of the Engineer .

3.20 FLOW METER INSTALLATION

A. Install flow meter per manufacturer's recommendations. Flow meter operational test with satellite controller shall be performed as required by Contractor in the presence of the Engineer .

3.21 ELECTRIC WIRE INSTALLATION

A. Low Voltage Wiring:

1. Bury control wiring in same trench as pressure supply line as specified.
2. Bundle all 24 volt wires at 20 foot intervals with electrical tape.
3. Provide expansion loops at every pressure supply line angle fitting, inside each electric remote control valve box, and at 250 feet length intervals along routing. Form expansion loop by wrapping wire a minimum of 10 times around a 3/4 inch pipe and withdrawing pipe.
4. Limit splicing of electrical wiring. Provide each splice made at intervals or in electric remote control valve assembly valve boxes with approved direct burial waterproof connectors.
5. Wire splices occurring at intervals outside electric control valve box shall be installed in a separate valve box.
6. Provide one electrical control wire for every electric remote control valve.
7. Install two (2) spare #14-1 electrical control wires (with common wire) from the automatic controller unit to the last electric control valve on each leg of pressure supply line. Locate the spare wires in their own valve box with mainline stub-out as specified. Provide one additional spare electrical control wire at every electric remote control valve manifold (valve grouping). In addition to these spare wires, provide additional wires as indicated on Drawings and locate them in the same valve box as the spare wires. Length of spare wires at each end enclosure shall be sufficient for connection into possible fixture equipment or connection point.

B. Power Source Wiring: Install 120 volt power source to automatic controller unit as required by California Electric Code, Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables".

3.22 CONTROL EQUIPMENT FIELD TESTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust electrical components, assemblies, and equipment installations, including connections, as follows:

1. Test each circuit for continuity.
2. Test each circuit for leaks to ground with an ohmmeter after each interconnect circuit has been installed and connections have been made. No circuit checking lower than 1 megohm will be acceptable.
3. Test the grounding system with a meter. System resistance shall not measure more than 5 ohms.
4. Perform operational test and demonstrate that each and every part of the system functions as specified. Do not start operational test without written approval to do so from the Engineer .

    a. The operational test for each new or modified electrical system shall consist of not less than five days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the condition shall be corrected and the test shall be repeated until the five days of continuous satisfactory operation are obtained.
    b. Shutdown caused by factors beyond the Contractor’s control shall not constitute discontinuity of the operational test.

5. Any material revealed by these tests to be faulty shall be replaced or corrected, and the same test shall be repeated until no fault is evident.
6. Record results of circuitry tests and submit to The Engineer .

3.23 CONTROL EQUIPMENT SUPPLIER SUPPORT

A. Engage control equipment supplier to provide the following field support services:

1. Conduct on-site system familiarization meeting for Contractor and the Engineer personnel to insure that all personnel understand the system installation technique.
2. Provide on-site technical assistance during installation period when requested by Contractor or the Engineer .
3. Test grounding system to verify that equipment is properly grounded.
4. Perform continuity and resistance test on communication wire to insure that proper voltage will be delivered to the equipment on line.
5. Hook-up communication and sensor wire to the proper terminals inside the enclosures to ensure that good connections are made.
6. Certify that equipment conforms to and is installed in accordance with plans, specifications and manufacturers recommendations.
7. Address satellites and decoders.
8. Test system components for proper operation.
9. Verify system flow range and calibrate pulse transmitter.

3.24 FIELD QUALITY CONTROL

A. Perform the following tests and inspections. All tests and inspections are required to be performed in the presence of the Project Inspector, who may delegate authority to the Engineer Landscape Inspector. Provide three days' notice to the Project Inspector prior to performing tests and requiring inspections.

1. Hydrostatic Pressure Testing the Pressure Supply Line: After backfilling, flushing, and prior to the installation of each electric remote control valve, isolation ball valve, quick coupling valve, and manual drain valve, pressure test the irrigation system utilizing the following procedure:

    a. Pressurize the irrigation system to 40 psi greater than the designated static pressure or 150 psi whichever is greater for a period of no less than 4 hours. The pressure gauge used for the pressure test shall not exceed readings greater than 300psi. Pressure pump and other equipment necessary for the test shall be furnished by Contractor.
    b. Test is acceptable if no leakage occurs within the system for the duration of the testing period.
    c. If leaks occur, repair said leaks and begin pressure test again. Repeat this operation until no leaks occur in the irrigation system.
    d. Before requesting a walk through for Substantial Completion, the entire irrigation system shall remain under pressure for a period of no less than 48 hours.

2. Inspections: Inspection will be performed by the Project Inspector at the following times:

    a. Upon installation and testing of main lines and lateral lines; when pipes are laid and are to be submitted to pressure tests. Do not cover lines until they have been inspected and approved.
    b. Upon installation and testing of valves, sensors and flow meters, quick couplers, backflow preventer device, pressure regulators and wye strainers, automatic controllers, control valves, and wires.
    c. When the irrigation system is completed, perform a coverage test, in the presence of the Project Inspector, to determine if the coverage is complete and adequate of all plants in the planter. Furnish materials and perform construction required to correct inadequacies in the coverage.
    d. Final inspection and performance test shall be at the same time as the final inspection of the landscape construction.

3. Flushing: Center-load all piping prior to flushing. After all new irrigation piping and risers are in place and connected and all necessary diversion work has been completed and prior to the installation of sprinkler heads, drip emitters and quick coupling valves, thoroughly flush piping system under full head of pressure. After the furthermost riser from the point of connection begins to flush, continue flushing for duration of five minutes. After the system is thoroughly flushed, cap all risers.

4. Walk-Through for Substantial Completion:

a. Before requesting a walk-through for Substantial Completion the following requirements must be entirely satisfied:

1) The entire irrigation system shall be completely installed, flushed and satisfactorily pressure tested.
2) All valve boxes shall be branded.
3) All automatic controllers or field satellite units are fully operable, control equipment has been certified and operation tested in the presence of the Engineer's Inspector and/or Landscape Manager.

b. Once the above requirements have been met a walk-through for Substantial Completion shall be requested. The following procedures shall be used during the walk-through:

1) Contractor shall have two personnel available with radio communication for the entire length of the walk-through.
2) All valve box lids shall be removed from valve boxes and placed faced up adjacent to the valve box prior to beginning the walk through.
3) The scheduling of each walk through type will be divided over several days as needed to provide adequate time to complete the review of all zones. The walk through will be divided into two sections and proceed as follows:

a) Visual Walk Through: This will consist of walking through the entire irrigation system and examining all components of the system without turning on zones. A punch list will be developed identifying deficiencies in the construction and workmanship of the system when compared to the requirements of the Contract Documents.
b) Operational Walk-Through: This will consist of walking through the entire irrigation system observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit. Manual bleeding of individual electric remote control valves are not acceptable. A punch list will be developed identifying deficiencies in the operation of each zone in the system evaluating, but not limited to: drip emitter operation, head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing, and flushing operation of zones when compared to the requirements of the Contract Documents.
c) Once the Walk-Through for Substantial Completion has been completed, a copy of the punch list will be forwarded to the Contractor who shall repair, replace, and adjust all items on the punch list prior to requesting a final walk-through.

5. Final Walk-Through

a. Before requesting a final walk-through, the following requirements must be entirely satisfied:

1) Each item on the Substantial Completion punch list shall have been thoroughly addressed and resolved by Contractor.
2) Controller charts for each automatic controller unit shall have been completed, installed, and submitted to the Engineer.

b. Once the above requirements have been met, a final walk-through shall be requested. The following procedures will be used during the walk-through:

1) Contractor shall have two personnel available with radio communication for the entire length of the walk-through.
2) Only those valve box lids shall be removed from valve boxes as indicated on the Substantial Completion punch list. The valve box lids shall be placed face up adjacent to the valve box prior to beginning the final walk-through.
3) The final walk-through shall be divided into two sections and proceed as follows:

a) Visual Walk-Through: This will consist of walking through the punch list items created at the time of the walk-through for Substantial Completion, examining all components of the system without turning on zones. Any remaining deficiencies in the construction and workmanship of the irrigation system when compared to the Substantial Completion punch list and Contract Documents will be noted.

b) Operational Walk-Through: This will consist of walking through the Substantial completion punch list items and observing each zone in a fully operable condition. Valves shall be activated from the automatic controller unit. Manual bleeding of individual electric remote control valves will not be acceptable. Any remaining deficiencies in the operation of each zone in the system including but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing, and flushing operation of zones, when compared to the Substantial Completion punch list and Contract Documents, will be noted.

6. Any additional walk-throughs required due to Contractor's inability to address all issues on the punch lists described above shall be provided at Contractor's expense, including costs of the Engineer's consultants.

3.25 DEMONSTRATION

A. Train the Owner's maintenance personnel to adjust, operate, and maintain equipment, sprinklers, specialties, and accessories.

***** END OF SECTION *****

SECTION 02851

CHAIN LINK FENCING AND GATES

PART 1- GENERAL

1.01 WORK OF THIS SECTION

A. This section pertains to furnishing and installing of new chain link fencing and gate(s).

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text of this section by the basic designation only. Listed reference documents pertain to the latest edition/version in all cases.

ASTM INTERNATIONAL (ASTM)

ASTM A116 Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric

ASTM A121 Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A392 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric

ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A824 Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence

ASTM C94 Standard Specification for Ready-Mixed Concrete

ASTM F567 Standard Practice for Installation of Chain Link Fence

ASTM F626 Standard Specification for Fence Fittings

ASTM F668 Poly-Vinyl Chloride (PVC) and other Organic Polymer-Coated Steel Chain-Link Fence Fabric

ASTM F900 Industrial and Commercial Swing Gates

ASTM F1043 Strength and Protective Coatings on Metal Industrial Chain- Link Fence Framework

ASTM F108 Standard Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures

ASTM F1184 Industrial and Commercial Horizontal Slide Gates

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-F-191 (Rev K)	Fencing, Wire and Post Metal (and Gates, Chain-Link Fence Fabric, and Accessories)
FS RR-F-191/1 (Rev D)	Fencing, Wire and Post, Metal (Chain-Link Fence Fabric)
FS RR-F-191/2 (Rev D)	Fencing, Wire and Post, Metal (Chain-Link Fence Gates)
FS RR-F-191/3 (Rev D)	Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)
FS RR-F-191/4 (Rev D)	Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

1.03 SUBMITTALS

A. The following shall be submitted (for new fencing and repaired fencing) in accordance with the submittal procedures contained in the Special Provisions, Section 23.0:

1. Shop Drawings For Fence Installation:
   a. Location of gate, corner, end, and pull posts
   b. Gate Assembly
   c. Turnstiles - NOT USED
   d. Gate Hardware and Accessories
   e. Installation drawings in accordance with paragraph titled "Assembly and Installation Drawings" of this section.

2. Product Data:
   a. Fence Installation
   b. Gate Assembly
   c. Gate Hardware and Accessories
   d. Manufacturer's catalog data.

3. Samples:
   a. Fabric
   b. Posts
   c. Post Caps
   d. Braces
   e. Line Posts
   f. Sleeves
   g. Top Rail
   h. Tension Wire
   i. Barbed Wire
   j. Barbed Wire Supporting Arms
   k. Stretcher Bars

l. Gate Posts
m. Gate Hardware and Accessories
n. Wire Ties
o. Samples as described within this section.

4. Test Reports:
   a. Weight in grams/ounces for zinc coating
   b. Thickness of PVC coating

5. Certificates:
   a. Chain Link
   b. Zinc Coating
   c. PVC coating
   d. Fabric
   e. Barbed Wire
   f. Stretcher Bars
   g. Gate Hardware and Accessories
   h. Concrete
   i. Gate Operator - NOT USED

6. Manufacturer's Instructions: Submit Manufacturer's instructions for the following items:
   a. Fence Installation
   b. Gate Assembly
   c. Hardware Assembly
   d. Accessories

1.04 QUALITY ASSURANCE

A. Required Report Data: Submit reports of chain-link fencing and accessories, describing the weight in grams (or ounces) for zinc coating and thickness of PVC coating. Submit reports demonstrating full compliance with the following standards: FS RR-F-191, FS RR-F-191/1, FS RR-F-191/2, FS RR-F-191/3, and FS RR-F-191/4.

B. Assembly and Installation Drawings: Submit complete Fence Installation Drawings for review and approval by the Engineer prior to shipment. Drawing details shall include, but are not limited to:
- Fence Installation
- Location of gate
- Corner, end, and pull posts
- Gate Assembly
- Turnstiles (if used)
- Gate Hardware and Accessories.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 - PRODUCTS

2.01 FENCE FABRIC

A. General: Provide ASTM A392, Class 2b polyvinyl chloride-coated steel fabric with 92 grams (0.3 ounces) of zinc coating per square meter (foot) in accordance with ASTM F668. Fabricate fence fabric of 9-gauge wire woven in 50 mm (2 inch) mesh conforming to ASTM A116. Polyvinyl chloride coating for fabric and all other fence components shall be forest green in color. Set fabric height at 1.8 m (6 feet). Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage. Secure fabric to posts using stretcher bars or ties spaced 375 mm (15 inches) on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured.

B. Approval of Polyvinyl Chloride-Coated Fence Materials: The Engineer may thoroughly inspect polyvinyl chloride-coated fence materials for damage, cracking, peeling, and conformance with the specifications before and after installation. Any fence materials rejected by the Engineer shall be replaced by the Contractor with approved materials at no additional cost to the Agency.

2.02 POSTS

A. Metal Posts for Chain Link Fence: Posts shall be zinc coated and polyvinyl chloride coated, matching the coating of the fence fabric. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric. Provide sizes as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Provide posts conforming to ASTM A53 Grade A schedule 40 pipe.

- FS RR-F-191/3 line posts: Class 1, steel pipe, Grade A.
- End, corner, and pull posts: Class 1, steel pipe.

B. Accessories: Provide accessories conforming to ASTM F626. All ferrous accessories shall be galvanized and polyvinyl chloride-coated, minimum thickness of 0.152 mm (0.006 inch), maximum thickness of 0.381 mm (0.015 inch) match color coating of fittings to color coating of the fabric. Polyvinyl chloride coating shall be performed by the same manufacturer and identical in color to polyvinyl chloride coating for the fence fabric. Furnish truss rods for each terminal post. Provide truss rods with turnbuckles or other equivalent provisions for adjustment. Provide barbed wire supporting arms of the single 45-degree outward angle 3-strand arm type and of the design required for the post furnished. Secure arms by top rail. Furnish post caps in accordance with manufacturer's standard accessories. Provide 9-gauge steel tie wire for attaching fabric to rails, braces, and posts and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A153 unless modified.

2.03 BRACES AND RAILS

A. ASTM F1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F1043. Braces and rails shall be Group IA, steel pipe, size NPS 1-1/4 or Group II, formed

steel sections, size 42 mm (1-21/32 inch) and be zinc coated (Type A) and polyvinyl chloride-coated conforming to the requirements of ASTM F1043. Match color coating of braces and rails to color coating of the fabric. Polyvinyl chloride coating shall be performed by the same manufacturer and identical in color to polyvinyl chloride coating for the fence fabric. Group II, formed steel sections, size 42 mm (1-21/32 inch), conforming to ASTM F1043, may be used as braces and rails if Group II line posts are furnished.

2.04 WIRE

A. Wire Ties: FS RR-F-191/4. Provide wire ties constructed of the same material as the fencing fabric. Provide accessories with polyvinyl (PVC) coating identical to that specified for chain-link fabric or framework. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric.

B. Barbed Wire: Provide barbed wire conforming to ASTM A 121 zinc-coated, Type Z, Class 3 with 12.5-gauge wire with 14 gauge, round, 4-point barbs spaced no more than 125 mm 5 inches apart. Provide barbed wire with polyvinyl (PVC) coating identical to that specified for chain-link fabric or framework. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric. Barbs shall not be PVC coated.

C. Tension Wire: Provide Type I or Type II tension wire, Class 4 coating, in accordance with ASTM A824. Provide 7-gauge coil spring wire for top wire. Provide tension wire with polyvinyl (PVC) coatings identical to that specified for chain-link fabric or framework. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric.

2.05 CONCRETE

A. Concrete: ASTM C94, using 19 mm {3/4 inch) maximum size aggregate, and having minimum compressive strength of 21 MPa (3000 psi) at 28 days. Grout shall consist of one part Portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.06 GATES

A. Gate Assembly: Provide gate assembly conforming to ASTM F900 and/or ASTM F1184 of the type and swing as shown or as required to match existing gate (where replacement is indicated). Gate frames and hardware shall be polyvinyl chloride-coated. Gate fabric shall be as specified for chain link fabric. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric.

B. Gate Leaves: For gate leaves provide either intermediate members and diagonal truss rods or tubular members as necessary to provide rigid construction, free from sag or twist. Attach fabric to the gate frame by method standard with the

manufacturer except that welding will not be permitted. Gate shall have two leaves as shown to match the layout and dimensions of existing gate to be replaced.

C. Gate Hardware and Accessories: Furnish and install latches, hinges, stops, keepers, rollers, and other hardware items as required for the operation of the gate. Arrange latches for padlocking so that the padlock will be accessible from both sides of the gate. Provide stops for holding the gates in the open position. Each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Except for metal to metal moving surfaces provide gate hardware with polyvinyl (PVC) coatings identical to that specified for chain-link fabric or framework. Polyvinyl chloride coating shall be performed by the same manufacturer and shall be identical in color to polyvinyl chloride coating for the fence fabric.

D. Padlocks: Padlocks for the vehicle gate shall be provided by the Agency.

PART 3 - EXECUTION

3.01 FENCE INSTALLATION

A. Perform complete installation conforming to ASTM F567.

B. Line and Grade: Install fence to the lines and grades indicated. Contractor shall clear surface vegetation along the fence line where fencing repairs or new fencing is to be constructed. Space line posts equidistant at intervals not exceeding 3 m (10 feet). Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Provide fabric continuous between terminal posts; however, runs between terminal posts shall not exceed 152.4 m (500 feet). Repair any damage to galvanized surfaces, including welding, with paint containing zinc dust in accordance with ASTM A780.

C. Excavation: Clear all post holes of loose material. Spread waste material where directed. Eliminate ground surface irregularities along the fence line to the extent necessary to maintain a 25mm (1 inch) clearance between the bottom of the fabric and finish grade.

3.02 POST INSTALLATION

A. Earth and Bedrock: Set posts plumb and in alignment. Except where solid rock is encountered, set posts in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, set posts to a minimum depth of 457 mm (18 inches) in rock. Where solid rock is covered with an overburden of soil or loose rock, set posts to the minimum depth indicated on the drawing unless a penetration of 457 mm (18 inches) in solid rock is achieved before reaching the indicated depth, in which case terminate depth of penetration. Grout all portions of posts set in rock. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Make diameters of holes in solid rock at least 25 mm (1 inch) greater than the largest cross section of the post. Thoroughly consolidate concrete and grout around each post, free of voids and finished to form a dome. Allow concrete and grout to cure for 72 hours prior to attachment of any

item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Set driven posts to a minimum depth of 914 mm (3 feet) and protect with drive caps when setting. Test fence post rigidity by applying a 222.4 newtons (50 pound) force on the post, perpendicular to the fabric, at 1.52 m (5 feet) above ground. Post movement measured at the point where the force is applied shall be less than or equal to 19 mm (3/4 inch) from the relaxed position. Test every tenth post for rigidity. When a post fails this test, make further tests on the next four posts on either side of the failed post. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.03 BRACES AND RAILS

A. Rails are not used for the fence except at corner and gate panels as shown on the plans. Gates shall be provided with rails. Bolt braces to brace ends and securely fasten rail end clips to the posts. Peen bolts to prevent easy removal. Install braces before chain link fabric.

3.04 FABRIC INSTALLATION

A. Install chain link fabric on the side of the post indicated. Attach fabric to terminal posts with stretcher bars and tension bands. Space bands at approximately 381 mm (15 inch) intervals. Install fabric and pull taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fasten fabric to line posts at approximately 381 mm (15 inch) intervals and fastened to all rails and tension wires at approximately 305 mm (12 inch) intervals. Cut fabric by untwisting and removing pickets. Accomplish splicing by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 25 mm (1 inch) plus or minus 13 mm (1/2 inch) above the ground. After the fabric installation is complete, exercise the fabric by applying a 222 newtons (50 pound) push-pull force at the center of the fabric between posts; the use of a 133 newtons (30 pound) pull at the center of the panel shall cause fabric deflection of not more than 63.5 mm (2.5 inches) when pulling fabric from the post side of the fence; every second fence panel shall meet this requirement. Re-secure and retest all failed panels at the Contractor's expense.

3.05 SUPPORTING ARMS FOR BARBED WIRE

A. Install barbed wire supporting arms and barbed wire on fencing only as indicated on the drawings. Barbed wire supports and installation shall conform to manufacturer’s recommendations. Anchor supporting arms with 9.5 mm (3/8 inch) diameter plain pin rivets or, at the Contractor's option, with studs driven by low-velocity explosive-actuated tools for steel, wrought iron, ductile iron, or malleable iron. Studs driven by an explosive-actuated tool shall not be used with gray iron or other material that can be fractured. Use a minimum of two studs per support arm. Pull barbed wire taut and attach to the arms with clips or other means that will prevent easy removal.

3.06 GATE INSTALLATION

A. Install gates at the location(s) shown. Mount gates to swing as indicated. Install latches, stops, and keepers as required. Install gates as recommended by the manufacturer. Attach padlocks to gates or gate posts with chains. Weld or

otherwise secure hinge pins and hardware assembly to prevent removal.

3.07 SECURITY

A. Contractor shall provide (maintain) continuous security for the reservoir site, while constructing new security fencing. Schedule and fully coordinate work with the Engineer.

B. Contractor shall provide temporary fencing at no additional cost to Agency, should that be necessary to maintain site security (equivalent to what is provided by existing fencing) while fencing improvements are being constructed.

3.08 CLEANUP

A. Remove waste fencing materials and other debris from the work site each workday.

3.09 WARRANTY

A. Form of Warranty: The Contractor shall warrant the new and repaired Chain Link Fencing and Gates to the extent and in the form required per this section and the Agency's Front End Documents.

B. Materials: Materials used for Chain Link Fencing and Gates shall be warranted to be free from defects, including but not limited to: breakage or fracture of any materials used in their installation, cracking or peeling of the polyvinyl chloride-coating of fence materials and from the development of red rust over five percent (5%) of the surface for a period of fifteen (15) years from date of substantial completion.

C. Workmanship: Workmanship used for Chain Link Fencing and Gates shall be warranted to be free from defects, including but not limited to: breakage or fracture of any materials used in their installation, cracking or peeling of the polyvinyl chloride-coating of fence materials and from the development of red rust over five percent (5%) of the surface for a period of fifteen (15) years from date of substantial completion.

*** END OF SECTION ***

SECTION 02900

LANDSCAPE PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMETS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes (not all inclusive)
   1. Plants.
   2. Planting soils, soil amendments, and fertilize
   3. Bark Mulch

1.3 SCOPE OF WORK

A. The work includes all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of "landscaping," complete as shown on the drawings and as specified herein.

1.4 RELATED SECTIONS

A. Section 02840 for “Planting Irrigation”

1.5 DEFINITIONS:

A. Engineer: Contractor is responsible for close coordination with other contractors involved with grading, drainage and construction of site elements. For the project to be successful, it is the responsibility of Contractor to coordinate his work with other trades, as well as with the City Engineer (hereinafter called “Engineer”) prior to, and throughout the construction period to avoid conflicts which may interrupt another’s work progress.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation.

C. Bonded Fiber Matrix: A continuous layer of elongated fiber strands held together by a water-resistant bonding agent.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Final Acceptance: Observation review by Architect at end of the specified Maintenance Period to verify completion and acceptance of the Work.

F. Finish Grade: Elevation of finished surface of planting soil.

G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

H. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

I. Planting Area: Areas to be planted.

J. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

L. Pre-maintenance review: Observation by Architect to verify substantial completion of the Work. The Architect will generate a Punch List during this review. Maintenance Period will commence when Contractor has completed items on this Punch List and Architect has verified that the Punch List is complete.

M. Punch List: List of work within the Contract, generated by Architect that needs to be completed, repaired, replaced, or rectified by Contractor.

N. Root Flare: The area at the base of the plant's stem or trunk where the stem broadens to form roots; the area of transition between the root system and the stem or trunk.

O. Soil Test: Required testing performed by Contractor after site is rough graded. A current soil report is also required for import soil prior to transport to the site.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.6 QUALITY ASSURANCE

A. Standards:

1. Provide plants and planting materials that meet or exceed specifications of Federal, State, and County laws requiring inspection for plant disease or insect control.
2. Provide quality and size conforming to current edition of “Horticultural Standards” for number one nursery stock as adopted by the American Association of Nurserymen.
3. Provide plants that are true to name. Tag one of each bundle or lot with the name and size of plants in accordance with the standards of practice of the American Association of Nurserymen.
4. Botanical names shall take precedence over common names.

B. Workmanship: Perform work in accordance with the best standards of practice for landscape work and under the continual supervision of a competent foreman capable of interpreting the Drawings and Specifications.

C. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

D. Installer's Field Supervision: Require Installer to maintain an experienced and qualified full-time supervisor on project site when landscaping is in progress.

E. Quantities and Types: Plant materials shall be furnished in the quantities and/or spacings as shown or noted for each location, and shall be of the species, kinds, sizes, etc., as symbolized and/or described in the Plant List, and as indicated on the Drawings.

F. Verification of dimensions, quantities, and existing conditions
1. Scaled dimensions are approximate. Before proceeding with work, carefully check and verify dimensions and quantities and immediately inform the Architect of discrepancies between the Drawings and/or specifications and actual conditions. Do not start work in areas where there are discrepancies until approval for same has been given by the Architect.
2. Prior to the excavation for planting or placing of plant materials, the Contractor shall verify the location of all underground utility lines and other improvements and take proper precautions to avoid damage to such improvements. In the event of conflict between such improvements and plant locations, the Contractor shall notify the Architect and arrangements will be made for relocation as necessary. Failure to follow the procedure places upon the Contractor the responsibility for making any and all repairs for damage resulting from work as herein specifies at his own expense.

1.7 VERIFICATION AND PROTECTION OF EXISTING CONDITIONS

A. Prior to the excavation for planting or placing of plant materials, the Contractor shall verify the location of all underground utility lines and other improvements, and take proper precautions to avoid damage to such improvements. In the event of conflict between such improvements and plant locations, the Contractor shall notify the Owner, and arrangements will be made for relocation as necessary. Failure to follow this procedure places upon the Contractor the responsibility for making any and all repairs for damage resulting from work as herein specified at his own expense.

B. The specified soil amendments and their rates of application are for bidding purpose only. The Contractor shall verify the soil conditions through soil testing. See Part 3 for execution of soil amendments.

C. During the construction and maintenance period, the Contractor shall take every precaution to protect and avoid damage to sprinkler heads, irrigation lines, drainage lines, existing underground facilities, paving, structures, fixtures, and existing plantings. The Contractor shall be held responsible for any and all damage to such improvements and shall completely repair or replace the same at no cost to the Owner.

1.8 SUBMITTALS AND SUBSTITUTIONS

A. Upon 15 days after the Contractor has received the Owner's notice to proceed, the Contractor shall submit to the Engineer three (3) typewritten lists of all materials proposed with quantities, size, quality, and source.

B. Prior to installation of any landscape elements, the Contractor shall submit for approval by the Engineer, a list of all materials and equipment proposed for use. Submit product data for each type indicated for approval, such as (not all inclusive):
   1. All soil conditioners, soil amendments, fertilizers, and other chemicals.
   2. Imported soil.
   3. Bark mulch.
   4. Pesticides: Also, include copies of sample label and Material Safety Data Sheet (MSDS).

C. Soil Test: Contractor shall have import soil and the soil of the site tested for fertility, agricultural suitability, and appraisal by Soil and Plant Laboratory Inc. (714) 282-8777, or Wallace Labs (310) 615-0116.
   1. Submit a copy of the Planting Plan and Plant Legend to the laboratory with the samples.
   2. Soil shall be tested from a minimum of three (3) locations per acre of planted area. Representative samples shall be taken from random and varied locations of the project site that will receive landscaping installation. Samples should represent major conditions of exposed cut soils, fill soils, and native undisturbed soil. Sample from the top foot for ground cover and shrubs. Sample from the expected depth for large container stock. Label each sample for location/origin, type of soil condition visibly observed, and sampling depth. Laboratory report shall identify each sample with same information. All samples taken shall be split into two samples, one half will go to a qualified laboratory by the Contractor (at his or her expense) and the other half will be retained by the Owner. All samples shall be at least one pint in volume. All samples shall go to an approved soil-testing laboratory.
   3. A copy of the soil test results shall be submitted to the Owner and Architect before work begins.
   4. Testing methods should comply with the United States Department of Agriculture Handbook Publication No. 60, Methods of Soil Analysis published by the Soil Science Society of America and peer-viewed methods published in scientific journals. Evaluations and recommendations should be based on University of California publication's and peer-viewed articles published in) scientific journals.

5. The Owner shall appoint a representative to oversee soil sampling that may be required. The time, depth, location, and number of samples to be taken as per instructions from the Owner.
6. Soil report shall include:
   a. pH measurement.
   b. Determination whether limestone is present or not.
   c. Percent water in saturation extract.
   d. Electrical conductivity of the saturated extract (salinity ECe) / soluble salts.
   e. Measurement of sodicity (Sodium Adsorption Ratio).
   f. Concentration of boron in saturation extract.
   g. Nutrients and elements:
      1) Measurement (low, medium, high) of: Boron, calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, sodium, sulfur, and zinc.
      2) Analyze saturation extract for: calcium, magnesium, sodium, boron, chloride, phosphorus, nitrate and sulfate.
      3) Trace metals: Aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, nickel, selenium, silver, strontium, tin and vanadium.
      4) The presence of calcium carbonate and/or magnesium carbonate.
   h. Soil Texture (gravel, sand, silt and clay). Determine organic matter content by the measurement of organic carbon. The quality of the organic matter shall be determined by measuring organic carbon and total nitrogen.
      1) Methods of Soil Analysis, Part 1, Physical and Mineralogical Methods, Soil Science Society of America, Inc., 1986, chapter 36, pgs 901-926 and Methods of Soil Analysis, Part 3 Chemical Methods, Soil Science Society of America, Inc, 1996, chapter 34, pgs 965-977 & pgs 1001-2 and chapter 37, pg 1088
   i. Interpretation and recommendations for correction of nutritional deficiencies/ excesses and potential toxicities. These recommendations shall include:
      1) Volume of soil amendment per 1,000 sq.ft. and cu.yd. of backfill mix.
      2) Pounds of gypsum per 1,000 sq.ft. and cu.yd. of backfill mix.
      3) Pounds of soil sulfur per 1,000 sq .ft. and cu.yd. of backfill mix.
      4) Pounds of iron sulfate per 1,000 sq.ft. and cu.yd. of backfill mix.
      5) Pounds of pre-plant fertilizer per 1,000 sq.ft. and cu.yd. of backfill mix.
      6) Recommendation for soil leaching.
      7) Pounds of maintenance fertilizer per 1,000 sq. Ft. and analysis.
      8) Recommendation for soil wetting agent and application rate.
      9) Percent of site soil-to-soil amendment in backfill mix.

      If any of the above listed items are not recommended, the recommendation shall call for zero volume or zero poundage per 1,000 square feet. All soil test costs will be the responsibility of the Contractor.

D. Legible copies of delivery slips for soil amendments, plant materials, rock products, and bark mulch specifying the quantities that were delivered. The contractor shall provide certificates, trip slips, and invoices to the Owner prior to final acceptance of the work.

E. Samples for verification for each of the following:
   1. Bark Much- 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of with and source of mulch.

Each sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

2. Top Soil- 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials.
3. Actual samples of the soil amendments shall be submitted to the Engineer only if requested by the Engineer after approval of the soils test.

F. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

G. Substitutions for the indicated materials will only be permitted provided the substitute materials are approved in writing, in advance, by the Engineer and the Owner. All substitute materials shall conform to the requirements of these specifications. If accepted substitute materials are of less value than those indicated or specified, the contract price will be adjusted in accordance with the provisions of the contract.

1.9 OBSERVATION SCHEDULE

A. Site observations herein specified shall be made by the Engineer during regular business hours. The Contractor or his authorized representative shall be on the site at the time of each observation. The Contractor will not be permitted to initiate the succeeding step of work until he has received approval to proceed by the Engineer.

B. All changes and deviations to the plans and specifications shall be communicated to the Construction Manager and shall be confirmed in writing.

C. The Contractor shall have sufficient work personnel available during normal working hours to correct deficiencies immediately upon request of the Engineer. Such repair or re-work services are to be performed without interference of regular project schedule.

D. Contractor shall be responsible for notifying the Architect, in advance, for the following observations, according to the time indicated:
1. Pre-construction conference – seven (7) days, immediately prior to the commencement of work of this section, the Owner, Contractor, and Engineer shall meet for the approval of the materials specified, equipment, schedule of work and the method of installation.
2. Incorporation of soil amendments- 48 hours, specified soil amendments are for bidding purposes only. A final soil test performed by an approved laboratory shall be submitted and paid for by the Contractor for agricultural suitability recommendations and approved by the Engineer before planting begins.
3. Final grade, soil preparation and planting area layout review - 72 hours, Upon the completion of soil amending, the finish grading and planter edging layouts in the field will be approved prior to planter edging installation. Shrub samples, three (3) each of all varieties and sizes (shrubs 5-gallon and under) shall be submitted for approval at the site a minimum of fifteen (15) days prior to planting operations for quality, size, variety, vigor, and rooting characteristics. Approved samples shall remain on the site and shall be maintained, by the Contractor as standards of comparison for plant materials to be furnished.
4. Plant materials review - 48 hours

5. Plant layout review - 48 hours, when material is spotted in place for planting, but prior to excavation of planting holes.
6. Planting operations - 48 hours
7. Completed planting (Pre-maintenance) walk through – seven (7) days, when planting and all specified work has been installed and completed, the Engineer will prepare a written "punch list" indicating all items to be corrected. These items must be completed prior to initiating the beginning date of the maintenance period. The Engineer will inform the Owner and Contractor of the actual date of the start of the maintenance period in writing. This observation is not the final acceptance of the project, and does not relieve the Contractor from any of the responsibilities in the contract documents.
   Final Site Observation and Acceptance of the Project – seven (7) days, At the conclusion of the maintenance period a final site observation will be made. The Contractor shall show all corrections made from the punch list." Any items deemed not acceptable shall be reworked and the maintenance period will be extended. The Contractor will be notified in writing that the contract work and maintenance period has been accepted or that the maintenance period has been extended to correct any deficiencies remaining. Final acceptance of the project shall establish the beginning date for the guarantee period.

E. Contractor shall be responsible for scheduling site Observation visits with Architect as work progresses. Failure to schedule required Observations shall not relieve Contractor of responsibility for obtaining approvals. Contractor shall redo, at no cost to the Owner, work that does not satisfy the Owner.

F. Observations may be waived or combined at the discretion of the Architect.

G. When someone other than the Architect conducts observations, the Contractor shall show evidence in writing of when and by whom these observations were made.

H. No site visits shall commence without adequate preparation or items noted in previous Observation Reports, either completed or remedied, unless the Owner has waived such compliance. Failure to adequately prepare or accomplish previous punch list items shall make the Contractor responsible for reimbursing the Architect for the site visit at his current billing rates per hour plus transportation costs. No further inspections will be scheduled until this charge has been paid and received.

I. Site observations of the work shall not relieve the Contractor of the obligation to fulfill all conditions of the contract.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall notify the Engineer in advance when material is scheduled for each delivery, in order to ensure satisfactory coordination of delivery and to expedite the required inspection at the point of delivery. The delivery of the material shall include invoices certifying that subject material has been inspected as required by the State Agricultural Code prior to acceptance or installation. Particular care, using approved equipment, shall be exercised to ensure safe loading, unloading, shipping and handling for all material from source to in place locations indicated on the drawings.

B. The Contractor shall furnish the Engineer with three (3) copies of signed, legible certificates and/or invoices stating the quality and quantity of all items herein specified at time of delivery. Recommendation shall be made by the Engineer or the Owner to stop work progress until certificates are received and reviewed by the Engineer.

C. Upon delivery of materials and/or completion of all soil amending and with the heretofore specified signed copies of required certificates, trip slips and invoices for soil preparation materials the Engineer shall invoice such material, comparing the total quantities of each material furnished against the total area of each operation. If the minimum rates of application have not been met, the Engineer will require the distribution of additional quantities of these materials to fulfill the minimum application requirements specified.

D. After installation of plant materials, but prior to the pre-maintenance site observation, the Engineer, with the heretofore specified signed copies of the required certificates and related items, shall invoice such material, comparing the total area and/or the amounts specified. If the minimum amounts have not been furnished, the Engineer will require the installation of additional materials to fulfill the minimum requirements specified.

E. Deliver fertilizer or soil amendments to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trademark, and conformance to state law. Protect material from damage or breakage. Immediately remove empty containers from site. The contractor shall furnish the Architect with a copy of signed, legible certificates or invoices stating the quality and quantity of all items herein specified at the time of delivery.

F. Deliver plants with legible identification labels. Store plant material in shade and protect from weather or injury. Maintain in a healthy, vigorous condition. Architect may at time reject plant material not maintained in this condition.

G. Handling: Do not drop plants or pick up container plants by their stems or trunks.

1.11 SAMPLES AND TESTS:

A. Contractor shall submit soil samples for testing, per this Specification.

B. Architect reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request by Architect.

C. Rejected materials shall be immediately removed from the site at the Contractor's expense.

D. Contractor shall pay cost of all testing or replacement of materials not meeting specifications.

1.12 WARRANTY AND REPLACEMENT

A. Special warranty: All plant material smaller than 15-gallon size shall be guaranteed to live and grow in vigorous, healthy, and upright condition for a minimum of ninety (90) days after final acceptance of work (excluding seasonal color).

B. Replacement: All plants not healthy and in a vigorous growing condition as determined by the Owner shall be replaced immediately. Plants used for replacement shall be the same kind and size as specified in the plant legend as shown on the drawings. They shall be furnished, planted, and fertilized as originally specified at no cost to the Owner.

1.13 SUSPENSION OF WORK

A. The Engineer shall recommend to the Owner any necessity to suspend the work wholly, or in part, for such period or periods as he/she may deem necessary due to unsuitable weather, or such other conditions as are considered unfavorable for the reasonable performance of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or to perform any or all provisions of the contract.

B. If it should become necessary to stop work for an indefinite period, the Contractor shall store all materials in such a manner that they will not become an obstruction nor become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed. The Contractor shall cover all open excavations and shall provide suitable drainage by opening ditches, planting pits, etc., and erect temporary structures where necessary.

C. Grading, soil preparation, and planting work shall be performed only during periods when beneficial and optimum results may be obtained. Excessive soil moisture that would destroy the soil structure, soil spreading, grading, and/or tilling operations shall be suspended until the moisture content reaches acceptable levels and the desired results are attainable. Moisten excessively dry soil that is not workable, and which is too dusty before working the soil.

PART 2 - PRODUCTS

2.1 QUALITY

A. All materials shall be of standard, approved, and first grade quality and shall be in prime condition when installed and accepted. All commercially processed, and/or packaged materials shall be delivered to the site in the original unopened containers bearing the manufacturer's guaranteed analysis.

2.2 SITE SOIL

A. Site soil used to form landscape planting areas or backfill planters shall be clean, fertile, loamy soil, free of stones, sticks, stumps, or other deleterious matter one inch in diameter or larger. It shall also be free from wire, plaster, construction debris, or similar objects that would be a hindrance to planting or maintenance.

B. The Architect shall approve suitability of soil of the site after reviewing results of the soil test.

2.3 IMPORTED TOP SOIL

A. Definition

1. General - Imported soil shall be from a source outside the limits of the project selected by the Contractor and in compliance with the requirements specified herein. Imported soil shall be screened, fertile, friable soil from well-drained aerated land, and shall be free of roots, clods, heavy clay, pockets of coarse sand, stones larger than 1-inch in the greatest dimension, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid or the like, obnoxious or invasive weeds (such as, but not all inclusive: Quackgrass, Johnsongrass, Poison Ivy, Nutsedge, Nimblewill, Canada Thistle, Bindweed, Bentgrass, Wild Garlic, Ground Ivy, Perennial Sorrel and/or Bromegrass), sticks, lumber, brush, other litter and/or refuse, or any material that might be deleterious to healthy plant growth. Imported soil shall not be infested with nematodes or other undesirable organisms, such as insects and disease-causing plant pathogens. Imported soil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent (15%) when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent (15%) on a dry weight basis.
2. At least 15 days before scheduled use, the proposed source of imported soil must be submitted to the Engineer for approval. The Contractor shall submit a written request for approval, which shall be accompanied by a written report from an approved soil-testing laboratory registered by the State of California for agricultural soil evaluation, which states that the proposed source complies with these specifications. The imported soil shall meet the following requirements:

B. Gradation limits - Sand, 50-80 percent, clay 20 percent maximum, and silt, 30 percent maximum. Recommendations of sandy loam or loam per USDA definitions. The sand, clay and silt gradation limits shall be as defined by the USDA classification scheme. Gravel over one-quarter-inch (1/4") in diameter shall be less than ten-percent (10%) by weight.

C. Permeability rate - Hydraulic conductivity rate shall be not less than 1-inch per hour nor more than 20-inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods. Successful soil can have a permeability rate of 5 to 10-inches per hour.

D. Agricultural suitability - The soil shall be suitable to sustain the growth of the plants specified as per USDA specs.

E. Fertility - The range of the essential elemental concentration in soil shall be as follows:

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram) dry weight basis

phosphorus	2 - 40
potassium	40 - 200
iron	2 - 35
manganese	0.3 - 6
zinc	0.6 - 8
copper	0.1 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100

sulfur	25 - 500
molybdenum	0.1 – 30

F. Acidity - The soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.5.

G. Salinity - The salinity range measured in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 0.5 - 2.0 dStm. If calcium and if sulfate ions both exceed 20 milliequivalents per liter in the saturation extract, the maximum salinity shall be 4.0 dS/mH.

H. Chloride - The maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mgtl (parts per million).

I. Boron - The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mgtl (parts per million).

J. Sodium Absorption Ratio (SAR) - The maximum SAR shall be 3 measured per Method 20b, USDA Handbook Number 60.

K. Aluminum Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than 5 parts per million.

L. Soil Organic Matter Content - Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter.

M. Calcium Carbonate Content - Free calcium carbonate (limestone) shall not be present.

N. Heavy Metals - The maximum permissible elemental concentration in the soil shall not exceed the following:

Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram) dry weight basis

arsenic	2
cadmium	2
chromium	10
cobalt	2
lead	30
mercury	1
nickel	5
selenium	3
silver	0.5
vanadium	3

If the soil pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.

O. Phytotoxic Constituent, Herbicides, Hydrocarbons, etc. - Germination and growth of monocots and dicots shall not be restricted more than 10%. Total petroleum hydrocarbons shall not exceed 100 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 2 mg/kg dry soil measured per EPA Methods No. 8020.

P. Soil Texture/Organic Matter - Provide information on the soil texture and soil organic matter.

30% - 40% Specified Compost

60% - 70% Specified Mineral Aggregate

The mixture shall be well blended to produce a homogeneous mix.

2.4 SOIL AMENDMENTS AND FERTILIZER

A. Soil Conditioner - shall be a product that aids the structure of the soil consisting of rapidly decaying, slowly decaying and non-decaying material. The rate of decomposition of this amendment is very important.

1. The humus material shall have an ash content of no less than 8% and no more than 50%.
2. The pH of the material shall be between 6 and 7.5.
3. The salt content shall be less than 10 millimho/cm @ 25° C. (ECe less than 10) on a saturated paste extract.
4. Boron content of the saturated extract shall be less than 1.0 parts per million.
5. Silicon content (acid-insoluble ash) shall be less than 30%.
6. Calcium carbonate shall not be present if to be applied on alkaline soils.
7. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, sludges, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.
8. Composted wood products are conditionally acceptable (stable humus must be present). Wood based products are not acceptable which are based on redwood or cedar.
9. Sludge-based materials are not acceptable if the soil already has a high level (toxic level) of zinc, copper or other heavy metals based on soil analysis.
10. Carbon: nitrogen ratio is less than 25: 1.
11. The compost shall be aerobic without malodorous presence of decomposition products.
12. The maximum particle size shall be 0.5 inch, 80% or more shall pass a NO. 4 screen.

Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis: arsenic: 20, cadmium: 15, chromium: 300, cobalt: 50, nickel: 100, copper: 150, lead: 200, mercury: 10, molybdenum: 60, selenium: 50, silver: 10, vanadium: 50, zinc: 300

The commercial grade product used shall be Loamex, or approved equal.

B. Agricultural grade gypsum - shall be a (CaS04 - 2H20) calcium sulfate product minimum 92% grade. Ninety-percent (90%) shall pass a 50-mesh screen. Control of dust during application is mandatory. The commercial grade product used shall be U.S. Gypsum, Sof'n'Soil, Dolmar, or approved equal.

C. Sulfur (soil sulfur) - shall be elemental sulfur (99.5%) commercially manufactured so that a pure sulfur product is used. Sulfur is a constituent of three amino acids (cystine, methionne and cysteine) and is essential for protein synthesis. Sulfur is also supplied by gypsum. Sulfur is not effective until it is oxidizes. The bacteria are specific for this and are not common in alkaline soils. The oxidization may require months or years. Gypsum is rapid in its actions. The sulfur used shall be 99.5% elemental. Sizing on stacked screen shall be approximately: 8-mesh 4.3%; 20-mesh 7.8 %; 50-mesh 46.9 %; 100-mesh 39.3 %; 200-mesh 1.7%. The commercial grade product used shall be Wil-Gro; Union Chemicals, Baker Industries, or approved equal.

D. Iron sulfate - derived from sulfate-deep green (FeS04, 7H20), a minimum analysis of iron shall be expressed as metallic is 20.0%. The commercial grade product used shall be Wil-Gro, Bandini, Wilson & Geo. Meyer, or approved equal.

E. Chelated iron shall be Becker Underwood Sprint 138 Fe or other approved equal commercial FeEDDHA for dicots and woody plants, and Becker Underwood Sprint 330 Fe or other commercial FeDTPA for grasses and monocots, or approved equal.

F. Pre-plant starter fertilizer (1-10-10) analysis shall be a commercial grade flowable fertilizer with a 1 % nitrogen analysis; 10% phosphorous pentoxide and 10% potassium oxide. No potassium chloride is to be used. Organic nitrogen shall be from cottonseed meal and urea. Phosphorous. from superphosphate and cottonseed meal. Potassium (potash) from sulfate of potash and cottonseed meal. Screen analysis 74% to be retained on a 20-mesh screen. 0% to pass a 4-mesh screen, and 2 % to pass a 48-mesh screen. The commercial grade product used shall be Wil-Gro, Gro-Power, Bandini, Kellogg, or approved equal.

G. Prilled post-plant fertilizer (14-7-3) for maintenance - all areas. A maintenance fertilizer shall be used that is granular and homogeneous. Iron and zinc shall be in chelated form and sizing of granules during manufacture is very important. A regular maintenance program using this product for at least the first year is recommended. The homogeneous fertilizer granules used shall contain a fertilizer analysis of 14% nitrogen of which 4% is ammoniac sulfate. Remainder of nitrogen shall be 8.75% water soluble and 1.25% water insoluble. Available phosphorous pentoxide shall be 7%. Potassium oxide shall be 3%. Minor elements shall be chelated 25% by volume consisting of iron 2.0%; zinc 0.15% and manganese 0.15%. By-product calcium shall be 2.0%. Organic nitrogen is derived from urea and cottonseed meal. Phosphate from superphosphate and cottonseed meal. Potash from sulfate of potash and cottonseed meal. No potassium chloride is 'to be used. Sulfur from sulfate of ammonia. Calcium from superphosphate, iron \ from ferrous sulfate and mixed sulfides. Zinc and manganese are expressed as metallic and in their elemental form. Screen Analysis (% retained) approximately: 4-mesh 1.3%; 8 mesh = 24.2%; 20-mesh = 74.0%; and 48-mesh = 0.05%. The commercial grade product used shall be Wil-Gro Fairway, Gro-Power, Bandini, Kellogg, or approved equal.

H. Planting tablets shall be tightly compressed chip type commercial grade planting tablets, of varying sizes with the following available percentages by weight of plant food:

Nitrogen	20.0 % min.
Phosphoric acid	10.0% min.
Potash	5.0 % min.

The commercial grade product used shall be Agriform, Gro-power, or approved equal.

2.5 WETITNG AGENT

A. An adjuvant (helping agent) is needed to make water penetrate difficult to wet soils. Also, organic soil amendments are more receptive to increased water holding capacity.

B. Soil water repellence resulting from compaction will be overcome with multiple applications of a soil penetrant in the irrigation water.

C. Product used shall have the following functioning agents: 2- hydroxyethyl ammoniumalkyl benzene sulfonate = 8.77%; alkyl phenoxy poly - (ethylene oxy) ethanol= 4.49%; di (2 hydroxy ethyl)- ammonium cis-9 otadecenoate-octyl alkyldiamide = 2.50 %; dimethyl silicone = 1. 00 %; carrier= 83.24 %. Adjuvant used shall be a commercial grade product and manufactured by Naiad/Wil-Gro, Dow, Dupont, or approved equal.

2.6 PLANTING BACKFILL FOR SHRUBS

A. (For bidding purposes only. Application rates shall be per soil analysis recommendation) Planting backfill shall be a thoroughly blended mixture of site soil and soil amendments at the following mixtures:

soil conditioner	30%
site soil from excavated planting pit	70%
gypsum	10 lbs. per cu. yd. of mix
iron sulfate	5 lbs. per cu. yd. of mix
pre-plant (1-10-10)	5 lbs. per cu. yd. of mix

2.7 PLANT TABLETS

A. 7-gram planting tablet designed for 12-month slow release. 12-8-8 NPK, 20% humus, 4% humic acids, 3.5% sulfur, 2% iron, micronutrients.

2.8 PLANT MATERIAL

A. Nomenclature: Scientific and common names of plants herein specified shall conform with the approved names given in "Checklist of Woody Ornamental Plants of California", published by the University of California, College of Agriculture, Manual 32 (1963).

B. Labeling: Each group of plant materials delivered on site shall be clearly labeled as to species and variety. However, final determination of plant species and variety will be

made by the Engineer and whose decision will be final. All patented plants (cultivars) required by the plant list shall be delivered with a proper plant patent label attached.

C. Quality: Quality of all plants shall conform to the American Nursery & Landscape Association (AN LA) American Standard for Nursery Stock ANSI Z-60. 1-2004 (Approved May 12, 2004). Plants shall be vigorous or normal growth, free from disease, insects, insect eggs, insect larvae, and other pests. Plant materials shall not contain any deleterious, obnoxious, or invasive weeds such as (not all inclusive): Quackgrass, Johnsongrass, Poison Ivy, Nutsedge, Nimblewill, Canada Thistle, Bindweed, Bentgrass, Wild Garlic, Ground Ivy, Perennial Sorrel and/or Bromegrass. All plants shall equal or exceed any measurements specified and shall be supplied from the source indicated when a source is specified.

D. Container stock: Shall have grown in containers for at least six (6) months and through one (1) full growing season, but not over two (2) years. Samples shall be shown to prove that no girdled roots, circled roots, and/or root-bound conditions are present. Any such shrubs shall be deemed as not acceptable. All container plants that have a cracked or broken rootball when taken from the container shall not be planted except on special approval from the Owner or the Engineer.

E. Pruning: At no time shall the plant materials be pruned, trimmed, or topped prior to delivery, and any alteration on the site of their shape shall be conducted only with the approval and in the presence of the Engineer.

F. Inspection of plant materials required by city, county, state, and/or federal authorities, and/or other regulatory agencies, shall be the responsibility of the Contractor. When necessary, the Contractor shall have secured permits or certificates prior to delivery of plants at site.

G. Inspection of plant materials: Plants shall be subject to inspection and approval or rejection at the project site at any time before or during progress of work for size, variety, condition, latent defects and injuries. Rejected plants shall be removed from the project site immediately.

H. Rejection and substitution: All plants not conforming to the requirements herein specified and/or as indicated on the drawings shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and be immediately removed from the site of the work and replaced with acceptable plant materials. Under no condition will there be any substitution of plant species, variety, or reduced size for those listed on the accompanying drawings, except with the express written consent of the Engineer.

I. Right to changes: The Engineer reserves the right to change the plant species, plant variety, and/or sizes of plant material to be furnished, provided that the cost of such plant changes does not exceed the cost of plants in the original bid. The Contractor shall be notified in writing sixty (60) days before the planting operation has commenced. Field changes to the plant species, plant variety, and/or sizes of plant material might be required due to current availability, and shall be coordinated with the Engineer and Owner. Changes in the size and/or variety of any plant to be furnished which involves a reduction or addition in cost shall be adjusted in the contract cost.

J. Root condition: The Engineer reserves the right to inspect root condition of any species, particularly those grown from seed, and if found defective, to reject the plants represented by the defective sample.

K. Protection: All plants at all times shall be handled and stored so that they are adequately protected from drying out, from wind burn, and from all other injury. All plants determined by the Engineer or Owner to be wilted, burned, or dried out, may be rejected at any time, whether in the ground or not. All plants shall be handled solely by their containers and all plants that have been handled by the stem or trunk shall be rejected, and removed from the site immediately. The Contractor's on-site plant storage area shall be approved by the General Contractor prior to the delivery of any plant materials.

2.9 SHRUBS

A. Plants shall be grown in one (1) gallon pot sizes as indicated on the planting plan and legend. Plants shall be protected at all times to prevent drying of the root ball.

2.10 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.11 WATER:

A. Furnished by Owner.

B. Transport by Contractor as required.

2.12 MULCH:

A. Decorative Bark:
   1. Forest Mulch as supplied by Agriservice, telephone: (760) 295-6255, or approved equal.
   2. No shredded lumber products, animal waste, or C&D wood by-products will be accepted.
   3. Shall be derived from tree trimmings, wood, and bark

B. Cobble mulch:
   1. Cobble shall be River Rock by KRC Rock or approved equal.
   2. Shape: rounded
   3. Size: 2-4”

2.13 SOIL SEPARATOR FOR COBBLE MULCH:

A. Geotextile filter fabric shall be a nonwoven geotextile composed of polypropylene fibers, formed into a stable network such that fibers retain their relative position.

B. Geotextile filter fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

C. Geotextile filter fabric shall be Mirafi #180N, as manufactured by Mirafi Construction Products, Inc. 365 South Holland Drive, Pendergrass, Georgia 30567, (706) 693-2226, www.tcmirafi.com/products/productnindex2.html or approved equal.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

A. Site acceptance:
   1. The Contractor shall be responsible for coordinating his work with the General Contractor and other Sub-Contractors, so no damage occurs to plantings after installation.
   2. The Contractor shall be responsible for verifying grades and site conditions before beginning work. No change in Contract price will be owed for actual or claimed discrepancy between existing grade and those shown on the plan after Contractor has accepted existing grades and moved on the site.

B. General: The areas to receive shrubs or ground covers and their respective requirements for imported soil, fertilizer applications, soil amendments, and other treatments shall be as defined on the drawings. Equipment necessary for preparation of the ground surface and for handling and placing all required material shall be readily available and in proper working condition.

C. Scheduling: Perform planting only when weather and soil conditions are suitable, as approved by Architect.

D. Utilities: Prior to excavation for planting or installation of stakes or guys, Contractor shall locate utility lines and cables, so that proper precautions will be taken not to damage them. In the event of a conflict between utility lines and plant locations, promptly notify the Architect, who shall arrange for the relocation of one or the other. Failure to follow this procedure shall make the Contractor responsible for repairing damages at his own expense.

E. Clearing and Grubbing: Prior to ripping and tillage operations, all existing vegetation in the area to be planted shall be grubbed, raked, and cleared from the site. The subsoil and ground surface shall be cleared of all material which has accumulated during construction activities, and all material which might hinder proper grading, tillage, planting, future plant health, and subsequent maintenance operations. The Contractor shall lawfully dispose of all grubbed materials and debris off the site at his or her expense. The Contractor shall completely remove any masonry, asphaltic concrete, and concrete from planting areas if present, and lawfully dispose of offsite at his expense. Do not bury any grubbed materials, debris, masonry, asphaltic concrete, concrete, paints, chemicals, or other deleterious substances within any planting area on the project. Completely remove any concrete and plaster slurry /

washout from planting areas if present, and remove the soil a minimum depth of 2-inches below a slurry / washout location.

F. The irrigation system shall be operational and approved prior to planting.

G. Underground Obstructions: All subsurface rocks over 2-inches in diameter and other underground obstructions shall be removed to the depth necessary to permit proper fine grading, tilling, or planting according to plans and specifications, a minimum depth of 6-inches. All abandoned utility lines uncovered or severed shall be cut below grade and capped or plugged with concrete. Explosives, shall not be used for removal. When the location of utility lines is shown on the plans or has been made known to the Contractor, all damage to these lines shall be repaired by the Contractor in a manner approved by the Owner and affected utility purveyor.

H. Deep Ripping: All areas to receive shrubs and/or groundcover shall be deep-ripped and loosened to a depth of 12-inches in all directions. Access roads used during construction activities within planting areas shall be deep-ripped and loosened to a depth of 3 feet in all directions.

I. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

J. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 SOIL AMENDMENTS, FERTILIZING AND ROTOTILLING:

A. The following specified soil amendments and fertilizers are guidelines for bidding purposes only. At the time of rough grade, the Contractor shall meet with the Owner to determine quantity and locations of soil samples to be taken. The soil tests/analysis are the responsibility of the Contractor. The Contractor shall submit soil samples from the site to an approved soil-testing laboratory for agricultural suitability analysis. The Contractor shall submit the results of the soil tests/analysis to the Engineer for interpretation and recommendations. If the test results reduce or increase the quantities specified, then the Owner shall be notified. The contract prices shall be adjusted to reflect any differences between the amendments as specified below and the recommendations of the soil-testing laboratory.

B. After the areas have been deep ripped, and plants are flats the following rates of soil amendment materials shall be evenly spread over all planting areas and shall be thoroughly scarified to an average depth of 8-inches by rototilling a minimum of 2 alternating passes. Amendments must be intimately blended with soil.

Soil Conditioner:	4 c.y. per 1,000 sq. ft.
Gypsum:	100 lbs. per 1,000 sq. ft.
Soil Sulfur:	20 pounds per 1,000 sq. ft.
Iron Sulfate:	20 pounds per 1,000 sq. ft.
Triple superphosphate (0-45-0)	4 pounds per 1,000 sq. ft.
Potassium sulfate (0-0-50)	8 pounds per 1,000 sq. ft.

1. Leaching shall be done prior to the application of soil conditioner, gypsum, soil sulfur, iron sulfate, and pre-plant fertilizer.
2. The thoroughness and completeness of the rototilling and incorporation of the soil amendments shall be acceptable to the Owner. Adjust soil amendments and fertilizers on all slopes with gradients of 2: 1 and steeper, or as indicated on the drawings.
3. Deep Water Leaching and Follow-Up Soil Testing:
   a. After rototilling in soil amendments, the area shall be deep water leached a minimum of three (3) times. Apply water slowly and avoid runoff. Allow the soil to drain thoroughly and partially dry out between applications. The total amount of water applied may be between 3 to 12-inches depending on the depth and degree of improvement. The soil type (sand, silt, or clay) will determine the amount of time required for the soil to dry out between leaching processes. Do not apply more water if the soil saturation exceeds 50% between applications. Treat and/or remove weeds that germinate.
   b. One day after final application of water, the soil shall be tested for content of soluble salts (electrical conductivity or E.C.). The Owner and the Contractor shall take several soil samples from the top 6-inches of sailor the depth of planting for that particular area, and deliver the samples to an approved laboratory for testing of soluble salts. Reference Section 02900, for a listing of approved soil testing laboratories. The E.C. test reading shall not be above 3.0 millimho/cm. 3.
   c. If soil test reading for E.C. for a particular area tested is above 3.0 millimho/cm, the soil amending, tilling and deep watering procedure shall be repeated until test readings are not above 3.0 millimho/cm.
   d. Care shall be taken that the rate of application of water does not cause erosion, sloughing of soils, damage to paving, damage to hardscape elements, or damage to structures. Contractor assumes all responsibility for monitoring of all areas during leaching period.
   e. All depressions, voids, erosion scars and settled trenches generated by the deep watering shall be filled with amended soil and brought to finish grade.
   f. Uniformly spread amendments and thoroughly cultivate by means of mechanical tiller per Soils Report.

3.3 IMPORTED SOIL

A. Subgrades of all planting areas (as noted on the plans to receive imported soil), shall be established at below finish grade in order to accommodate imported soil.

B. The subgrade shall be scarified a minimum depth of 2-inches before placement of the imported soil. Compacted subgrade needs to be ripped. Place 2-inches of import soil and till to 4-inches depth, to form a fifty-fifty (50/50) blend 4-inches in depth in order to avoid a sharp interface of soil types.

C. Placement: of the imported soil shall be smooth and even in all planting areas. Finish grades in lawn areas shall be 1-inch below adjacent finished paving surfaces and 2-inches in shrub areas without abrupt changes in gradient, not only in the surface of the soil but also where soil meets walks, curbs, pavement or other features, unless otherwise indicated on the drawings.

3.5 SOIL PREPARATION AND FINISH GRADING

A. Rough Grade: Site to be received by Landscape Installer to within one-tenth-of-a-foot (0.1'), plus or minus, by others based on Civil Engineer's drawings.

B. Finish Grade: Finish grading to consist of grading, raking, watering in, mechanically compacting and settling to achieve desired contour and flow line patterns resulting in evenly finished surface.

C. All undulations and irregularities in the planting surfaces resulting from tillage, rototilling and all other operations shall be leveled and floated out before planting operations are initiated.

D. Finish grades shall insure positive drainage of the site with all surface drainage away from buildings, walls, over mow curbs, and toward roadways, drains and catch basins. Planting surfaces shall be graded with no less than two-percent (2%) surface slope for positive drainage.

E. The Contractor shall take every precaution to protect and avoid damage to existing sprinkler heads, irrigation lines, and other underground utilities during soil amending and fertilizing operations.

F. All rocks, debris, and other deleterious materials shall be removed from planting areas, and then from the site. Rocks in accordance with the following criteria: 1-2” diameter in groundcover areas; 2-inches diameter in shrub areas a minimum depth of 6- inches.

G. Final finish grade shall be two-inches below finish paving surface in 2-inches in shrub areas. Final grades shall be acceptable to the Owner before planting operations will be allowed to begin.

3.7 PLANTING INSTALLATION – GENERAL

A. Timing: Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally acceptable practice.

B. Layout of planting: Locations shall be approved by the Engineer. All container plants shall be set by the Contractor in their final location in their respective containers prior to digging holes and/or planting. All plant locations shall be checked for possible interference with existing underground utility lines.

C. Backfill for shrubs: shall be as specified in this section.

D. Disposal of excess soil and debris - all excess excavated subsoil, rocks and debris shall be legally disposed of off the site by the Contractor at his or her cost or utilized on the site as directed by and at the option of the Owner. Use the more suitable soil excavated from the planting pit, and dispose the less suitable soil. Do not place unamended soil over amended soil.

3.8 EXCAVATION FOR PLANT MATERIALS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

B. Excavate approximately 2 times as wide as ball diameter for boxed and container-grown stock.

C. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

D. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.

E. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

F. Excavation shall include the stripping and stacking of all acceptable soil encountered within the areas to be excavated for plant pits and planting beds. Protect all areas that are to be trucked over and upon which soil is to be temporarily stacked pending its re-use for the filling of holes, pits, and beds.

G. Maintain supervision of excavations during working hours.

H. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

I. Subsoil and topsoil removed from excavations may be used as planting soil.

J. Obstructions: Notify Engineer if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

K. Hardpan Layer: Drill 6-inch diameter holes, 24-inches apart, into free draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

L. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in shrub planting pits.

M. Fill excavations with water and allow to percolate away before positioning shrubs.

3.9 PLANTING SHRUBS

A. Soil moisture level in planting areas at time of planting shall be no less than horticulturally acceptable. The Contractor shall request approval of moisture, and if found to be insufficient for planting, the planting pits shall be filled with water and allowed to drain before starting any planting operations.

B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root -flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

C. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

D. Set container-grown stock plumb and in center of excavated planting pit or trench with root flare 1-inch above adjacent finish grades.
   1. Carefully remove root ball from container without damaging root ball or plant.
   2. Use planting soil with the heretofore specified amendments for backfill.
   3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   4. Do not cover the top of the rootball with backfill soil, which might create soil interface conflicts and inhibit aeration and gaseous exchange.
   5. Place planting tablets in each planting pit when pit is approximately one half filled; in amounts recommended below. Place tablets beside the root ball about 1-inch from root tips; do not place tablets in bottom of the hole. See below for application rates.
   6. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

F. The Contractor shall be responsible for all surface and subsurface drainage required which may affect his / her guarantee of the shrubs.

G. Planting tablets shall be placed in each planting hole at the following rates and per the manufacturer's recommendations (soil reports from soil-testing laboratory supercede application rates in this section, if different):
   1. One 5-gram tablet per individual liner and flat size plant.
   2. One 21-gram tablet per 1-gallon container.

   Random testing to verify planting tablet installation shall be conducted by the Owner.

H. Immediately after planting, install a soil berm around the perimeter of each planting pit to create an enclosed water basin, except in turf locations. The height of the soil berm shall be 3-inches for shrubs. All plants shall be thoroughly watered to the full depth of each planting hole. If water slowly moves into the rootball from the backfill soil, dual berms may be needed. One over the rootball and another one at the edge of the backfill so that each one can be separately irrigated. Drip irrigation can be used to irrigate difficult rootballs.

I. Pruning after planting shall be required on all trees, shrubs, and vines when necessary to provide the specified or approved standard shapes, form and/or sizes characteristic to each plant. Pruning shall be required when necessary to provide

horizontal and/or vertical sight line clearance. Pruning may include thinning and/or cutting and shall be under the direction of the Engineer. Pruning cuts shall not be painted with tree sealants.

3.10 PLANTING GROUNDCOVER

A. Groundcovers shall be planted in the areas indicated on the plans, and shall be installed only after all debris and surface rocks 1-inch diameter and larger have been removed from the planting area.

B. If the top 4-inches of soil in the area to be planted in groundcover is not sufficiently moist (horticulturally acceptable standards), the area shall be thoroughly irrigated and no less than 12 hours shall pass before planting.

C. Groundcovers shall be planted in even, triangularly spaced rows, at the intervals called out for in the legend on the drawings, unless otherwise noted.

D. The size of planting excavation for groundcover shall be at least twice the width of the root ball.

E. For rooted cutting plants supplied in flats, each plant shall be planted in a manner that will ensure minimum disturbance of the root system, but in no case shall this depth be less than two (2) nodes.

F. Each groundcover plant shall be planted with one 5-gram planting tablet incorporated into the root zone. Planting area shall be hand-smoothed after planting to provide an even and smooth final finished grade. To avoid drying out and damaging groundcover, plants must be irrigated after planting. This may be done manually or by using the installed irrigation system. Repeated applications may be required, especially on a sloping site. This initial irrigation procedure shall continue until the soil profile is thoroughly moistened to field capacity a minimum depth of twice the depth of each planting hole.

3.15 BARK MULCH

A. All planter areas shall be evenly covered with bark mulch to a uniform depth of 2 inches.

B. Provide horizontal clearance 3- inches of horizontal clearance away from the collar of shrubs and 2-inches of horizontal clearance away from the basal stem of ground covers.

C. Bark mulch will be required on all planter areas with a slope gradient less than or equal to two-to-one (2:1).

3.17 PESTICIDE APPLICATIONS.

A. Apply pesticides and other chemical products and biological control agents in accordance with manufacturer's written recommendations.

B. Coordinate applications with Owner's operations and others in proximity to the Work.

C. Notify Owner before each application is performed.

D. No restricted pesticides shall be used.

E. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and groundcover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

F. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.20 CLEANUP

A. After planting operations have been completed, remove trash, excess soil, empty plant containers, and rubbish from the property, and dispose of legally.

B. Cleanup shall be performed at the end of each working day, with a maximum cleanup effort (in a manner satisfactory to the Owner) for each weekend or Holiday.

C. The Contractor shall sweep the site and shall wash down pavement within the Contract area, leaving the premises in a clean condition.

D. Walks shall be left in a clean and safe condition.

E. Scars, ruts, or other marks in the ground caused by this work shall be repaired and the ground left in a smooth condition throughout the site.

3.21 GENERAL MAINTENANCE AND THE MAINTENANCE PERIOD

A. Keeping the plants in a healthy, growing condition by watering, fertilizing, pruning, spraying, weeding and all other necessary operations of maintenance. All paving and walks shall be kept clear, clean and washed down.

B. Protection: The Contractor shall be responsible for providing adequate protection of all planting areas against traffic or other use by erecting fencing or other acceptable means immediately after the planting is completed. Warning signs and barricades shall be placed in various high traffic areas. Damaged areas shall be repaired immediately by the Contractor.

C. Weeding and cultivating: All shrub and groundcover areas shall be kept free of weeds, noxious grasses, rocks over 1-inch in diameter, clods, trash and debris on a weekly basis. Groundcover and shrub areas shall be cultivated at intervals of not more than 14 days minimum.

D. Replacement: During the Maintenance Period, plants which die or which are in an unhealthy or badly impaired condition shall be replaced by the contractor within 14 days after unsatisfactory condition is evident. No replacement of plantings shall be made in any season definitely unfavorable for planting. At the conclusion of the Maintenance Period, the Engineer will make an inspection of the work to determine the condition of all plants. All unhealthy plants shall be removed from the site and replaced with plants of the same kinds and sizes as originally specified. Such

replacement shall be made in the same manner as specified for the original planting and at no extra cost to the Owner.

E. Fertilization:
   1. Shrubs - post fertilization shall occur 60 days after planting and apply fertilizer at the rate of 1 teaspoon per each one-gallon plant and 1 tablespoon per five-gallon plant. Fertilizer shall be 14-7-3, or approved equal.
   2. Groundcover and lawn areas - post fertilization shall occur 60 days after planting and apply fertilizer at the rate of 7-lbs per 1,000 square feet fertilizer shall be 14-7-3, or approved equal.

F. Maintenance Period: The Maintenance Period shall begin on the first day after the pre-maintenance observation acceptance and shall continue thereafter for no less than 180 continuous calendar days. If any plants are replaced during the Maintenance Period, then the 180-day Maintenance Period for those plants shall begin at the date of installation for that plant, if so directed by the Engineer or the Owner.

G. Extended Maintenance Period: When, in the opinion of the Engineer, there is improper maintenance, and/or poor condition of plant materials, and/or unhealthy condition of plant materials, then the Contractor shall be responsible for additional maintenance of the work at no additional cost to the contract until all work is acceptable by the Engineer.

*** END OF SECTION ***

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SECTION 03200

REINFORCEMENT STEEL

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. The Contractor shall provide concrete reinforcement steel, concrete inserts, wires, clips, supports, chairs, spacers, and other accessories, complete, all in accordance with contract documents.

B. Work included in this section: Principal items are:

1. Furnishing and placing bar reinforcing for cast-in-place concrete and shotcrete.

1.02 RELATED SECTIONS

A. The work of the following sections apply to the work of this section. Other sections, not referenced below, shall also apply to the extent required for proper performance of this work.

1. Section 03300 Cast-in-Place Concrete
2. Section 03314 Strand Wound, Prestressed Concrete Tank

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this section of the specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Work Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The latest edition of the California Building Code (CBC).

C. Commercial Standards (Current Edition):

ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318	Building Code Requirements for Structural Concrete
CRSI MSP	Concrete Reinforcing Steel Institute Manual of Standard Practice
AWS D1.4	Structural Welding Code – Reinforcing Steel
ACI 117	Standard Tolerances for Concrete Construction Materials

D. ASTM Standards in Building Codes (Current Edition):

ASTM A615	Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

ASTM A706	Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A1060	Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plan and Deformed for Concrete

1.04 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish shop bending diagrams, placing lists, and drawings of all reinforcement steel before fabrication in accordance with the requirements of Sub-Section 1.23.0 of the Special Provisions.

B. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt of the Notice to Proceed. Details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements indicated. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.

C. If reinforcement steel is spliced by welding at any location, the Contractor shall submit mill test reports which shall include the information necessary for the determination of the carbon equivalent as specified in AWS D1.4. The Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; a mere statement that AWS procedures will be followed will not be acceptable.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall furnish samples from each heat of reinforcement steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Agency. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

B. If reinforcement steel is spliced by welding at any location, the Contractor shall submit certifications of procedure qualifications for each welding procedure used and certification of welder qualifications, for each welding procedure, and for each welder performing the work. Such qualifications shall be as specified in AWS D1.4.

C. If requested by the Engineer, the Contractor shall furnish samples of each type of welded splice used in the Work in a quantity, and of dimensions, adequate for testing. At the discretion of the Agency, radiographic testing of direct butt welded splices will be performed. The Contractor shall repair any weld which fails to meet the requirements of AWS D1.4. The costs of testing will be paid by the Agency; except, the costs of all tests which fail to meet specified requirements shall be paid by the Contractor at no increase in cost to the Agency.

PART 2 - PRODUCTS

2.01 MATERIAL REQUIREMENTS

A. Materials which may remain or leave residues on or within the concrete shall be classified as acceptable for potable water use by the Environmental Protection Agency within 30 days of application or use.

2.02 REINFORCEMENT STEEL

A. Reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar reinforcement shall conform to the requirements of ASTM A615 for Grade 60 Billet Steel Reinforcement or as otherwise indicated.
2. All welded reinforcement (unless otherwise indicated), specifically detailed or otherwise indicated shall be low-alloy grade 60 deformed bars conforming to the requirements of ASTM A706.
3. Welded wire fabric shall conform to ASTM A1060.
4. Ties shall be Annealed Steel, 14 gauge minimum.

B. Accessories:

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. All bar supports shall meet the requirements of the CRSI Manual of Standard Practice, including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Wire ties shall be embedded in concrete block bar supports.

2.03 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the Engineer. All welded splices of reinforcement steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars which are connected.

B. All materials required to conform the welded splices to the requirements of AWS D1.4 shall be provided.

2.04 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled.

PART 3 - EXECUTION

3.01 GENERAL

A. All reinforcement steel and other appurtenances shall be fabricated, and placed in accordance with the requirements of the California Building Code and the supplementary requirements indicated herein.

3.02 FABRICATION AND DELIVERY

A. The Contractor shall conform to CRSI MSP except as otherwise indicated or specified. The Contractor shall bundle reinforcement and tag with suitable indication to facilitate sorting and placing, and transport and store at site so as not to damage material. The Contractor shall keep a sufficient supply of tested, approved and proper reinforcement at site to avoid delays.

B. Bending and Forming: The Contractor shall bend bars of indicated size and accurately form in accordance with the requirements of ACI 315 and ACI 318 to shapes and lengths indicated on drawings and required by methods not injurious to materials. The Contractor shall not use heat for bending reinforcement. Bars with kinks or bends not scheduled will be rejected.

C. Fabricating Tolerance: All fabrication of reinforcing bars shall meet the requirements of ACI 117.

3.03 PLACING

A. Reinforcement steel shall be accurately positioned and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the Contractor shall furnish acceptable bar chairs and spacers.

B. Limitations on the use of the bar support materials shall be as follows:

1. Concrete Dobies: Permitted at all locations except where architectural finish is required.
2. Wire Bar Supports: Permitted only at slabs over dry areas, interior dry wall surfaces and exterior wall surfaces.

3. Plastic Bar Supports: Permitted at all locations except on grade.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Agency.

E. Unless otherwise specified, reinforcement placing tolerance shall be within the limits specified in ACI 318 except where in conflict with the requirements of the CBC.

F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to the approval of the Engineer.

G. Epoxy coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating. Non-abrasive slings made of nylon and similar materials shall be used. Specially coated bar supports shall be used. All chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

3.04 SPLICES

A. Splicing shall be in accordance with ACI 318, unless otherwise noted on Drawings.

B. Vertical Bars. Except as specifically detailed or otherwise indicated, splicing of vertical bars in concrete is not permitted, except as indicated above approved horizontal construction joints or as otherwise specifically detailed.

C. Horizontal Bars: Except as specifically detailed or otherwise indicated, splicing of horizontal bars in concrete is not permitted.

D. Welding: Except as specifically detailed or otherwise indicated, welding of reinforcing bars is not permitted.

3.05 ADDITIONAL REINFORCING

A. The Contractor shall provide additional reinforcing bars at sleeves and openings as indicated on Drawings.

3.06 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation:

1. The hole diameter shall be as indicated on the Drawings but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as indicated on the Drawings.
3. The hole shall be drilled by methods which do not interfere with the proper bonding of epoxy.
4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes to be drilled shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
5. The hole shall be blown clean with clean, dry compressed air to remove all dust and loose particles.
6. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets. The hole shall be filled to a depth that ensures that excess material will be expelled from the hole during dowel placement.
7. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy. The bar shall be inserted slowly enough to avoid developing air pockets.

*** END OF SECTION ***

SECTION 03230

EARTHQUAKE CABLES

PART 1 – GENERAL

1.01 WORK OF THIS SECTION

A. This section covers the work necessary for the tank earthquake cables, complete.

1.02 SUBMITTALS

A. The Contractor shall submit five copies of the quantity, location and details for the Engineer's approval before the earthquake cables are fabricated.

PART 2 - PRODUCTS

2.01 EARTHQUAKE CABLES

A. Where called for on the Drawings, earthquake cables consisting of seven wire galvanized strands, meeting the minimum strength requirements on the contract drawings, shall be installed to connect wall and wall footing. If no strength requirements are shown on the contract drawings, the minimum ultimate strength for 3/8" diameter and 1/2" diameter strand shall be 21,400 lbs. and 38,200 lbs., respectively.

B. The wires shall be hot-dipped galvanized before stranding with a minimum zinc coating of 0.85 oz./ft^2.

C. Galvanized strands for earthquake cables shall meet the quantity and spacing outlined on the Drawings.

2.02 CLOSED CELL NEOPRENE SEISMIC CABLE SLEEVES

A. Neoprene sleeves for seismic cables, which encase the galvanized strands, shall conform to the minimum dimensions shown on the contract drawings to permit unrestrained flexing of the strands inside the sleeves under the maximum projected radial wall movements.

B. The material shall be medium grade closed cell neoprene conforming to 2A3 of ASTM D1056-85 and as further specified herein and on the contract drawings.

1. Compression deflection: 9 to 13 PSI
2. Shore 00 durometer: 60 to 80 PCF
3. Density: 12 to 28 PCF
4. Water absorption by weight: 5%
5. Temperature range:

a) Low (flex without cracking): -30° F
b) High continuous: 150° F
c) High intermittent 200° F

6. Heat aging (7 days @ 158° F)
   lineal shrinkage (max.): 5%
7. Tensile strength: 115 PSI min.
8. Elongation: 180% min.
9. Resilience (Bayshore-% rebound average
   1/2" thickness @ 72° F): 20% to 40%

C. Product AA60-003 by DACON Industries, or approved equal, are acceptable materials.

2.03 MILD STEEL REINFORCING BARS

A. The mild steel reinforcing bars for the support of the earthquake cable anchors shall conform to the requirements of Section 03200, REINFORCEMENT STEEL.

PART 3 - EXECUTION

3.01 EARTHQUAKE CABLES

A. The cables may be cut to length with a burning torch.

B. Where necessary, the strands shall be pre-bent before placing the units in wall and wall footings, as called for on the contract drawings.

C. The strands shall be tied to the tank wall as required and as shown on the contract drawings.

D. In the footing, the strands shall be tied to the footing bars.

*** END OF SECTION ***

SECTION 03251

EXPANSION AND CONSTRUCTION JOINTS

PART 1 – GENERAL

1.01 WORK OF THIS SECTION

A. This section covers the work necessary to furnish and install concrete expansion and construction joints.

B. All products furnished per the requirements of this specification section shall be NSF61-certified for contact with potable water.

1.02 SUBMITTALS

A. Furnish certified mill certificates showing that the material meets all of the requirements specified herein. The Engineer, at his option, may take samples of any materials and have them tested by an independent testing laboratory to verify their compliance with these Specifications. All such costs shall be borne by the Agency. If any materials should fail to meet these Specifications, all costs for further testing of the replacement material shall be borne by the Contractor.

1.03 OBSTRUCTIONS

A. Contractor shall pay particular attention to removing all obstructions such as concrete, nails, etc., from joints when movements of floor, wall and roof sections can be expected under prestressing, temperature and other conditions.

PART 2 - PRODUCTS

2.01 JOINT SEALERS

A. Joints shall be sealed with a joint sealer material in accordance with the manufacturer's instructions and as indicated on the contract drawings (no substitutions permitted).

B. Primer materials, if required by the sealant manufacturer, shall conform to the printed instructions of the sealant manufacturer.

2.02 PREFORMED JOINT FILLER

A. Preformed joint filler material shall be of the preformed non-extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth

in ASTM D1752 for Type I, except as otherwise specified herein.

2.03 BACKING ROD

A. Backing rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant material used and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at 8 psi. The rod shall be 1/8-inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a ¾-inch wide joint.

PART 3 - EXECUTION

3.01 JOINT SEALERS

A. Joint sealed areas shall be sandblasted or roughened and blown clean of dust and sand with compressed air before the material may be applied.

B. Joints shall be primed (if required) and the sealant shall be applied in accordance with the manufacturer's instructions.

*** END OF SECTION ***

SECTION 03255

TANK WALL BASE JOINT

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section covers the work necessary for the tank wall base joint as shown on the contract drawings, complete.

1.02 SUBMITTALS

A. The Contractor shall provide the Engineer a 2-foot minimum length of each of the closed cell neoprene pads and the neoprene bearing pads in order that the Engineer can test the pads for compliance with these Specifications.

B. Furnish certified mill certificates showing that the material meets all of the requirements specified herein. The Engineer, at his option, may take samples of any materials and have them tested by an independent testing laboratory to verify their compliance with these Specifications. All such costs shall be borne by the Agency. If any materials should fail to meet these Specifications, all costs for further testing of the replacement material shall be borne by the Contractor

PART 2 - PRODUCTS

2.01 CLOSED CELL NEOPRENE PADS

A. Closed cell neoprene pads shall be used as indicated in the contract drawings.

B. The materials shall be medium grade closed cell neoprene conforming to 2A3 of ASTM D 1056-00 and as further specified herein and on the contract drawings.

1. Compression deflection: 9 to 13 PSI
2. Shore 00 durometer: 60 to 80 PCF
3. Density: 12 to 28 PCF
4. Water absorption by weight: 5%
5. Temperature range:
   a. Low (flex without cracking): -30º F
   b. High continuous : 150° F
   c. High intermittent: 200° F
6. Heat aging (7 days @ 158° F)
   lineal shrinkage (max.): 5%
   Tensile strength: 175 PSI min.
7. Elongation: 180% min.
8. Resilience (Bayshore-% rebound average
   1/2" thickness @ 72° F): 20% to 40%

C. Product AA60-003 by DACON Industries, or approved equal, are acceptable materials.

PART 3 - EXECUTION

3.01 BEARING AND FILLER PADS

A. Bearing and filler pads shall be installed as indicated on the contract drawings.

B. Bearing and filler pads shall be glued to the concrete with an approved rubber cement material to prevent uplift of the pads during concrete pouring.

C. In addition, all pads shall be held down with approved plastic shim plates placed under the reinforcing steel.

D. Nailing down pads will not be permitted

E. Closed cell neoprene shall be ordered at least l/4-inch wider than theoretically required to facilitate placing and to reduce development of voids between filler pads, bearing pads and waterstops.

F. Contractor's workmanship shall be such that no cement grout or concrete seepage will occur through the bearing and filler pad area resulting in a restraint of radial wall movements.

G. A continuous neoprene pad and one or more sponge filler pads are required between the top of the wall and the underside of the roof. Any void areas between such pads shall be caulked and sealed to prevent any mortar from the wall pour to come in contact with the wall top.

*** END OF SECTION ***

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 WORK OF THIS SECTION

A. This section covers cast-in-place concrete including formwork.

1.02 RELATED WORK

A. Related work specified in other sections:

Section 03200 - Reinforcement Steel
Section 03230 - Earthquake Cables
Section 03251 - Expansion and Construction Joints
Section 03255 - Tank Wall Base Joint
Section 03314 - Strand Wound, Pre-Stressed Concrete Tank

1.03 REFERENCED SPECIFICATIONS, GUIDES AND RECOMMENDATIONS

A. The latest edition of the following publications, form a part of this specification to the extent indicated by the references thereto.

B. American Society for Testing and Materials (ASTM):

1. C31 Practice for Making and Curing Concrete Test Specimens in the Field.
2. C33 Test Method for Specification for Concrete Aggregates.
3. C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. C40 Test Method for Organic Impurities in Fine Aggregates for Concrete.
5. C85 Test Method for Cement Content of Hardened Portland Cement Concrete.
6. C88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
7. C94 Specification for Ready-Mixed Concrete.
8. C131 Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
9. C136 Method for Sieve Analysis of Fine and Coarse Aggregates.
10. C143 Test Method for Slump of Hydraulic Cement Concrete.
11. C150 Specification for Portland Cement.

12. C156 Test Method for Water Retention by Concrete Curing Materials.

13. C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

14. C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

15. C233 Test Method for Air-Entraining Admixtures for Concrete.

16. C260 Specification for Air-Entraining Admixtures for Concrete.

17. C289 Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

18. C441 Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction.

19. C457 Test Method for Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete.

20. C494 Specification for Chemical Admixtures for Concrete.

21. C670 Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials.

22. C683 Method of Test for Compressive and Flexural Strength of Concrete Under Field Conditions.

23. C803 Test Method for Penetration Resistance of Hardened Concrete.

C. American Concrete Institute (ACI):

1. 301 Specifications for Structural Concrete (as supplemented and modified herein)

2. 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

3. 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete.

4. 318 Building Code Requirements for Structural Concrete and Commentary.

D. California Building Code (CBC)

1.04 SUBMITTALS

A. The following shall be submitted:

1. The Shop Drawings shall show complete details and arrangement of reinforcing steel and embedded items.

2. A sufficient quantity of the proposed aggregate, sand, air-entraining admixtures, cement and water (if other than Agency furnished water) for testing of materials and concrete mix designs referred to under Sub-Section 1.05 below.

3. Certification of aggregate compliance with these contract documents, and source of supply and location of all materials and cement.

4. Mix design for each concrete mixture. Mix Designs shall be prepared by a qualified independent testing agency based on laboratory trial mixes.

5. Material certificates for all admixtures and additives signed by the manufacturer's representative.

6. Curing compounds material certificates signed by the manufacturer's representative.

7. Material samples and certificates.

8. Forming:

    a. Forming and bracing designs shall be designed by the Contractor to meet all requirements specified herein.

    b. If requested by the Engineer, drawings and calculations shall be submitted verifying the selection of form ties, horizontal and vertical stiffbacks or braces for forms, form openings, or any other part of forming or bracing which may be considered critical by the Contractor.

    c. The Contractor shall be solely responsible for the adequacy of the forming and bracing design.

    d. The turn-around time of the Contractor's review or approval, or disapproval, will be 2 weeks from date of receipt of each written submittal.

    e. Any formwork installed by Contractor shall be solely at Contractor's risk. The Engineer's review or approval will not lessen or diminish the Contractor's liability.

1.05 CONCRETE MIX DESIGNS

A. All concrete materials shall be proportioned so as to produce a workable mixture in which the water content will not exceed the maximum specified.

B. If the concrete mix designs specified herein have not been used previously by the readymix supplier or if directed by the Engineer, mix proportions and concrete strength curves for regular cylinder tests, based on the relationship of 7, 14 and 28 day strengths versus slump values of 2, 4 and 6 inches, all conforming to these Specifications, shall be established by an independent testing laboratory. A laboratory, independent of the readymix supplier, shall be required to prepare and test all concrete cylinders.

The costs for preparation of mix designs and testing of concrete and materials shall be borne by the Contractor.

C. The exact proportions by weight of all materials entering into the concrete delivered to the jobsite shall conform to the approved mix design unless specifically so directed by the Engineer or Laboratory for improved specified strength or desired density, uniformity and workability.

D. The proportions of such mix design shall be based on a full cubic yard of hardened concrete.

E. Ready mix companies or jobsite batch plants shall furnish delivery tickets, signed by a Certified Weigh-Master, on which each shall state the weight of coarse and fine aggregates, cement, admixtures and water and the number of cubic yards of concrete furnished, which will be compared against the approved mix design.

F. There shall be no variation in the weights and proportions of materials from the approved mix design.

G. There shall be no variation in the quality and source of materials once they have been approved for the specific mix design.

1.06 READY MIXED CONCRETE

A. Ready mixed concrete shall conform to the requirements of ACI 301 and ASTM C94. In case of conflict, ACI 301 shall govern.

PART 2 - PRODUCTS

2.01 CONCRETE COMPOSITION

A. Concrete shall be composed of portland cement, fine aggregate, coarse aggregate, water, and specified additives so proportioned and mixed as to produce a plastic workable mixture in accordance with requirements of this section of the specifications and suitable to the specific conditions of placement.

2.02 PORTLAND CEMENT

A. Portland cement shall be from an approved source and shall conform to the requirements of the current ASTM Specification C150, for Type II cement. Only one brand of cement from one manufacturing plant may be used.

B. Cement may be delivered in paper sacks or in bulk.

C. If cement is delivered in sacks, each sack shall contain not less than 94 pounds of cement, and if delivered in bulk, one barrel of cement shall be considered to weigh 376 pounds.

D. In order that the cement may not become unduly aged after delivery, the Contractor shall use cement that has been stored on the jobsite before using cement direct from freighting, hauling or transporting operations.

E. Storage bins for bulk cement shall be watertight and constructed so that there will be no dead storage.

F. If there is reason to believe that dead storage exists, the bins shall be emptied completely at least once every four months.

G. Cement bins at the mixing plant, and cement storage silos shall be provided with effective dust collectors at the vents to prevent loss of cement.

H. The Contractor shall designate the source and quantity of cement required for his needs at least 30 days prior to its use, so that appropriate tests, inspection and certification can be made.

I. Certified mill certificates shall be furnished by the cement company with every shipment, giving proof that the above requirements have been met.

J. In addition, the Agency may conduct, at its own expense, any tests it considers necessary, to ensure that the cement furnished meets the specified requirements.

K. Any cement not meeting the Specifications will be rejected.

L. The Engineer may direct the use of portland cement of a type other than that above specified, in which case the City will pay the additional cost, if any, for the cement required over the cost of that specified, or shall receive appropriate credit for any cement required of a lesser cost than specified.

2.03 FINE AND COARSE AGGREGATES

A. Fine aggregate shall be clean, natural sand consisting of hard, strong, durable and uncoated particles.

B. Material removable by decantation from fine aggregate shall not exceed five percent (5%) by weight.

C. The moisture content of fine aggregate shall be carefully monitored by the use of moisture probes, placed at varying depths, which indicate the moisture content at the

time the aggregate is used for the concrete.

D. Fine aggregate shall be subjected to careful, thorough analysis to determine conformity with all requirements of these specifications.

E. Mortar specimens made with the fine aggregate shall have a compressive strength after seven (7) days of at least ninety percent (90%) of the strength of similar specimens made with Ottawa sand having a fineness modulus of 2.40 ± 0.10.

F. Coarse aggregate shall be washed gravel or crushed stone consisting of hard, tough, durable particles free from adherent coating.

G. It shall contain no vegetable matter of soft, friable, thin, flat or elongated particles in quantities considered deleterious.

H. A thin, flat or elongated particle is defined as a particle having a maximum dimension in excess of five times its minimum dimension.

I. Aggregate which has disintegrated or weathered badly under exposure conditions similar to those which will be encountered in the work under consideration shall not be used.

J. When crushed stone is used, the crusher shall be equipped with a screening system which will entirely separate the dust from the stone and convey it to a separate bin.

K. The substances designated shall not be present in excess of the following amounts:

1. Soft fragments: 5%
2. Clay lumps: 1.4%
3. Material removed by decantation: 1%

L. When the material removed by decantation consists essentially of crushed dirt, the maximum amount permitted may be raised to one and one-half percent (1-1/2%).

M. Coarse aggregate shall be subjected to a careful, thorough analysis to determine conformity with all requirements of these Specifications.

N. The maximum size aggregate shall be 1 inch and the aggregate shall be uniformly well graded from coarse through fine.

O. Corrective measures to remedy deficiencies in aggregate grading may be used only with the written approval of the Engineer.

P. The Contractor shall furnish satisfactory evidence to the Engineer that all aggregate used in the work meets the requirements specified herein. Tests shall be performed by a reputable independent testing laboratory and the cost of testing be borne by the Contractor.

Q. If the Engineer deems that additional testing of aggregate is necessary, he may select samples from any of the aggregate delivered to the ready-mix plant or jobsite and have them tested by a laboratory of his choice. Such material shall not be used in the work until test reports are available. If in such tests the material fails to meet the

specified requirements, the aggregate will be rejected and the expense of testing shall be borne by the Contractor. If such tests show the aggregate to be satisfactory, the cost of additional testing will be paid by the Agency but the Contractor shall have no claim for costs due to delays caused by testing.

R. When tested in accordance with "Organic Impurities in Fine Aggregates for Concrete" (ASTM C40), the fine aggregate shall provide a color in the supernatant liquid no darker than the reference standard color solution.

S. When tested in accordance with "Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate" (ASTM C88), the loss resulting after five cycles shall not exceed 10% for fine aggregate and 12% for coarse aggregate when using sodium sulfate.

T. When tested in accordance with "Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impaction in the Los Angeles Machine" (ASTM C131), the coarse aggregate shall show a loss not exceeding 50% after 500 revolutions or 10% after 100 revolutions.

U. When tested in accordance with "Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)" (ASTM C289), the aggregates should be represented by points lying to the left side of the solid line of Figure 2.

2.04 WATER

A. Water for mixing shall be clean, fresh and free from injurious amounts of oil, acid, chlorides, sulfates, alkali or organic matter. Water shall conform to ACI 301.

2.05 ADMIXTURES - GENERAL

A. All admixtures used in any mix design shall be manufactured and supplied by the same admixture company to insure compatibility.

2.06 RETARDING DENSIFIERS

A. Any product offered for consideration shall contain no calcium chloride, and shall be compatible with air-entrained cements and air-entraining admixtures conforming to the applicable ASTM, AASHTO, ANSI and Federal specifications.

B. Contractor shall certify that admixtures do not contain calcium chlorides or other corrosive materials.

2.07 AIR-ENTRAINING AGENTS

A. Air-entraining admixtures shall conform to ASTM C260.

2.08 WATER REDUCING ADMIXTURES

A. In addition to air-entrainment, approved water reducing additives, which do not affect the ultimate performance of any steel in any way, may be added to maintain the maximum water content below that specified herein. Water reducing additives shall conform to ASTM C494, Type A or D.

B. The use of water reducing additives shall not permit a reduction in the minimum specified cement content or in the specified amount of air-entrainment.

C. Admixtures shall contain no calcium chloride or tri-ethanolamine. All admixtures shall be from the same manufacturer.

D. Super-plasticizers shall conform to ASTM C494, Type F or G, batch plant-added using second or third generation only.

2.09 PROPORTIONING NORMAL CONCRETE

A. Unless indicated otherwise on the contract drawings, concrete shall meet the mix and compressive strength requirements as specified hereafter.

2.10 MEASUREMENT

A. All measurements shall be by weight. However, Contractor, at his own expense, may increase the cement content at a corresponding reduction in weight of aggregates, whenever he is concerned that the minimum strength and mix ratio requirements under these specifications cannot be met. The amount of water to be used shall be the amount necessary to produce a plastic mixture of the specified slump.

B. The slump shall be between two inches and four inches when tested in accordance with ASTM C143. Variations in the slump range may be allowed by the Contractor if admixtures, such as water reducers or super-plasticizers, are utilized in the concrete mix. Regardless of the measured slump, the maximum allowable water-cement ratios as specified here-in, shall be strictly adhered to.

2.11 COMPRESSIVE STRENGTH, WATER AND CEMENT CONTENT

A. Notwithstanding what has been stated herein-before, and unless shown otherwise on the contract drawings, the concrete shall meet the following requirements:

1. Minimum Compressive Strength	4,000 psi
2. Minimum Compressive Strength	5,000 psi (Reservoir Core Wall)
See Section 03314	
3. Maximum Water Content (gallons per 94 lb. sack of cement)	4.75 gallons
4. Minimum Cement Content (94 lb. sack of cement per cubic yard of solid concrete)	6.0 sacks

B. The cement content is required irrespective of strength.

C. The total chloride ion content of hardened concrete shall be less than 0.06 percent by weight of cement.

2.12 WALL FOOTING FORMS

A. Full Height Pours: The wall footing form design shall be such that wall footing sections can be poured without creating horizontal cold joints and without causing snapping of form ties (if used) which shall be of sufficient strength and number to prevent spreading of the forms during the placement of concrete and which shall permit ready removal of the forms without spalling or damaging the concrete.

B. Ties (if used):

1. Snap ties, if used, shall not be broken until the concrete has reached the design concrete strength. Snap ties, designed so that the ends must be broken off before the forms can be removed, shall not be used. The use of tie wires as form ties will not be permitted. Fully threaded stub bolts may be used in lieu of smooth ties with waterstops.

2. Taper ties with plastic or rubber plugs of an approved and proven design may also be used. The plugs must be driven into the hole with a steel rod, placed in a cylindrical recess made therefore in the plug. At no time shall plugs be driven on the flat area outside the cylindrical recess. Plugs shall be A58 SURE PLUG as manufactured by DAYTON SUPERIOR, Santa Fe Springs, CA (phone: (714) 522-3442).

3. Ties or other approved methods of holding the outside wall footing form shall positively secure the wall to the required dimension and hold the wall footing to that dimension prior to and during concrete placement.

2.13 CURING COMPOUND

A. All horizontal, screeded and floated surfaces, exposed to drying winds and sunlight, shall be sprayed with AMERICAN 309 ACRYLIC SEALER as manufactured by American Concrete Systems, Inc., San Diego, CA 92126, (application rate: 200 sf/gallon), or SELECT CURE SEAL AC-309 as manufactured by Select Products Company, Upland, CA, (application rate: 200 sf/gallon), and subsequently covered with a 6 mil thick polyethylene sheet.

B. Alternate curing compounds will be accepted if it is pigmented or colored, such as white, at the time of application and it is non-toxic to potable water. Regardless of the type of curing compound used, Contractor shall assume complete responsibility for its adequacy.

PART 3 - EXECUTION

3.01 CONCRETE QUALITY

A. Concrete shall conform to the requirements of Sub-Section 2.01 above. The required proportions shall be assembled, well mixed, transported, placed, consolidated, finished and cured as herein-after specified. Concrete shall be uniformly dense and sound, free from faults, cracks, voids, honeycomb and other imperfections.

B. If not called for specifically and unless specified otherwise hereunder, concrete requirements shall follow ACI 301 where applicable.

3.02 MIXING

A. Concrete shall be batched in fully automatic or semi-automatic stationary plants or approved portable batch type plants, and mixed in stationary or truck mixers. Mixing equipment and mixing procedures shall be subject to the approval of the Engineer.

B. Site-Mixed Concrete:

1. Conform to ACI 304R except as modified by these Specifications.

2. Use a batch-type mixer capable of combining the aggregates, cement, and water within the specified time into a thoroughly mixed and uniform mass and discharging the mixture without segregation.

3. Use supporting equipment that can accurately proportion the cement, the coarse and fine aggregates, the admixtures, and the water which enters the mixing drum. Proportion the cement and aggregate by weight.

4. Discharge each entire batch before recharging. Do not allow the volume of the mixed materials per batch to exceed the manufacturer's rated capacity of the mixer.

5. Mixing time shall be as follows:
   a. For mixer of capacity of 1 cubic yard or less, one and one-half minutes after batching is completed.

   b. For mixers of capacities larger than 1 cubic yard, one and one-half minutes plus one-half minute for each additional ½ cubic yard capacity or fraction thereof in excess of 1 cubic yard.

   c. The mixer shall revolve at a uniform rate as specified by the manufacturer for the mixing equipment.

C. Ready-Mixed Concrete:

1. Provide central-mixed concrete conforming to ASTM C94 except as modified by these Specifications.

2. Limit the haul time of central-mixed concrete so that the specified slump is attained without the onsite addition of water which will cause the mix design water-cement ratio to be exceeded. In no event shall the time exceed 90 minutes from the batch plant to the completion of the pour, unless specifically approved by the Engineer.

3. Use truck-transported, dry-batched concrete or mix on the jobsite when haul time is excessive. Do not re-temper partially hardened concrete.

3.03 PROTECTION FROM ABRASION OR FIRE

A. Every reasonable precaution shall be taken to protect finished surfaces from

abrasions or other damage. Concrete surfaces or edges likely to be injured during the construction period shall be protected by leaving the forms in place or by erecting satisfactory covers. No fire shall be permitted in direct contact with concrete at any time.

3.04 PLACEMENT OF CONCRETE

A. Placement shall conform to ACI 304R except as modified by these Specifications.

B. Notify the Engineer of readiness, not just intention, to place concrete in any portion of the work. This notification shall be such time in advance of the operation as the Engineer deems necessary to observe the preparations at the location of the proposed concrete placing. All forms, steel, anchors, ties, inserts, and other embedded items shall be in place before the Contractor's notification of readiness is given to the Engineer.

C. Schedule sufficient equipment for continuous concrete placing, program backup equipment, and the actions to be taken in case of an interruption in placing. Provide extra concrete vibrators. Test the concrete vibrators the day before placing concrete.

D. Concrete shall not be placed in layers thicker than can be properly vibrated and consolidated at any one time.

E. Each layer of concrete shall be vibrated thoroughly before the next layer may be placed thereon. Vibrators shall be taken through the top layer down through the full layer thickness below to ensure proper integration of the concrete and to avoid the development of cold joints and honeycomb between the layers. In other words, each layer of concrete shall be vibrated at least twice.

F. Each initial wall pour (where occurs) shall be preceded with a grout layer as indicated on the contract drawings.

G. Unforeseen horizontal cold joints shall be roughened and then covered with a pure mixture of cement and water of approximately 1-inch thickness, before the pour may be continued.

H. Horizontal waterstops, if shown on the contract drawings, shall be lifted up, then the concrete shall be placed under the waterstop, the waterstop shall then be laid down on that concrete, additional concrete shall be placed on top of that waterstop to the approximate finish level of the concrete, whereupon the concrete shall be thoroughly vibrated in one continuous motion from one end of the waterstop to the other end without skipping any areas. Visual observation shall be performed by the Contractor to certify that voids under waterstops do not exist.

I. Cold joints in footings shall be avoided at all costs. Joints shall be continuously covered with new concrete, and shall be thoroughly integrated through vibration, even if it means that horizontal passes of only 6 inches in width be made until additional concrete and equipment becomes available to permit wider passes in concrete placement.

J. The following minimum equipment, which must be in excellent working condition, shall be available on the site for every concrete placement:

1. Vibrating: 3 vibrators of 14,000 vibrations per minute (minimum).

The Contractor shall be the sole judge as to the acceptability of the equipment as to its condition and capacity. The Contractor shall assume complete responsibility for having adequate equipment.

K. Use mechanical vibration in placing concrete to eliminate rock pockets and voids, to consolidate each layer with that previously placed, to completely embed reinforcing bars and fixtures, and to bring just enough fine material to exposed surfaces to produce a smooth, dense, and even texture. Vibrators shall be of the high-frequency internal type, and the number in use shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least three (3) operable vibrators shall be available at the site. Use external vibrators for consolidating concrete when the concrete is otherwise inaccessible for adequate consolidating, provided the forms are constructed rigidly enough to resist displacement or damage from external vibration.

L. At the intersection between a new wall footing and an existing wall footing, the existing wall footing shall be adequately roughened to ensure a good bond between the existing wall footing and the new wall footing where indicated on the contract drawings.

M. Do not place concrete during rainstorms. Protect concrete placed immediately before rain to prevent rainwater from coming in contact with it. Keep sufficient protective covering on hand at all times for this purpose.

N. Concrete placed for encasement shall not be backfilled until the concrete has reached at least 50% of its 28-day compressive strength as confirmed by concrete cylinder tests. The Contractor may mold and cure additional concrete cylinders as specified here-in to verify that the 50% strength has been achieved, prior to the required 7-day test. The Contractor shall keep the trench dewatered until that time.

3.05 PUMPING CONCRETE

A. Base pump size on the rate of concrete placement, length of delivery pipe or hose, aggregate size, mix proportions, vertical lifts, and slump of concrete. The minimum inside diameter of pipe or hose shall be based on the maximum aggregate size as follows:

- For 1-inch maximum Aggregate, use 3-inch minimum Hose inside diameter.

B. Do not use aluminum pipes for delivery of concrete to forms.

C. Before pumping is started, prime the delivery pipe or hose by pumping mortar through the line using 5 gallons of mortar for each 50 feet of delivery line. Do not deposit mortar in the forms.

3.06 GENERAL FORMING

A. Purpose:

1. Forms shall be used, whenever necessary, to confine the concrete, to shape the concrete to the required lines and grades, and to obtain a thoroughly compacted dense concrete through proper vibrating.

2. The forms shall have sufficient strength and rigidity to hold the concrete and to withstand the necessary pressure, tamping and vibration, without deflection from the prescribed lines.

B. Design:

1. The surfaces of all forms in contact with the concrete shall be clean, rigid, tight and smooth.

2. Openings sufficient in size and number to permit convenient access to properly clean, inspect and place concrete within the forms shall be provided.

3. Exposed sharp edges shall be eliminated from finished concrete work by means of 3/4 inch triangular fillets or chamfer strips placed in the forms.

C. Removal:

1. All forms shall be removed before backfilling is placed.

2. Forms shall be so constructed that they can be removed without hammering on, or prying against the concrete and shall be removed in such a manner as to prevent damage to the concrete and to ensure the complete safety of all parts of the structure.

D. Form-Ties and Seepage:

1. Form-ties may be loosened temporarily to permit the removal of bulkheads.

2. All forms, whether prefabricated or custom made, shall be assembled and connected in such a manner that only minor mortar seepage through the joints will occur during vibration of the concrete, which shall be small enough that no honeycomb areas will develop.

E. Clean and Oil:

1. All dirt, chips, sawdust, mud, water and other foreign matter shall be removed from within the forms or within the excavated areas, before any concrete is deposited therein.

2. Forms previously used shall be thoroughly cleaned of all dirt, mortar and foreign matter before being reused.

3. Before concrete is deposited within the forms, all inside surfaces of steel and plywood form surfaces shall be thoroughly, but not excessively, coated with an approved non-staining bond releasing form oil.

3.07 WALL FOOTING FORMS

A. All vertical wall footing sides shall be formed by methods acceptable to the Contractor and to the correct elevations and location shown on the contract drawings.

B. Block-outs: There shall be no block-outs or other types of openings other than those shown on the contract drawings.

C. Remove Wood Splinters:

1. Contractor shall remove all wood splinters on concrete surfaces after stripping of wood forms.

2. Such work shall be completed before abrasive blasting of exterior wall surfaces may be started.

D. Bulkheads:

1. Bulkheads to form vertical wall footing joints shall be strong enough to withstand concrete pressures during pouring and vibrating, and shall be properly placed between the forms to avoid mortar seepage.

2. Holes shall be provided in the bulkheads to permit passage of horizontal mild steel reinforcing where required by the contract drawings.

E. Form Removal:

1. Forms may be removed as soon as the concrete has developed sufficient strength to prevent sagging, excess deflection, misalignment, spalling, cracking, breaking of edges and surfaces and any other damage to the concrete. “Sufficient Strength” is defined as 70% of design compressive strength.

2. Removal of wall footing forms shall not be started any sooner than 12 hours of accumulated time with the ambient air temperature above 50° after completion of the pour.

F. Alignment and Tolerances:

1. Every precaution shall be taken to see that all forms are in the proper alignment, plumb, placed to correct radius and that all form supports are secure and tight.

2. Form sills shall be used to contain or hold down neoprene pads (if required) and facilitate proper alignment of forms. The maximum permissible variation in the horizontal and vertical location of the waterstops, neoprene pads and seismic cables (if required) is plus or minus 1/4 of an inch.

3. The out-of-round tolerance is: 3/4" in 50', 3/8" in 10' and 3/16" in 24" from the true curvature specified at any point on the wall footing.

4. The maximum permissible variation in the vertical alignment, from the bottom to the top of the wall footing, is plus or minus 3/8 of an inch.

5. All transitions from plus to minus shall be gradual, even and smooth, and without abrupt changes in the surfaces.

6. Adequate time and cooperation shall be provided to the Inspector to verify the compliance of these requirements prior to closing up the forms or pouring concrete.

3.08 SURFACE FINISHES

A. Wood Float Finish:

1. This requires an integral finish by wood float after screeding, to compact the surface evenly.

2. Any excess surface water shall be removed before floating and no mortar shall be used for leveling.

B. Steel Trowel Finish:

1. This shall be an integral finish obtained by trowelling with a steel trowel after the surface has been floated and allowed to stand until all water sheen has disappeared.

2. Final trowelling shall be done after the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface and when the concrete is sufficiently hard that no mortar accumulates on the trowel.

3. Cement or mixture of cement and sand, shall not be spread on surfaces to absorb excess water or to stiffen the concrete.

4. Trowelling shall produce a dense, smooth, impervious surface free from defects and blemishes.

5. All finished top surfaces of wall footing surfaces shall receive a smooth, even, level and hard (so called "burnt") steel trowel finish.

C. Unformed Surfaces: Unformed surfaces which will not be exposed in the completed work shall be brought to required finished elevations and left true and regular.

D. Screeds:

1. Sufficient screeds, unaffected by form deflections under concrete loads, shall be installed to insure an even concrete surface, true to grade and elevation, without unacceptable local depressions of any sort.

2. Screeds shall be set to the required levels and be approved by the Contractor before any concrete may be placed.

E. Form Tie Holes (if used):

1. Tie holes shall be thoroughly sandblasted or roughened. After the taper tie holes have been cleaned, plugs as specified in Sub-Section 2.12B2 shall be installed in the middle third of the wall footing. The tie holes shall then be coated with a water insensitive epoxy or an acceptable bonding agent and properly filled through

damp-packing with a mortar of dry consistency and a mix of one part of cement to one part sand. The amount of water to be added to the cement-sand mix shall be such that the mortar can be driven into the voids and will compact properly. The outside of the tie hole shall be drypacked no sooner than 7 days after the inside has been drypacked.

2. Embeco or other fast-setting cements/additives shall not be used for damp-packing such cavities.

F. Abrasive Blasting:

The exterior surface of concrete wall areas, which will receive strand-wrapped prestressing/shotcrete, shall be abrasively blasted by a mechanical etching or shot blast system combined with a vacuum recovery system, or a self-contained waterblasting system.

1. The surface shall be blasted sufficiently to remove all laitance, form oil or other type coatings.

2. The surface shall be cut sufficiently to provide a good mechanical bond between the shotcrete covercoat and the concrete wall. The surface shall be cut to a minimum CSP5 profile, as established by the International Concrete Repair Institute (ICRI), over a minimum 90% of the area as measured over any one-foot-square area.

3. Systems that have not been used in the past to prepare circular tank wall surfaces for shotcreting and strand-wrapping or systems which rely on sandblasting or steel shot without a vacuum system will not be allowed.

4. All abrasive blasting shall be done to the satisfaction of the Engineer.

G. Honeycombed areas:

1. Unless complete removal is required by the Engineer, defective surfaces, such as honeycomb, shall be cut out entirely until homogeneous concrete is exposed, even if it means going through the entire wall, slab or footing.

2. Such areas shall be coated with an approved epoxy or adhesive bonding material, which shall be applied in accordance with the manufacturer's instructions, before damp-packing the area with a mix consisting of one part of Portland cement and two parts of sand and fine gravel, epoxy and sand mix, or any combination of materials and mixes as the situation dictates in the opinion of the Engineer.

3. The water content of the damp-pack material shall be such that a ball of the mix may be squeezed in the hand without bringing free water to the surface.

4. Damp-pack material shall be tamped into place and finished to match adjacent concrete surfaces.

5. Particular care shall be taken that no sagging of the material will occur.

6. The bond between any two layers of damp-pack shall be improved through the

use of an approved epoxy bonding agent.

7. Surfaces which have been damp-packed shall be kept continuously damp during, and for a period of not less than seven days after completing the damp-pack operation, by the curing procedure described below in Sub-Section 3.09.

8. Under no circumstances shall Contractor apply a plaster coat over the honeycomb areas to conceal the existence of the honeycomb in the concrete.

9. Neither Embeco, calcium chloride or fast-setting cements or additives shall be used for filling honeycomb areas, nor shall they be mixed with damp-pack material. Contractor shall provide certification that any material placed on or in the core wall shall be free of chlorides and other materials corrosive to reinforcing or prestressing steel.

H. Miscellaneous Surfaces: Miscellaneous surfaces that are not covered herein and not specifically designated on the contract drawings shall be finished as directed by the Engineer.

3.09 CURING

A. All horizontal, screeded and floated surfaces, exposed to drying winds and sunlight, shall be sprayed with a curing compound as specified in Sub-Section 2.13 of these specifications at an application rate of 200 sf per gallon. After the surface is dry to the touch, a 6 mil thick polyethylene sheet shall be carefully taped and sealed to the concrete surface and kept on such surface for as long as possible, but for at least 7 days, to minimize the loss of moisture trapped between the polyethylene and the concrete.

B. Water must be introduced between the polyethylene sheeting and the concrete (after the concrete has set) whenever moist drops cannot be detected on the concrete side of the sheeting. Water for curing shall be generally clean and free from any elements which might cause staining or discoloration of the concrete.

C. All formed concrete surfaces shall be sprayed with a concrete curing compound as specified in Sub-Section 2.13 of these specifications at an application rate of 200 sf per gallon. This requirement will be waived if the forms have been left in place for at least 7 days.

3.09 CONCRETE TESTS

A. Compression tests shall conform to ASTM C39, ASTM C670, ASTM C683 and ASTM C803.

B. Proportioning (or chemical analysis) tests shall conform to ASTM C85.

C. At least one slump test and five test cylinders shall be made, under the supervision of the Contractor, by an approved testing lab for every 40 cubic yards of ready-mixed concrete delivered to the jobsite. Each cylinder shall be coded to identify the date of delivery, the truck number, the location where the concrete has been used and the slump measured upon discharge. For each tank wall footing section, two sets of five cylinders shall be made, at the Contractor's option. This testing will be implemented

by the Agency Representative as part of Special Inspection.

D. The specimens shall be standard test cylinders, six inches in diameter, twelve inches in length, and they shall be prepared in accordance with ASTM C31.

E. Molds for the standard test cylinders shall be furnished at the expense of the contractor.

F. Subject to the conditions outlined in Sub-Section 3.10(L), all costs for making and testing of concrete and materials, by a qualified independent testing laboratory, will be borne by the Agency.

G. Making and testing of cylinders shall be performed by an approved testing laboratory that normally engages in the preparation of concrete mix designs and testing of concrete materials.

H. A compression test may be made on one cylinder from each group of five after 7 and/or 14 days, at the Engineer's option. A strength test shall be made using two cylinders from each group of five at 28 days for use in evaluating the concrete strength in accordance with the current editions of the CBC and ACI 318.

I. If desired by the Engineer, proportioning tests for each class of concrete delivered to the jobsite shall be made from test cylinders designated by the Engineer.

J. In addition to the test cylinders referred to in Sub-Section 3.10(C), an additional 3 test cylinders shall be made for each day's pour.

They shall be cured in the same manner, and in the same location of the concrete area to be investigated.

K. The method of determining the standard deviation of compressive concrete strengths from previously utilized mix designs shall conform to Section 4 of ACI 301.

L. The compressive test results of the cylinders referred to in Sub-Section 3.10(H) above will be compared against the strength-versus-slump relationship curves referred to in Sub-Section 1.05(B) above. Proportioning tests may then be made, at the discretion of the Engineer, on those groups of cylinders which have shown low readings.

M. Any concrete not meeting the minimum specified design strength, and any concrete showing a cement content less than the ratio by weight established in the original mix design, will be subjected to further testing of concrete cores taken from the concrete in question. Should these tests confirm that the specified requirements have not been met, the extra costs involved in such testing shall be borne by Contractor; and the concrete, at the Contractor's option, and at Contractor's sole expense, may be rejected and must then be removed from the site or may be strengthened with additional shotcrete or concrete as the situation warrants it. Should the core tests indicate that the strength requirement has been met or if the low strength concrete is deemed acceptable to the Engineer, the extra costs involved in such testing shall still be borne by the Contractor.

N. A drying shrinkage test shall be conducted on the preliminary trial batch with the maximum water-cementitious materials ratio used to qualify each proposed concrete

mix design using the concrete materials, including admixtures, that are proposed for the project. Three test specimens shall be prepared for each test. Drying shrinkage specimens shall be four-inch by four-inch by 11-inch prisms with an effective gauge length of ten-inches, fabricated, cured, dried, and measured in accordance with ASTM C157 except with the following modifications:

(1) Specimens shall be removed from the molds at an age of 23 hours plus/minus one hour after trial batching, shall be placed immediately in water at 73°F plus/minus 3°F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in lime-saturated water as specified in ASTM C157. Measurement to determine expansion expressed as a percentage of original length shall be taken at age seven calendar days. The length at seven calendar days shall be the base length for drying shrinkage calculations ("0" days drying age).

(2) Specimens then shall be stored immediately in a humidity controlled room maintained at 73°F plus/minus 3°F and 50 percent plus/minus 4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be reported separately for seven calendar days, 14 calendar days, and 21 calendar days plus/minus four hours of drying from "0" day after seven calendar days of moist curing.

(3) Drying shrinkage deformation for each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. Results of the shrinkage test shall be reported to the nearest 0.001 percent. If drying shrinkage of any specimen deviates from the average for that test age by more than 0.004 percent, the results for that specimen shall be disregarded.

(4) The average drying shrinkage of each set of test specimens cast in the laboratory from a trial batch as measured at the 21 calendar days drying age or at 28 calendar days drying age shall not exceed 0.036 percent or 0.042 percent respectively for concrete to be used in liquid-containing structures and 0.048 percent for concrete to be used in other structures. Drying shrinkage tests will not be required for any additional concrete mixes used for piles, pile caps, isolated footings, pipe blocking, pipe encasement, and duct banks. Maximum allowable shrinkage from field samples can be increased by 25 percent.

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SECTION 03314

STRAND-WOUND PRESTRESSED CONCRETE TANK

PART 1 – GENERAL

1.01 WORK OF THIS SECTION

A. This section specifies the qualifications for the Tank Contractor and requirements for the construction of AWWA D110 strand wound, prestressed, concrete circular tanks; including all site work, excavation, reinforcing, concrete work, appurtenances, disinfection, testing, and backfill directly related to the tank unless otherwise specified.

B. In the event of discrepancy between this section of the Specifications and any other section of the Specifications, this section shall govern.

C. The Tank Contractor shall furnish all labor, materials, tools, and equipment necessary to construct, disinfect and test the strand wound, prestressed concrete tank and appurtenances as indicated on the drawings, and as specified.

1.02 RELATED WORK

A. Related work specified in other sections:

Section 03200 – Reinforcement Steel
Section 03300 – Cast-in-Place Concrete
Section 03251 – Expansion and Construction Joints
Section 03255 – Tank Wall Base Joint
Section 05500 – Miscellaneous Metals

1.03 DESCRIPTION OF SYSTEM

A. The constructed tank shall consist of circumferential prestressing strand, reinforcing steel, and earthquake cables with shotcrete cover.

1.04 CODES AND STANDARDS

A. All Codes, Standards, Specifications and Reports cited herein shall be considered the most current version of that document unless noted otherwise:

1. ACI 301 Specifications for Structural Concrete

2. ACI 305R for Hot Weather Concreting

3. ACI 306R for Cold Weather Concreting

4. ACI 309R Guide for Consolidation of Concrete

5. ACI 318 Building Code Requirements for Structural Concrete and Commentary

6. ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary

7. ACI 350.3 Seismic Design of Liquid-Containing Concrete Structures and Commentary

8. ACI 372R Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures

9. ACI 506R Guide to Shotcrete

10. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

11. ASTM A416 Standard Specification for Steel Strand, Uncoated Seven-Wire Stress-Relieved, for Prestressed Concrete

12. ASTM A475 Standard Specification for Zinc-Coated Steel Wire Strand

13. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

14. ASTM A706/A706M Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

15. ASTM A722/A722M Standard Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete

16. ASTM A1060/A1060M Standard Specification for zinc coated (galvanized) steel welded wire reinforcement, plain and deformed, for concrete.

17. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

18. ASTM C33 Standard Specification for Concrete Aggregates

19. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

20. ASTM C173/C173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

21. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

22. ASTM C618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

23. ASTM C920 Standard Specification for Elastomeric Joint Sealants

24. ASTM C1116/C1116M Standard Specification for Fiber-Reinforced Concrete

25. ASTM D698 Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5lb Rammer and 12-inch Drop

26. ASTM D1056 Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber

27. ASTM D1556 Standard Test Method for Density of Soil in Place by the Sand-Cone Method

28. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft. – lbf/ft^3 (2700 kN-m/m^3)]

29. ASTM D2000 Classification System for Rubber Products in Automotive Applications

30. ASCE Standard 7 Minimum Design Loads for Buildings and Other Structures

31. AWWA C652 Standard for Disinfection of Water Storage Facilities

32. AWWA D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks

33. California Building Code (CBC)

34. US Army Corps of Engineers Specification CRD-C572, Specification for Polyvinyl-Chloride Waterstops

1.06 DESIGN CRITERIA

1.06.1 General

A. The prestressed concrete tank shall be constructed in accordance with the applicable provisions of AWWA D110, ACI 350, ACI 350.3, ASCE 7 and the CBC.

B. Horizontal prestressing shall be continuous. Discontinuous prestressing tendons or strands will not be allowed.

1.06.2 Tank Dimensions and Capacities

a. The Tank Contractor shall use the following tank capacities and tank dimensions for estimating purposes:

Tank Characteristic:	
Design Storage Capacity (note 1)	7.5 Million Gallons
Inside Tank Diameter	246 feet
Max Side Water Depth (feet) (note 2)	22.17 feet

Note 1: The indicated design storage capacity is the nominal "rated" tank capacity per the contract drawings.

Note 2: The indicated maximum side water depth is to tank overflow level, and does not reflect sloshing during a seismic event.

1.07 SUBMITTALS

1.07.1 Construction Submittals for Review Prior to Use

A. Design proportions for all concrete and shotcrete. Concrete strengths of trial mixes.

B. Admixtures to be used in the concrete or shotcrete and their purpose.

C. Reinforcing steel shop drawings showing fabrication and placement.

D. Catalog cuts or shop drawings of all appurtenances, i.e. hatch, vent, ladders, stairs, landings and waterstops.

1.08 GUARANTEE

A. The Tank Contractor shall guarantee the structure against defective materials or workmanship for a period of one year from the date of completion. If any materials or workmanship prove to be defective within one year, they shall be replaced or repaired by the Tank Contractor at the Tank Contractor's expense.

PART 2 – PRODUCTS

2.01 CONCRETE

A. Concrete shall conform to ACI 301.

B. Cement shall be Portland cement, Type II.

C. Admixtures, other than air-entraining, superplasticizers, shrinkage reducing and water reducing admixtures will not be permitted unless approved by the Engineer.

D. Concrete for all tank elements shall have a minimum compressive strength of 4,000 psi at twenty-eight days and a maximum water to cement ratio of 0.42 unless otherwise indicated on the contract drawings.

E. Concrete for the tank footings, pipe encasement, and all other work shall have a minimum compressive strength of 4,000 psi at twenty-eight days, shall not be air-entrained and shall have a maximum water to cement ratio of 0.42. The coarse and fine aggregates shall meet the requirements of ASTM C33. Coarse aggregate shall be No. 57 with 100% passing the 1 inch sieve. Superplasticizers, water-reducing, and shrinkage reducing (if applicable) admixtures shall be incorporated into the concrete. If fibers are used, they shall be virgin poly-propylene or cellulose fibers, Microfiber by Grace, Fibermesh 150 by Propex, UltraFiber 500 by Buckeye, or equal. Fiber lengths shall be a maximum of ¾ inches. The amount of fibers added to the concrete mix shall conform to the Manufacturer's recommendations.

F. Proportioning for concrete shall be in accordance with ACI 301.

G. All concrete shall have a maximum water soluble chloride ion concentration of 0.06% by weight of cement.

2.02 SHOTCRETE

A. Shotcrete shall conform to ACI Standard 506R, except as modified herein.

B. The wet mix process shall be employed for shotcreting.

C. Shotcrete used for covering prestressed strand shall consist of not more than three parts sand to one part Portland cement by weight. Additional coats of shotcrete shall consist of not more than four parts sand to one part Portland cement by weight. Polypropylene fibers shall be included in the shotcrete used for the finish cover coat. Fibers shall be Fibercast 500 by Propex, Fibermesh or equal. Fibers shall be virgin polypropylene and comply with ASTM C1116 performance level I. Fiber length shall be ¼ inch. The amount of the fibers added to the shotcrete used for the finish cover coat shall conform to the Manufacturer's recommendations. Fly ash may be incorporated into the finish cover coat. Fly ash shall conform to ASTM C618, Type F. Shotcrete shall have a minimum compressive strength of 5,000 psi at twenty-eight days and have a maximum water-cement ratio of 0.42.

D. Rebound material shall not be reused in any form for shotcrete.

E. If used by the Tank Contractor, the total volumetric air content of the shotcrete before placement shall not exceed 7% (±1%) as determined by ASTM C173 or ASTM C231.

F. Fine Aggregates:

1. The fineness modulus shall be between 2.7 and 3.0. A well-graded coarse sand shall be used for all shotcrete applications.

2. The gradation for the fine aggregates shall adhere to Gradating No. 1 requirements listed in "Table 1.1.1 – Grading Limits for Combined Aggregates" of ACI 506R-16.

G. All shotcrete shall have a maximum water soluble chloride ion concentration of 0.06% by weight of cement.

2.03 REINFORCING STEEL

A. Reinforcing steel shall conform to ASTM A615, Grade 60, as shown on the contract drawings, meeting the requirements of ASTM A615. Welded wire fabric and weldable reinforcing steel shall conform to ASTM A1060 and ASTM A706, respectively.

B. Reinforcing steel shall be accurately fabricated and shall be free from loose rust, scale, and contaminants.

C. Reinforcing steel shall be accurately positioned on supports, spacers, hangers, or other reinforcements and shall be secured in place with wire ties or suitable clips.

D. Circumferential reinforcing shall be lap spliced as indicated on the contract drawings.

E. Continuous reinforcing through joints, where applicable, shall have a Class A galvanized coating.

2.04 BASE RESTRAINT (EARTHQUAKE) CABLES

A. Base restraint cables shall be hot-dip galvanized seven-wire strand and shall be manufactured in accordance with ASTM A416 prior to galvanizing, and ASTM A475 after galvanizing. Only seven-wire strand will be allowed.

B. Hot-dip galvanized seven-wire strand shall have a nominal strand diameter of 0.50 in. Strand having 0.50 inch diameter strand shall have a minimum ultimate strength (MUS) after galvanizing of 38.25 kips and a minimum yield strength at 1% extension of 28.00 ksi. All strand wires shall have a minimum weight of zinc coating of 0.85 oz/sq-ft.

C. Neoprene sleeves for base restraint cables shall be closed-cell conforming to ASTM D1056, Type 2, Class A, and Grade 3. The sleeves shall have a compression deflection limited to 25% at 9 to 13 psi, hardness of 60 to 80 durometer, a minimum tensile strength of 175 psi, a minimum elongation of 180%, and a maximum compressive set of 35%.

2.05 CIRCUMFERENTIAL PRESTRESSING STEEL

A. Steel for prestressing shall be galvanized seven-wire strand.

B. Galvanized strand shall meet the requirements of ASTM A416 with zinc coating for galvanizing meeting the requirements of ASTM A475. Each wire shall be individually hot-dip galvanized before being stranded. The minimum weight of zinc coating per unit area of uncoated wire surface shall be no less than 0.85 ounces per square foot.

C. Splices for horizontal prestressed reinforcement shall be ferrous material compatible with the reinforcement and shall develop the full strength of the strand. Strand splice and anchorage accessories shall not nick or otherwise damage the prestressing.

2.06 ELASTOMERIC MATERIALS

A. Sponge filler shall be closed-cell neoprene or rubber conforming to ASTM D1056, Type 2, Class A, and Grade 1 or 3. Compression deflection limited to 25% at 2 to 5 psi.

B. Polysulfide or polyurethane sealant will be a two or three component elastomeric compound meeting the requirements of ASTM C920. Sealants shall have permanent characteristics of bond to metal surfaces, flexibility, and resistance to extrusion due to hydrostatic pressure. Air cured sealants shall not be used.

C. The remaining voids below the wall, not taken up by the solid neoprene or natural rubber pads, shall be filled with closed cell rubber pads and soft mastic to ensure a substantially unrestrained free movement of wall.

2.07 EXTERIOR COATINGS

A. A decorative coating shall be applied to the above grade exterior wall surfaces using two coats of a non-cementitious, high build, 100% acrylic resin polymer such as “Tammscoat Smooth” textured protective coating, “Tnemec Envirocrete 156”, “Sherwin Williams Loxon XP WP”, or equal.

2.08 APPURTENANCES

A. The Tank Contractor shall provide all appurtenances as shown on the contract drawings. Appurtenances shall include the following:

1. Interior Ladder: The ladder elements shall be made out of 316 stainless steel and all bolts of 316 stainless steel. Location as shown on the drawings.

2. Exterior Stairs: The stairs shall extend from the finish grade to the tank roof. The ladder shall be made out of galvanized steel. Bolts shall be 316 stainless steel.

PART 3 – EXECUTION

3.01 SAFETY

A. Every precaution shall be taken to keep personnel and visitors outside the prestressing area.

B. At no time shall anyone stand in the line of stressed strand.

C. No personnel are allowed other than the prestressing crew, within 100 feet from the exterior tank wrapping operation. Additional precautions shall be taken by Tank Contractor should this specified clearance not be available.

D. Where access to the site by unauthorized persons is outside the Tank Contractor's control while prestressing work is in progress, Tank Contractor shall erect protective fencing.

E. Tank Contractor shall conform to, and enforce, all local and Federal OSHA safety rules and regulations.

F. The Tank Contractor shall submit a safety plan for approval.

3.02 ABRASIVE BLASTING

A. The exterior surface of concrete wall areas, which will receive strand-wrapped prestressing/shotcrete, shall be abrasively blasted by a mechanical etching or shot blast system combined with a vacuum recovery system, or a self-contained waterblasting system.

B. The surface shall be blasted sufficiently to remove all laitance, form oil, or other type coatings.

C. The surface shall be cut sufficiently to provide a good mechanical bond between the shotcrete covercoat and the concrete wall. The surface shall be cut to a minimum CSP5 profile, as established by the International Concrete Repair Institute (ICRI), over a minimum 90% of the area as measured over any one-foot-square area.

D. Systems that have not been used in the past to prepare circular tank wall surfaces for shotcreting and strand-wrapping or systems which rely on sandblasting or steel shot without a vacuum system will not be allowed.

E. All abrasive blasting shall be done to the satisfaction of the Engineer.

3.03 CONCRETE

A. All concrete shall be conveyed, placed, finished, and cured as required by pertinent ACI standards.

B. Weather Limitations:

1. Unless specifically authorized in writing by the Engineer, concrete shall not be placed without special protection during cold weather when the ambient temperature is below 35 degrees Fahrenheit and when the concrete is likely to be subjected to freezing temperatures before initial set has occurred and the concrete strength has reached 500 psi. Concrete shall be protected in accordance with ACI 306R. The temperature of the concrete shall be maintained in accordance with the requirements of ACI 301 and ACI 306R. All methods and equipment for heating and for protecting concrete in place shall be subject to the approval of the Engineer.

2. During hot weather, concreting shall be in accordance with the requirements of ACI 305R.

3. Placement of concrete during periods of low humidity (below 50%) shall be avoided when feasible and economically possible, particularly when large surface areas are to be finished. In any event, surfaces exposed to drying wind shall be covered with polyethylene sheets immediately after finishing, or flooded with water, or shall be water cured continuously from the time the concrete has taken initial set. Curing compounds may be used in conjunction with water curing, provided they are compatible with coatings that may later be applied, or they are degradable.

C. Finishes: The tank shall be given the following finishes:

1. The top of the wall footing shall receive a steel trowel or magnesium trowel finish.

2. Exterior shotcrete shall receive a natural gun /nozzle finish.

D. Curing: Concrete shall be cured using water methods, sealing materials, or curing compounds. Curing compounds shall not be used on surfaces to which decorative coatings, mortar, or shotcrete is to be applied. Curing compounds used within the tank shall be suitable for use with potable water.

E. Testing:

1. For all concrete, five test cylinders shall be made for every 40 cubic yards. Two cylinders shall be tested at seven days, two at twenty-eight days, and one held as a spare. In addition, an additional 3 test cylinders shall be made for each day's pour.

2. Slump, air content and temperature testing shall be performed on each truck where cylinders are taken.

3. All initial concrete testing shall be in accordance with ASTM C31 and C39, at the expense of the Agency.

3.04 SHOTCRETING

A. Weather Limitations:

1. Shotcrete shall not be placed in freezing weather without provisions for protection against freezing. Shotcrete placement can start without special protection when the temperature is 35 degrees Fahrenheit and rising, and shall be suspended when the temperature is 40 degrees Fahrenheit and falling. The surface to which the shotcrete is applied shall be free from frost. Cold weather shotcreting shall be in accordance with ACI 506R, ACI 301 and ACI 306R.

2. Hot weather shotcreting shall be in accordance with the requirements of ACI 506R, ACI 301 and ACI 305R.

B. Coating Over Prestressing Strand:

1. Each prestress strand shall be individually encased in shotcrete. Shotcrete thickness shall be sufficient to provide a clear cover over the strand of at least 3/8 inch.

2. Finish cover coat shotcrete shall be applied as soon as practical after the last application of strand coat.

3. The minimum final shotcrete cover over the outermost prestressing strand layer shall be 1.5 inches.

C. Placement of Shotcrete:

1. Shotcrete shall be applied by automated shotcrete equipment using the wet mix process only. Nozzles shall be kept mounted on power driven machinery enabling the nozzle to travel parallel to the surface to be sprayed at a uniform linear or bi-directional speed. The nozzle shall be kept at a uniform constant distance from the surface, always insuring a right angle spray of the material to the surface. The high velocity impact shall be developed pneumatically by injecting compressed air at the nozzle.

2. For localized touchup, manually applied shotcrete is allowed. The shotcrete nozzle shall be held at a small upward angle not exceeding 5 degrees and constantly moving during application in a smooth motion with the nozzle pointing in a radial direction toward the center of the tank. The nozzle distance from the prestressing shall be such that shotcrete does not build up or cover the front face of the strand until the spaces behind and between the prestressing elements are filled.

D. Curing:

1. Shotcrete shall be cured using water curing methods, sealing materials or curing compounds at the option of the Tank Contractor. Curing compounds shall not be used on surfaces to which decorative coatings, mortar or shotcrete is to be applied. Curing compounds used within the tank wall shall be suitable for use with potable water. Intermediate layers of shotcrete shall be kept damp by water curing or other means no sooner than twelve hours after the shotcrete has been applied.

2. Water curing is not required should additional shotcrete be applied on the entire wall surface within the following twelve hours.

3. Indiscriminate use of continuous water cure for intermediate layers shall be avoided.

4. Completed shotcrete surfaces, which do not receive any additional coatings, may be water cured for a period of at least seven days by encapsulating the shotcrete inside of plastic sheeting.

E. Testing:

1. Testing of shotcrete shall be in accordance with ACI 506R, except as specified herein. One test panel shall be made for each of the following operations: strand cover and cover coat. Test panels shall be made from the shotcrete as it is being placed, and shall, as nearly as possible, represent the material being applied. The method of making a test sample shall be as follows: A frame of wire fabric (1 foot square, 3 inches in depth) shall be secured to a plywood panel and hung or placed in the location where shotcrete is being placed. This form shall be filled in layers simultaneously with the nearby application. After twenty-four hours, the fabric and plywood backup shall be removed and the sample slab placed in a safe location at the site.

2. The sample slab shall be moist cured in a manner identical with the regular surface application. The sample slab shall be sent to the testing laboratory. Nine 3 inch cubes shall be cut from the sample slab and subjected to compression tests in accordance with current ASTM Standards. Three cubes shall be tested at the age of seven days, three shall be tested at the age of twenty-eight days, and three shall be retained as spares. Testing shall be by an independent testing laboratory, approved by the Engineer and at the Agency's expense.

3. At the Tank Contractor's option, testing of shotcrete applied with an automated process shall be in accordance with ACI 301.

3.05 PRESTRESSING

A. Circumferential Prestressing:

1. The circumferential stressing system shall produce a continuously, electronically (or substantial equivalent) monitored permanent stress or force recording along its full length as it is being applied and the stress variation in any strand at any point around the circumference shall not be greater than ± 1.5% of the ultimate strength of the steel. In addition to this recording, any system which deflects the tensioned prestressing material between the tensioning device and the wall after it has left the tensioning device shall provide a similar continuously monitored stress or force record along its full length as it is being applied to the wall. These recordings shall show that either before or after deflection the stress variation in the prestressing material at any point around the circumference shall not be greater than ± 1.5% of the ultimate strength of the steel.

2. No manual, individual or intermittent force readings taken on wrapped strand in full bodily contact with the wall will be accepted. Force readings based on anything other than instantaneous force readings, as the strand is being tensioned, and wrapped around the tank, will not be accepted. This requirement shall be strictly adhered to.

3. The prestressing system shall be capable of applying a continuous wrapped force at any point around the circumference within the specified tolerances. Circumferential stressing systems based on jack-operated cable or rod-type tendons will not be allowed.

4. Each coil of prestressing strand shall be temporarily anchored at sufficient intervals to minimize the loss of prestress in case a strand breaks during wrapping.

5. Minimum clear distance between prestressing strands is 3/8 inch. Any strands not meeting the spacing requirements shall be respaced. Prestressing shall be placed no closer than 2 inches from the top of the wall, edges of openings, or inserts, nor closer than 3 inches from the base of walls or floors where radial movement may occur.

6. The band of prestressing normally required over the height of an opening shall be displaced into circumferential bands immediately above and below the opening to maintain the required prestressing force. Bundling of the prestressing strand shall be prohibited.

7. Ends of individual coils shall be joined by suitable steel splicing devices capable of developing the full strength of the prestressing strand.

3.06 DECORATIVE COATINGS (Where Applicable)

A. All exterior exposed wall surfaces shall be given a coating as specified in Section 09902. Work shall be performed by workmen skilled in the application of these types of products. The Manufacturer's application instructions shall be submitted to the Engineer for approval. The Tank Contractor shall confer with the Manufacturer's representatives regarding application techniques and shall follow the Manufacturer's instructions implicitly.

B. The concrete surface to be coated shall be clean, free of all laitance, dirt, grease, or other foreign materials. All defective surfaces shall be filled and/or repaired. Application shall be in full accordance with the manufacturer's instructions or as amended by the Engineer.

C. The Owner shall select the color.

3.07 DISINFECTION

A. The Tank Contractor shall, at the completion of tank construction, thoroughly clean the interior of the tank.

B. The Tank Contractor shall notify the Engineer prior to disinfecting the tank. Disinfection shall meet with the approval of the Engineer, AWWA C652, and the appropriate state agency.

C. The tank floor and interior of the wall shall be disinfected by using a solution of chlorine and water per Method 3 of AWWA C652.

D. Prior to placing the tank in service, a bacteriological test shall be taken, and successful results received. Testing shall be by an independent testing laboratory at the expense of the Agency.

3.08 WATERTIGHTNESS TEST

3.08.1 General Requirements:

A. Prior to placing backfill to the tank, and the area surrounding the tank and appurtenant equipment required to isolate the tank from the distribution system, the tank shall be tested to determine watertightness. The tank shall be filled with potable water to the maximum level. Water will be furnished to the tank by the Agency. The test shall consist of visual inspection of the exposed walls, footings, appurtenant piping and isolation valves for any leaks and by measuring the liquid level over the next twenty-four hours to determine if any change has occurred. If leaks are visually identified or if a change in the level of the tank is observed and exceeds the maximum allowance, the test shall be extended to a total of five days. Leaks visually identified shall be noted on the contract drawings and immediately brought to the Agency's attention. If at the end of five days no visual leaks are detected and the average daily change has not exceeded the maximum allowance, the test shall be considered satisfactory.

B. The tank shall be filled with potable water to the maximum level and isolated from the distribution system – see 3.08.2 Detailed Requirements below. Water will be furnished to the tank by the Agency. The test shall consist of measuring the liquid level over the next twenty-four hours to determine if any change has occurred. If a change is observed and exceeds the maximum allowance, the test shall be extended to a total of five days. If at the end of five days the average daily change has not exceeded the maximum allowance, the test shall be considered satisfactory.

C. The liquid volume loss for a period of twenty-four hours shall not exceed 1/20th of 1% of the tank capacity, 0.0005 x tank volume. If the liquid volume loss exceeds this amount, it shall be considered excessive, and the tank shall be repaired and retested.

D. Damp spots will not be permitted at any location on the tank wall. Damp spots are defined as spots where moisture can be picked up on a dry hand. All such areas shall be repaired as necessary.

E. Damp spots or standing water on the footing may occur upon tank filling and are permissible within the allowable volume loss. Measurable flow in this area is not permissible and shall be corrected.

3.08.2 Detailed Requirements:

A. Fill the hydraulic structure that is to be leak tested after completion of tank construction with water to the maximum operating liquid level. Filling shall not exceed 8 feet of water depth per 24-hour period. Filling shall be at a uniform rate over a 24-hour period with continuous monitoring. Repair any running leaks which appear during filling before continuing with the leak test.

B. After the structure has been kept full for 48 hours, it will be assumed for the purposes of the test that the absorption of moisture by the concrete in the structure is complete. Close all valves and gates to the structure and measure the change in water surface each day for a five-day period.

C. During the test period, examine exposed portions of the structure, and mark visible leaks or damp spots. Repair visible leaks or damp spots after dewatering. If the drop in water surface in a 24-hour period exceeds 1/20th of 1% of the normal volume of liquid contained in the structure, the leakage shall be considered excessive.

D. The determination of surface moisture evaporation shall be aided with a 24-inch deep, white-colored, water-tight container with not less than 10 square feet of surface area exposure. Position container to experience environmental conditions similar to the structure being tested. Subtract the water loss due to evaporation from the measured water loss in the structure to determine the water loss due to leakage.

E. If the leakage is excessive, drain the structure, repair leaks and damp spots, and refill the structure and, again, test for leakage. Continue this process until the drop in water surface in a 24-hour period meets the test requirements.

F. Inspect the underdrain/footing system for evidence of leaks in floor slabs. If leakage is indicated, locate and repair.

G. Repair visible leaks and damp spots whether leakage exceeds the allowable leakage rate or not.

H. Make repairs and additional filling and testing (including the cost of water) at no additional cost to Agency.

3.09 CLEAN-UP

A. The premises shall be kept clean and orderly at all times during the work. Upon completion of construction, the Tank Contractor shall remove or otherwise dispose of all rubbish and other materials caused by the construction operation. The Tank Contractor shall leave the premises in as good a condition as it was found.

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SECTION 03600

GROUT

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Furnish all labor, materials, equipment and incidentals required and install grout complete as shown on the contract drawings and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 – Cast-In-Place Concrete.

B. Section 05500 - Miscellaneous Metalwork.

1.3 SUBMITTALS

A. Submit to the Engineer, in accordance with Sub-Section 1.23.0 of Special Provisions showing materials of construction and details of installation for:

1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalogue cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalogue cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

B. Samples

1. Samples of commercially manufactured grout products when requested by the Engineer.

C. Qualifications

1. Grout manufacturers shall submit documentation that they have at least 10 years experience in the production and use of the proposed grouts which they will supply.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes

2. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

5. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics

B. U.S. Army Corps of Contractors Standard (CRD)

1. CRD C-621 - Corps of Contractors Specification for Nonshrink Grout

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

A. Qualifications

Grout manufacturer shall have a minimum of 10 years experience in the production and use of the type of grout proposed for the work.

B. Pre-installation Conference

Well in advance of grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date.

C. Services of Manufacturer's Representative

A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

D. Field Testing

All field testing and inspection services required shall be provided by the Agency. The Contractor shall assist in the sampling of materials and shall provide any

ladders, platforms, etc., for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.

E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, component systems requiring only blending as directed by the manufacturer.

1.7 DEFINITIONS

A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

PART 2 - PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout

1. Nonshrink cementitious grout shall be Sika Grout 212 by Sika Corp (no substitutions).

B. Nonshrink Epoxy Grout

Nonshrink epoxy-based grout shall be Sikadur 42 Grout-Pak PT by Sika Corp (no substitutions).

C. Water

Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 – EXECUTION

3.1 PREPARATION

A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.

B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.

C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with grout shall be the oil less type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.

D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of base plates prior to the installation of the grout.

E. Epoxy-based grout does not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.

F. Construct grout forms or other leak-proof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.

1. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.

G. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

H. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

3.2 INSTALLATION - GENERAL

A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and until grout compressive strength reaches 1000 psi or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.

F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.3 INSTALLATION - NONSHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.

B. Mixing in a mortar mixer (with moving blades) is required. Hand mixing shall be permitted only with the express permission of the Engineer. Pre-wet the mixer and empty excess water. Add pre-measured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3 inches in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces

and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cementitious grout in layers. Do not add additional water to the mix (retemper) after initial stiffening.

F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.4 INSTALLATION - NONSHRINK EPOXY GROUTS

A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.

B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.

E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.

F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.5 SCHEDULE

A. The following list indicates where the particular types of grout are to be used:

1. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3 feet wide by 3 feet long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.

2. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3 feet by 3 feet. Use at all locations indicated to receive flowable nonshrink grout by the contract drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.

3. Nonshrink epoxy grout: Use for all locations specifically indicated to receive epoxy grout.

*** END OF SECTION ***

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SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. The Contractor shall furnish all labor, equipment, materials, and incidentals necessary for performing all operations of the Work for this Section as shown on the contract drawings and as specified herein.

1.02 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 03600 - Grout
2. Section 05310 – Steel Roof Deck
3. Section 05500 - Miscellaneous Metalwork

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The Work of this Section shall comply with the current California Building Code (CBC) as adopted by the authority having jurisdiction over the Work.

B. Except as otherwise indicated in this Section, the Contractor shall comply with the 2015 edition of the Standard Specifications for Public Works Construction (SSPWC) together with the latest adopted editions of the Regional and Supplement Amendments.

1.04 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.05 CONTRACTOR SUBMITTALS

Submit in accordance with Section 01300 the following:

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

C. Welding certificates.

D. Qualification Data: For Installer and fabricator.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Tension-control, high-strength bolt-nut-washer assemblies.
5. Shear stud connectors.
6. Shop primers.
7. Non-shrink grout.

F. Source quality-control test reports.

G. Samples

1. Submit two samples of Contractor's proposed load indicator bolts or direct tension indicators.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

C. Shop-Painting Applicators: Qualified according to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."

E. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Preinstallation Conference: Conduct conference at Project site.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and lubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
3. Handle material with cranes or derricks as far as practicable. Do not dump steel off cars or trucks nor handle in any other manner likely to cause damage.

1.08 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992.

B. Channels, Angles: ASTM A 36.

C. Plate and Bar: ASTM A 36 and ASTM A 572, Grade 50.

D. Cold-Formed Hollow Structural Sections (HSS): ASTM A 500, Grade C, structural tubing.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Weight Class: as indicated.
2. Finish: Black, except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type.

   a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, baked epoxy coated.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

D. Anchor Rods: ASTM F 1554, Grade 36 unless otherwise indicated.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

2.03 GROUT

A. Cement Grout: Portland cement, ASTM C 150, Type II; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.04 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings" (ANSI/AISC 360-10).

1. Camber structural-steel members where indicated.

2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Complete structural-steel assemblies, including welding of units, before starting galvanizing operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

F. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.05 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Unless otherwise noted, remove backing bars or runoff tabs, back gouge, and grind steel smooth.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
3. Verify that weld sizes, fabrication sequence, and equipment used for exposed structural steel will limit distortions to allowable tolerances.

a. Grind butt welds flush.
b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.06 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.

1. Fill vent holes and grind smooth after galvanizing.

2. Galvanizing Repair Paint: ASTM A780.

2.07 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the contract documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" (ANSI/AISC 360-10).

B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten or Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base and bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base and bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and

other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Remove erection bolts on welded, exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1.

H. Do not enlarge misaligned holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" (ANSI/AISC 360-10) for bearing, adequacy of temporary connections and alignment.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth unless otherwise indicated.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for exposed structural steel will limit distortions to allowable tolerances.

   a. Grind butt welds flush.
   b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.05 FIELD QUALITY CONTROL

A. Field Testing

1. Allow the Engineer free access to work. Notify the Engineer in writing 4 working days in advance of high strength bolting and field welding operations, including pre-installation verification of high strength bolt assemblies.

2. Fastener assemblies which include bolts to be pre-tensioned shall be tested on site in a tension calibrator for pre-installation verification in accordance with the AISC Specification for Structural Joints using ASTM A325 Bolts.

3. All high strength bolting will be inspected visually. High strength bolts to be pre-tensioned by the turn-of-nut method shall have the turned portion marked with reference to the steel being connected after the nut has been made snug and prior to final tightening. Retighten rejected bolts of remove and provide new bolts. In cases of disputed bolt installations, the bolts in question shall be checked using a calibrated wrench, at no additional cost to the Agency.

4. Field welding will be inspected visually. Comply with all requests of inspectors to correct deficiencies.

5. The fact that steel work has been accepted at the shop and mill will not prevent its final rejection at the site, before or after erection, if it is found to be defective.

6. Remove rejected steel work from the site within 10 working days after notification of rejection.

B. Testing Agency: Agency will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

F. Correct deficiencies in Work that test reports and inspections indicate does not comply with the contract documents.

3.06 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

*** END OF SECTION ***

SECTION 05220

CONCRETE BOLTS

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. The Contractor shall provide concrete anchor bolts, inserts, complete, in accordance with the contract documents. Principal items are anchor bolts placed in concrete, adhesive anchors, and drilled anchors.

1.02 RELATED SECTIONS

A. The work of the following sections apply to the work of this section. Other sections, not referenced below, shall apply to the extent required for proper performance of the work.

1. Section 03200 Reinforcement Steel
2. Section 03300 Cast-in-Place Concrete
3. Section 05500 Miscellaneous Metals
4. Steel supports hangers, brackets and other miscellaneous items such as bolts accessory to mechanical and electrical installations indicated or detailed on the contract drawings and in Divisions 11, 13, 15 and 16 (where apply).

1.03 REFERENCE, SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this section of the specifications, the Contractor shall comply with the latest adopted editions of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The latest edition of the California Building Code (CBC).

C. Federal Specifications (Current Edition):

MIL-A-907E	Antiseize Thread Compound, High Temperature

D. ASTM Standards in Building Codes (Current Edition):

ASTM A193	Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and other Special Purpose Applications
ASTM A194	Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A276	Specification for Stainless Steel Bars and Shapes
ASTM F593	Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

ASTM F594 Specification for Stainless Steel Nuts

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: Shop drawings of all concrete bolts shall be submitted to the Engineer for review in accordance with Sub-Section 1.23.0 of Special Provisions.

B. An ICC Evaluation Service, Inc. report listing the ultimate load capacity in tension and shear for each size and type of adhesive concrete anchor used shall be submitted for review. The Contractor shall submit manufacturer's recommended installation instructions and procedures for all adhesive anchors for review and approval. The Contractor shall follow approved procedures during installation of concrete anchors.

C. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICC Evaluation Services, Inc. report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Anchor Bolts: Unless otherwise indicated, anchor bolts shall be fabricated of materials as follows:

1. Stainless steel bolts, nuts, washers ASTM F 593, Type 316
2. Stainless Steel nuts ASTM F594, Type 316
3. Plates and washers ASTM A276

B. Buried or Submerged Bolts: Unless other corrosion-resistant bolts are indicated, all bolts, anchor bolts, nuts and washers which are buried, submerged, or below the top of the wall inside any hydraulic structure shall be Type 316 stainless steel conforming to ASTM A193 for bolts and to ASTM A194 for nuts. All threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E.

1. Antiseize lubricant shall be classified as acceptable for potable water use.
2. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or approved equal.

C. Bolt Requirements:

1. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series (where apply).
2. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case, more than 1/2 inch beyond the nut.

D. Epoxy Adhesive Anchors: Grout for epoxy adhesive anchors shall be as specified on the contract drawings. No substitutions will be considered unless accompanied with ICC evaluations Services, Inc., report verifying strength and material equivalency.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Installation: Except as otherwise indicated, the fabrication and installation of anchor bolts shall conform to the requirements of the American Institute of Steel Construction “Steel Construction Manual".

B. Install adhesive and drilled anchor bolts in accordance with method specified in the ICC evaluation report for manufacturer product.

3.02 INSPECTION

A. The Agency reserves the right to inspect all materials and workmanship covered in this section. Such inspections will not relieve the Contractor of its responsibility to furnish materials and workmanship in accordance with the specifications. If inspections indicate that the materials or workmanship are defective, the Contractor shall remove and replace the defective work at no additional cost to the Agency.

*** END OF SECTION ***

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SECTION 05310

STEEL ROOF DECK

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. The Contractor shall furnish all labor, equipment, materials, and incidentals necessary for performing all operations of the Work for this Section as shown on the contract drawings and as specified herein.

1.02 RELATED SECTIONS

A. The Work of the following Section applies to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 05120 - Structural Steel

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The WORK of this Section shall comply with the current California Building Code (CBC) as adopted by the authority having jurisdiction over the Work.

1.04 CONTRACTOR SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. Field quality-control test and inspection reports.

F. Research/Evaluation Reports: For steel deck.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.07 COORDINATION

A. Coordinate layout and installation with structural steel fabrication and erection.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Steel Deck:
   a. ASC Profiles, Inc.
   b. Consolidated Systems, Inc.
   c. Verco Manufacturing Co.

2.02 ROOF DECK

A. Steel Roof Deck: Fabricate panels, to conform with the following:

1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G90 zinc coating.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Steel Thickness: As indicated.

2.03 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

C. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

D. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

E. Galvanizing Repair Paint: ASTM A 780.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02 INSTALLATION, GENERAL

A. Install deck panels and accessories as indicated and in conformance with the requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.03 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated, and as follows:

1. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2-1/2 inches.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Agency will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Engineer.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.05 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

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SECTION 05500

MISCELLANEOUS METALWORK

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. The Contractor shall provide miscellaneous metals and appurtenances, complete, in accordance with the contract documents.

B. Work included in this section. Principal items covered are:

1. Shop/erection drawings and samples.
2. Ladders.
3. Stairs.
4. Metal grating.
5. Welding electrodes.
6. Bolts (not including bolts associated with piping or pipe installation).
7. Shop prime paint.
8. Pipe rails and railings.
9. Pipe and conduit supports and bracing.
10. Embedded steel channel and angle frames.
11. Warning signs.

1.02 RELATED SECTIONS

A. The work of the following sections apply to the work of this section. Other sections, not referenced below, shall also apply to the extent required for proper performance of this work.

1. Section 03200 Reinforcement Steel
2. Section 03300 Cast-in-Place Concrete
3. Section 03314 Strand Wound, Prestressed Concrete Tank
4. Section 05220 Concrete Bolts
5. Steel supports, hangers, brackets and other miscellaneous items such as bolts accessory to mechanical and electrical installations indicated on the contract drawings or covered in Divisions 11, 13, 15 and 16 (where applicable).

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Except as otherwise indicated in this section of the specifications, the Contractor shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC), together with the latest adopted editions of the Regional Amendments.

B. The latest edition of the California Building Code (CBC).

C. Except as otherwise indicated, the current editions of the following commercial standards apply to the work of this section:

1. Commercial Standards:

Aluminum Design Manual	Aluminum Association
AISC 360	Specification for Structural Steel Buildings
AISC 303	Code of Standard Practice for Steel Buildings and Bridges
AISC	Steel Design Guide 27 – Structural Stainless Steel
AISI MANUAL	Cold-Formed Steel Design
AWS D1.1	Structural Welding Code – Steel
AWS D1.2	Structural Welding Code – Aluminum
AWS D1.6	Structural Welding Code – Stainless Steel
AWS QC1	AWS Certification of Welding Inspectors
NFPA 101	Life Safety Code

2. ASTM Standards in Building Codes:

ASTM A36	Specification for Structural Steel
ASTM A48	Specification for Gray Iron Castings
ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A123	Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A167	Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
ASTM A193	Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A194	Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High-Temperature Service
ASTM A276	Specification for Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A283	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A307	Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
ASTM A312	Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A320	Specification for Alloy Steel Bolting Material for Low-Temperature Service
ASTM A424	Specification for Steel, Sheet for Porcelain Enameling
ASTM A500	Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A536	Specification for Ductile Iron Castings
ASTM A563	Specification for Carbon and Alloy Steel Nuts
ASTM A569	Specification for Steel, Carbon (0.15 Maximum Percent), Hot Rolled Sheet and Strip Commercial Quality
ASTM A575	Specifications for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A786	Specification for Rolled Steel Floor Plates
ASTM B98	Specification for Copper-Silicon Alloy Rod, Bar and Shapes
ASTM B210	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
ASTM B221	Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
ASTM B438	Specification for Bronze-Base Powder Metallurgy (PM) Bearings (Oil-Impregnated)

3. Trade Standards:

Specifications for Stainless Steels as published by the Specialty Steel Industry of North America, Washington, DC.

Porcelain Enamel Institute, Inc.

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings: Shop drawings shall be submitted in accordance with Sub-Section 1.23.0 of Special Provisions.

B. Layout Drawings: Layout drawings for grating shall be submitted showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners. Load and deflection tables shall be submitted for each style and depth of grating used.

C. Product List and Product Data Sheets: A product list shall be submitted with product data sheets of intended shop coats.

1.05 QUALITY ASSURANCE

A. Miscellaneous metals shall be fabricated and erected in accordance with the latest edition of the AISC "Specification for Structural Steel Buildings", and "Code of Standard Practice for Steel Buildings and Bridges", except wherever there is a

discrepancy between the contract drawings and this specification, the contract drawings shall govern.

B. Aluminum work shall be fabricated and erected in conformance with applicable requirements of the CBC and referenced standards of the Aluminum Association.

C. Continuous Inspections:

1. The Contractor shall perform all welding and high strength bolting of structural steel assemblies under the continuous inspection of a certified Special Inspector approved by the Engineer. Should such fabrication be performed in the shop of a licensed Fabricator approved by the Engineer, only the field welding and high strength bolting of structural steel assemblies will be required to be performed under continuous inspection of the certified Special Inspector.
2. The Contractor shall notify the Engineer at least 24 hours in advance of the needed inspection.
3. The Contractor shall provide copies of inspection reports to the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: Steel shall conform to the following requirements:

1. Shapes, Plates, Bars: ASTM A36
2. Pipe, Pipe Columns, Bollards: ASTM A53, Type E or S, Grade B Schedule 40 unless noted otherwise.
3. Tubes: ASTM A500, Grade C

B. Stainless Steel: Unless otherwise designated or approved, stainless steel alloy types shall conform to ASTM A276 and ASTM A312 as follows:

1. Stainless steel plates, pipe and structural shapes: Type 316.
2. Stainless steel bolts, nuts and washers: Type 316L where connecting or bearing on aluminum.

C. Aluminum: Aluminum structural shapes shall be new and conform to applicable Federal Specification for 6061-T6 alloy and temper, unless otherwise noted. Aluminum pipe shall conform to Schedule 40 or greater.

D. Cast Iron: Cast iron shall conform to ASTM A 48, except as otherwise noted.

E. Ductile Iron: Ductile Iron shall conform to ASTM A536, using Grade 60-40-18 or better, except as otherwise noted.

2.02 LADDERS

A. Ladders: Ladders which may be partially or wholly submerged, or which are located inside a hydraulic structure, shall be entirely of Type 316 stainless steel. All other ladders shall be of aluminum, or as otherwise indicated with skid resistant rungs.

B. Pop-Up Extensions: Ladders that do not have an exterior handhold shall be equipped with a pop-up extension. Pop-up extension device shall be manufactured of the same material and finish as the ladder with telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by stainless steel spring balancing mechanisms. Units shall be completely assembled with fasteners for securing to ladder rungs in accordance with the manufacturer's instructions.

C. Fall Prevention Systems: The fall prevention system shall be provided for ladders used to ascend heights exceeding 20 feet unless otherwise indicated on the drawings. All necessary components shall be provided, including 2 safety belts for each fall prevention installation to provide a complete and fully operational fall prevention system. A rail extension shall be provided for each installation. At all locations where fall prevention systems are installed, a safety chain with a snap hook shall be permanently attached to the top of the ladder. The chain shall be long enough to allow a person to connect the belt to the chain while standing on the landing adjacent to the ladder. The chain and snap hook shall have a minimum allowable capability of 500 pounds. Safety belts shall fit a waist range from 23 inches to 54 inches. Safety rails and associated accessories shall match the ladder material.

2.03 METAL GRATING

A. General: Metal grating shall be of the design, sizes and types indicated. All grating shall be completely banded at all edges and cutouts using materials and cross section equivalent to the bearing bars. Such banding shall be welded to each cut bearing bar. Where grating is supported on concrete, embedded support angles matching grating material shall be used on all sides, unless indicated otherwise. Such angles shall be mitered and welded at corners. Grating shall conform to the following requirements:

1. All pieces of grating shall be fastened in two locations to each support.
2. Where grating forms the landing at the top of a stairway, the edge of the grating, which forms the top riser, shall have an integral nonslip nosing, width equal to that of the stairway.
3. Where grating depth is not given, grating shall be provided which will be within allowable stress levels, and which shall not exceed a deflection of 1/4 inch or the span divided by 180, whichever is less. For standard duty plank and safety grating, the loading to be used for determining stresses and deflections shall be uniform live load of the adjacent floor or 125 psf, whichever is greater or a concentrated load of 1,000 pounds.

B. Grating Materials: Grating materials shall conform to the following requirements:

1. Grating material shall be aluminum, welded steel, galvanized after fabrications or stainless steel as specified on the contract drawings. Cross bars shall be welded in position.
2. No single piece of grating shall weigh more than 80 pounds, unless indicated otherwise.
3. Cross bars shall be welded into position so that there is no movement allowed of bearing and cross bars.

C. Grating Fastening Devices: For metal gratings, either welded or mechanical attachments shall be used except where otherwise noted.

2.04 IRON CASTINGS

A. General: Iron casting shall be uniform quality, free from blow holes, porosity, hard spots, shrinkage, distortion, or other defects. They shall be smooth and well cleaned by shotblasting.

B. Covers and Grates: Covers and grates shall fit together evenly, so that the cover fits flush with the surrounding surface and so that the cover does not rock or rattle when loading is applied. Round covers and frames shall have machined bearing surfaces.

C. Design Loads: Covers and grates with matching frames shall be designed to support the following loadings:

1. Where located within a structure, the design loading shall match that required for the adjacent floor area, or, if no loading is given, a minimum of 300 pounds per square foot, unless indicated otherwise.
2. Exterior covers and grates shall be designed for AASHTO H20 loading unless indicated otherwise.

D. Cover Details: Unless indicated otherwise, access manway covers shall be two-part street type removable covers. Larger cover shall be for a 48-inch diameter clear opening with 24-inch diameter cover offset from the center as indicated. Raised lettering shall be as indicated.

2.05 WELDING ELECTRODES

A. Steel Electrodes: Welding electrodes shall conform with AWS D1.1, except E7024 rods or electrodes shall be not be used.

B. Aluminum Electrodes: Contingent upon alloys being welded, only inert gas-shielded arc or resistant-welding process with filler alloys shall be used. No process requiring a welding flux shall be used.

C. Stainless Steel Electrodes: Welding of stainless steel with electrodes and techniques shall conform to AWS D1.6.

2.06 BOLTS

A. Bolt Requirements: Bolts shall comply with the following:

1. Nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirement of the American Standard for Screw Threads. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series (where applies) .
2. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2 inch beyond the nut.

B. Bolts Buried or Inside Tanks or Channels: Unless otherwise indicated, bolts, anchor bolts nuts and washers which are buried, submerged or below the top of the wall inside any hydraulic structure shall be of Type 316 stainless steel.

2.07 SHOP PRIME PAINT

A. Shop Prime Paint: To ensure compatibility with deferred field-applied paint or coating systems for ferrous metals other than stainless steel, ductile iron, galvanized steel, and cast iron, provide surface preparations and use shop prime paint product and manufacturer as painting, or protective coating system intended for field application. Shop prime shall not be provided on portions of work immediately adjacent to intended field welds, nor portions intended for embedment.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the AISC 303.

1. The work of this section shall be coordinated with related trades. Particular attention is required for items to be embedded in concrete work. All punching and drillings, indicated or required, shall be provided for the attachment of other work to that of this section.
2. Compliance with Safety Requirements. Dimensions required for the fabrication and installation of handrails, ladders, grating, plate, pipe hangers and etc. which are not shown on the drawings, shall conform to the Division of Occupational Health and Safety, General Industrial Safety Orders, State of California.

B. Protection: The Contractor shall provide and be responsible for protection and repair of adjacent surfaces and areas which may become damaged as a result of work in this section. Work performed hereunder shall be protected until completion and final acceptance of project by the Agency. The Contractor shall repair or replace all damaged or defective work to original specified condition at no additional cost to the Agency.

1. Finished floor surfaces and adjacent work shall be protected from damage. Concrete floors shall not be overloaded. Mobile equipment used in placing steel shall have pneumatic tires. Steel members shall not be placed directly on floors; pads of timber of other material shall be used for cushioning.
2. Where welding is done in proximity to glass or finished surfaces, such surfaces shall be protected from damage due to weld sparks, spatter or tramp metal.

C. Hatches: Install roof hatches in conformance with the manufacturer's recommendations.

D. Ladders: Ladders shall be fabricated of stainless steel (316 interior) or galvanized steel(exterior), with skid resistant rungs, as shown on the drawings. Ladder fabrication shall conform to requirements shown on the drawings and CAL/OSHA (and/or OSHA). Rails shall be extended where indicated. Units shall be secured with stainless steel anchoring devices. Fall prevention systems shall be provided on all

ladders used to ascend heights exceeding 20 feet unless otherwise indicated on the drawings.

E. Pipe Rails and Railings: Pipe rails and railing shall be fabricated of stainless steel (316) or aluminum, unless otherwise indicated, completed with stanchions, toe plates, welded and bolted fittings, attachments and expansion/contraction provisions true to size configurations to meet or exceed the requirements of CAL/OSHA and as shown on the contract drawings. The Contractor shall grind and polish welds flush and smooth. Curves, where indicated or necessary, shall be bent on a radius of not less than 5 inches.

1. Safety chains shall be 1/2 inch link chain of same material as the railing with stainless steel harness-type snap to meet or exceed the requirements of CAL/OSHA.
2. Provisions shall be made to drain water from rail systems by drilling weep holes in concealed locations at the lowest possible elevations.

F. Pipe and Conduit Supports and Bracing: Supports and bracing for pipe and conduit shall be fabricated and installed as detailed on the contract drawings and in accordance with the requirements described in the City of Upland Standard Specifications in a fully coordinated manner with the work of other trades. Where shown or indicated, hot-dip galvanizing using materials specified in this section shall be hot-dip galvanized. Unless otherwise indicated, members shall be shop primed with a rust-inhibitive primer.

G. Embedded Channel and Angle Frames: Embedded steel channel and angle frames shall have continuously welded joints. Exposed welds shall be ground flush. Hot-dip galvanizing shall be provided after fabrication.

3.02 WELDING

A. Welding Steel: Welding shall be performed in accordance with the "Structural Welding Code- Steel", AWS, D1.1. Welders shall be qualified by tests in accordance with AWS B3.0.

B. Welding Aluminum: Welding shall be performed in conformance with AWS D1.2.

C. Welding Stainless Steel: Welding shall be performed in conformance with AWS D1.6

3.03 PAINTING

A. Painting: One or more shop coats of paint shall be given on all ferrous metals, except cast-iron, ductile iron, stainless steel and galvanized metals. Before priming, surfaces shall be thoroughly cleaned. Shop coats shall be allowed to dry before materials are loaded for delivery to the job site. After erection, all areas shall be painted where the shop coats have been rubbed off or omitted and all field bolting and welding areas as specified for shop priming.

B. Isolation of Dissimilar Metals: Aluminum members shall be isolated from contact with dissimilar metals, concrete and masonry to provide protection from electrolytic deterioration. The Contractor shall use non-absorptive tape or gaskets, a heavy brush

coat of approved zinc chromate primer made with a synthetic resin vehicle or a heavy coat of approved alkali-resistant bituminous paint unless otherwise indicated on the contract drawings.

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SECTION 07411

METAL ROOF PANELS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The Contractor shall furnish all labor, equipment, materials, and incidentals necessary for performing all operations of the Work for this Section as shown on the Drawings and as specified herein.

1.2 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 05120 - Structural Steel

2. Section 05310 - Steel Roof Deck

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The WORK of this Section shall comply with the current California Building Code (CBC) as adopted by the authority having jurisdiction over the Work.

B. Except as otherwise indicated in this Section, the CONTRACTOR shall comply with the latest adopted edition of the Standard Specifications for Public Works Construction (SSPWC) together with the latest adopted editions of the Regional and Supplement Amendments.

1.4 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

B. Steel Sheet Thickness: Minimum thickness of base metal without metallic coatings or painted finishes.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft.

2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

C. Water Penetration: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft..

2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.

E. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1. Wind Loads: Uniform pressure of 35 lbf/sq. ft., acting inward or outward.

2. Exposure B.

F. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.6 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Roof Panels: 24 inches square panel.

D. Qualification Data: For Installer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:

1. Metal Roof Panels: Include reports for air infiltration, water penetration, fire-test-response characteristics, and structural performance.

F. Maintenance Data: For metal roof panels to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Engineering Responsibility: Preparation of data for metal roof panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal roof panels and are based on the specific system indicated.

1. Do not modify intended aesthetic effects, as judged solely by Engineer, except with Engineer's approval. If modifications are proposed, submit comprehensive explanatory data to Engineer for review.

D. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

1. Meet with Owner, Engineer, Owner's insurer if applicable, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, deck Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.

4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.

5. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.

6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

7. Review temporary protection requirements for metal roof panel assembly during and after installation.

8. Review roof observation and repair procedures after metal roof panel installation.

9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal roof panels without field measurements, or allow for field-trimming of panels. Coordinate roof construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.10 COORDINATION

A. Coordinate installation of roof deck, substrate, and roof penetrations(if any).

B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks**,** structural steel framing, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Twenty years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified
.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

3. Basis-of-Design Product: The design for each metal roof panel specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2. Surface: Smooth, flat finish.

3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.

a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.

B. Panel Sealants:

1 Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

2 Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

3 Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.3 MISCELLANEOUS METAL FRAMING

A. General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G90, hot-dip galvanized zinc coating.

B. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.

1. Fasteners for Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.

2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.

3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Copper Sales Inc.; Una-Clad UC-3 or a comparable product of one of the following:

a. AEP-Span.

b. Berridge Manufacturing Company.

c. Custom Panel Industries, LLC.

d. MBCI; Div. of NCI Building Systems.

e. McElroy Metal, Inc.

f. Metal-Fab Manufacturing, LLC.

g. Metal Sales Manufacturing Corporation.

2. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

a. Exterior Finish: Fluoropolymer.

b. Color: Premium Metallic Champagne (AEP) unless otherwise determined by owner.

3. Clips: Manufacturer's standard for concealed securement of panels.

a. Material: 0.0528-inch- thick, zinc-coated (galvanized) steel sheet.

b. Fasteners: Manufacturer's standard #12-14x1 1/4" long self-drilling, self-tapping hex head drive screws for metal, noncorrosive base material; unless otherwise noted.

4. Joint Type: Double folded.

5. Panel Coverage: 18 inches.

6. Panel Height: 1.875 inches.

7. Uplift Rating: UL 90 (maximum spacing of 48 inches).

2.6 ACCESSORIES

A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.

2. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.

3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- thick, stainless-steel or nylon-coated aluminum sheet.

4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-

foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.7 FABRICATION

A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install flashings and other sheet metal.

B. Install fascia and copings.

C. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written recommendations.

3.3 METAL ROOF PANEL INSTALLATION, GENERAL

A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal roof panels by torch is not permitted.

2. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.

3. Provide metal closures at rake edges.

4. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.

5. Locate and space fastenings in uniform vertical and horizontal alignment.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.

B. Fasteners

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.

3.4 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.

2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight

mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform inspections and prepare reports.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.

C. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07920

JOINT SEALANTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

a. Control and expansion joints in unit masonry.

b. Other joints as indicated.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

E. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

1.4 QUALITY ASSURANCE

A. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:

1. Conduct field tests for each application indicated below:

a. Each type of elastomeric sealant and joint substrate indicated.

2. Test Method: Test joint sealants by hand-pull method described below:

a. Install joint sealants in 60-inch-long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.

b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.

c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler alongside of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.

3. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

4. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each type of sealant indicated.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

C. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Water: Where elastomeric sealants are indicated for joints that will come in repeated contact with water, provide products that comply with NSF 61.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are

compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.

3. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint configuration per ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without Huntington Beach Public Works Department deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION

SECTION 09902

ARCHITECTURAL PAINTS AND COATINGS: EXTERIOR OF CONCRETE TANKS

PART 1- GENERAL

1.01 WORK OF THIS SECTION

A. General: This section pertains to painting the following concrete structure:

Water Storage Tank: Painting the below-grade and above-grade exterior of the new City of Upland 7.5 million gallon (MG) concrete water storage reservoir for architectural enhancement.

B. Water Storage Tank: The new 7.5 MG water storage tank exterior will be of shotcrete construction, and painted.

C. Rendering: The City of Upland's selected rendering is provided in Appendix D. The Contractor shall prepare a test panel on the finished reservoir, minimum 10 feet wide by 30 feet tall, location to be selected by the Engineer, for City review and acceptance prior to moving forward with the final product.

1.02 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Special Provisions - Section 1.23.0 Shop Drawings
2. Section 09904 Coating Systems for Steel and Other Non-Concrete Surfaces

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Each listed document refers to the latest edition.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

CGIH 0100Doc	Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM C920	Specification for Elastomeric Joint Sealants
ASTM D235	Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D4214	Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4263	Standard Test Method Indicating Moisture in Concrete by the

	Plastic Sheet Method
ASTM D523	Standard Test Method for Specular Gloss
ASTM F1869	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 6	Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
SSPC Guide 7	Guide to the Disposal of Lead-Contaminated Surface Preparation Debris
SSPC PA Guide 3	A Guide to Safety in Paint Application
SSPC QP 1	Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)
SSPC SP 1	Solvent Cleaning
SSPC SP 2	Hand Tool Cleaning
SSPC SP 3	Power Tool Cleaning
SSPC SP 6/ NACE No. 3	Commercial Blast Cleaning
SSPC SP 7/ NACE No. 4	Brush-off Blast Cleaning
SSPC SP13/ NACE No. 6	Surface Preparation of Concrete

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Agency Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants
29 CFR 1910.1025	Lead
29 CFR 1926.62	Lead

1.04 SUBMITTALS

A. The following shall be submitted in accordance with the submittal procedures contained in Sub-Section 1.23.0 of the Special Provisions.

B. The following shall be submitted in accordance with the submittal requirements of this specification. All coats on a particular substrate must be from a single manufacturer.

1. Samples of specified materials may be taken and tested for compliance with specification requirements.
2. Certifications
3. Manufacturer's Instructions
4. Application instructions:
   a. Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.
   b. Manufacturer's Material Safety Data Sheets: Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.
   c. Operation and Maintenance Data: Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.05 APPLICATOR'S QUALIFICATIONS

A. Contractor Qualification: Submit the name, address, telephone number, FAX number, and e-mail address of the subcontractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on water tanks on a minimum of three similar projects within the past three years. List information by individual and include the following: (1) Name of individual and proposed position for this work. (2) Information about each previous assignment including: (a). Position or responsibility Employer (if other than the sub-contractor); (b) Name of facility owner; (c) Mailing address and telephone number of facility owner; (d) Name of individual in facility owner's organization who can be contacted as a reference; (e) Location, size and description of structure; (f) Dates work was carried out; (g) Description of work carried out on structure.

1.06 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:

1.05.1.1 Specialize in manufacture of coatings with a minimum of 10 years successful experience.

1.05.1.2 Able to demonstrate successful performance on comparable projects.

1.05.1.2Single Source Responsibility: Coatings and coating application accessories shall be products of a single manufacturer.

B. Pre-application Meeting:

1. Convene a pre-application meeting 3 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Agency Representative, Design Engineer, applicator, and manufacturer’s representative. Review the following:

a. Environmental requirements.
b. Protection of surfaces not scheduled to be coated.
c. Surface preparation.
d. Application.
e. Repair.

f. Field quality control.
g. Cleaning.
h. Protection of coating systems.
i. Coordination with other work.

1.07 REGULATORY REQUIREMENTS

A. Environmental Protection: In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Agency Representative of any paint specified herein which fails to conform.

B. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

C. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.

D. Asbestos Content: Materials shall not contain asbestos.

E. Mercury Content: Materials shall not contain mercury or mercury compounds.

F. Silica: Abrasive blast media shall not contain free crystalline silica.

G. Human Carcinogens: Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.08 PACKAGING, LABELING, AND STORAGE

A. Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 4 to 35 degrees C, or 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.09 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following: Work shall comply with applicable Federal, State, and local laws and regulations.

A. Safety Methods Used During Coating Application: Comply with the requirements of SSPC PA Guide 3.

B. Toxic Materials: To protect personnel from overexposure to toxic materials,

conform to the applicable and most stringent guidance of:

1. The applicable manufacturer's Material Safety Data Sheets (MSDS) or State of California regulations.
2. 29 CFR 1910.1000.
3. ACGIH 0100 Doc, threshold limit values.
4. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 applies to surface preparation on painted surfaces containing lead. Removal and disposal of coatings which contain lead is required under these laws and other state and federal requirements. Additional guidance is given in SSPC Guide 6 and SSPC Guide 7.

1.10 ENVIRONMENTAL CONDITIONS

A. Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

1. Coatings: Do not apply coating when air or substrate conditions are:
   a. Less than 3 degrees C (5 degrees F) above dew point.
   b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Agency Representative and the product manufacturer.
   c. Under no circumstances shall application conditions exceed manufacturer recommendations.
2. Post-Application: Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted areas. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:
   a. Supply 100 percent outside air 24 hours a day.
   b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 13 degrees C (55 degrees F) and 29 degrees C (85 degrees F) and humidity is between 30 percent and 60 percent.
   c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.11 SCHEDULING

A. Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs.

1.12 COLOR SELECTION

A. Colors of finish coats shall be as determined by the Agency. No substitutes will be accepted. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors precisely match colors indicated and the product conforms to specified requirements.

1. Tint each coat progressively darker to enable confirmation of the number of coats.
2. Color, texture, and pattern of wall coating systems shall be as determined by

the Engineer; no alternates will be accepted.

1.13 LOCATION AND SURFACE TYPES TO BE PAINTED

A. Painting Included: Where a space or surface is indicated to be painted in the contract documents, include the following unless indicated otherwise.

1. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
2. New finished surfaces that require identification or color coding and finished surfaces that are damaged during performance of the work.
3. Existing coated surfaces that are damaged during performance of the work.
4. Exterior Painting: Includes new surfaces of the exterior concrete/shotcrete exterior walls, but excluding any ladders, piping or other devices or facilities attached to, or a part of the reservoir tank structure. Attachments, etc. shall be masked off and protected from overspray or damage resulting from the surface painting operations.
5. Interior Painting: No painting of interior surfaces is included in this project.

B. Painting Excluded: Do not paint the following unless indicated otherwise.

1. Ladders, grillwork, ductwork or other ancillary equipment or fixed equipment attached to the exterior of the tank.
2. Surfaces in concealed spaces.
3. Steel to be embedded in concrete.
4. Bare galvanized steel, copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
5. Hardware, fittings, and other factory finished items.

1.14 DEFINITIONS AND ABBREVIATIONS

A. Qualification Testing: Qualification testing is the performance of all test requirements listed in the product specification.

B. Batch Quality Conformance Testing: Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by independent testing lab.

C. Coating: A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

D. DFT or dft: Dry film thickness, the film thickness of the fully cured, dry paint or coating.

E. DSD: Degree of Surface Degradation, defining degree of surface degradation.

F. EPP: Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

G. EXT: Designation for an exterior coating system.

H. INT: Designation for an interior coating system.

I. Micron / Microns: The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

J. Mil / Mils: The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

K. mm: The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

L. Gloss Levels: Seven (7) gloss levels (1 to 7) are defined below. Traditionally, Flat refers to 1/2, Eggshell refers to 3, Semi-gloss refers to 5, and Gloss refers to 6.

Gloss level:

Gloss Level	Description	Units @ 65°	Units at 85°
1	Flat	0 to 5	10 max
2	Matte	0 to 10	10 to 35
3	Eggshell	10 to 25	10 to 35
4	Satin	20 to 35	35 min
5	Satin-Gloss	35 to 70	
6	Gloss	70 to 85	
7	High Gloss	85+	

2. Gloss is tested in accordance with ASTM D523.

M. Paint: See Coating definition.

PART 2 - PRODUCTS

2.01 ACCEPTABLE SYSTEMS AND MANUFACTURERS

A. General: Paint products/systems specified are not intended to limit competition, but to establish a standard of quality desired. The owner will consider equivalent systems by other manufacturers as long as they meet the listed performance criteria.

2.02 MATERIALS

A. Materials specified herein are cited as minimum standard of quality which will be acceptable. Tnemec Company Incorporated, 6800 Corporate Drive, Kansas City, Missouri 64120-1372. Toll Free (800) 863-6321. Phone (816) 483-3400. Fax (816) 483-3969. Southern California Representative, TPC Consultants, Inc. (310) 637-2363. Web Site: www.tnemec.com/tpc

2.03 UNDERGROUND WALL AREAS OF WATER STORAGE TANK

A. Underground wall areas of the concrete tank shall be coated with SELECT SHIELD 300A (phone 714-429-0808), CARBOLINE BITUMASTIC (phone 314-644-1000), or an approved equal in conformance with these Specifications.

B. The material shall be an approved waterproofing/damproofing composition for use on exterior concrete and shotcrete surfaces of liquid retaining structures.

C. Approved materials shall conform to the following physical properties:

1. Percent solids: 50% minimum
2. Tack force time: 30 minutes approx. (initial set)
3. Tensile stress: 150 psi minimum @ 21 day (ASTM D412)
4. Ultimate elongation: 1500% minimum @ 21 day (ASTM 412)
5. Moisture vapor transmission: 0.03 perms @ 21 day (ASTM E96)
6. Ultra-violet resistance: No degradation (ASTM D822)
7. Adhesion in Peel (ASTM D903): 20 lbs. peel strength with 0% adhesion loss

D. Apply two coats of the approved product, by brush, spray or roller to completely cover the underground wall at a maximum coverage of 80 square feet per gallon per coat; or if smaller, at the manufacturer's recommended usage rate. Each coat shall be free of runs, skips or "holidays". All work shall be done in accordance with the manufacturer's recommendations, except for the above usage rate of the paint. Coating application shall commence within 5 days after completion of water curing unless otherwise approved by Agency Representative.

E. Contractor shall coordinate with the coating manufacturer regarding the compatibility of their product to be a substrate for the impermeable membrane that will be adhered to a portion of the buried tank wall per the contract drawings (this membrane is a feature of the tank footing drainage system). If there is a compatibility issue, Contractor shall bring that information to the Engineer's attention, and shall recommend a method to successfully attain a long-term attachment of the impermeable membrane to the tank wall without the use of concrete anchors or batten strips that are mechanically attached to the tank wall.

2.04 PERFORMANCE CRITERIA (FOR PAINT PER PARAGRAPHS 2.04 AND 2.05)

A. Adhesion
Method: ASTM D3359, (Method B, Crosshatch).
Coating systems cured 7 to 14 days at 75°F (24°C) and 50% Relative Humidity (R.H.)
System: One coat Series 156 Enviro-Crete applied to concrete block.
Requirement: No less than a rating of 5.

B. Freeze Thaw
Method: ASTM D2246.
System: One coat Series 156 Enviro-Crete applied to concrete block and cured 30 days at
75°F (24°C) and 50% R.H.
Requirement: No cracking over concrete after 15 cycles.

C. Fungal Resistance
Method: ASTM D3273, 90°F (32°C), 95-98% R.H., suspended 3" above soil containing
aspergillus niger, aspergillus oryzae and an unknown species of penicillium.
System: Two coats Series 156 Enviro-Crete applied to drywall panels.
Requirement: No more than slight mold growth after five weeks exposure.

D. Humidity
Method: ASTM D4585.
System: One coat Series 156 Enviro-Crete applied directly to concrete and cured 7 to 10 days at
75°F (24°C) and 50% R.H.
Requirement: No blistering, cracking or visible damage after 2,000 hours exposure.

E. Moisture Vapor Transmission
Method: ASTM D1653 (Method B), Wet Cup, Condition C at 100°F (38°C).
System: Two coats Series 156 Enviro-Crete (free film) 16 mils (405 microns) DFT.
Requirement: Average 125 grams/square meter in 24 hours.

F. QUV Exposure
Method: ASTM G53 (FS-40 lamps; four hours UV/60°C, four hours CON/50°C).

System: One coat Series 156-PA11 Enviro-Crete Alabaster cured seven days at 75°F (24°C) and 50% R.H.

Requirement: No blistering, cracking or chalking. No more than 3.5 MacAdam units color change after 4,000 hours exposure.

G. Salt Spray
Method: ASTM B117.
System: One coat Series 156 Enviro-Crete applied to concrete block and cured 7 days at 75°F (24°C) and 50% R.H.

Requirement: No blistering, cracking or delamination of film. No visible damage to coating or substrate after 2,000 hours.

System: Two coats Series 156 Enviro-Crete applied to concrete block and cured 30 days at 75°F (24°C) and 50% R.H.

Requirement: No blistering, cracking or delamination of film. No visible damage to coating or substrate after 5,000 hours.

H. Tensile Strength & Elongation
Method: ASTM D2370.
System: Two coats Series 156 Enviro-Crete cured 14 days at 75°F (24°C) and 50% R.H.

Requirement: Elongation no less than 200 percent average of five tests. Tensile strength no less than 250 psi (1.7 MPa), average of three tests.

I. Wind Driven Rain
Method: TT-C-555B, Section 4.4.7.3.
System: Two coats Series 156 Enviro-Crete applied to concrete block and cured 7 or 10
days respectively at 75°F (24°C) and 50% R.H.

Requirement: No damage to coating or substrate. No visible moisture on the back of lightweight block after 48 hours exposure.

PART 3 - EXECUTION

3.01 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

A. Prior to surface preparation and coating applications, remove, mask, or otherwise protect hardware and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.02 PREPARATION OF NEW CONCRETE AND CEMENTITIOUS SURFACE

A. Concrete and Shotcrete:

1. Curing: Concrete, shotcrete, and cement plaster surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

2. Surface Cleaning: Remove the following deleterious substances:

   a. Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 0.2 liter (1/2 cup) trisodium phosphate, 0.1 liter (1/4 cup) household detergent, and 6.4 liters (4 quarts) of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.

   b. Fungus and Mold: Wash existing coated, and new uncoated repair surfaces with a solution composed of 0.2 liter (1/2 cup) trisodium phosphate, 0.1 liter (1/4 cup) household detergent, 1.6 liters (1 quart) 5 percent sodium hypochlorite solution and 4.8 liters (3 quarts) of warm water. Rinse thoroughly with fresh water.

   c. Paint and Loose Particles: Remove by wire brushing.

   d. Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 0.4 square meter (4 square feet) of surface, per workman, at one time.

   e. Removal of Existing Coatings: For surfaces to receive textured coating MPI 42, remove existing coatings including soundly adhered coatings if recommended by textured coating manufacturer.

   f. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

B. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F1869. In all cases follow manufacturer's recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.03 APPLICATION

A. Coating Application:

1. Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPCPA Guide 3. SSPCPA Guide 3 methods are applicable to all substrates, except as modified herein.

2. At the time of application, paint shall show no signs of deterioration.

3. Uniform suspension of pigments shall be maintained during application.

4. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

5. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

6. Thoroughly work coating materials into joints, crevices, and open spaces.

7. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

8. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish.

9. Hiding shall be complete.

10. Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

11. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

12. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely and there shall be a visually perceptible difference in shades of successive coats.

13. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

14. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

B. Mixing and Thinning of Paints:

1. Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Engineer to use thinners. The written permission

shall include quantities and types of thinners to use.

2. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 0.125 L (0.25 pint) of suitable thinner per liter (gallon). The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3. Two-Component Systems: Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

C. Coating Systems:

1. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the specification.

2. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 0.038 mm 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

3. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

4. Existing Surfaces Damaged During Performance of the Work: Coat surfaces with the following:

   a. One coat of primer.

   b. One coat of undercoat or intermediate coat.

   c. One topcoat to match adjacent surfaces.

5. Existing Coated Surfaces to Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.04 WASTE MANAGEMENT

A. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in a protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials.

3.05 SPARE PAINT

A. At no additional cost to the Agency, the Contractor shall provide ten (10) additional gallons of matching specified paint in 1 gallon air tight containers. The paint shall be from the same batch used to coat the reservoir and shall be clearly identified on the outside of the container for where it is to be used.

END OF SECTION

SECTION 09904

COATING SYSTEMS FOR STEEL AND OTHER NON-CONCRETE SURFACES

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

A. General: This section pertains to painting steel and other non-concrete surfaces as required by the contract documents (drawings and specifications).

1.02 DESCRIPTION

A. Scope:

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to provide painting as shown and specified herein.
2. The extent of painting work shall be as shown on the contract drawings and as specified herein.
3. The work includes the painting and finishing of all interior and exterior items and surfaces specified. Surface preparation, priming and number of coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.
4. The term "paint" as used herein means all coating systems materials, which includes pretreatments, primers, emulsions, epoxies, enamels, varnish, stain, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
5. The Contractor shall paint all exposed surfaces whether or not colors are designated in any schedule, except where the natural finish of the material is specifically noted as a surface not to be painted. The term "exposed" as used herein means all items not covered with concrete, plaster, fireproofing or similar material. Where items or surfaces are not specifically mentioned, the contractor shall paint these the same as adjacent similar materials or areas.
6. Structural and miscellaneous metals covered with concrete, plaster, or similar material shall only receive a primer compatible with the covering material.
7. Shop drawings and samples shall be submitted for review at least 30-days prior to any painting or coating application.

B. Coordination:

1. The Contractor shall review installation procedures under other Sections and coordinate the installation of items that must be field painted in this Section.
2. The Contractor shall coordinate the painting of areas that will be inaccessible once equipment has been installed.

3. The Contractor shall provide finish coats that are compatible with the prime paints used. Contractor shall review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Contractor shall be responsible for the compatibility of all shop primed and field painted items in this Contract. Contractor shall furnish information on the characteristics of the finish materials proposed for use, to ensure that compatible prime coats are used. Barrier coats shall be provided over incompatible primers or primers shall be removed and re-primed as required. The Engineer shall be notified in writing of anticipated problems using the coating systems as specified with substrates primed by others. Such notification shall be included with the equipment submittals.

C. The following categories of work are not part of the field-applied finish work:

1. Shop Priming: Unless otherwise specified, shop priming of structural metal, miscellaneous metal fabrications, other metal items and such fabricated components as shop-fabricated or factory-built heating and ventilating, and electrical equipment or accessories shall conform to applicable requirements of Section 09904. Contractor shall meet the requirements of other appropriate Sections of this Specification.

2. Pre-Finished Items: Unless otherwise shown or specified, painting shall not be included when factory finishing such as baked-on enamel, porcelain, polyvinylidene fluoride or other similar finish is specified for such items including, but not limited to, acoustic materials, finished mechanical and electrical equipment such as light fixtures and distribution cabinets. Contractor shall be required to touch up factory finished items with paint supplied by the item manufacturer. Contractor shall field paint damaged pre-finished items as directed by the Engineer. Where a factory finished coating is applied to an item which is not specified to receive a factory finish coat, acceptance of the factory finish coat shall be at the discretion of the Engineer. The color shall be noted with the equipment submittals.

3. Concealed Surfaces:

   a. Unless otherwise shown or specified, painting is not required on nonmetallic wall or ceiling surfaces concealed from view areas and in generally inaccessible areas, such as furred areas, pipe spaces, duct shafts and elevator shafts, as applicable to this project.

   b. All piping, equipment, and other such items within these areas that are not galvanized or coated with another corrosion resistant coating as specified shall be painted according to this Specification.

4. Finished Metal Surfaces: Metal surfaces of stainless steel, chromium plate, copper, bronze, nickel, aluminum, and similar finished materials, including factory finished surfaces, will not require finish painting, unless otherwise shown or specified.

5. Operating Parts and Labels:

a. Moving parts of operating units, mechanical and electrical parts, such as valve operators, linkages, sensing devices, motor and fan shafts do not require finish painting unless otherwise specified.

b. The Contractor shall not paint over any code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

c. All paint, coating or splatter inadvertently placed on these surfaces shall be removed.

1.03 RELATED SECTIONS

A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Special Provisions – Section 1.23.0 Shop Drawings
2. Section 09902 - Architectural Paints and Coatings: Exterior of Concrete Tank

1.04 QUALITY ASSURANCE

A. Manufacturer: Tnemec products www.tnemec.com are listed as basis of design. Products manufactured by one of the following can be submitted 10 days prior to bid date to be considered:

1. Carboline Company, Incorporated.
2. ICI Paint: DeVoe Coatings
3. Ellis Paint Company

B. Applicator Qualifications:

1. The name and experience record of the painting applicator shall be supplied. A list of utility or industrial installations painted, responsible officials, architects, or engineers concerned with the project and the approximate contract price shall be included. Applicator shall have a minimum of ten utilities or industrial installations of a similar size or larger, all in Southern California within the last five years.
2. Painting applicators whose submissions indicate that they have not had the experience required to perform the Work will not be approved.

C. All paint and coating products for a specified coating system shall be supplied by the same manufacturer unless otherwise approved. Coating manufacturer shall be the primary source of information for all coatings supplied.

D. Reference Standards: Applicable provisions and recommendations of the following shall be complied with, except where otherwise shown or specified:

1. ANSI A13.1, Scheme for the Identification of Piping Systems.
2. OSHA 1910.144 Safety Color Code for Marking Physical Hazards.

3. SSPC Volume 2, Systems and Specification, Surface Preparation Guide and Paint Application Specifications.

4. ANSI/AWWA C105 Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.

5. Published standards of The National Association of Corrosion Engineers.

6. All paints to be applied in the field shall conform to VOC requirements of regulations of the State of California. Reference SCAQMD regulations, Rule 1113. Architectural Coatings. VOC limits for Industrial Maintenance coatings are set at 100 grams/liter.

1.05 SUBMITTALS

A. The information to be submitted by the Contractor in accordance with Special Provisions Section 1.23.0 shall include, but not be limited to, the items listed below.

B. Shop Drawings: The following shall be submitted for approval:

1. Copies of manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.

2. Each material shall be listed and cross-referenced to the specific paint and finish system and application, and shall be identified by manufacturer's catalog number and general classification.

3. Copies of manufacturer's complete color charts for each coating system.

4. Certifications from manufacturers shall be provided, verifying that the factory applied prime coats are compatible with specified finish coatings.

5. Maintenance Manual: Upon completion of the Work, copies of a detailed maintenance manual including the following information shall be furnished:

a. Product name and number.

b. Name, address and telephone number of manufacturer and local distributor.

c. Detailed procedures for routine maintenance and cleaning.

d. Detailed procedures for light repairs such as dents, scratches and staining.

C. The Contractor shall submit to the Engineer an itemized schedule of the surfaces to be painted. After approval of submittals and prior to beginning work, Engineer will note on the schedule the selected color to be furnished.

D. All systems specified herein have undergone substantial research by the Engineer and are deemed appropriate for this Work. If the Contractor proposes a coating system other than those specified herein, the manufacturer shall submit reference documentation for a minimum of five (5) similar installations, which have been in service for more than five (5) years in the United States of America. Reference documentation shall include installation location/details, installation date, current owner contact information, and contractor/applicator contact information.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: All materials shall be delivered to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information.

1. Name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Manufacturer's name.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions where recommended.
6. Application instructions.
7. Color name and number.

B. Storage of Materials:

1. Only acceptable project materials shall be stored on project site.
2. The Contractor shall store coating products in a suitable location approved by the Engineer. Area shall be kept clean and accessible.
3. Storage shall be restricted to paint materials and related equipment.
4. Health and fire regulations shall be complied with, including the Occupational Safety and Health Act of 1970.
5. Coatings and painting materials shall be stored according to manufacturer's recommendations including, but not limited to, product shelf life and recommended storage temperature.

1.07 JOB CONDITIONS

A. Existing Conditions:

1. Before painting is started in any area, it shall be broom cleaned and excessive dust shall be removed.
2. After painting operations begin in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipment.
3. Contractor shall adequately protect all existing structures from new painting splatters and overspray. Contractor shall thoroughly clean all accidental spills, splatters, and overspray. Any damage stains to finishes, equipment, or concrete shall be restored to original condition to Engineer's satisfaction.

B. Environmental Requirements:

1. Water-based paints shall be applied only when the temperature of surfaces to be painted and the surrounding air temperatures are between 55 °F and 90 °F unless otherwise permitted by the paint manufacturer's printed instructions.

2. Other paints shall be applied only when the temperature of the surfaces to be painted and the surrounding air temperatures are between 65 °F and 95 °F, unless otherwise permitted by the paint manufacturer's printed instructions.

3. Paint shall not be applied in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces unless specifically permitted by the manufacturer's printed instructions.

4. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods, and there is no danger of condensation on the surfaces being painted.

5. Adequate illumination and ventilation shall be provided in all areas where painting operations are in progress.

C. Protection: Finished Work of other trades and surfaces not being painted concurrently or not to be painted shall be covered or otherwise protected.

PART 2 - PRODUCTS

2.01 MATERIAL QUALITY

A. The best grade of the various types of coating suitable for use in water treatment plants, as regularly manufactured by acceptable paint material manufacturers shall be provided. Material not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Primers produced by the same manufacturer as the finish coats shall be provided. Use only thinners recommended by the paint manufacturer, and use only to recommended limits. The Engineer's approval shall be obtained prior to thinning any material.

C. Paints and pipe markers of durable and washable quality shall be provided. Materials that will withstand normal washing as required for removing grease, oil, chemicals, etc., without showing discoloration, loss of gloss, staining, or other damage shall be used.

D. The Contractor shall only use coating materials suitable for the intended use and recommended by the manufacturer for the intended service.

2.02 SUBSTITUTIONS

A. No substitutions shall be allowed that decrease the film thickness, the number of coats, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent color in all coating systems.

2.03 COLORS AND FINISHES

A. Surface treatments, and finishes, are shown under "Painting Systems" below. All substrates scheduled under "Painting Systems" shall be painted whether or not shown on the Drawings, or in Schedules, unless an item is specifically scheduled as not requiring the painting system scheduled below.

B. Color Selection: Consult with Agency for color selection.

C. Schedule Submittal: The Contractor shall submit to the Engineer an itemized schedule of the surfaces to be painted. After approval of submittals and prior to beginning work, Engineer will note on the schedule the selected color to be furnished.

D. Color Coding: In general, all color coding of piping, ducts and equipment shall comply with applicable standards of ANSI A13.1 and OSHA 1910.144.

E. Piping Color Code: To be selected by the Engineer.

F. Sample Colors: Representative color shall be used when preparing samples for Engineer's review. Final acceptance of colors will be from samples applied on the job.

G. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

1. Lead: Lead content shall not exceed amount permitted by federal, state and local government laws and regulations.

2. Paints specified for application on submerged concrete or metal in contact with potable water shall be approved by the California State Department of Health Services.

H. All painting systems specified are based on brush application. Other mechanical techniques shall be submitted to the Agency for approval before these application techniques may be reflected in any paint schedules submitted by the Contractor. Submit proof of acceptability, of technique proposed, by the paint manufacturer selected.

2.04 PAINTING SYSTEMS

A. System "A": Shop Applied, 100% Solids, NSF-61 Epoxy, For New Ferrous Metal (e.g. steel anti-vortex plate and supports, or steel 90-degree bend): Immersed in potable water:

1. Shop Surface Preparation: SSPC-SP 10 Near White Blast as specified in Paragraph 3.02.

2. Surface Preparation Per Manufacturer: If proper installation of the coating system requires a more stringent surface preparation than is specified herein, comply with manufacturer's requirements at no additional cost to Agency.

3. Shop Applied Coating System:

Tnemec Company: The following shall be provided:

(1) Primer: Series V140F, Pota-Pox Plus– 1 coat, 3.0 to 5.0 dry mils.

(2) Finish: Series 22 Epoxoline (1218 Blue) -- 1 coat, 20.0 to 30.0 dry mils.

4. This system shall be used for all new exposed ferrous metal and ductile iron in potable water immersion.

B. System "B": Field Applied, 100% Solids, NSF-61 Epoxy, For Existing Ferrous Metals, (e.g. steel inlets): Immersed in potable water:

1. Field Surface Preparation: SSPC-SP 10 Near White Blast as specified in Paragraph 3.02.

2. Surface Preparation Per Manufacturer: If proper installation of the coating system requires a more stringent surface preparation than is specified herein, comply with manufacturer's requirements at no additional cost to Agency.

3. Products and Manufacturer: The following shall be provided:

a. Tnemec Company:

(1) Primer: Series V140F Pota-Pox Plus -- 1 coat, 3.0 to 5.0 dry mils.

(2) Finish: Series 22 Epoxoline (1218 Blue) -- 1 coat, 20.0 to 30.0 dry mils.

4. This system shall be used for all existing exposed ferrous metal and ductile iron in potable water immersion.

C. System "C": New Exposed Metal, Including Piping, Valves and Pipe Supports: Non-Immersion:

1. Shop Surface Preparation: Abrasive blast cleaning per SSPC-SP 6 Commercial Blast as specified in Paragraphs 3.02. If proper installation of the coating system requires a more stringent surface preparation than is specified herein, comply with manufacturer's requirements at no additional cost to Agency.

2. Product and Manufacturer: The following shall be provided:

a. Tnemec Company:

(1) Shop Primer: Series 94-H2O -- 1 coat, 2.5 to 3.5 dry mils.

(2) Touch-Up: Series 94-H2O -- 1 coat, 2.5 to 3.5 dry mils.

(3) Intermediate: Series V69 Epoxoline II -- 1 coat, 4.0 to 6.0 dry mils.

(4) Finish: Series 1095 Endura-Shield -- 1 coat, 3.0 to 5.0 dry mils.

D. System “D”: Existing Painted Steel: Exterior exposure; Non-Immersion (Colony Booster Pump Station and Colony Booster Pump Station: existing piping and appurtenances):

1. System Type: Acrylic.

2. Surface Preparation: SSPC –SP 2/3.

3. Touch-up Primer: Series 135 Chembuild. DFT 3.0 to 5.0 mils.

4. Primer: Series 115 Uni-Bond DF Enduratone. DFT 2.0 to 4.0 mils.

5. Finish Coat: Series 1029 Enduratone. DFT 2.0 to 3.0 mils.

E. System "E": All Aluminum in Contact with Concrete:

1. Surface Preparation: Remove all foreign matter. If proper installation of the coating system requires a more stringent surface preparation than is specified herein, comply with manufacturer's requirements at no additional cost to Agency.

2. Product and Manufacturer: One of the following shall be provided:

a. Carboline Company:

(1) Primer: Rust-Bond -- 1 coat, 3.0 to 5.0 dry mils.

(2) Finish: Carboguard 890 VOC -- 1 coat, 3.0 to 5.0 dry mils.

b. Tnemec Company:

(1) Primer: Series L69, Epoxoline II -- 1 coat, 3.0 to 5.0 dry mils.

(2) Finish: L69, Epoxoline II -- 1 coat, 3.0 to 5.0 dry mils

c. ICI Paint--DeVoe:

(1) Primer: Devran 203 – 1 coat, 3.0 to 5.0 dry mils per coat; or

(2) Finish: Devran 224HS – 1 coat, 3.0 to 5.0 dry mils.

d. Ellis Paint Company:

(1) Primer: Low VOC Etching Primer

(2) Intermediate Coat: Maximus 5100Epoxy Coating – 1 coat, 3.0 to 5.0 dry mils.

(3) Finish: Maximus 5100 Epoxy Coating – 1 coat, 3.0 to 5.0 dry mils.

F. System "F": Ferrous Metals, Buried (Other than ductile iron pipe which is protected per Specification Section 15060). Use this paint system where System “G” is not otherwise applicable.

1. Surface Preparation: SSPC-SP 10, Near White Blast, as specified in Paragraph 3.02. If proper installation of the coating system requires a more stringent surface preparation than is specified herein, comply with manufacturer's requirements at no additional cost to Agency.

2. Product and Manufacturer: One of the following shall be provided:

a. Carboline Company:

(1) Primer: Carboguard 890 VOC -- 1 coat, 3.0 to 5.0 dry mils.

(2) Field Touchup: Carboguard 890 VOC -- 1 coat, 3.0 to 5.0 dry mils.

(3) Finish: Carboguard 890 VOC -- 2 coats, 8.0 to 10.0 dry mils per coat.

b. Tnemec Company:

(1) Shop Primer: Series V69, Epoxoline II -- 1 coat, 3.0 to 5.0 dry mils.

(2) Field Touchup: Series L69, Epoxoline II – 1 coat, 3.0 to 5.0 dry mils.

(3) Finish: 104 HS Epoxy -- 2 coats, 8.0 to 10.0 dry mils per coat.

c. ICI Paint--DeVoe:

(1) Primer: Bar-Rust 223H Low VOC – 1 coat, 4.0 to 6.0 dry mils; or

(2) Primer (Shop Coated): Devran 201H – 1 coat, 4.0 to 6.0 dry mils

(3) Field Touchup: Bar-Rust 233H Low VOC – 1 coat, 4.0 to 6.0 dry mils.

(4) Finish: Devtar 5A-HS – 2 coats, 8.0 to 10.0 dry mils per coat.

d. Ellis Paint Company:

(1) Primer: Maximus Epoxy Primer – 1 coat, 4.0 to 6.0 dry mils.

(2) Field Touchup: Maximus Epoxy Primer – 1 coat, 4.0 to 6.0 dry mils.

(3) Intermediate: Maximus Epoxy Primer – 2 coats, 4.0 to 6.0 dry mils per coat.

(4) Finish: Maximus Epoxy Coating – 3 coats, 4.0 to 6.0 dry mils per coat.

G. System "G": Exterior of Buried Ferrous Valves: Contractor shall apply all of the following types of coating systems to the exterior of buried valves:

1. The manufacturer's standard exterior coating.
2. A cold-applied petrolatum wax tape system conforming to AWWA C217.
3. Encase in a double layer of 8 mil polyethylene sheeting.

All field cuts and damage to the coating shall be repaired in conformance with recommendations of the coating system manufacturer. All foreign matter shall be removed by wire brush or sandpaper prior to the application of the selected coating system. Buried valves shall also be polyethylene-encased.

H. Exterior of Above-Grade Valves: Coat metal valves located above ground or in vaults and structures, the same as the adjacent piping. If the adjacent piping is not coated, then coat valves per applicable requirements of Section 09904 for the exposure condition. Apply the specified prime coat at the place of manufacture. Apply intermediate and finish coats in the field. Finish coat shall match the color of the adjacent piping. Coat handwheels and floor stands the same as the valves.

Valves shall be shipped from the factory with manufacturer's standard exterior epoxy coating if that coating is compatible with the requirements of this section for the exposure condition. If that standard coating is not compatible, then it shall be shipped with a compatible primer so that the valve exterior can be field painted per this specification.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor and its applicator shall examine the areas and conditions under which painting work is to be performed and notify the Engineer in writing of conditions

detrimental to the proper and timely completion of the Work. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. The Contractor shall not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

C. Records: The Contractor shall maintain an accurate written record of the coatings used each day. A copy of this record shall be furnished to the Engineer at the close of each working day. This record shall list: coating manufacturer's product number, amount of each coating in gallons used in the day, component ratio of mixed paints and any approved thinning procedures, and amount of excess mixed paint left over at the end of each day.

3.02 SURFACE PREPARATION

A. General:

1. All preparation and cleaning procedures shall be performed as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.

2. All hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted shall be removed or provided surface applied protection prior to surface preparation and painting operations. The Contractor shall remove these items, if necessary, for the complete painting of the “target” surfaces. Following completion of painting of each space or area, the removed items shall be reinstalled by workers skilled in the trades involved.

3. Surfaces to be painted shall be cleaned before applying paint or surface treatments. Oil and grease shall be removed with clean cloths and cleaning solvents prior to mechanical cleaning. The cleaning and painting shall be programmed so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

4. All surfaces which were not shop painted or which were improperly shop painted, and all abraded or rusted shop painted surfaces, which are to be painted, as determined by the Agency Representative, shall be prepared as specified below.

B. Galvanized Surfaces:

1. The Contractor shall clean free of oil and surface contaminants with solvent or other methods recommended by the coating manufacturer, complying with SSPC-SP 1.

2. Submerged or intermittently submerged galvanized ferrous metal, interior and exterior, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by a brush-off blast cleaning complying with SSPC-SP 7 with one mil profile minimum.

C. Ferrous Metals:

1. Non-Immersed ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by commercial blast cleaning complying with SSPC-SP 6.

2. Immersed ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.

3. Buried ferrous metals shall first be cleaned of visible deposits of oil, grease, and other organic contaminates by using a solvent wash complying with SSPC SP1, followed by near-white blasting complying with SSPC SP10. The temperature of the substrate shall be 5 degrees F above the dew point temperature.

4. Non-Immersed, ferrous surfaces that have not been shop-coated shall be cleaned of all oil, grease, dirt, loose mill scale and other foreign substances by commercial blasting, complying with SSPC-SP 6.

5. Immersed ferrous surfaces that have not been shop-coated or that, in the opinion of the Engineer, have been improperly shop-coated, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.

6. Bare and blasted or pickled clean metal shall be treated with metal treatment wash coat, prior to priming only if recommended by the paint manufacturer.

7. Shop applied prime coats which have damaged or bare areas shall be touched-up with primer recommended by the coating manufacturer after commercial blasting complying with SSPC-SP 6.

8. Miscellaneous existing coated or painted surfaces, in vault and not subjected to immersion shall be brush-blasted per SSPC-SP7 or power tool cleaned per SSPC-SP3.

D. Ductile Iron:

1. Uniformly abrasively blast the entire exterior surface of ductile iron using angular abrasive to an NAPF 500-03-04: “External Pipe Surface Condition”. When viewed without magnification, the exterior surfaces shall be free of all visible dirt, dust, loose annealing oxide, loose mold coating, rust and other foreign matter. Tightly adherent annealing oxide, mold coating and rust staining may remain on the surface provided they cannot be removed by lifting with a dull putty knife. Any area where rust reappears before application shall be re-blasted. The surface shall contain a minimum angular anchor profile of 2.0 mils (76.2 microns) (Reference NACE RP0287 or ASTM D 4417, Method C).

3.03 MATERIALS PREPARATION

A. General:

1. Painting materials shall be mixed and prepared in strict accordance with the manufacturer's written directions.

2. Coating materials produced by different manufacturers shall not be mixed, unless otherwise permitted by the manufacturer's instructions.

3. Materials not in actual use shall be stored in tightly covered containers. Containers used in storage, mixing, and application of paint shall be maintained in a clean condition, free of foreign materials and residue.

4. All materials shall be stirred before application to produce a mixture of uniform density, and as required during the application of the materials. Any film that may form on the surface shall not be stirred into the material. The film shall be removed and, if necessary, the material shall be strained before using.

B. Tinting: Each undercoat shall be tinted a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Undercoats shall be tinted to match the color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat. A code number shall be provided to identify material tinted by the manufacturer.

C. Mixing:

1. The Contractor shall mix only in mixing pails placed in a suitably sized non-ferrous or oxide resistant metal pans to protect concrete floor from splashes or spills which could stain exposed concrete or react with subsequent finish floor material. Contractor shall thoroughly clean all accidental spills and any damage to finish or concrete shall be restored to original condition to Engineer's satisfaction.

2. Paint shall be mixed and applied only in containers bearing accurate product name of material being mixed or applied.

3.04 APPLICATION

A. General:

1. Paint shall be applied by brush. Other mechanical application techniques such as roller, air spray, or airless spray in accordance with the manufacturer's directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable, shall be used only as approved by the Engineer. Brushes best suited for the type of material being applied shall be used. Where approved by the Engineer, rollers of carpet, velvet back, or high pile sheep's wool shall be used, as recommended by the paint manufacturer for material and texture required.

2. The number of coats and paint film thickness required is the same regardless of the application method. Succeeding coats shall not be applied until the previous coat has completely dried per Manufacturer's recommendation.

3. Additional coats shall be applied when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. The Contractor shall ensure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.

4. Surfaces not exposed to view do not require color coding but require the same coating systems specified for exposed surfaces. "Exposed to view surfaces" is defined as those areas visible when permanent or built-in fixture, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.

5. The backs of access panels and removable or hinged covers shall be painted to match the exposed surfaces.

6. Exterior doors on tops, bottoms, and side edges shall be finished the same as the exterior faces.

7. Aluminum parts in contact with dissimilar materials shall be painted as specified with appropriate finish.

B. Minimum Coating Thickness: The Contractor shall apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified. Extra coats shall be applied if required to obtain specified total dry film thickness.

C. Scheduling Painting:

1. The first-coat material shall be applied to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Sufficient time between successive coatings shall be allowed to permit proper drying. The Contractor shall not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Prime Coats: Primed and sealed walls and ceilings shall be recoated where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

E. Pigmented (Opaque) Finished: The Contractor shall completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.

F. Brush Application:

1. All brush coats shall be brushed-out and worked onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. All glass and color break lines shall be neatly drawn.

2. All primer or first coats shall be brush applied, unless otherwise permitted to use mechanical applicators.

G. Mechanical Applicators:

1. Mechanical methods shall be used for paint application when permitted by governing ordinances, paint manufacturer, and approved by Engineer. If permitted, it shall be limited to only those surfaces impracticable for brush applications.

2. Roller applications, if approved by the Engineer, shall be limited to interior wall and ceiling finishes for second and third coats. Each roller coat shall be applied to provide the equivalent hiding as brush-applied coats.

3. Spray application shall be confined to metal framework, siding, decking, wire mesh and similar surfaces where hand brush work would be inferior and to other surfaces specifically recommended by paint manufacturer.

4. Wherever spray application is used, each coat shall be applied to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.

H. Completed Work: The Contractor shall match approved samples for color, texture and coverage. Work not in compliance with specified requirements shall be removed, refinished or repainted, as required by the Engineer.

I. Coating Defects: Contractor shall check coatings for film characteristics or defects that would adversely affect the performance or appearance of each coating system. Check for holidays on interior steel immersion surfaces using an Agency-approved holiday detector.

3.05 FIELD QUALITY CONTROL

A. The right is reserved by the Engineer to invoke the following material testing procedure at any time, and any number of times during the period of field painting:

1. Engage the service of an independent testing laboratory to sample any of the paint being used. Samples of materials delivered to the project site will be taken, identified and sealed, and certified in the presence of the Contractor.

2. The testing laboratory will perform appropriate tests for any or all of the following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantative material analysis.

3. If the test results show that the material being used does not comply with the specified requirements, the Contractor may be directed to stop the painting Work, and remove the non-complying paint; pay for testing; repaint surfaces coated with the rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

B. Prior to initial coat and after completion of each successive coat of paint, the Contractor shall notify the Engineer. After inspection, checking of film thickness and approval by the Engineer, proceed with the succeeding coat. Contractor shall supply the Engineer for his use a Gardner dry-film thickness gage.

3.06 PROTECTION

A. Work of other trades shall be protected, whether to be painted or not, against damage by the painting and finishing work. All such work shall be left undamaged. All damage

shall be corrected by cleaning, repairing or replacing, and repainting, as acceptable to the Engineer.

B. "Wet Paint" signs shall be provided as required to protect newly painted finishes. All temporary protective wrapping provided for protection of this contract construction shall be removed after completion of painting operations.

3.07 CLEAN-UP

A. During the progress of the Work, all discarded paint materials, rubbish, cans and rags shall be removed from the site at the end of each work day.

B. Upon completion of painting work, all paint-spattered surfaces shall be cleaned. Spattered paint shall be removed by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, all damaged or defaced painted surfaces shall be touched-up and restored, as determined by the Engineer.

*****END OF SECTION*****

SECTION 11010

MECHANICAL EQUIPMENT GENERAL

PART 1 – GENERAL

1.1 DESCRIPTION

A. General: This Section contains general information required to install mechanical equipment as shown on the Drawings and specified on the various individual Specifications.

B. Supervision, Labor, Materials, Tools, Equipment, and Services: Included shall be all supervision, labor, materials, tools, equipment, and services as required for installation and test operation of equipment, including the services of manufacturer service Contractors, receiving, unloading, storage, protection, installation, and complete erection of all mechanical equipment required in these Specifications.

C. Installation: Installation shall include, but not be limited to, placing, shimming, anchoring, grouting, cleaning, painting, lubricating, assembling, testing, and adjusting of all mechanical equipment. Installation shall also include providing all required miscellaneous parts.

D. Contractor Coordination: The Contractor shall coordinate his work with other disciplines to provide a complete, operational installation.

1.2 RESPONSIBILITY FOR EQUIPMENT

The Contractor shall be liable for all damage to the equipment which is to be furnished and installed under this Contract, as well as for any damage to the building structures or other property, real or personal, resulting from the movement of equipment or installation work. This liability shall continue until the installed equipment is accepted by the City.

1.3 QUALITY OF EQUIPMENT AND WORKMANSHIP

A. Designed Equipment and Appurtenances: Equipment and appurtenances shall be designed in conformity with the specified standards as listed herein. Equipment shall be constructed of materials for the conditions of exposure and of such strength to withstand all stresses which may occur during testing, installation, and all conditions of normal operation.

B. Installation: All equipment shall be installed true and level and to the locations shown on the Drawings. All work shall be performed to the satisfaction of the Engineer. Precision gauges and levels shall be used in setting all equipment.

C. Safety and Warranties: The Contractor shall be responsible for installation of the equipment in a manner consistent with the requirements of performance warranties and equipment workmanship of the manufacturer.

D. Conforming to Shop Drawings: Machinery parts shall conform exactly to the dimensions shown on the shop drawings. The corresponding parts of identical machines shall be made interchangeable. Clearance shall be provided for repairs, inspection and adjustment.

E. Finished Appearance on Exposed Surfaces: Exposed surfaces shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be rounded or chamfered for personnel protection.

F. Compliance with OSHA: All machinery and equipment shall comply in all respects with the provisions of the Occupational Safety and Health Act of 1970, and other applicable Federal, State and local laws and regulations.

G. Seismic and Wind Forces: Equipment, together with their appurtenances, shall be designed to withstand the wind forces and loadings accordingly to the Uniform Building Code, latest edition. Seismic and wind forces need not be combined. Structures shall be investigated for various conditions of content levels, including both full and empty. Design shall be based upon the most severe condition. Shop drawings shall show all design forces and reactions and shall be sealed by a registered Professional Contractor licensed in the State of California.

1.4 CONFORMANCE TO DESIGN CRITERIA AND PERFORMANCE GUARANTEE

In the bid proposal, the Contractor shall formally acknowledge receipt of and understanding of the design criteria presented in the Specifications and guarantee that the equipment supplied shall perform in compliance with the design criteria.

Contractor shall guarantee all equipment provided under this Contract in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.1 ANCHORS AND SUPPORTS

A. Guides, Plates, Anchor, and Attachment Bolts: The Contractor shall furnish, install, and protect all guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation. Anchors and supports shall be of ample size and strength for the purpose intended and shall be approved by the Engineer.

B. Anchor Bolts: Anchor bolts shall be furnished and set in concrete foundations where required. Reference Drawings for sizes, locations, and materials.

C. Installation: The Contractor shall obtain and use shop drawings and suitable templates when required for installation of equipment.

2.2 LUBRICATION

A. General: The Contractor shall thoroughly lubricate all equipment in accordance with the equipment manufacturer's instructions. Lubricating oils and greases shall be of the type and viscosity recommended by the equipment manufacturer.

B. Flushing Oils: All lubricants shall be furnished with flushing oils as recommended by the Manufacturer. This includes, but is not limited to, all gearing and bearings, regardless of whether they have been shipped with or without oil soluble protective coatings.

C. "Run-In" Oil: Following flushing, oil lubricating systems shall be filled with "run-in" oil as recommended by the equipment manufacturer. The equipment shall be "run-in" at the no-load condition for a minimum of two hours. Following "run-in" and inspection, the equipment is to be drained and flushed again with flushing oil and refilled with lubricant as recommended by the manufacturer.

D. Schedule: The schedule for the above procedures is to be submitted for review by the Owner's representative, at least two weeks prior to the selected procedure starting date.

E. Grease Fittings: The grease fittings on all mechanical equipment shall be such that they can be serviced with a single type of grease gun. Grease fitting shall be a standard button-head type.

F. Grease Fittings: Where locally mounted grease fittings would be difficult to service, the fittings shall be extended by adequately sized tubing to a point that shall provide accessibility for normal maintenance. Such points shall be located and installed as per the Engineer's directive.

2.3 PROTECTIVE COATINGS AND PAINTING

A. Painting: All equipment and materials shall be shop painted. Particular attention shall be directed to wetted surfaces and other areas exposed to corrosive, extreme temperature or other hazardous environments. Painting shall be in strict accordance with Section 09900 unless otherwise indicated in the detailed equipment Specifications.

B. Corrosion: All matched surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure a minimum protection for two years after shipment.

C. Oil Lubrication: Oil lubricated gearing, bearings, and other lubricated components, shall be shipped with an oil soluble protective coating as recommended by the manufacturer. The coating shall be selected to provide protection for 2 years.

D. Motors, Reducers, and Electric Controls: Motors, reducers and electric controls shall have the standard factory finish prior to delivery except where specific exception is noted in the individual equipment Specifications.

E. Extra Paint Provided: Provide two quarts of paint compatible with the equipment finish coat for field touch-up.

2.4 TOOLS AND ACCESSORIES

The Contractor shall furnish, with each type, make, or size of equipment, any special tools, wrenches and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be high-grade, properly labeled, and delivered to the Owner with the equipment.

PART 3 - EXECUTION

3.1 APPROVAL INFORMATION TO BE SUBMITTED BY THE CONTRACTOR

Standard drawings, schematics, technical data and all other information as necessary to evaluate compliance with the Specifications.

Manufacturer model number and supporting data as required for all major system components that shall be provided with the equipment to provide a complete operating unit. No changes in such equipment listed with the Bid shall be permitted without prior review and approval by the Engineer.

Shipping weight and number of pieces, method of shipment, point of origin.

Time required from date of contract to furnish certified detail shop drawings for review.

Completion of data sheets when attached to Specifications.

A list of recommended spare parts with a price on each item.

A list of all special tools to be provided in accordance with Paragraph 2.4.

All information that is required in the individual equipment Specifications.

3.2 NOISE REQUIREMENTS

All equipment specified shall be tested for noise generation after installation. When tested, equipment shall include the complete driver and driven equipment. Three certified copies of the test shall be submitted to the Engineer for approval prior to final acceptance.

3.3 SHOP INSPECTION AND SHOP TESTING

A. The Engineer shall be granted reasonable access to the production and shop test areas of the equipment manufacturer's facility during manufacturing and testing.

B. The Contractor shall notify the Engineer in writing, at least five working days prior to commencement of shop tests, of the time and place of all shop tests.

C. Inspection by the Engineer will not relieve the Contractor of his responsibility for workmanship, materials, and Specification requirements.

D. Manufacturer's standard test procedures shall be required and the Manufacturer shall demonstrate that equipment meets all the requirements of this Specification.

3.4 SHIPPING AND IDENTIFICATION

A. All shipments shall be "tagged" by the Contractor with a "wired-on" metal or plastic tag clearly stenciled or lettered with paint or waterproof ink. The information on the tags and cartons should include Contractor's order number, purchase order number, manufacturer's number, and the equipment number. Any expense incurred by the City due to the Contractor's failure to do so will be back charged or deducted from his contract.

B. Each piece of equipment shall be provided with a substantial stainless steel nameplate, securely fastened in a conspicuous location and clearly inscribed with the Manufacturer's name, year of manufacture, serial number, principal rating data and equipment item number.

C. The equipment covered in these Specifications shall be fabricated in the minimum number of sub-assemblies necessary for transportation. Small components or assemblies shall be adequately boxed or crated to prevent damage during shipment.

D. Each assembly or package shall be identified with a durable shipping tag securely attached and plainly marked with the Contractor's order number, manufacturer's purchase order number and equipment number.

E. All openings shall be covered with plywood, plastic or wood plugs or shields to prevent debris from entering the assemblies. Each assembly or sub-assembly shall have lifting lugs to facilitate erection.

3.5 OPERATING AND MAINTENANCE MANUALS

Operation and Maintenance Manuals shall be furnished in accordance with Section 01730.

3.6 OPERATION AND MAINTENANCE INSTRUCTION

A. Instruction Time: The Contractor shall provide a minimum of 32 hours of instruction time, after the equipment has been accepted by the Owner's representative. The time shall be used to instruct the City's personnel in the proper operation and maintenance of the equipment. The manufacturer shall provide technical personnel familiar with the operation and maintenance of the equipment in making this presentation. The service shall be coordinated with the Engineer.

B. Training: Training shall consist of on-site operation training, classroom training, operational, safety and emergency drills.

C. Additional Instruction: The Contractor shall recommend additional number of training days that may be required, if necessary, to properly instruct the City's operating personnel in the proper use of the equipment. Such additional instruction time shall be included in Bid.

3.7 INSTALLATION OF EQUIPMENT

A. Installation: The Contractor's work procedure shall conform to the manufacturer's installation instructions unless expressly directed otherwise by the Engineer.

B. Equipment: Equipment shall be erected level and plumb on the foundations and supports at the locations and elevations shown on the Drawings, unless otherwise directed by the Engineer during installation.

C. Wedges, Shims, Backing Nuts, and Grout

1. Equipment shall be brought to proper level with wedges, shims, or backing nuts. After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to anchor the machine firmly into place against the shims and backing nuts. Wedges shall be removed after shimming.

2. Grout shall be as specified in Section 03600. The grout shall be installed in accordance with the manufacturer's instructions.

3. All equipment shall be installed in such a manner as to provide access for routine maintenance and lubrication as specified in paragraph 2.2.

4. Equipment of a portable nature which requires no installation shall be delivered to a location designated by the Engineer.

3.8 MECHANICAL START-UP

A. Running Equipment: Once the equipment has been installed, complete with all auxiliary and support systems, and is ready for operation, the Contractor shall

mechanically check out the equipment to verify that the equipment functions correctly under "non-process" conditions. The equipment shall be fine-tuned, adjusted, water tested, where applicable, and completely checked out before the equipment and support systems are considered ready for process start-up.

B. Contractor Coordination: The Contractor will be responsible for coordinating this effort and providing all support services and facilities necessary for this work effort.

C. City Satisfaction: The equipment will not be considered ready for process start-up until the City's representative is satisfied that the equipment has been satisfactorily checked-out and successfully passed a "non-process" test run.

3.9 FIELD SERVICE

It is understood that the Contractor and manufacturer share a joint responsibility in this work. The Contractor shall provide the manufacturer's qualified field representative and supporting personnel as required for the equipment furnished and installed under this Contract to perform the following:

A. Assistance during equipment installation shall be provided to align the equipment or check the alignment of pre-aligned equipment prior to making connections to or anchoring of the equipment.

B. Inspection during equipment installation work shall be provided to determine compliance with equipment erection methods and procedures recommended by the manufacturer.

C. Written approval of the equipment installation shall be submitted to the Engineer after satisfactory completion of mechanical start-up and "run-in period" of the equipment.

D. Conduct the process start-up necessary to operate, adjust, calibrate and tune the equipment and systems into operating service in accordance with the design criteria described in each detailed equipment Specification.

E. Conduct performance tests to demonstrate compliance with design criteria and performance guarantee set forth in the Specifications.

3.10 PROCESS START-UP

A. Start-Up: Once the equipment has been considered ready for process start-up and the support systems can deliver the process material, the Contractor shall start-up the equipment under process conditions and conduct performance tests to verify compliance with the Specifications.

B. Supervision: The Contractor shall provide the necessary supervision and technical personnel and services required to perform the work. The Engineer shall coordinate

this phase of the work with the Contractor and provide all necessary support services and facilities to assist the Contractor in performing the work.

C. Operation for 3 Continuous Days: The equipment shall be considered ready for a performance test only after the Contractor has demonstrated to the Engineer that the equipment can operate continuously, without mechanical interruption under process flow conditions for up to three days, or a such lesser time as may be mutually agreeable to the City and Contractor.

D. Performance Testing: After it has been determined that the equipment will operate satisfactorily under process conditions, the performance test shall be made by the Contractor to verify that the equipment can meet the requirements outlined in the Specification. The performance test shall be based on maintaining the design requirements for up to seven consecutive days or such lesser time mutually agreeable to the Engineer and the Contractor.

3.11 PERFORMANCE TESTS

Performance test procedures shall be prepared by the Contractor and approved (in writing) by the Engineer before performance tests are conducted.

Costs of all inspections, field service, mechanical start-up, run-in work, process start-up in Section 3.6 and performance test shall be borne by the Contractor and shall be included in the total price Bid for the work.

If the equipment is rejected for failure to meet performance requirements, the Contractor will modify or replace such equipment with other equipment capable of meeting performance at no cost to the Owner.

3.12 FAILURE OF TESTS

A. Defects or Deviations: Any defects in the equipment, or deviations from the guarantees or requirements of the Specifications, shall be promptly corrected by the Contractor by replacement and/or Engineer approved repair. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to correct any defects or deviations, or if the replaced equipment, when tested, shall fail to meet the guarantees or specified requirements, the City, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of such equipment, may reject that equipment and order the Contractor to remove it from the premises at the Contractor's expense.

B. Rejection of Equipment: If the Engineer rejects a particular item of equipment, then the Contractor hereby agrees to repay to the City all sums of money paid to him for the rejected equipment on progress certificates of otherwise on account of the prices specified. Upon receipt of such monies the City will execute and deliver to the

Contractor a bill of sale of all his rights, title, and interest in and to the rejected equipment; provided however, that the equipment shall not be removed from the premises until the City obtains from other sources equipment to take the place of that rejected. The bill of sale shall not abrogate City's right to recover damages for delays, losses, or other conditions arising out of the basic contract. The City hereby agrees to obtain alternate equipment within a reasonable time and the Contractor agrees that the City may use the original equipment furnished by him without rental or other charge until the alternate equipment is obtained.

C. Repay City Installation Costs: The Contractor shall also agree to repay the City installation costs for the rejected equipment. The installation costs will be derived by the City based on actual costs charged for the installation of the equipment.

END OF SECTION

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SECTION 11060

ELECTRIC MOTORS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope: This section provides Specifications for all electric motors furnished under this Contract.

B. Type: Motors specified herein are premium efficiency 3 phase, squirrel cage, 1 HP and above; or single phase types smaller than 1 HP.

1.2 QUALITY CONTROL

A. Performance and Design Requirements:

1. The motors specified are, in general, premium quality motors in accordance with NEMA Standard Publication MG-1-2009, and shall be suitable for continuous duty operation. Full load Efficiencies shall meet or exceed the levels listed below:

Efficiency

HP	6-pole	4-pole	2-pole
1	82.5	85.5	77.0
1.5	87.5	86.5	84.0
2	88.5	86.5	85.5
3	89.5	89.5	85.5
5	89.5	89.5	88.5
7.5	91.0	91.7	89.5
10	91.0	91.7	90.2
15	91.7	92.4	91.0
20	91.7	93.0	91.0
25	93.0	93.6	91.7
30	93.0	93.6	91.7
40	94.1	94.1	92.4
50	94.1	94.5	93.0
60	94.5	95.0	93.6
75	94.5	95.4	93.6
100	95.0	95.4	94.1
125	95.0	95.4	95.0
150	95.8	95.8	95.0
200	95.8	96.2	95.4

2. Each motor shall develop ample torque for its required service throughout its acceleration range at impressed voltages in the range between 10 percent above and below nameplate rating. In addition, all motors shall be selected to be non-

overloading at all points along the driven machines' full speed characteristic curve.

Motors with a 1.0 service factor shall not be required to deliver more than 87 percent of rated nameplate horsepower under the specified loading conditions. Motors with 1.15 service factor shall not be required to deliver more than its rated nameplate horsepower under the specified loading condition.

3. Motors supplied under this specification shall be suitable for continuous duty in an enclosed building where ambient temperatures may range between 30 degrees F and 125 degrees F. Ambient relative humidity will range between 30 and 100 percent.

Enclosures shall be TEFC unless otherwise noted.

B. Standards:

Motors shall be designed and built in accordance with the latest revisions of the following reference standards.

1. NEC; Environmental Operation Requirements.

2. ANSI Requirements for Numbering and Schematic Representation.

3. IEEE Standards for Electric Motors.

4. NEMA MG1 - latest revision.

5. NEMA 4; Requirements for Watertight Equipment.

6. NEMA 4X; Requirements for Outdoor Installations.

7. NEMA 7D; Requirements for Explosive Environments.

8. NEC Requirements for Hazardous Locations.

9. UL Requirements for Motors and their Appurtenances.

10. UL Requirements for Explosive Environments.

C. Performance Tests:

1. Should any motor exhibit indication of questionable performance, the Owner's representative, at his discretion, may request information or load test at any time after delivery of a motor to the job site. If any motor proves to be defective, all costs of testing and repair or replacement of defective motor shall be borne by the Contractor. If any motor proves to be in accordance with recommendations or manufacturer's tolerances, the cost of testing will be borne by the Owner.

2. Insulation resistance tests shall be performed by the Contractor. Tests for acceptability shall be made using a 1000 volt megohm meter (megger).

Interpretations of test results for minimum acceptable values of insulation resistance will be made in accordance with IEEE Publication 43.

3. Load tests shall be performed to determine the motor's ability to meet service factor loading conditions within the temperature limits of the manufacturer's submittal data. Tests shall be conducted in accordance with IEEE Publication 112A. In the event that a motor does not meet the load test requirements, the Contractor shall replace the motor at no cost to the Owner.

1.3 SUBMITTAL DATA

The following material shall be submitted for each size and type of electric motor furnished under this Contract:

A. Descriptive bulletins, including full description of insulation system.

B. Manufacturer's connection diagrams for motors furnished with over-temperature protectors, heaters, and other auxiliary devices.

C. Sufficient data on over-temperature devices to verify required protection.

D. Service factor.

E. Efficiency at 1/2, 3/4 and 4/4 nameplate horsepower.

F. Power factor at 1/2, 3/4 and 4/4 nameplate horsepower.

G. Temperature rise at service factor horsepower.

H. Guaranteed maximum sound power levels rated in accordance with paragraph 2.04 of this Specification.

I. Bearing information.

PART 2 - PRODUCTS

2.1 GENERAL

Totally enclosed fan cooled and totally enclosed non-ventilated motors shall be provided with drilled and tapped holes to drain all cavities within the motor. Motors with frames 286T or smaller shall have corrosion-resistant plugs in the drain holes. Motors with frame 324T or larger shall be provided with automatic breather-drain devices.

Explosion proof motors shall be UL listed for Class I, Division 1, Group D hazardous locations and be provided with UL approved combination breather drains suitable for hazardous locations.

Submersible motors shall be watertight and supplied with a continuous flexible electrical cable of the correct capacity of sufficient length to reach the junction box shown.

The motor manufacturer's nameplates shall be engraved or stamped on stainless steel and fastened to the motor frame with No. 4 or larger oval head stainless steel screws or drive pins.

Nameplates shall indicate clearly all the items of information enumerated in NEMA Standards MG1-10.37, MG1-10.38, or MG1-20.60, as applicable.

The nameplate shall be positioned to be readily visible for inspection in the complete machine.

2.2 THREE PHASE MOTORS - 2 HORSEPOWER AND ABOVE

GENERAL REQUIREMENTS

A. General:

All motors 2 HP and above shall be 3 phase, squirrel cage, induction motors on NEMA frame 143T or larger. Motors shall be manufactured by U.S. Electrical Motors, General Electric or approved equal.

B. Rating:

Motors shall be designed and connected for 460 volt, 3 phase, 60 HZ operation. Dual voltage (230/460) rated motors are acceptable if all leads are brought out to the motor terminal box. All motors shall have a 1.15 continuous duty service factor at 50 degrees C ambient temperature and shall be suitable for 65 degree C ambient with 1.0 service factor, unless noted otherwise. Starting KVA/HP shall not exceed the values given in NEMA Standard MG1-12.34. The motors shall be suitable for operation in either direction (clockwise or counterclockwise) of rotation.

C. Insulation:

Insulation systems shall be NEMA Class F, with Class B insulation temperature rise maximum at rated load, non-hygroscopic, and shall be suitable for use in moisture laden atmospheres and atmospheres containing acid or alkali vapor. Insulation systems shall be manufacturer's premium grade, capable of withstanding contaminated atmospheres.

D. Current Balance:

Current unbalance on polyphase motors shall not exceed the values tabulated below when motor is operating at any load within its service factor rating and is supplied by a balanced voltage system:

Under 5 horsepower	25 percent
5 horsepower and above	10 percent

If, however, the unbalanced currents cause mechanical vibrations, the Contractor shall correct the problem even if the measured unbalance is less than listed above.

E. Over-Temperature Protection:

Winding over-temperature devices shall be provided for all motors rated 100 horsepower and larger, for all Type E (explosion proof) motors, and for all other motors where specified.

Over-temperature devices shall provide a normally open contact suitable for wiring into the motor control circuit. Any relays or solid state contacts which are required shall be provided in an enclosure on or near the motor.

F. Space Heaters

All pump motors shall be provided with 120V space heaters of sufficient wattage, quantity and in proper locations so as to keep the motor interior and windings dry during periods of disuse.

G. Enclosures:

All motors shall have cast iron housing, bearing brackets, fan guards and conduit box. Open drip-proof and totally-enclosed motors shall be furnished with silicon rubber gaskets at the base of the conduit box and between the halves of the motor terminal box.

H. VFD Operation:

Where shown on the drawings, shall be suitable for inverter duty.

I. Bearings:

Three-phase motor bearings shall be conservatively designed to withstand all stresses of the service specified. Antifriction motor bearings shall be designed to be regreasable and initially shall be filled with grease suitable for ambient temperatures to 50 degrees C. If a higher ambient temperature is specified for motor insulation rating purposes, bearings shall be sized and designed for the same ambient temperature. Bearing identification by AFBMA number shall be indicated on the motor nameplate.

2.3 VERTICAL TURBINE PUMP MOTOR

The vertical turbine pump motor shall comply with all of the requirements of Section 2.2 in addition to the following.

A. General

Vertical turbine pump motors shall be rated as follows:

Pump	HP	RPM	Voltage/phase	Type	Insulation
P-1	100	1785	460/3	TEFC, Hollow Shaft	Class B or F
P-2	100	1785	460/3	TEFC, Hollow Shaft	Class B or F
P-3	100	1785	460/3	TEFC, Hollow Shaft	Class B or F
P-4	100	1785	460/3	TEFC, Hollow Shaft	Class B or F
P-5	100	1785	460/3	TEFC, Hollow Shaft	Class B or F

The motor shall be selected and supplied by the pump supplier. It shall be the responsibility of the Contractor to coordinate this work so that the motors are sized properly to operate at all pump conditions specified.

B. Design Requirements

1. The motor must be nameplate rated for 3-phase, 60-cycle, 460V power, continuous duty, as indicated on the drawings, with a synchronous operating speed of 1,785 rpm.

2. Motors shall be rated premium efficiency or better and be in accordance with standard specification IEEE 841. Minimum motor efficiency shall be 95%.

3. The motor thrust and guide bearing shall be of the antifriction type and shall be calculated in strict accordance with AFBMA-B-10 and shall be of sufficient capacity to carry the static and hydraulic load imposed by each pump for an average 5-year life. Motor bearing design shall provide for 8,000 lb shutoff thrust and upthrust protection that is equal to 30% of downthrust. If spherical or roller bearings are supplied to meet the thrust requirements, they shall be of the self-cooled type. Thrust and guide bearing cavities shall be provided with flushtype visual oil gauges clearly marked for maximum and minimum levels. Grease lubrication bearings that are regreasable will be accepted however, if that is the motor manufacturer's standard lubrication system for motors of the sizes specified herein. Provide for draining and replacing lubricant without disturbing the bearing housing.

4. The motor shall be dynamically balanced so that with a vibrometer test the peak-to-peak amplitude shall not exceed NEMA standards of 0.0020-inch movement, and shall also be provided with means of trim balance in the field after completion of the installation.

5. Bolt-down style, non-reverse protection is required. The non-reverse mechanism shall be of the ball-ratchet or drop-pin type, and shall have a minimum of 70 lock positions limiting maximum reversal to within 5.1º rotation.

6. Provide a steady bushing at the lower end of the hollow shaft, having the same bore size and tolerance as the upper coupling.

7. Motor shall be totally enclosed fan cooled suitable for VFD operation.

8. Motors shall be furnished with space heaters.

9. Motors shall be furnished with an over temperature switch in the windings.

10. Motors shall be furnished with an oversized junction box, with 3 tapped conduit openings.

2.4 SINGLE-PHASE MOTORS

A. General:

Unless otherwise specified, single-phase motors shall be capacitor-start induction motors. Small single-phase fan motors may be split-phase or shaded-pole type, if such is standard for the equipment. Universal (AC-DC) type single-phase motors are not acceptable unless their specific characteristics are necessary for the application. Conductors shall be copper.

Single-phase motors shall be designed and connected for operation on a 115 volt, 60 HZ alternating current electrical system, or 208 volt where indicated.

B. Rating:

Unless otherwise specified, single-phase motors shall not be required to deliver more than its rated nameplate horsepower under any condition of required loading.

Single-phase motor locked rotor current shall not be greater than that specified in NEMA Standard MG1-12.32, Design "N".

C. Enclosures:

Unless otherwise specified, single-phase motors shall be TEFC.

D. Insulation:

Unless otherwise specified, single-phase motor insulation systems shall be as recommended by the motor manufacturer.

E. Construction:

Unless otherwise specified, single-phase motor construction shall be as recommended by the motor manufacturer.

F. Bearings:

Unless otherwise specified, single-phase motors shall be provided with sealed ball bearings lubricated for 10 years normal use.

PART 3 - EXECUTION

END OF SECTION

SECTION 11214

VERTICAL TURBINE PUMPS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included in this Section: The Contractor shall furnish and install five new vertical turbine pumps in cans for water service including fittings and accessories as shown on the Drawings, described in the Specifications and as required for a complete and operable system.

B. Each pumping unit shall be complete with a pump, electric motor, pedestal, pump barrel, anchor bolts, taps, gauges, lifting eyes, and all other appurtenances specified or required for proper installation and operation. The pump shall be designed for constant speed operation.

C. Except as modified or supplemented herein, the vertical turbine pumps shall conform to the applicable terminology, standards and requirements of the American National Standards Institute (ANSI/HI 2.1-2.5) and latest edition of Hydraulic Institute Standards (HIS).

D. Work Specified in Other Sections:

1. Section 01730 – Operation and Maintenance Manuals

2. Section 01800 – Testing, Training and Facility Start Up

3. Section 09904 - Coating Systems for Non-Concrete Surfaces

4. Section 11060 – Electric Motors

5. Section 15060 – Piping – Installation

1.2. QUALITY ASSURANCE

All materials and equipment furnished under this Section shall be of a manufacturer who has been engaged in the design and manufacture of the vertical turbine pumps of similar head and capacity to this project for a period of at least ten (10) years.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings in accordance with the Special Provisions, Section 01300 “Shop Drawings”. An incomplete submittal package will be rejected as non-responsive.

B. Submit dimensional drawings.

C. Submit manufacturer's catalog data and detail drawings showing all pump parts and described by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type. Show linings and coatings.

D. Provide a letter from the pump manufacturer accepting warranty responsibility for the entire pump assembly including pumps, discharge heads, shafting, columns, motors, pump cans, air relief from pump can, bases, and anchor bolts.

E. Show shaft diameter and bearing spacing. Submit calculations showing shaft critical frequency and determination of bearing spacings.

F. Submit pump curves on which the specified operating points are marked. Show efficiency and brake horsepower for the selected pump curve. Show required NPSH.

G. Submit manufacturer's sample form for reporting performance test results. The test form should contain the data presented in the sample form in Section 6 of the ASME PTC 8.2 or ANSI/HI 2.6.

H. Each pump shall be tested with its respective job motor. As such, do not correct test results for speed.

I. Submit manufacturer's certified performance curves for approval at least three (3) weeks prior to shipping the units from the factory. Show pump total head, torque, brake horsepower, pump efficiency, required submergence, and required NPSH. Provide copies of the data recorded during the test and methods of data reduction for determining certified test results.

J. Submit report on test results of pump cans.

K. Submit motor data per Specification Section 11060 – Electric Motors.

L. Submit manufacturer's requirements for pump and pump can alignment limits and manufacturer’s approved methods for field measurement.

M. Submit written documentation signed by the Contractor that confirms the pump cans have been set (installed) and field measured to meet the vertical alignment requirements established by the manufacturer. The pump supplier shall submit written documentation to verify the field measurements were performed in accordance with their approved methods and the vertical alignments of the installed pump cans are acceptable.

N. Submit written documentation on regarding pump coating materials, surface preparation, and application procedures, including holiday and DFT testing.

O. As part of the field test procedure for the pumps, record measurements for impeller adjustment at the top of shaft and total radial shaft deflection (shaft

runout) above the stuffing box or seal chamber and submit for Owner's review.

P. Submit operations and maintenance data in accordance with Specification Section 01730, "Operation and Maintenance Manuals".

1.4 APPURTENANCES

Furnish and install all necessary guides, inserts, anchors and assembly bolts; washers nuts, hangers, supports, gaskets, and flanges; all other appurtenant items shown on the Drawings, specified or required for the proper installation and operation of the vertical turbine pumps.

PART 2 - MATERIALS

2.1 PUMP DESIGN

A. Equipment for the pumps, including discharge heads, shafting, columns, motors, pump cans, bases, and anchor bolts, shall be provided as a complete unit by the pump manufacturer who accepts warranty responsibility for the complete pump unit. Pump units assembled by entities other than the pump manufacturer will not be acceptable.

B. The new replacement vertical turbine pumps shall have operational parameters at least equal the existing pumps as given in Part 2.2, B. "Nominal Characteristics of the Existing Pumps". The minimum pump efficiency shall be 78 percent.

C. Each pump shall be capable of at least a 5% head increase at normal operating conditions by installing a larger impeller or an impeller of different hydraulic design.

D. Pump curve shall be continuously rising and shall be free of dips and valleys from the design point to the shutoff head. The shutoff head shall be at least 120% of the head that occurs at the design point.

E. The NPSH required shall be at least 10 feet less than the minimum NPSH available at all points on the pump curve up to 120% of the flow at the best efficiency point (BEP).

F. Acceptable vertical turbine pumps furnished under this section shall be manufactured by Peerless, Fairbanks Morse, Goulds, Floway or Owner approved equal.

G. The pumps are located outside, fully exposed without a roof or sun, wind or rain protection.

H. Suction strainers on the inlet to each pump are not required.

I. Service Conditions: The pumping units shall be suitable for the following service conditions:

1. Seismic zone: 4

2. Pumps to start and stop against a closed valve.

3. Ambient air temperature range: 30 to 105 °F

4. Liquid temperature range: 50 to 70 °F

5. Units are not subject to freezing temperatures.

6. The approximate ground elevation is 1605.

7. The water source is chlorinated domestic water.

8. Solids concentration, percent by weight: None

9. Size of solids: None

2.2 PUMP PERFORMANCE CONDITIONS - VERTICAL TURBINE PUMPS

A. The installation of the existing five vertical turbine pumps is shown on Sheet M-11.

B. The nominal characteristics of the existing pumps are:

1. Design Flow Rate: 1,250 gpm
2. Total Dynamic Head: 240 feet
3. Horsepower: 100.
4. Voltage: 460.
5. Constant Speed
6. Operating Speed: 1,770 rpm
7. Minimum Efficiency at Operating Point shall be 80%

2.3 MATERIALS

A. Materials of construction for the new vertical turbine pumps shall be as follows:

Component	Material
Pump shafts and couplings	Stainless steel, ASTM A276, UNS Grade S31600 or S41000
Bearing retainers (fabricated integral)	Welded integral
Lineshaft bearings	Neoprene.
Impellers	Stainless steel ASTM A743, Grade CF-8M.
Impeller wear rings	Stainless steel: ASTM A743, Grade CF-8M or CA-15 or ASTM A276, Type 410.
Pump bowls and suction bell	Cast iron, ASTM A48, Class 30 or ductile iron, ASTM A536.
Bowl bearings	Bronze
Bowl wear rings	Stainless steel, ASTM A743, Grade CF-8M or CA-15; or ASTM A276, Type 410
All parts made of fabricated steel including discharge head	Carbon steel, ASTM A283, Grade B or C; ASTM A36; or ASTM A53, Grade B.
Column pipe	Carbon steel, ASTM A283, Grade B or C, or ASTM A53, Grade A or B.
Flanges	ASTM A105, A181, or A182.
Bolts and nuts for discharge heads, column pipe flanges, and bowl flanges.	Bolts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M. Nuts shall be Type 316 stainless steel conforming to ASTM A194, Grade 8M.
Submerged bolts and nuts	Stainless steel, Type 316.

2.4 PUMP CONSTRUCTION

A. Motors shall be vertical high thrust, solid shaft. The driver motor thrust bearing loading shall include the total pump line shaft down thrust. An adjustable coupling shall be provided between the motor shaft and the pump shaft to permit removal of the motor without disturbing the pump. The coupling shall provide for vertical adjustment of the impeller and also for removal of the mechanical seal with the motor in place.

B. Motor shall be per Specification Section 11060 – Electrical Motors.

C. Impellers shall be enclosed and dynamically balanced.

D. Pump bowls shall be equipped with wearing rings designed to maintain pump efficiency.

E. Line shafts shall be open and self-lubricating.

F. Mechanical seals shall be the cartridge type manufactured by A.W. Chesterton or Owner approved equal.

G. Pump cans shall have a pressure rating of 150 psi.

2.5 COATINGS AND LININGS

A. Line and coat interiors and exteriors of pump column and discharge head, with fusion-bonded epoxy per Specification Section 09904, “Coating Systems for Non-Concrete Surfaces”. Apply coating at factory.

B. Coat interior and exterior of bowl assemblies and interior and exterior of suction bell with fusion bonded epoxy per Specification Section 09904, “Coating Systems for Non-Concrete Surfaces”.

C. Pump cans shall have internal and external fusion-bonded epoxy coating in accordance with Specification Section 09904, “Coating Systems for Non-Concrete Surfaces”.

D. Internal coating material shall be NSF certified for potable water

2.6 SPARE PARTS

A. Provide the following spare parts:

1. Two (2) sets of impellers
2. Four (4) sets of wear rings
3. Four (4) sets of pump shaft bearings
4. Four (4) sets of column shaft bearings
5. Four (4) mechanical seals
6. Four (4) sets of all gaskets and O-rings

PART 3 - EXECUTION

3.1 GENERAL

A. Provide the pump manufacturer's services at the jobsite for the minimum labor days listed below, travel time excluded:

1 Two (2) labor days for the first pump replacement to check and verify the installation and advise during initial start-up, field testing, and adjustment of the equipment.

2 One (1) labor day to instruct the District's personnel in the operation and maintenance of the equipment.

3 Repeat Item 1 for each of the four subsequent pump replacements (two days for each subsequent replacement).

3.2 FACTORY PERFORMANCE TESTS

A Each pumping unit shall be subjected to a laboratory performance test. Conduct tests in accordance with the ASME PTC 8.2 or ANSI/HI 2.6, **using the actual job driver to be furnished with each pump.** The performance test shall be equivalent to ANSI/HI 2.6.

B. The pump tests will not be observed by the Owner or Owner's Representative.

C. No motor overload above nameplate rating will be allowed at any flow up to 120% of the flow at the BEP.

D. Hydrostatically test columns and discharge heads and cans at 150 psi.

E. Deviations and fluctuations of test readings shall conform to ASME PTC 8.2, 1.11 (Type A) or ANSI/HI 2.6, paragraph 2.6.5.4.1.

F. Perform tests and record data, including head, flow rate, speed, vibration and power at a minimum of six points. These points shall include shutoff, minimum flow, midway between minimum flow and design flow, design flow, 120% of design flow, and maximum flow.

G. The complete pump, including column and discharge elbow, shall be used.

H. Locate the pressure tap for head measurement not less than 10 pipe diameters downstream from the discharge elbow of the test pump.

I. Should results of the full-scale tests indicate, in the opinion of the Owner's Representative, that the pumps will fail to meet any of the specified requirements, the Owner's Representative will notify the Contractor of such failure. The pump manufacturer shall thereupon, at no expense to the Owner,

make such modifications and perform additional tests as may be necessary to comply with these specifications

3.3 SHIPMENT AND STORAGE

A. Prepare equipment and motors for shipment including blocking of the rotor when necessary. Identify blocked rotors by means of corrosion-resistant tags attached with stainless steel wire. The preparation shall make the equipment suitable for six months of outdoor storage from the time of shipment, with no disassembly required before operation, except for inspection of bearings and seals.

B. Coat exterior machined surfaces with a rust preventative.

C. Provide flanged openings with metal closures at least 3/16-inch thick, with elastomer gaskets and at least four full-diameter bolts. Install closures at place of pump manufacture prior to shipping. For studded openings, use all the nuts needed for the intended service to secure closures.

D. Wrap exposed shafts and shaft couplings with waterproof, moldable waxed cloth or volatile-corrosion-inhibitor paper. Seal the seams with oil-proof adhesive tape.

E. If electric motors are stored or installed outside or in areas subject to temperatures below 40°F or are exposed to the weather prior to permanent installation, provide the manufacturer's recommended procedures for extended storage. Provide temporary covers over the motor electrical components.

3.4 PUMP INSTALLATION

A. Install the equipment in the horizontal and vertical planes according to the manufacturer's written instructions and the contract documents. Confirm that pump cans and pumps are set to meet the vertical alignment requirements established by the manufacturer. Using the machinist's level check all the way across the opening of the mounting flange at 90 degree increments. Pump can mounting flange should be set level and within the pump manufacturer's allowable tolerance. If required, machine can flange to achieve specified levelness prior to pump installation. All costs associated with setting the pump can flange shall be borne by the Contractor and included in the Contractor's original bid price; no additional compensation will be due to the Contractor.

3.5 FIELD TESTING

A. Bump motor to ensure that motor has been connected for proper rotation prior to coupling pump.

B. Perform field tests for four consecutive hours on each pump.

C. Conduct vibration harmonic and torsional level tests with pumps operating at their rated capacity. Adjust or replace pumps that exceed the maximum vibration

levels.

D. Assure that in the automatic mode each pump responds to its start/stop signal.

E. Assure that limit switches on the pumps' control valves indicate and transmit the signals for the valves in the open and closed positions.

F. Demonstrate that the pumping units, drivers, and control system meet the following requirements:

1. The pumping units operate as specified without excessive noise (in excess of 103 decibels at 3-feet), cavitation, vibration, and without overheating of the bearings.

2. Automatic and manual controls function in accordance with the specified requirements.

3. Drive equipment operates without being overloaded.

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SECTION 11242

LIQUID CHEMICAL INJECTION SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: Positive displacement, diaphragm metering pumps, accessories, chemical analyzers, injection quills, drives, skids, control panels and PLC requirements for pumping chemical solutions.

B. Tag numbers:

1. Refer to Pump Schedule in this Section.

C. Related sections:

1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

2. It is the Contractor's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of Contractor's Work.

3. The following Sections are related to the Work described in this Section. This list of Related Sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the Contractor to see that the completed Work complies accurately with the Contract Documents.
   a) Section 01011 – Summary of Work.
   b) Section 01025 – Measurement and Payment.
   c) Section 01300 – Contractor Submittals.
   d) Section 01700 – Project Closeout.
   e) Section 01730 – Operation and Maintenance Manuals.
   f) Section 01800 – Testing, Training, and Facility Start Up.
   g) Section 11010 – Mechanical Equipment General.
   h) Section 11258 – Chemical Feed Equipment General.
   i) Section 11904 – In-Line Static Mixers.
   j) Section 13208 – Polyethylene Tanks.
   k) Section 13621 – Primary Sensors and Field Instruments.
   l) Section 15050 – Piping, Valves, and Accessories.
   m) Section 15060 – Piping – Installation.
   n) Section 16000 – General Provisions.
   o) Section 16010 – General Electrical Requirements.
   p) Section 16923 – Panel Instrumentation and Devices.
   q) Section 16950 – Electrical Testing.

1.2 REFERENCES

A. International Society of Automation (ISA):

1. ISA-5.4 - Instrument Loop Diagrams.

B. National Electrical Code (NEC).

C. National Electrical Manufacturer's Association (NEMA):

1. 250 - Enclosures for Electrical Equipment (1000 V Maximum).

D. NSF International (NSF):

1. 61 - Drinking Water System Components - Health Effects.

E. Control Panel and PLC:

1. The entire system shall be constructed in strict accordance with the latest published standards of NEMA, IEEE and ANSI. Wherever possible, control system components shall be Underwriters Laboratory listed. All control hardware and software shall be factory assembled, wired and thoroughly tested prior to shipment.

1.3 DEFINITIONS

A. NEMA Type 4X enclosure in accordance with NEMA 250.

1.4 SYSTEM DESCRIPTION

A. General: The liquid chemical injection system Manufacturer shall provide the fabrication and all design, material, equipment, anchorage, mounting, shipping, and incidentals required to furnish three liquid chemical injection skid packages, three chlorine residual analyzers, three control panels, and one PLC. The skid system shall be a complete mechanical system and contain all piping, mechanical equipment, pumps, appurtenances as specified or indicated or as required making a complete and operable chemical injection system.

B. Scope: This section specifies three factory-built liquid chemical injection systems, with all the necessary piping, pumps, motors, valves, enclosures, electrical systems, analyzers and controls interface, and other necessary appurtenances as specified herein. The injection systems and analyzer sample stations shall be installed within a stainless steel NEMA Type 4X enclosure, one enclosure per injection system and one enclosure for the sample station, four total. The chemical injection systems shall function to inject 12.5% sodium hypochlorite to a variable concentration of 0.5 ppm to 2 ppm using residual chlorine concentration measurements and pipeline flowrate data summarized in Table 2 below. The liquid chemical injection systems shall be complete when delivered to the project site with all necessary pumping equipment installed within the skid. The Contractor shall furnish, install, and place into successful operation three 120/240 volt, 1 phase, 3 wire, Duplex Chemical Feed control systems (one per each chemical injection system). The Contractor shall furnish, install and place one ControlLogix PLC, housed within a stainless steel NEMA Type 4X enclosure, into successful operation, which will communicate with the existing City SCADA system. System shall be as hereinafter described and all necessary appurtenances which might normally be considered a part of the complete electrical system for this installation. The chemical feed system and automatic control equipment is to be supplied by one manufacturer. It shall be

factory assembled, wired and tested and covered by complete electrical drawings and instructions.

1. The liquid chemical injection system, control panels, and PLC shall be designed by a licensed Professional Engineer.

2. The liquid chemical injection system Manufacturer shall review the civil, structural, mechanical, electrical, and instrumentation contract drawings for the installation of the liquid chemical injection system by the Installation Contractor. The liquid chemical injection system Manufacturer, during design, shall familiarize themselves with the location and the set-up of the equipment specified and shall insure that the equipment specified is appropriate for and coordinated with what is shown on the contract drawings.

3. The control panels and PLC will be powered from a utility power source. Utility metering equipment is existing or to be furnished by others.

4. Provide hydraulically actuated, positive displacement, diaphragm type chemical metering pumps, accessories, and other items required for a complete and operational system. Each chemical metering pump system shall include, but not be limited to, the following items, which shall be supplied by the chemical metering pump manufacturer.

   a) Pumps.

   b) Motors.

   c) Variable frequency drive (VFD)

   d) Control Panels and PLC

   e) Pulsation dampeners.

   f) Calibration columns.

   g) Diaphragm back pressure valves.

   h) External pressure relief valves.

   i) Flow sight glasses, UV resistant.

   j) Pressure switches with diaphragm seal (as specified Section 13621).

   k) Suction Accumulators.

   l) Analyzers.

   m) Sample Station.

   n) Cabinets.

o) Injection Quills.

p) HDPE skids with chemical containment and spill protection.

C. Fluid characteristics:

1. Sodium hypochlorite:

a) Dry chemical formula: NaOCl.

b) Solution concentration: 12.5 percent by weight.

c) Solution specific gravity: 1.12

D. Design requirements:

1. Pump performance characteristics: The chemical metering pumps shall be hydraulically actuated, positive displacement, diaphragm type chemical metering pumps with variable speed drives. Pumps must be dry self-priming, capable of being run dry without damaging effects to pump. All surfaces that may come into contact with the pumped fluid shall be NSF 61 approved.

Table 1 – Equipment List

Item	Equipment Number
Well 25, 26, 27 Chemical Feed System	SH-INJ-101
Well 3, 4, LH4, 17 Chemical Feed System	SH-INJ-102
Reservoir Outlet Chemical Feed System	SH-INJ-103

2. Motor characteristics:

a) As specified in this Section and in Section 11060.

b) Minimum acceptable motor size is 1/3 horsepower.

3. VFD characteristics: As specified in this Section.

4. Shafting and couplings: Design shafting and couplings to withstand a minimum of 1.5 times the maximum operating torque or other imposed loads.

5. Supports:

a) Provide pump and driver supported on a common base.

b) Design anchor bolts to withstand a minimum of 1.5 times the maximum imposed operating loads or 1.0 times the imposed seismic loads, whichever is greater.

E. Performance requirements: The design parameters presented in Table 2 below are

intended to describe the expected flowrates of the combined well pipelines and reservoir outlet pipeline. Equipment furnished under this section shall be fully suitable for continuous operation at any specified condition or any condition lying between the extremes of the operating conditions.

Table 2 – System Design Parameters

Source Water	Pipe Diameter	Maximum Flowrate	Minimum Flowrate	Pipeline Pressure
Well 25, 26, 27 (1)	10 inches	1,800 gpm	240 gpm	100 psi max
Well 3, 4, LH4, 17 (2)	16 inches	3,100 gpm	180 gpm	100 psi max
Reservoir Outlet (3)	36 inches	8,750 gpm	2,250 gpm	100 psi max

Control Philosophy:

Notes:

(1) Proposed chemical injection system SH-INJ-101 shall provide liquid sodium hydroxide from the storage tank to the 10-inch diameter pipeline injection point. The 10-inch inlet to the reservoir is a combined source from Wells 25, 26, and 27 with varying flowrates as identified in Table 2. The source water is considered free of chlorine. The chemical injection system shall provide an operator selected residual chlorine concentration between 0.5 to 2.0 ppm. The control system shall adjust the variable speed chemical feed pumps dosing rate based on the flowrate of the pipeline with information relayed from a magnetic flowmeter and the residual chlorine concentration measured by the downstream chlorine analyzer.

(2) Proposed chemical injection system SH-INJ-102 shall provide liquid sodium hydroxide from the storage tank to the 16-inch diameter pipeline injection point. The 16-inch inlet to the reservoir is a combined source from Wells 3, 4, LH4, and 17 with varying flowrates as identified in Table 2. The source water is considered free of chlorine. The chemical injection system shall provide an operator selected residual chlorine concentration between 0.5 to 2.0 ppm. The control system shall adjust the variable speed chemical feed pumps dosing rate based on the flowrate of the pipeline with information relayed from a magnetic flowmeter and the residual chlorine concentration measured by the downstream chlorine analyzer.

(3) Proposed chemical injection system SH-INJ-103 shall provide liquid sodium hydroxide from the storage tank to the 36-inch diameter pipeline injection point. The 36-inch outlet to the reservoir provides supply to the gravity zone and the Plant 7 booster pump station (located on site). The estimated demand leaving the reservoir is identified in Table 2. The reservoir supplied by the Water Treatment Plant and the well supplies as described above. Chlorine is added to outlet of the Water Treatment Plant at varying concentrations of 1-1.5 ppm. The chemical injection system shall provide chlorine boost, if necessary, at an operator selected residual chlorine concentration between 0.5 to 2.0 ppm. The control system shall adjust the variable speed chemical feed pumps dosing rate

based on the flowrate of the pipeline with information relayed from a magnetic flowmeter and the residual chlorine concentration measured by the downstream chlorine analyzer.

1.5 SUBMITTALS

General: The following information shall be provided in accordance with Section 01300, 15050, and 16010. Sections to be marked up and submitted include a copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification section, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

A. Product data:

1. Manufacturer's literature, illustrations, specifications, and bill of materials for each component of the system.

   a) Data shall include a complete description in sufficient detail to permit comparison.

2. Strike data for materials and components not provided as part of the Work.

B. Control panel shop drawings:

1. Control panel views showing equipment arrangement, doors, equipment layout inside the panel and dimensional information.

2. Internal interconnecting wiring diagrams showing terminal strips and external devices connected to the panel as specified in Section 17000.

3. Loop drawings for analog and discrete signals in accordance with ISA-5.4.

4. Complete schematic and diagrams including terminal block and wire identification numbers and device location symbols consistent with the Contract Documents.

5. Panel bill of material with detailed description of components and equipment data sheets.

6. Field cable numbers and terminations.

7. System operational description.

8. Fabrication and nameplate legend drawings.

C. Liquid Chemical Injection System Shop drawings:

1. Provide a list of parameters, ratings, or other characteristics where the proposed chemical feed systems deviate from the requirements.

2. Dimensions, including anchor bolt layout, materials of construction, size, weight, and performance data.

3. Drawings: Provide electrical and instrumentation drawings showing coordination with electrical control devices operating in conjunction with the associated feed system.

4. Dimensioned inlet and outlet connections.

5. Current NSF 61 Certification for components to be in contact with associated chemical or potable water.

6. Provide data showing chemical compatibility and history of service with the associated chemical for materials in the system.

D. Design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports:

1. Chemical feed pumps:

a) For each pump type, submit calibration charts and tables relating flow rate to stroke length and stroke rate.

b) Submit hydraulic modeling results for each pumping system.

1) Confirm scheduled values or recommend new pressure set points for the backpressure valves and pressure relief valves listed in the Pump Schedule.

c) Submit calculations for each metering pump showing the suitability of each pump for the suction and discharge conditions of each application point.

1) Pump manufacturer shall recommend and size an accumulator to be piped to the suction side of each metering pump, when required based on calculations.

d) Submit calculations recommending dimensions of pulsation dampener indicated on the Drawings to reduce pressure variations within 5%.

e) Calibration curves for each pump relating potentiometer reading to flow rate shall be supplied.

1) Capacity control shall be 0 to 100 percent with delivery repeatable within plus or minus 1 percent accuracy over at least a 10 to 1 range.

E. Third Party Approval

1. The control panel submittal shall contain a copy of the front page of the control panel builders UL508A standard that shows their UL file number. The name on the front page of the UL Standard shall match the name in the title block of the control panel submittal.

F. Closeout documents:

1. As specified in Section 01300.

2. Submit copies of complete Operation and Maintenance Manuals covering each piece of equipment, including instrumentation, as specified in Section 01730.

a) Provide all safety considerations relating to operations and handling of the associated chemical.

b) Maintenance data shall include all information and instructions required by plant personnel to keep equipment properly cleaned, lubricated, and adjusted so that it functions economically throughout its full design life.

c) Lubrication charts and tables of alternate lubricants.

d) Name, address, and phone number of manufacturer and manufacturer's local service representative.

1.6 QUALITY ASSURANCE

A. As specified in Sections 15050 and 16010.

B. Manufacturer qualifications:

1. Minimum 5 years experience in production of equipment substantially similar to the specified equipment.

2. Submit evidence of satisfactory operation of units similar to the specified units in at least 5 separate facilities in accordance with the following requirements:

a) All units on the submitted installation list shall utilize the same design for critical components as specified for this Project.

b) The 5 installations shall satisfy the following requirements:

1) Service: Municipal water or wastewater in U.S. or Canada.

c) Multiple units at a plant shall be considered as 1 installation toward meeting the experience requirements.

3. Fulfillment of the specified experience requirements shall be a condition of

acceptance.

C. Pre-installation meetings.

1.7 DELIVERY, STORAGE AND HANDLING

A. Packing, shipping, handling and unloading:

1. Pack for shipping and outdoor storage at the project site for up to 6 months.

a) Apply temporary corrosion protective coatings to unpainted components and pack components to protect from the elements.

2. Ship pump and drive completely assembled.

a) VFD shall be shipped unwired to the motor for field wiring.

B. Acceptance at site:

1. Equipment and materials shall be inspected against approved shop drawings at time of delivery.

2. Equipment and materials damaged or not meeting requirements of the approved shop drawings shall be immediately returned to the system manufacturer for replacement or repair.

C. Storage and protection:

1. Protect the liquid chemical injection system and components at the site and during installation prior to project completion.

2. Store and safeguard equipment, material, instructions, and spare parts in a dry location in accordance with system manufacturer's written instructions.

1.8 PROJECT CONDITIONS

A. Project conditions specified in Table 2.

Table 2 – Project Conditions

Temperature	Maximum: 110 ºF Minimum: 35 ºF
Elevation	1,610 feet above MSL
Pressure	14.82 psia

1.9 SCHEDULING

A. As specified in Section 01115.

1.10 WARRANTY

As a condition of final acceptance of the equipment furnished under this Section, a written manufacturer's warranty covering all equipment provided under this Section shall be furnished. The Warranty shall have the following features:

1. The coverage shall be for one calendar year from the date of beneficial use.

2. Coverage shall extend to complete replacement at no cost to the Owner of any part exhibiting latent defects during the entire coverage period.

3. Latent defects shall mean any abnormal wear or failure other than that attributable to (1) operation at other than specified operating conditions, (2) operating or maintenance procedures other than that described in the manufacturer's maintenance manual or (3) operating modes not described in the project manual.

4. Normal wear and tear shall be specifically excluded from coverage under the warranty.

The warranty shall be in a form and secured by a bond acceptable to the Owner.

1.11 MAINTENANCE

A. Extra materials:

1. Special tools: Deliver 1 set for each furnished pump type and size needed to assemble and disassemble pump system.

2. Spare parts: Furnish the following spare parts packed and labeled for warehouse storage:

a) 1 complete spare parts kit for each pump provided.

b) 1 spare parts kit for each size and type of backpressure and pressure relief valve.

c) An initial supply of all oils, greases, and lubricants required to start operations. Supply an amount of these materials equivalent to 1 year of continuous operation for each system. Oil shall be food grade.

1.12 CONTRACTOR'S RESPONSIBILITY

A. The services of a qualified liquid chemical injection system Manufacturer's technical representative shall be provided for a period of not less than 3 days as follows:

1. At least one trip of 2 days to check and supervise the equipment installation and field tests and to certify that the systems have been properly installed and are ready for operation.

2. One trip of 1 day to supervise initial start-up and operation and to instruct the Owner's personnel in proper operation and maintenance of the equipment. Instruction shall be provided for up to five persons and shall include printed handouts of start-up procedures, operating procedures, shut-down procedures, routine maintenance and troubleshooting.

3. The manufacturer shall be responsible for the correct operation of the equipment as specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Liquid Chemical Injection System:

1. The liquid chemical injection system shall be supplied by Cortech Engineering, U.S. Water, or approved equal with pumps and other equipment as listed herein, modified to provide the specified features and to meet the specified operating requirements.

2. A single pump manufacturer shall furnish and coordinate all drives and pump components specified in this Section, including motors, gears, couplings, supports, analyzers, and other specified accessories and appurtenances to ensure compatibility and integrity of the individual components.

3. The manufacturer of the pumps shall have sole-source responsibility for furnishing the complete assemblies and meeting the specified performance requirements.

B. Control Panels and PLC:

1. The Owner and Engineer require the specified Manufacturer to provide the equipment and/or products to be furnished under this Section. The Owner and Engineer believe the Manufacturer is capable of producing equipment and/or products that will satisfy the requirements of this Section This statement, however, shall not be construed to mean that the named Manufacturer’s standard product will comply with the requirements of this Section.

2. Manufacturers and models shall be as specified for the purpose of compatible and efficient utilization of existing equipment, supplies, and personnel training and experienced, no substitutions are permitted.

2.2 PUMPS

A. Equipment:

1. Pump manufacturer:

a. Milton Roy or approved equal.

2. Type: Simplex chemical proportioning pumps of the positive displacement diaphragm type.

3. Materials:

a. The metering pumps and their components and accessories shall be suitable for the following chemical concentrations, as scheduled in this Section:

1) Sodium hypochlorite:

a) Wetted parts shall be suitable for use 12.5 percent sodium hypochlorite solution.

b) Other non-specified materials are to be manufacturer's standard for continuous service with 12.5 percent sodium hypochlorite solution. Brass and bronze components are not acceptable for contact with sodium hypochlorite.

b. Diaphragm materials:

1) Flat, composite, hydraulically actuated diaphragms shall be Viton, EPDM or PTFE faced as pump manufacturer deems suitable for the pumped liquid.

c. Other parts in contact with pumped liquid: PFA, or other approved thermoplastic.

4. Characteristics:

a. Chemical metering pump drive mechanism will be a true sinusoidal amplitude modulation (non-loss-motion) stroke adjustment design to ensure chemical delivery during 100% of each discharge stroke cycle at infinite stroke settings. Lost-motion drive mechanism designs that deliver "slug feed" chemicals during portions of the discharge stroke cycle will not be acceptable.

b. Metering pump drive mechanism shall be either a polar crank or variable eccentric cam design. Drive mechanism which employs a full forward scavenging design of the displacement chamber head shall be used for chemical metering applications on gas bearing fluids exhibiting high vapor pressure to minimize /(prevent vapor) lock condition of discharge check valve operation during intermittent operation of metering pump service.

c. Diaphragm simplex chemical proportioning pumps of the positive displacement, hydraulically balanced diaphragm type.

d. The diaphragm shall be hydraulically actuated. Pumped fluid diaphragm

shall be actuated by hydraulic pressure from a push rod piston hydraulic cylinder actuator. There shall be no mechanical connection between pumped fluid diaphragm and actuating push rod.

e. Liquid end:

1) Liquid end shall be sealed by means of an O-ring of material compatible with the pumped liquid.

2) Pumps for sodium hypochlorite service shall be equipped with an off-gassing valve.

3) Liquid end of each metering pump shall be fitted with a system to handle closed suction and or discharge lines and shall be able to bypass oil to prevent damage to the pump as well as act as a safety feature. Oil shall be automatically filled by the pump without calibration or refining required from the operator after closed suction or discharge operation.

4) Liquid end of each metering pump shall be fitted with a system to detect early stage diaphragm failure. Upon actuation, the leak detector shall stop the pump, light a locally visible LED and sound a remote alarm.

5. Components:

a. Manually controlled external stroke controllers.

b. Double suction and discharge, self-seating ball-type check valves.

c. Built-in internal or external, adjustable pressure relief valve to relieve pressure in the event of discharge line stoppage; which shall be factory set to relieve at 100 pounds per square inch gauge but shall be adjustable from 10 to 175 psig.

d. Hydraulic make-up and air bleed valves.

6. Accessories: As indicated on the Drawings, pumps shall be equipped with:

a. Calibration column in suction piping rated for 30 second draw down at max duty point.

b. Diaphragm backpressure, pulsation dampener and pressure relief valve in discharge piping.

7. Tests and inspections:

a. As scheduled in this Section.

8. Verification of performance.

2.3 PUMP GEARBOX DRIVE

A. Pump gearbox shall be constructed of steel and nodular iron and be water resistant and suitable for outdoor installation.

1. Pump and gearbox housing shall be coated in high-solids epoxy.

B. Gearbox shall be oil bath lubricated with food grade oil.

C. All fasteners shall be Type 316 stainless steel.

2.4 DRIVE AND MOTOR

A. Main Power Feed (Voltage/Phase/Hertz): As scheduled.

B. Type:

1. Each chemical metering pump shall be motor-driven through a flexible coupling, or direct-connected to the pump when manufacturer's standard. Pumps and motors shall be installed and factory tested on complete HDPE skids.

C. Characteristics:

1. Electric motors shall be as specified in Section 11060.

2. Motors and motor starters shall be furnished by the pump manufacturer and shall be coordinated with the requirements of the pumps and the following characteristics:

Horsepower (minimum)	1/3
Volts/phase/hertz	120/1/60
Speed (maximum)	1,800 revolutions per minute
Service factor	1.15
Enclosure	TEFC
Insulation	Class B, moisture resistant, inverter duty
Bearings	Tapered rollers
Fasteners	Type 316 stainless steel

1. The motor shall be an induction type, premium efficiency, inverter rated, AC squirrel cage type capable of 120 VAC single-phase inverted power.

2. Motor shall have a thermostat for high temperature shutdown.

D. Each chemical metering pump shall be equipped with a VFD.

2.5 CONTROL PANELS AND PLC

A. Construction Standards:

1. Wire Numbers – Each wire in the control panel shall be marked with a wire number that corresponds to the page and ladder rung of the schematic diagrams. A unique wire number shall be provided between component contacts and coils. Wire markers shall be Brady Thermal Transfer Self-Laminating Vinyl or equal by Grafoplast or Thomas & Betts.

2. Color Coding – Wires shall also be color-coded as follows: 120 VAC Line = black; Neutral = white; Ground = green; Switched 120 VAC = red; DC current carrying conductor = blue, DC non-current carrying conductor = white with blue stripe, Foreign voltage = yellow, Intrinsically safe = light blue.

3. Component Identification – Each component in the system shall be identified by a unique number that corresponds to its coil's page and ladder rung location on the schematic drawings.

4. Wire – AC control conductors shall be 600 volt and a minimum of 18 gauge. DC control conductors shall be a 300-volt and a minimum of 18 gauge. Control conductors shall be UL Type MTW rated for 105° C. Analog conductors shall be 22 gauge shielded twisted three conductor rated for 300 volts. Wire shall be Beldon 8771 or equal. Shields shall be grounded at the PLC or panel location. Power conductors shall be sized per UL and NEC standards and rated for 600 volts. Conductors shall be UL Type MTW, THHN or THWN rated for 90° C.

5. Control Terminals – All field control conductors shall be connected to terminal blocks. Terminals shall have machine marked wire numbers. Connection of field control conductors directly to control panel components will not be allowed. Terminal blocks shall be rated for 30 amps at 600 volts. They shall be screw terminal type capable of terminating 10 to 26 gauge wire. Terminal bridge bars shall be provided when it is necessary to bridge multiple like terminals together. Terminals and accessories shall be Phoenix Contact "Clipline" or equal by Allen Bradley or Weidemueller.

6. System Control

   a. General Operation

      1) A Programmable Logic Controller (PLC) shall be provided to monitor 4-20 mA signals from Chlorine Residual transmitters and Station Flow meters as specified elsewhere in these specifications. The controller will display these signals locally and provide automatic on/off and feed rate control for two chemical feed metering pumps as specified elsewhere, via contact closure outputs representing on/off and 4-20 mA signals representing chemical feed rate. The pumps shall start and stop and regulate speed as required to maintain an acceptable chlorine residual level as determined by operator adjustments via PLC operator interface.

      2) The PLC controller shall be supplied with a touch graphic operator interface for viewing system status and make operator adjustments.

      3) The PLC shall communicate with the existing PLC via DH-485 or Ethernet communications for transmitting system status.

7. Enclosure

    a. All control and power equipment shall be mounted in a 14-gauge, NEMA 4X 304 SS enclosure. A gasket shall be provided for each outer door. All internal components shall be mounted on a painted steel back plate. An aluminum inner door shall be provided for mounting of the operator interface, HOAs, ETMs, pilot lights, and reset buttons. A padlock hasp shall be provided on the enclosure door. Enclosure mounting tabs shall be provided.
    b. Enclosure shall be sized sufficiently to allow for easy access to all internal equipment and to accommodate future equipment. Enclosure shall be not less than 30” High x 24” Wide x 12” Deep.

8. Power Entry
    a. The control panel shall include a thermal magnetic main circuit breaker to provide an incoming power disconnect means and short circuit/overcurrent protection for the control panel equipment
    b. The circuit breaker must have a minimum ampere interrupting capacity of 10,000 @ 240 volt symmetrical RMS amps. The circuit breaker shall be operable through the operator’s door of the enclosure and shall have a trip rating to allow full voltage starting and continuous operation of the motors.
    c. The commercial power input to the control panel/main breaker shall be UL service entrance rated and labeled.

9. Lightning Arrestor
    a. The control panel shall be protected from electrical surges caused by lightning and high current/voltage surges. A surge Protector shall be installed and connected to each leg of incoming service. The surge arrestor shall meet the following requirements:
        1) Designed to meet ANSI/IEEE C62.11-1987 requirements.
        2) Rated for not less than 10,000 amp surge current.
        3) Response time of not more than 50 nanoseconds.
        4) Three LED Indicators for visual indication of the devices operational status
        5) Built in fuses
        6) Maintenance free, long life design.

10. Control Power Circuit Breaker
    a. A 1P1T circuit breaker shall be provided to provide additional short circuit protection and to allow control power on/off. Unit shall be rated 10,000 AIR or higher.

11. Power Supply Systems
    a. The control panel shall be supplied with a DC power supply.
        1) Power supply will be sized so that under normal conditions, no more than 60% of its rated wattage output is used.
        2) The DC power outputs shall be protected by separately mounted replaceable fuses

12. Programmable Logic Controller (PLC)
    a. The Station PLC shall be preprogrammed as required to provided specified monitoring and control functions. The PLC shall be capable of monitoring

process variable inputs and automatically control up to three variable speed chemical feed system.

b. The PLC shall include processor, power supply, input and outputs and communications ports needed for a complete system. The PLC shall include a real time clock and the PLC shall be mounted on the back panel of the enclosure. Inputs and outputs shall be wired to terminal blocks suitable for connection to field wiring.

c. The PLC shall be supplied with an Operator Interface have a minimum of 6" diagonal screen dimension. The screen shall be a touch graphic display with a resolution of not less than 340 by 240 pixel resolution. The display shall connect directly to the PLC via Ethernet connection and shall be programmed to display chemical feed station status to provide local operator adjustments to system parameters.

d. The operator interface shall display the chlorine residual and flow rate signals and pump operational status.
   1) An active/dynamic graphical representation of each pump and its status shall be displayed on the same screen along with required and actual speed. Feed Pump graphic shall change state to indicate – "Off", "Called", "Running", and "Failed/Out of Service".
      a) Touching an active pump on the home screen takes you to the respective pump status screen displaying associated run time and number of starts.

e. To prevent the loss of data during an extended power outage, the PLC shall have a built in replaceable battery system to keep volatile memory active for approximately 10 years.

f. Each controller shall come standard with herein specified inputs and outputs. The controller shall also have the ability to accommodate additional expansion I/O without the need to replace hardware or upgrade the controller.
   1) The controller shall be configured to monitor the following discrete input status signals:
      a) Feed Pump 1, 2 Running
      b) Feed Pump 1, 2 HOA In Auto
      c) Feed Pump 1, 2 Failure
   2) The controller shall provide the following discrete output signals:
      a) Feed Pump 1, 2 Call
      b) Common Alarm
   3) The controller shall monitor the following (4-20 mA) process signals:
      a) Chlorine Residual
      b) Station Water Flow Rate
      c) Feed Pump 1 Feed Rate
      d) Feed Pump 2 Feed Rate

g. The PLC shall have a built in security system that will require an operator to enter a security code in order to acknowledge an alarm or make set point adjustments. Without the code, the system shall be view only.
   1) To prevent unauthorized controller adjustments, an adjustable 0-999 second delay shall be provided to automatically logoff the current user

after the adjustable time period, and no operator screen navigation has been detected.

h. The controller shall be capable of operating pumps in an automatic or fixed mode. In automatic mode, a built in alternator shall be available to equalize motor starts, stops and run time. The alternator shall have the capability of being put into fixed sequence mode at any time. Alternation shall also have the capability to alternate cyclically or following an adjustable period of time.
   1) Alternator shall have pump fail replace logic allowing a failed pump to be detected and the lag pump to be called into service without level increasing to lag start set point.
      a) Auto Alternation Mode
         - If the running signal input is not received within 60 seconds (adjustable) of the respective pump being called to start, a pump failure alarm shall be displayed in the alarm banner and the next pump in sequence shall be called to start.
      b) Fixed Alternation Mode
         - If the running signal input is not received within 60 seconds (adjustable) of the respective pump being called the respective pump shall continue to be called until the level in the wet well reaches the next level set point at which point the next pump in the sequence shall be called to start.

i. The following system set points shall be provided: (* indicates an associated, user adjustable (0-999) seconds time delay shall also be provided to prevent momentary process fluctuations from impacting alarm or control.)

   1) Chlorine Residual – Desired Level
   2) Chlorine Residual High and Low Level Alarm *
   3) Start Lead*, Lag 1*
   4) Stop Lead*, Lag 1*
   5) Pump 1, 2 Failure To Start Delay xxx sec

j. The controller shall monitor, display and log the following alarms:
   1) Chlorine Residual High or Low Level Alarm
   2) Pump 1, 2 Failure To Start
   3) Pump 1, 2 Feed Pump Failure (Signal From Feed Pump)

k. The controller shall have Pump Status screens that provide the following information and control options:
   1) Pump 1, 2 Status (Off, Called, Running, & Failed)
   2) Pump 1, 2 Hard H-O-A Status
   3) Today: Pump 1, 2 Runtime xx.x Hours
   4) Today: Pump 1, 2 Starts xxx
   5) Yesterday: Pump 1, 2 Runtime xx.x Hours
   6) Yesterday: Pump 1, 2 Starts xxx
   7) Current (CRNT) Month (MNTH): Pump 1, 2 Runtime xxx.x Hours
   8) Current (CRNT) Month (MNTH): Pump 1, 2 Starts xxx
   9) Last Month (MNTH): Pump 1, 2 Runtime xxx.x Hours
   10) Last Month (MNTH): Pump 1, 2 Starts xxx
   11) Total: Pump 1, 2 Runtime 999999.9 Hours
   12) Total: Pump 1, 2 Starts 999999

l. Navigation
   1) A menu system shall be provided for the user with proper access to change set points, setup pump starts, stops, alarms, alarm delays and setup pump alternation.

m. Alarms and Historical Events
   1) When an alarm is activated it shall be logged with a time and date stamp and displayed in the alarms summary screen until the operator acknowledges it.
   2) A historical screen shall provide a historical log for the most recent 64 events
   3) An additional screen shall be provided to indicate todays, yesterdays, previous month and current month flow through the pump station.

n. Controller Communications
   1) The controller shall be supplied as telemetry ready.
   2) The controller shall include a minimum of one RS-232/RS-485 serial ports (Operating at up to 115 Kbs.
   3) Ethernet 10/100 MB.
   4) PLC shall be configured for communicating system data and status to existing City SCADA via Ethernet or DH-485 connection to be determined. Supplier to include appropriate Net ENI modules if required for proper connection.
   5) The supplier shall provide a data table to the City allowing for proper data addressing for networking to the chemical feed system.

o. The PLC shall be CompactLogix PLC.

p. Chemical Feed Pump Circuit Breakers
   1) Each feed pump motor shall be provided with a circuit breaker. Circuit breakers shall be thermal magnetic rated for a minimum of 10,000 AIC at 240 VAC.
   2) Each feed pump shall include an HOA switch, non-reset type ETM (99999.9 hours) and run light as specified elsewhere in these specifications.
   3) The motor starters and circuit breakers shall be sized to accommodate the following motors

Motor	Voltage	HP
1	120	1/3 (minimum)
2	120	1/3 (minimum)
3	120	1/3 (minimum)

13. Pilot Devices
    a. Selector switches shall include removable 10 Amp, 600-volt double make double break contacts. All pilot lights, selector switches and pushbuttons

shall be rated for NEMA/UL 4 applications. They shall be not less than 22.5mm diameter.

b. Contact blocks/terminals shall be finger safe meeting IP20 standards.
c. Operators shall be rated for a minimum life of 500,000 operations with a MTBF of less than 1 fault per 10 million operations.
d. All Pilot devices shall be clearly identified by a phenolic nameplate with black surface and white letters not less than 3/16” in height placed over the associated pilot device.
e. The following Pilot Lights shall be mounted on the inner door:
    1) Pump 1, 2 Run
    2) Pump 1, 2 Feed Pump Failure
f. The following Selector Switches shall be mounted on the inner door:
    1) Pump 1 Hand-Off-Auto
    2) Pump 2 Hand-Off-Auto

14. Running Timer Meters
    a. An elapsed time meter shall be mounted on the inner enclosure door for each pump. It shall be 6 digit (99999.9 hours) non-reset types.
    b. Unit shall have quartz accuracy. Accuracy shall be within +/- .02% over entire range.

15. Relays
    a. Relays shall be provided as needed to provide the specified functionality of these specifications.
    b. Relays shall be general-purpose plug-in type.
    c. Each relay shall be a minimum of 4-pole with contacts rated for 6 amps at 240 VAC resistive load and 3 amps at 240 VAC inductive load.
    d. Each relay shall have a built in LED indicator and illuminate when active.
    e. Minimum mechanical life is 20,000,000 operations AC, 30,000,000 operations DC

16. Timers shall be 4-pole solid-state plug-in type.
    a. Timers shall be provided as necessary to provide the specified functionality of these specifications.
    b. Each timer shall have contacts rated for 3 amps at 220 VAC resistive load and .8 amps inductive load.
    c. All relay and timer sockets shall be of the same type and shall be 14-blade. Timers shall be adjustable from 0 – 6 hours. A "time cycle in progress" and “timed out” indicating LED shall be provided.
    d. Minimum mechanical life is 500,000 operations.

17. External Alarm Light
    a. Alarms shall be visually annunciated at site via external alarm light.
    b. Alarm light shall be low profile, 40 watt, UL Type 4X light with a red Lexan® lens.
    c. Alarm light shall be top panel mounted and be viewable from any direction.
    d. Active light shall be visible in direct sunlight.
    e. Light shall flash when activated.
    f. Relamping of the alarm light shall be done from the inside of the enclosure.

2.6 ACCESSORIES

A. Pulsation dampeners:

1. Manufacturers: One of the following or equal:

   a. Kemlon Products.

   b. Blacoh Fluid Controls, Inc.

   c. Pulsafeeder.

2. Pulsation dampeners shall be furnished and installed on each chemical metering pump's discharge lines as indicated on the Drawings and scheduled in this Section.

3. Materials:

   a. Pulsation dampeners shall have hypalon diaphragms and CPVC, PVC, stainless steel or lined cast iron chamber.

      1) Materials shall be compatible with the pumped liquid at the specified concentration, and suitable for outdoor use and exposure.

4. Characteristics:

   a. Pulsation dampeners shall be gas or air charged, single diaphragm type complete with valved gas/air charge valve connection and pressure gage graduated from 0 to 200 pounds per square inch.

   b. Pulsation dampeners shall allow no more than **5** percent discharge pressure fluctuation.

5. Dampeners shall be provided with a true-union ball valve for shutoff.

B. Calibration columns:

1. Materials:

   a. Materials shall be compatible with the pumped liquid and concentration specified in this Section, and suitable for outdoor use and exposure.

2. Characteristics:

   a. Furnish and install calibration columns, 1 for each chemical metering pump, on each chemical pump's inlet line as indicated on the Drawings and specified in this Section.

      1) Columns shall be translucent.

      2) Columns shall be sized for 30 second draw down at specified maximum flow.

b. Provide top cap threaded connection with vent piped to floor to prevent entry of foreign materials and to direct spillage or overflow.

c. End connections shall be threaded.

d. Capacities and graduations shall be as indicated in the schedule in this Section.

C. Diaphragm backpressure and pressure relief valves:

1. Type PRV 740 as Specified in Section 15050 and provided by the chemical metering pump supplier. Valves shall be located in the discharge side of the piping system to prevent excessive pressure in the system. Fluid shall be returned to the inlet side of the system if the pre-set maximum system pressure is exceeded.

D. Flow sight glasses:

1. Provide one flow sight glass on pressure relief bypass piping for each metering pump arrangement.

2. Equip the flow sight glass with vinyl streamers or flutter device to help detect flow.

3. Materials:

a. Dual wall indicator with Pyrex glass interior and acrylic exterior.

b. Seals: Viton®.

4. Manufacturer: Plast-O-Matic Valves, Inc. or equal.

E. Additional accessories to be provided with each skid:

1. Additional accessories required for the system but not required to be supplied by the pump manufacturer include:

a. Diaphragm seals:

1) Materials shall be compatible with the pumped liquid at the specified concentration and suitable for outdoor use and exposure.

b. Pressure switches as specified in Section 13621, except as modified in this Section:

1) Materials shall be compatible with the pumped liquid at the specified concentration and suitable for outdoor use and exposure.

c. Pressure gauges as specified in Section 13621, except as modified in this Section:

1) Materials shall be compatible with the pumped liquid at the specified concentration and suitable for outdoor use and exposure.

d. Isolation valves for suction and discharge piping as indicated on the Drawings:

1) Materials shall be compatible with the pumped liquid at the specified concentration and suitable for outdoor use and exposure.

e. Y-strainers:

1) Materials shall be compatible with the pumped liquid at the specified concentration and suitable for outdoor use and exposure.

2.7 ANALYZER

A. Contractor shall supply three analyzers, which shall be housed in one cabinet at location indicated on the Drawings.

B. Make and Model: Rosemount 1056 Dual-Input Intelligent Analyzer, or approved equal.

C. Measurements:

a. Temperature

b. Chlorine

c. pH

d. Conductivity

e. Turbidity

D. Display: Monochromatic graphic liquid crystal display

E. Enclosure: NEMA Type 4X

F. Temperature: 32 to 131 ºF

2.8 SAMPLE STATION

A. Contractor shall supply three sample stations, which shall be housed in one NEMA Type 4X cabinet at location indicated on the Drawings.

B. Make and Model: Rosemount Model FCL Free Chlorine Measuring System, or approved equal.

C. Contractor shall route sample station waste lines to storm drain.

2.9 CABINETS

A. Contractor shall supply four NEMA Type 4X cabinets to fit equipment specified in this section. Cabinets shall be sized to allow for full access to equipment for operation and/or maintenance purposes. Four cabinets will be required in total, one for each injection skid and one for the three sampling stations and analyzers.

2.10 INJECTION QUILLS

A. Contractor shall supply three sodium hypochlorite chemical injection quills.

B. Make and Model: SAF·T·FLO EB-145 Series Retractable Injector 150 psi, or approved equal.

C. Contractor shall coordinate with product manufacturer to determine appropriate size, length, configuration, material, and installation for each application.

2.11 NAMEPLATES

A. Each pump, gearbox and motor shall have, securely affixed in a conspicuous location, a stainless steel nameplate with raised letters providing the manufacturer's model, serial number, rating, range, speed and other pertinent data.

2.12 HDPE SKIDS

A. The skid mounting of the metering pumps shall conform to the following requirements:

1. Each chemical feed system shall be completely assembled, mounted, calibrated, tested, and delivered to the site on a single skid. Components to be mounted on the skid shall include the metering pump, calibration column, piping, valves, piping accessories (pulsation dampeners, back pressure valves, check valves, pressure relief valves, etc.), and wiring integral to the skid. The pump supplier shall be responsible for providing all equipment, valves and piping within the skid boundary.

2. The skids shall be constructed of HDPE sheets with adequate supports for all equipment and piping and a ½" drip lip. Rotationally molded skids are not acceptable. Forklift truck cut outs shall also be provided. Skids shall have a horizontal surface form mounting the pump and a vertical back wall for mounting piping and other accessories. Flat skids with no back wall are prohibited. Side walls that restrict pump access are also prohibited. All piping and other accessories shall be supported using FRP channel supports.

3. Equipment shall be arranged for ease of maintenance and operation. Pumps shall be oriented so that both the display panel and pump head are accessible from the front of the pump skid (i.e. rotated sideways). Suction and discharge piping shall be oriented so that it does not impede access to the pump or motor. No piping, pulsation dampeners, supports, etc. shall be within 1-ft on any side or on top of the motor.

4. All components of the skid-mounted system (pumps, piping and controls) shall be tested at the shop prior to shipping.

5. All piping within the skid shall be PFA tubing.

6. Skids shall provide chemical containment and spill protection.

B. Valves: As indicated on the Drawings.

C. Piping: All piping shall be PFA. As indicated on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The equipment shall be installed and tested in accordance with the recommendations of a qualified manufacturer's representative. After completion of installation, each liquid chemical injection system shall be field tested in the presence of the Owner and Engineer to ensure compliance with specified requirements to the extent possible.

B. The services of a factory trained, qualified representative shall be provided to inspect the complete installation, making all adjustments necessary to place the system in trouble-free operation and instruct the operating personnel in the proper care and operation of the equipment.

3.2 FIELD QUALITY CONTROL

A. Site tests and inspections shall be performed per Section 01700 and 01800:

1. Witnessing: As specified.

2. Inspection and checkout: As specified.

3. Equipment performance test: Test Level as scheduled; test as specified.

4. Vibration test: Test Level as scheduled; test as specified.

5. Noise test: Test Level as scheduled; test as specified.

6. Operational testing: As specified.

B. Manufacturer’s field service:

1. Furnish a factory trained field representative to supervise the start-up, adjustment, and testing of the units.

2. Coordinate field service work with the manufacturer’s field representative, Owner, and Engineer prior to initiating such work.

3. Require manufacturer’s field representative to perform the following services as specified in Section 01800.

a. The specified durations are the minimum required time on the job site.

b. Additional services or longer durations shall be provided as needed at no cost to Owner to meet the required quality of work:

1) Installation assistance: As required to meet the specified quality.

2) Installation inspection: 1 workday.

3) Start-up and testing assistance: 3 workdays.

4) Training: 2 workdays. The training time shall not be included in the start-up, adjusting and testing time.

5) Final acceptance checkout: 1 workday.

6) Post start-up checkout: 1 workday.

3.3 CLEANING

A. As specified in General Provisions, Special Provisions, and Section 01700.

3.4 DEMONSTRATION AND TRAINING

A. Training shall be provided during the one day trip to the project site to supervise initial start-up and operation. A minimum of four hours of training shall instruct the Owner's personnel in proper operation and maintenance of the equipment. Instruction shall be provided for up to five persons and shall include printed handouts of start-up procedures, operating procedures, shut-down procedures, routine maintenance and troubleshooting. Training shall be performed at the project site as specified in Sections 01800.

B. After each system has been installed, the Supplier shall demonstrate with simulated I/O the performance of each unit, and document that the system operates properly as specified. Monitoring signals shall register at all required locations and loop checks on all loops shall have been completed and tested. Each station must be tested and accepted by the city prior to proceeding to the next installation.

C. All travel and per-diem expense for training will be the responsibility of the Supplier.

D. **Important Note: The Contractor will be required to conduct a 30-day acceptance test of the entire chemical feed system including analyzers and controls. The City will not accept the system until 30 days have elapsed with no system failures.**

3.5 PROTECTION

A. As specified in General Provisions, Special Provisions, and Sections 01115 and 01800.

3.6 SCHEDULES

A. Pumps:

Tag Number	SH-INJ-101-PMP-1, SH-INJ-101-PMP-2 SH-INJ-102-PMP-1, SH-INJ-102-PMP-2 SH-INJ-103-PMP-1, SH-INJ-103-PMP-2
Feed Point	Varies
Service	Sodium Hypochlorite
Pump Type	Single Diaphragm
Number of Pumps	6 (3 duty & 3 standby)
Named Manufacturer	Milton Roy or approved equal
Torsional Analysis	Not Required
Maximum Flow, (gallons per hour)	TBD by Manufacturer
Minimum Flow, (gallons per hour)	TBD by Manufacturer
Pump Stroke Range (strokes per hour)	TBD by Manufacturer
Maximum Discharge Pressure (psig)	100
Minimum Suction Lift (feet)	10
Relief Valve Setting (psig)	110 (Field Adjustable)
Pump Housing/Enclosure	Aluminum
First Diaphragm	PTFE faced EPDM backed
Pump Eccentric Shaft	Tool Steel
Pump Housing Support	Aluminum
Pump Connections	150LB PVDF ANSI Flange with Viton O-Rings

Driver Type	Motor with VFD
Drive Coupling	Piloted C-Face
Minimum Driver Horsepower	1/3
Nominal Driver Speed (rpm)	1,750
Service Factor	1.15
Voltage/Phases/Hertz	120/1/60
NEMA Enclosure Type	TEFC
Field Test Witnessing	Witnessed
Performance Test Level	1
Vibration Test Level	None
Noise Test Level	None
Performance Test Level	1
Vibration Test Level	None
Noise Test Level	None
Hydrostatic Testing	Required at 100 psig

1. Provide pumps that deliver the maximum capacity required to meet the design pipeline flowrates given in Table 1 to supply maximum chlorine concentration residual of 2 ppm, when at full speed and maximum stroke length.

B. Pulsation dampeners:

Quantity	Single/Double Diaphragm	Size
One per pump	As specified in this Section	As specified in this Section

C. Calibration columns:

Quantity	Graduation Volume(ml)[1]	Graduation Scale (ml)[2]
One per pump	TBD by Supplier	TBD by Supplier

Notes:

1. The volume of the calibration column should be rated for 30 second draw down at maximum pump flow specified.

2. Graduation scale shall read in gallons per hour and milliliters.

D. Backpressure valves:

Quantity	Spring Range	Minimum Backpressure
One per pump	Field Adjustable from 7 - 150 psi	10 psi over maximum process pressure

E. External pressure relief valves:

Quantity	Spring Range	Relief Pressure
One per pump	Field Adjustable from 7 - 150 psi	10 psi over rated discharge pressure

*** END OF SECTION***

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SECTION 11258

CHEMICAL FEED EQUIPMENT, GENERAL

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide chemical feeding equipment, complete and operable, in accordance with the Contract Documents.

B. Equipment shall be from manufacturers with several years of experience in the manufacture and assembly of similar products, with a record of successful installations. Such manufacturers shall maintain a well-established, authorized, local service agency with sufficient spare parts and personnel to respond within 48 hours to any service calls.

C. Unless indicated otherwise, the requirements of this Section apply to all chemical feeding equipment in the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01300.

B. Shop Drawings: Complete fabrication, assembly, foundation, and installation drawings, together with detailed specifications and data covering materials used, power drive assemblies, parts, devices, pumps, tanks, mixers, supports, panels, and other accessories forming a part of the equipment, plus schematics, diagrams, and panel layouts.

C. Certification: The Contractor shall obtain written certification from each manufacturer, addressed to the Owner, stating that the equipment will efficiently and thoroughly perform the required functions in accordance with these Specifications and the Drawings, and that the materials are best suited for the chemicals handled.

D. Technical Manuals: Furnish complete operations and maintenance manuals prior to start-up.

E. Spare Parts List: The Contractor shall obtain from the manufacturer a list of suggested spare parts for each piece of equipment subject to wear, such as seals, packing, gaskets, nuts, bolts, washers, wear rings, etc.

F. Maintenance: Printed instructions relating to proper maintenance, including lubrication, and parts lists indicating the various parts by name, number, and diagram where necessary, shall be furnished in duplicate with each unit or set of identical units.

G. Field Procedures: Instructions for field procedures for erection, adjustments, inspection, and testing shall be furnished prior to installation of the equipment.

H. Calibration Graphs: The manufacturer's representative shall prepare a calibration graph from field tests for each chemical feed unit which does not have a rate set device. Graphs shall read in pounds per hour for dry feeders or in gallons per hour for liquid feeders. The graph shall show the rate setter graduation conversion to pounds per hour or gallons per hour throughout the range of the feed unit. Each graph shall be furnished on hard paper and be sealed in clear plastic.

1.3 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Erection and Startup Assistance: Service and instruction assistance by the manufacturer's engineering representative for each equipment unit shall be furnished by the Contractor during the following period:

B. One day during erection, unless indicated otherwise in the feed equipment section.

C. One day during startup, unless indicated otherwise in the feed equipment section.

D. Instruction of Owner’s Personnel: The Contractor shall furnish the services of a factory service representative to instruct the Owner’s personnel in the operation and maintenance of the equipment. This service shall consist of a minimum one day's visit to the plant for each type of similar equipment.

1.4 GUARANTEES, WARRANTIES

A. After completion, the Contractor shall furnish to the Owner the manufacturer's written guarantees that the equipment will operate with the published efficiencies, heads, criteria, and flow ranges and meet these specifications. The Contractor shall also furnish the manufacturer's warranties as published in its literature.

PART 2 – PRODUCTS

2.1 GENERAL

A. Wherever it is required that a single manufacturer shall be responsible for the compatible and successful operation of the various components of any equipment unit, it shall be understood to mean that the Contractor shall provide only such equipment as the designated manufacturer will certify is suitable for use with its equipment and with the further understanding that this in no way constitutes a waiver of any indicated requirements.

B. Manufactured items provided under this Section shall be new, of current manufacture, and shall be the products of reputable manufacturers specializing in the manufacture of such products.

C. Where 2 or more units of the same type or size of equipment are required, such units shall be produced by the same manufacturer.

2.2 MATERIALS

A. General: Materials employed in the equipment shall be suitable for the intended application; materials not specifically called for shall be high-grade, standard

commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. The following table lists the chemicals used for this project and some of the suitable materials for the construction of chemical feeding equipment. Unless the manufacturer proposes more suitable materials, the table shall be adhered to:

Chemical	Suitable Handling Material
Sodium Hypochlorite (SH) (10% to 15% solution)	Viton Teflon Polyethylene PVDF PVC

2.3 APPURTENANCES

A. Nameplate: Each piece of equipment shall be provided with a nameplate (of material compatible with chemical), indicating equipment characteristics, capacity, motor horsepower, speed, electrical characteristics, manufacturer, model number, serial number, etc.

B. Pressure Gauges: Where indicated on Drawings, chemical transfer and metering pumps and other equipment shall be equipped with pressure gauges with diaphragm seals in accordance with DIV 13, except that the size of gauges on small metering pumps may be smaller than indicated in that section.

C. Calibration Columns: Provide per Section 11242.

D. Backpressure Valves: All backpressure valves for chemical service, as shown on the Drawings, are to be Type PRV740 and provided by the chemical metering pump supplier.

E. Chemical Tank Discharge Connection Expansion Joints: Provide a custom flexible connection for each chemical tank discharge connection as shown on the contract drawings. The flexible connection shall be manufactured by Red Valve. The flexible connection shall consist of all nonmetallic materials: EPDM with convoluted PTFE liner.

F. Equipment Supports**:** Chemical feeding equipment and piping shall be firmly supported and anchored on concrete equipment pads as shown or on FRP shelves designed by the CONTRACTOR, where indicated.

G. Basket Strainers: Provide basket type strainers as indicated on the Drawings.
   1. PVC Basket strainers for chemical service (Sodium Hypochlorite):
      a. Simplex as indicated on the Drawings; baskets and bodies PVC; gaskets Viton or EPDM as required for the chemical service; basket mesh size to be specified by the ENGINEER during shop drawing review.
      b. Connections:
         1) Liquid Ends: Flanged
         2) Cover: Quick opening with retaining clamp and gasket. Threaded covers are prohibited
      c. Manufacturer: Spears

H. By Code, chemical unloading, storage, and feeding equipment shall be provided with the necessary safety devices and warning signs, clearly visible. Signage shall be provided in accordance with San Bernardino County Fire Department, Identifying devices.

2.4 TOOLS AND SPARE PARTS

A. Tools: Special tools necessary for maintenance and repair of the equipment and one pressure grease gun for each type of grease required for the equipment shall be furnished as a part of the Work; such tools shall be suitably stored in metal tool boxes, and identified with the equipment number by means of stainless steel or solid plastic name tags attached to the box.

B. Spare Parts: Furnish spare seals, packing, gaskets, wear rings, and bearings as required by the feed equipment sections.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Chemical feeding equipment shall be installed in accordance with governing safety standards, the Shop Drawings, and as indicated.

B. Alignment: Equipment shall be field tested to verify proper alignment, operation as indicated, and freedom from binding, scraping, vibration, shaft runout, leaks, or other defects. Drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.

C. Lubricants: The Work shall include furnishing the necessary oil and grease for initial lubrication and testing of all equipment.

END OF SECTION

SECTION 11904

IN-LINE STATIC MIXERS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: In-line static mixers for dispersion of chemicals, including sodium hypochlorite, as indicated on the Drawings.

B. Related Sections:
   1. Section 01800 - Commissioning and Process Start-Up
   2. Section 15050 - Piping, Valves, and Accessories

1.02 SUBMITTALS

A. Submit the following information.
   1. Make, model, weight of each assembly.
   2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
   3. Head loss versus flow curves throughout operating ranges.
   4. Detailed drawings showing dimensions, size, and locations of components.
   5. Nozzle schedule showing sizes and locations.
   6. Certificate of compliance signed by the equipment manufacturer that states the equipment meets all requirements of the specification.
   7. Special shipping, storage and protection, and handling instructions.
   8. Manufacturer's written installation instructions.
   9. Routine maintenance requirements prior to plant start-up.
   10. Manufacturer's Certificate of Proper Installation as specified in Section 01800
   11. Operation and Maintenance Manuals.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of static mixers similar to those specified as evidenced by references to minimum 2 installations currently operating and documentation supporting the compatibility of the wetted mixer parts in contact with the applied chemicals

B. Provide mixers in this Section from same manufacturer.

C. Require mixer manufacturer to provide written installation and check out requirements.

1.04 PROJECT CONDITIONS

A. Environmental Requirements: As specified in Section 11242.

1.05 SEQUENCING AND SCHEDULING

A. Contractor is responsible for coordinating installation of static mixers and any required piping modifications.

1.06 WARRANTY

A. As specified in Section 15050.

1.07 DELIVERY, STORAGE, AND HANDLING

A. The static mixers shall be completely factory assembled, aligned, and securely crated for shipping.

B. Mixer shall be stored as received at the site (in its shipping container) until ready for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers
   1. Westfall Manufacturing Company
   2. Komax

B. All in-line static mixers specified in contract shall be supplied by the same manufacturer.

2.02 MIXER SCHEDULE

Application	Body Material	Mixing Elements	Injection Quill (s)	Injection Port Connection	Body Connection	Gaskets	Flow Range (gpm)	Diameter (in)
Sodium Hypochlorite	FRP	PVC	One	1” Flange	Wafer	Neoprene	240 to 1,800	10
Sodium Hypochlorite	FRP	PVC	One	1” Flange	Wafer	Neoprene	180 to 3,100	16
Sodium Hypochlorite	FRP	PVC	One	1” Flange	Wafer	Neoprene	2,250 to 8,750	36

2.03 OTHER REQUIREMENTS

A. Headloss
   1. Maximum pressure drop across mixer not to exceed 5 psi at maximum flowrate
   2. 99% mixing efficiency shall be achieved no more than 10 pipe diameters downstream of the mixer across entire flow range.
   3. Overall length shall not exceed 4-in from flange face to flange face, including injection ports.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions and as specified in Section 15050.

B. Where identified on the Drawings, Contractor shall install injection point containment.

3.02 FIELD QUALITY CONTROL

A. Inspection and Check-out: As specified in Sections 15050 and approved by the manufacturer’s field representative.

B. Operational Testing: As specified in Section 01800.

3.03 MANUFACTURER'S FIELD SERVICES

A. Require manufacturer to inspect system before initial start-up and certify that system has been correctly installed and prepared for start-up as specified in this Section and in Sections 15050 and 01700.

B. Training: As specified in Section 01800.

END OF SECTION

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SECTION 13208

POLYETHYLENE TANKS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Sodium Hypochlorite Storage Tank.

B. Related sections:
   1. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
   2. It is the Contractor's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of Contractor's Work.
   3. The following Sections are related to the Work described in this Section. This list of Related Sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the Contractor to see that the completed Work complies accurately with the Contract Documents.

1.02 REFERENCES

A. American Society for Mechanical Engineers (ASME):
   1. B16.4 - Gray Iron Threaded Fittings.
   2. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.

B. ASTM International (ASTM):
   1. D 638 - Standard Test Method for Tensile Properties of Plastics.
   2. D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
   3. D 1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique.
   4. D 1525 - Standard Test Method for Vicat Softening Temperature of Plastics.
   5. D 1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
   6. D 1998 - Standard Specification for Polyethylene Upright Storage Tanks.
   7. D 2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.

C. National Fire Protection Association (NFPA):
   1. 30 - Flammable and Combustible Liquid Code.

D. National Electrical Manufacturer's Association (NEMA).

E. Occupational Safety and Health Administration (OSHA):
   1. 29 CRF Part 1910 - Occupational Safety and Health Standards.

1.03 DESIGN CRITERIA

A. Tanks: Sodium Hypochlorite Storage.

B. Tank wall thickness: Calculated in accordance with ASTM D 1998 using design specific gravity as scheduled. Note that design specific gravity may be higher than specific gravity of tank contents.

C. The minimum design specific gravity shall be 1.12.

D. The minimum required wall thickness for the cylinder straight shell must be sufficient to support its own weight in an upright position without any external support.

E. Tank shell thickness:
   1. In accordance with ASTM D 1998, Section 6.1.
   2. Design tank wall thickness for liquid with specific gravity as specified.
   3. Provide adequate thickness at all fittings and connection points for mounting of fittings to the tank without damage to the tank or causing excessive deflection.
   4. Maximum allowable hoop stress used in tank wall thickness calculations per ASTM D 1998 shall be based on test data in accordance with ASTM D 2837.

F. Restraint system:
   1. Seismic load restraint system: As indicated on drawings

1.04 SUBMITTALS

A. Fabrication drawings for each tank including:
   1. Dimensions.
   2. Tank wall thickness.
   3. Materials of construction.
   4. Tank fittings.
   5. Tank appurtenances.
   6. Tank restraint system.
   7. Tank resin and hoop stress data.

B. Chemical compatibility sheet to include:
   1. Chemical to be stored.
   2. Percentage of chemical.
   3. Temperature of chemical.

C. Engineering design calculations of restraint and anchoring system signed by a civil or structural engineer registered in the state where the project is located.

D. Installation instructions.

E. Warranty.

F. Certification to certify that each tank is suitable for the specified chemical service, no degradation within warranty period, including tank fittings and gasket material.

G. Proof of qualification: Provide lists of installation and contact information with same type of application and chemical used.

H. Color charts for proposed coating systems.

1.05 WARRANTY

A. Manufacturer warranty against defects:
   1. Tank: 5 years full warranty. Prorated warranties are not acceptable.

1.06 QUALITY ASSURANCE

A. Qualification of manufacturer: Manufacturer with experienced personnel, physical facilities, and management capacity sufficient to produce custom-made rotationally molded polyethylene tanks of the size, exposure, and chemical services specified for minimum 5 years with satisfactory performance record.

PART 2 - PRODUCTS

2.01 SCOPE OF SUPPLIES

A. Provide all materials, labor, equipment, and hardware to provide a 1250 gallon polyethylene storage tank with specified fittings and accessories, seismic and wind load restraint systems, anchor bolts, and flange flexible connectors for complete installation in the positions and orientations indicated on the Drawings.

2.02 MANUFACTURERS

A. One of the following or equal:
   1. Poly Processing Company, Polyscrub.

2.03 TANK MATERIALS

A. Type 1 high-density crosslinked polyethylene (XLPE) or Type 2 high-density linear polyethylene (HDLPE).

B. Resin:
   1. Manufacturers: One of the following or equal:
      a. PAXON, grade 7204 resin for crosslinkable polyethylene.
      b. Exxon 8660-8661 for linear polyethylene.

C. The material used shall be virgin polyethylene resin as compounded and certified by the manufacturer.
   a. Type 1 tanks shall be made from crosslinked polyethylene resin as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties.
   b. Type II tanks shall be made from high-density linear polyethylene resin as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties.
   c. Resin choice would be based on the specific application, chemical to be stored and concentration.

D. Ultra violet stabilizer:
   a. The polyethylene resin material shall contain a minimum of a UV 8 stabilizer as compounded by the resin manufacturer.
   b. Pigments may be added but shall not exceed 0.25 percent (dry blended) of the total weight.

E. Free of holes, blisters, crazing, cracking, delamination, undispersed raw materials, and any sign of contamination from foreign matter.
   a. The finished tank wail shall be free of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking, and delaminations.
   b. All cut edges where openings are cut into the tanks shall be trimmed smooth.
   c.

F. Resin shall meet or exceed the following properties:
   a. Mechanical Properties of Type 1 of Tank Material: Current XLPE Resin:

Property	ASTM	Value
Density (Resin)	D 1505	0.938-0.946 g/cc
Tensile (Yield Stress 2"/min)	D 638	3,000 psi
Elongation at Break (2"/min.}	D 638	>300%
ESCR (100% Igepal, Cond. A, F50)	D 1693	>1000 hours
ESCR (10% Igepal, Cond. A, F50)	D 1693	>1000 hours
Vicat Softening Temperature,	D 1525	250
Flexural Modulus	D 790	100,000 psi

   2. Mechanical Properties of Type II tank material: Current HDLPE Resin:

Property	ASTM	Value
Density (Resin)	D 1505	0.942-0.948 g/cc
Tensile (Yield Stress 2"/min)	D 638	2,950 psi
Elongation at Break (2"/min.)	D 638	>1,000%
ESCR (100% Igepal, Cond. A, F50)	D 1693	550 hours
ESCR (10% Igepal, Cond. A, F50)	D 1693	48 hours
Vicat Softening Temperature,	D 1525	235
Flexural Modulus	D 790	129,000 psi

G. Gel test: This test does not apply to Type II linear resins.
   1. Inner portion of tank wall:
      a. Not less than 65 percent.
      b. ASTM D 1998 requirements.
   2. Entire wall thickness: Not less than 80 percent.

H. Restraint system:
   1. Metal components, include anchor bolts:
      a. Type 316 stainless steel.
      b. The anchor bolts shall be supplied by the tank manufacturer.
      c. The drawings and calculations for the seismic system shall be submitted for review.
   2. Concrete anchors or flush shells shall not be used.

2.04 FITTINGS

A. Terminate in socket, threaded, or flanged connections:
   1. Flanges: 150 pound ASME B 16.5.
   2. Threaded connections: ASME B 16.4.

2.05 ACCESSORIES
   1. Finish coating:
      a. Waterproof and ultra-violet light resistant.
      b. Acrylic enamel or latex mastic.
      c. 2 coats.
      d. Minimum dry film thickness: 5 mil.
      e. Color: Selected by Engineer.

2.06 TANK FABRICATION

A. Rotationally molded construction in accordance with ASTM D 1998.

B. Provide for each tank the following shop finishing:
   1. Shipping label identifying:
      a. Tank tag number.
      b. Chemical service.
   2. Coating:
      a. Color: Selected by the Engineer.
   3. Permanent labels:
      a. Identification label.
      b. NFPA label specifically coded for the tank contents in accordance with NFPA 30.
      c. Paint or affix label onto the tank wall to be clearly visible from outside the tank enclosure.

2.07 TESTING

1. Each tank shall be leak tested by the manufacturer prior to shipment by filling with clean water for a period of at least 4 hours with all fittings installed and blinded.
   a. There shall be no measurable drop in liquid surface.
   b. Any leaks shall be noted and repaired and the tank shall be re-tested for an additional 4 hours minimum.
   c. Reason for leak and method of repair shall be recorded and submitted to the Engineer.
2. Any defects or leaks that have not been adequately repaired will be cause for rejection of the tank.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Transportation, handling, storage of the tanks, and installation shall be in accordance with the manufacturer's printed instructions.
   2. Repair any damage to tank components or the insulation due to transportation or installation.
   3. Install piping to tank with sufficient flexibility to allow tank movement of 1 inch in any direction without damage to piping.

B. All tank fitting attachments shall be equipped with flexible couplers or other movement provisions provided by the tank customer.
   1. The tank will deflect based upon tank loading, chemical temperature and storage time duration.
   2. Tank piping flexible couplers shall be designed to allow 4 percent design movement.
   3. Movement shall be considered to occur both outward in tank radius and downward in fitting elevation from the neutral tank fitting placement.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's field service:
   1. Inspect the installed tanks for proper installation.
   2. Instruct Owner's personnel on operations and maintenance of the tanks.

END OF SECTION

SECTION 13621

PRIMARY SENSORS AND FIELD INSTRUMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals required to install, calibrate, test, adjust and place into satisfactory operation all primary sensors and field instruments furnished under this Section.

2. The Drawings and Specifications illustrate and specify functional and general construction requirements of the sensors and field instruments and do not necessarily show or specify all components, wiring, piping and accessories required to make a completely integrated system. Contractor shall provide all components, piping, wiring accessories and labor required for a complete workable and integrated system.

3. Contractor shall be responsible for installing in-line flow elements (magmeter flow tubes) and for providing taps in the process piping systems for installation of other flow, chlorine residual, pressure and level sensing instrumentation.

B. Coordination: Coordinate the installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.

1.2 QUALITY ASSURANCE

A. Acceptable Manufacturers:

1. Furnish primary sensors and field instruments by the named manufacturers or equal equipment by other manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.

3. Obtain all sensors and field instruments of a given type from the same manufacturer.

B. Manufacturers' Responsibilities and Services:

1. Design and manufacture the primary sensors and field instruments in accordance with the applicable general design requirements specified in the detailed specifications herein.

2. Field supervision, inspection, start-up and training in accordance and conjunction with the requirements of Section 11010.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

Primary sensors and field instruments shall not be delivered to the site until all product information and system shop drawings for the sensors and instruments have been approved.

1.4 SUBMITTALS

Comply with the requirements specified in Section 01300.

PART 2 - PRODUCTS

2.1 PROCESS TAPS, SENSING LINES AND ACCESSORIES

A. Pressure Tap Sensing Lines and Accessories for Pressure Gauges, Pressure Switches and Pressure Transmitters.

1. Material and Fittings: Type 316 SCH40S stainless steel pipe (ASTM A 312) with threaded fittings and adapters (ASTM A 403) in accordance with Section 15050.

2. Sizes: 1/2-inch minimum for main sensing piping.

3. Pressure Rating: Equal to or greater than the applicable system test pressure.

4. Accessories:

a. Provide one piece, full port bronze ball valve at each tap in accordance with section 15050.

b. Provide 316 SS, block bleed valve to allow bleeding of air and shut-off (Anderson Greenwood M-9 or equal).

c. Provide ½” snubber for all pressure sensing devices (Ashcroft 50-1112S or equal)

2.2 PRESSURE TRANSMITTERS

A. Type: Two-wire, 4-20 mA, low power with LCD display.

B. Function: Measure discharge pressure of the booster station and produce an analog output signal directly proportional to that pressure.

C. Quantity: 1 Required; Discharge Pressure

D. Performance Specifications:

1. Accuracy (includes combined effects of linearity, hysteresis and repeatability):

Absolute, Gauge, Standard Range Differential Pressure Transmitters: ±0.10% of calibrated span.

2. Stability (drift over a 1-year period): Not more than ±0.10% of transmitters upper range limit.

3. Supply Voltage Effect: Output change not greater than 0.01% of span for each 1V change in supply voltage.

4. Output: two wire analog, 4-20 mA proportional to pressure; current limited – 28 mA maximum, 2 mA minimum.

5. Calibrated Range: 0-150 psig, pump station discharge

E. Required Features and Accessories:

1. Solid state electronic components.

2. Positive over-range protection of at least 2 times the maximum span limit.

3. Local LCD indicator calibrated in PSI units for discharge pressure.

4. Calibration Adjustments:

a. Zero: -600 to 600% of lower range limit.

b. Span: 16 to 100% of the upper range limit. Coarse and fine span adjustments in electronics compartment.

5. Adjustable internal damping.

6. Measuring elements protected by sealing diaphragm.

7. Built-in electrical surge and RFI protection.

8. Electrical Conduit Connection: 1/2-inch NPT.

9. Process Connections: 1/2 inch NPT unless otherwise shown on the contract drawings.

10. Process Wetted Parts: Type 316 stainless steel.

11. Non-Wetted Parts:

a. Housing and Cover: Low copper aluminum, epoxy finish, explosion-proof, rated for a Class 1, Division 1 location.

b. Fill Liquid: Silicone oil.

12. Mounting Bracket: Furnish stainless steel mounting bracket with stainless steel bolts for each pressure switch provided.

F. Product and Manufacturer:

1. Rosemount 2088, no equal.

2.3 PRESSURE SWITCHES

A. Pump Low Suction Pressure and High Discharge Pressure

1. Type: Switch assembly with SS Bourdon tube actuating in mercury switch.

2. Function: Pump low suction pressure and high discharge pressure control.

3. Switch: Mercury switch, SPDT rated at 4 amps at 120VAC.

4. Switch and Reset (Deadband) Action: Adjustable.

5. Quantity: 2 per pump, 10 total

6. Construction Features:

a. Set and Reset Point Adjustments: Adjusting nuts and pressure setting scales.

b. Process Connection: 1/4-inch NPT.

c. Housing: Pressed steel with a transparent cover.

d. External Mounting Bracket.

e. Electrical Connection: 1/2-inch NPT.

7. Product and Manufacturer:

Mercoid DAW-041-153-24E, or equal. (High discharge pressure switch)

Mercoid DAW-231-53-SS, or equal. (Low suction pressure switch)

2.4 PRESSURE GAUGES

A. Bourdon Tube Pressure Element Type, Liquid Filled Gauges

1. Performance Requirements:

a. Accuracy: ±1.0 percent of full span (ANSI B40.1 Grade 2A).

b. Range and Scale: 0-160 PSI

c. Quantity required: 8

2. Construction Features:

a. Case: Stainless Steel

b. Window: Glass.

c. Dial: White with black marking; 270° scale.

d. Bourdon Tube and Socket: Type 316 Stainless Steel, heliarc welded unless otherwise specified in the Instrument Schedule.

e. Size: 4-1/2-inch.

f. Connection: 1/2-inch male NPT bottom or as required.

g. Adjustable pointer.

h. Externally accessible zero adjustment.

i. Built-in overload and underload movement stops.

j. Filling Liquid: Silicone Oil.

k. Product and manufacturer Ashcroft 45-1009-S-04L or equal.

2.5 FLOAT SWITCHES

A. Type: Tipping float switch

B. Function: Liquid level sensing

C. Quantity Required: As shown on plans

D. Required Features

1. Mercury Free

2. Cable: #18AWG 3-conductor type SJOW 90ºC. Length shall be determined by contractor.

3. Housing & Clamp: Polypropylene

4. Electrical Rating: 7A @ 120VAC with one (1) normally open (NO) and one (1) normally closed (NC) contact.

5. Installation: Wire mounted

E. Product and Manufacturer

1. Anchor Scientific Inc. G Series Eco-Float or equal.

2.7 FLOW METER

A. Type: Electromagnetic with remote flow indication.

B. Function: Measure flow in forward directions.

C. Sizes:

Quantity	Size	Range
2	10-inch flanged	52 – 7,670 GPM
2	16-inch flanged	118 – 20,900 GPM
1	20-inch flanged	185 – 32,720 GPM
2	36-inch flanged	610 – 105,930 GPM

D. Electrical Conductivity: 5 µs/cm

E. Electrode Design: Type 316 Stainless Steel

F. Materials:

1. Measuring Tube –Stainless Steel
2. Electrodes –Type 316 Stainless Steel
3. Housing – Fusion Bonded Epoxy Coated Steel
4. Grounding Rings – Type 316 Stainless Steel
5. Converter – IP67 Die Cast Aluminum
6. Liner – UltraLiner NSF approved, fusion bonded epoxy
7. Furnish sufficient length of cable to connect local transmitter to remote indicator/ transmitter.

G. Indicator/Transmitter

1. Remote indicator/transmitter

H. Outputs:

1. Dual 4-20mA, Proportional to instantaneous flow rate

2. Pulse, Totalized Flow

3. Relay Output, Forward/Reverse Flow Direction

4. AMR/AMI, Totalized Flow compatible with the CITY's AMR/AMI system

I. Product and Manufacturer: McCrometer UltraMag UM06 with M-Series AC Signal Converter with Option Part #MIM087 for Sensys AMI Interface.

2.8 CONDUCTIVITY PROBE

A. Function: Provide two (2) conductivity level probes, fitting and relay to sense a reservoir overflow condition and send an alarm signal to the PLC.

B. Materials:

1. Probe shall be 316 stainless steel with threaded ends that screw into a fitting extending vertically into the reservoir.

Probes shall be Warrick Series 3R or equal.

Top Mounting Fitting: One (1) required capable of accepting a maximum of three (3) probes. Fixture shall have die cast aluminum epoxy coated terminal housing, with a 316 S.S. body, and shall incorporate a 2-inch, male, threaded connection. Mounting fixture shall be Warrick Series 3F-3-E or equal.

Solid State Plug-in Module Control Relays: One (1) required. Relay shall provide 2 DPDT output contacts rated at 5 amps. The relay shall operate on 120 VAC supply voltage, and shall be furnished with a NEMA 1 enclosure, and 11 pin socket. Relays shall be Warrick 16 DM or equal.

2.9 SUBMERSIBLE LEVEL PRESSURE TRANSMITTER

A. Function: Continuous Reservoir level measurement

B. Measuring principle: Hydrostatic liquid level

C. Materials:

1. Cable: Polyurethane

2. Body and Nose Cone:

Body: 17.5mm diameter Titanium

Nose Cone: Acetyl

D. Mechanical: Manufacturer's Cable Clamp System

E. Measuring Performance:

1. Range: 0 to 22 ftH2O

2. Resolution: 0.022 inches or better

3. Accuracy: ± 0.08% for distances < 3.3 feet; ± 0.06% for distances >3.3 feet.

F. Display & Configuration: None

G. Output Units: For Level or distance-to-surface: meters, inches and feet.

H. Electrical:

1. Current Output: Loop powered (two wire), 4 to 20 mA.

2. Cable Entry: ½" 14 NPT conduit entries for cable glands.

I. Environmental:

1. Operating Temperature Range: -4 to 140ºF

2. Compensated Temperature Range: 28 to 86ºF

3. Water Ingress Protection: IP68 to 700 mH2O

J. Product and Manufacturer: GE Druck PTX 1830 Series, with GE Druck Sensor Termination Enclosure, GE Druck Cable Clamp, and GE Druck Sink Weight accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall require the system supplier to furnish the services of qualified factory-trained servicemen to assist in the installation of the instrumentation and control system equipment.

B. Install each item in accordance with manufacturer's recommendations and in accordance with the Contract Documents. Transmitters and instruments which require access for periodic calibration or maintenance shall be mounted so they are accessible while standing on the floor.

C. All items shall be mounted and anchored using stainless steel hardware unless otherwise noted.

D. All field instruments shall be rigidly secured to walls, stands or brackets as required by the manufacturer and as shown on the Contract Drawings.

E. Conform to all applicable provisions of the NEMA standards, NEC and local, State and Federal codes when installing the equipment and interconnecting wiring.

*** END OF SECTION***

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SECTION 15050

PIPING, VALVES AND ACCESSORIES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included in this Section: The Contractor shall furnish and install all piping, including fittings, valves, supports, and accessories as shown on the Drawings, described in the Specifications and as required to completely interconnect all equipment with piping for complete and operable systems.

B. Work Specified in Other Sections:

1. Section 15060 – Piping Installation

1.2. QUALITY ASSURANCE

All materials and equipment furnished under this Section shall be of a manufacturer who has been engaged in the design and manufacture of the specific materials and equipment for a period of at least 5 years.

1.3 SUBMITTALS

A. Shop Drawings:

1. Verify by excavation, inspection and measurement all installation conditions for shop fabricated pipe before preparation of Shop Drawings. Submit field measurements and photos with Shop Drawings where exposed conditions are significantly different than indicated on the Drawings.

2. Layouts and Schematics: Submit detailed installation drawings of all piping. Schematics may be submitted for piping 4-inches and smaller. The drawings shall include pipe support locations, and types if different than shown on the Drawings and specifications, all fittings, valves, and other appurtenances.

3. Submit data to show that the following items conform to the Specification requirements:

   a. Pipe, fittings, and accessories.

   b. Fabricated pipe supports and other pipe supports as required herein.

   c. Flexible couplings and flanged adapters.

   d. Valves.

4. Submit certified test reports as required herein and by the referenced standard specifications.

5. Pipe, fittings and joint fabrication details for welded steel pipe.

B. Affidavits: The Contractor shall furnish affidavits from the manufacturers for valves.

1.4 APPURTENANCES

Furnish and install all necessary guides, inserts, anchors and assembly bolts; washers nuts, hangers, supports, gaskets, and flanges; all other appurtenant items shown on the Drawings, specified or required for the proper installation and operation of the piping; devices included in or on the piping equipment; and piping accessories.

PART 2 - PRODUCTS

2.1 GENERAL

A. Pipe and valve sizes are nominal inside diameter unless otherwise noted.

B. All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.

C. Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the complete product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified hereinafter.

D. Cutoff Flanges: Provide at all pipe penetrations for pipes 4 inches and greater in nominal diameter, and at all penetrations of 3-inch and smaller nominal diameter pipe in wet or potentially wet locations as indicated on the Drawings. Cutoff flange outside diameter shall be at least 85% of the standard connection flange's outside diameter. Link type seals may be substituted for cutoff flanges.

2.2 GENERAL MATERIAL REQUIREMENTS

A. Gaskets: Unless specifically specified otherwise, all gaskets shall be non-asbestos synthetic fiber bound by nitrile rubber; Garlock 3000 or equal.

B. Bolts and Tie Rods: Unless specifically specified otherwise, flange bolts and nuts, tie rods and other flange hardware shall be as follows:

1. Exposed: Type 316 stainless steel.
2. Submerged: Type 316 stainless steel.
3. Encased: Steel.

4. Buried: Type 316 Stainless Steel.

C. Flexible Sealant: Flexible sealant for pipe joints, where shown on the Drawings, shall be a two-component polysulfide, non-sag; Sikaflex 412, Dualthane, or equal.

2.3 MATERIALS

A. Steel Pipe 8-inches or Larger

1. Pipe: AWWA C200, shop applied fusion bonded epoxy lined and coated steel pipe, and shop applied cement mortar lined and coated steel pipe.

   a. Dimensions: For pipe 14 inches in diameter and larger, the inside diameter shall not be less than the nominal diameter specified or shown. Pipe smaller than 14 inches in diameter may be furnished in standard outside diameters.

   b. Cylinder thickness: Cylinder thickness for steel piping shall be as follows:

      1. All 18-inch diameter and larger pipe up to 36-inch diameter shall have a shell thickness of ¼-inch. All 36-inch diameter pipe shall have a shell thickness of 3/8-inch.
      2. The 10-inch by-pass inlet pipe and the 12-inch reservoir drain will be Schedule 40 steel pipe.

   c. Steel for cylinders and fittings: Pipe manufactured under ANSI/AWWA C200 shall be fabricated from sheet conforming to the requirements of ASTM A 570, Grades 30, 33, 36, or 40, or from plates conforming to the requirements of ASTM A 36, A283, Grades C or D, or A 572, Grade 42, or coil conforming to the requirements of ASTA A 139, Grades B or C. All longitudinal and girth seams, whether straight or spiral, shall be butt welded using an approved electric-fusion-weld process. All steel used for the fabrication of pipe shall have a maximum carbon content of 0.25 percent and shall have a minimum elongation of 22 percent in a 2-inch gauge length.

2. Fittings: Fittings shall be made of hydrostatically tested cylinders of the same material as the pipe.

   a. Provide reinforcement for fittings outlets, tees and wyes, in the form of collars, wrappers or crotch plates, in accordance with AWWA M11.

   b. Crotch plates shall be designed in accordance with AWWA M11 for an internal pressure of 225 psi, using a minimum plate thickness of 1-inch.

c. Mitered 90 Degree Elbows: Four pieces minimum.

d. Mitered 45 Degree Elbows: Three pieces minimum.

e. Outlets shall be extra heavy half couplings in accordance with AWWA M-11.

3. Lining and Coating:

a. Fusion bonded epoxy, 16 Mils DFT Conforming to AWWA C213.

b. Cement mortar lining and coating shall comply with AWWA C205.

4. Flanges: Steel ring flanges conforming to AWWA C207, Class D, with bolt holes drilled in conformance with ANSI B16.1, 150-pound class. Flanges shall be welded to the cylinder without warping and with the flange face perpendicular to the longitudinal axis of the cylinder.

5. Factory Testing: Hydrostatic pressure tests performed in accordance with Section 3.4 of AWWA C200. Specials shall be tested in accordance with Section 4.3 of the AWWA C200.

6. Marking: Cylinders and completed pipe and fittings shall be marked in accordance with AWWA C200, Section 9.8. The manufacturer shall maintain records that identify the cylinder test results and other documentation required to be furnished to the Contractor.

7. Joints: All joints shall be restrained, either by welding, flanges, Victaulic, or restrained couplings. Field welded joints shall be in accordance with ANSI/AWWA C206. As soon as practical after the welding of each joint, all field-welded joints shall be tested by the liquid penetrant inspection procedure conforming to the requirements of ANSI/ASTM E 165 under Method “B” and “Leak Testing”. All defects shall be chipped out, re-welded, and re-tested. Upon re-test, the repaired area shall show no leaks or other defects.

All welded joints on 36-inch diameter pipe shall be welded inside and out per Detail 5, Sheet C-22 and air tested in the presence of the Engineer.

B. <u>PVC Pipe 2" and Smaller</u>

PVC pipe shall meet the following requirements:

Pipe	PVC SCH 80
Joints	Solvent Weld
Unions	PVC, SCH 80, Solvent Weld

Ball Valves	150 PSI, with TFE true union ends with TFE seats and seals
Check Valves	150 PSI, true union ball check with TFE seats and seals

C. Galvanized Steel Pipe and Appurtenances

Galvanized steel pipe shall meet the following requirements:

Pipe	Galvanized steel, SCH 80, ASTM A120
Joints	Screwed, 150 PSI, Galvanized, ANSI B163
Unions	300 PSF, galvanized, screwed, brass to iron seat
Gate Valves	150 PSI, screwed, bronze, union bonnet, disc, rising stem
Ball Valves	500 PSI, screwed, carbon steel body, ball and stem, TFE seats and seals
Swing Check Valves	200 PSI, screwed, bronze, metal disc, screwed caps

D. Steel Pipe 2” and Smaller

Pipe	SCH 40 conforming to ASTM A120
Joints	Threaded
Flanges	Threaded, 150-pound forged steel
Fittings	Malleable Iron

E. Stainless Steel Pipe

Stainless steel pipe shall be Type 316 Schedule 40 threaded pipe conforming to ASTM A312 with stainless steel threaded fittings, or with stainless steel welded fittings, where indicated.

Pipe	Type 316, SCH 40
Joints	Threaded, 150 psi
Ball Valves	One-piece, conventional port, 400 psi CWP, 316 SS Body, PTFE Seats, Non-Blow-Out Stem
3-Way Valves	Multiport, Threaded ends, T Arrangement flow pattern (Triac Series 33 or Equal)

F. Copper Pipe 2" and Smaller

Copper pipe and appurtenances shall be in accordance with the following:

Pipe	Seamless, Type K copper tubing, ASTM B88
Pipe Joints	Compression type, 3-piece, screwed
Fittings	Wrought copper, compression type, 3-piece, Parker, Swagelok or equal
Gate Valves	200 psi, WOG, bronze, ends, screwed bonnet, rising stem, solid wedge
Globe Valves	200 psi, WOG, bronze, screwed bonnet, renewable seat
Check Valves	200 psi, WOG, bronze, screwed ends, swing type, bronze disc, screwed cap
Block/Bleed Valves	5000 psig, Teflon packing, all 316 S.S. construction. (Anderson Greenwood M9 or equal)

G. Ductile Iron Pipe

1. Materials: Pipe, fittings and appurtenances shall conform to the thickness class Ductile Iron Pipe as designated on the Plans.

   All ductile iron pipe shall be new and shall conform to all requirements of Federal Specification WW-P-421C, ANSI A21.51 (latest revision) and AWWA C151 (latest revision).

   All pipe and fittings shall be clearly marked with the name of the manufacturer or with a trademark of the size and type which has been approved by and filed with the Owner.

   a. Lining and Coating: All ductile iron pipe and fittings, unless otherwise prescribed in another item of the Contract Documents, shall be double thick cement mortar lined with seal coat in accordance with AWWA C104. Pipe coating shall be 1 mil asphaltic material in accordance with AWWA C151.

   b. Type of Joints: Ductile iron pipe shall have any of the following types of joints as specified: Push-on, Tyton Joint, Grip-Tite, or flanged.

   c. Specials and Fittings: All fittings for ductile iron pipe, unless otherwise required by the Drawings or Specifications, shall conform in all respects to AWWA C110 (latest revision).

d. Delivery and Handling: All pipe and fittings shall be manufactured, handled, loaded and shipped in such a manner that it is delivered undamaged, in sound condition, and conforming in all respects to these Specifications. Care shall be taken in loading and handling the pipe so as not to injure the pipe coating. No other pipe or material of any kind shall be placed inside any pipe or fitting at any time after the coating has been applied and prior to installation. All pipe and fittings installed on the work shall be new material which has never been previously used for any purpose whatsoever.

H. Polyvinyl Chloride Pressure Pipe (4”-12”)

Pipe size shall be as shown on the Contract Drawings.

Polyvinyl chloride (PVC) plastic pressure pipe for 4-inches through 12-inches in diameter shall conform to AWWA C-900. PVC pressure pipe shall be pressure class 200 (maximum working pressure shall not exceed 200 psi and maximum field test pressure shall not exceed 250 psi) meeting the requirements of DR 14 and shall have bell and spigot joints with elastomeric gaskets.

1. Elastomeric gaskets for bell and spigot PVC pipe joints shall be furnished by the Pipe Manufacturer and shall conform to AWWA C900.

2. Lubricant shall be furnished by the pipe manufacture and shall conform to AWWA C900 and NSF 61.

3. Fittings shall be Ductile Iron and shall conform to AWWA C110. Fittings shall be Cement Mortar Lined “Double Thickness” in conformance with AWWA C104. Type of joint shall be as shown on the Contract Drawings.

4. All buried bolts, nuts and washers, including mechanical joint and flanged joint bolts shall be 316 Stainless steel. Bolts and Nuts shall be American National Standard Regular and shall have heavy hexagon heads. Threads shall be Coarse Thread Series, Class 2A and 2B fit.

5. Detection tape for non-metallic piping (PVC) shall be a plastic metallic tape consisting of a blue color-coded polyethylene or melinex film, a solid core aluminum foil detection layer and other layers as required. Detection tape shall be resistant to acids, alkalines and other components likely to be encountered in soils. Unless shown otherwise on the Contract Drawings, detection tape shall be installed 12-inches above the top of pipe and shall be imprinted with “CAUTION POTABLE WATER PIPELINE BELOW” (minimum ½-inch black letters). Detection tape shall be Terra Tape “D” by Griffolyn Company, Detectatape by Allen Systems, or approved equal. Detection tape shall terminate above grade at each fire hydrant.

2.4 PIPE COUPLINGS AND FLEXIBLE PIPE PIECES

A. General: For typical pipe joints refer to pipe material specifications. Other joint devices shall be furnished where called for as specified below.

B. Flexible Couplings and Flange Coupling Adaptors:

1. Sleeve: Fabricated steel.

2. Followers: Cast iron, ductile iron, or steel.

3. Sleeve Bolts: 316 Stainless Steel.

4. Coating: Fusion epoxy line and coat sleeve and followers.

5. Pressure Rating: Pressure rating shall be equal to or greater than that of pipe being connected as determined by Barlow's Formula.

6. Manufacturers:

a. Flexible Couplings:

1) Connecting Pipe with Identical Outside Diameters: Smith Blair 411 or equal.

2) Connecting Pipe with Slightly Different Outside Diameters: Smith Blair 413 or 415, or equal.

b. Flange Coupling Adaptors: Smith Blair 913 or equal.

c. Victaulic Couplings: Style 77 Flexible Coupling with ductile iron housing and grade E gasket. For pipe sizes greater than 24-inches: Style W07 AGS Rigid Coupling.

7. Flex Coupling and Flanged Coupling Adapter Gaskets: Buna “N” NSF 61 Rated.

8. Joint Restraint: Provide joint harnesses (tie rod lug or attachment plate assemblies) across all flexible couplings, flange coupling adaptors, and victaulic couplings, except where specifically indicated otherwise on the Drawings. Design restraint for 1-1/2 times the test pressure of the applicable service.

2.5 VALVE AND ACCESSORIES

A. General Requirements for Valves:

1. All valves of each type shall be the product of one manufacturer.

2. All valves shall be furnished with operators, handwheels, levers, or other suitable type wrench including handles as specified herein or as shown on the Drawings. Valves 4-inch and larger located more than 7 feet above the floor level shall be furnished with chain operators. Chains shall be galvanized and shall extend to within 3 feet of the floor.

3. All threaded stem valves shall open by turning the valve stem counter-clockwise.

4. All valves shall be epoxy lined in accordance with AWWA C550 and NSF 61.

5. All valves and valve operators shall have a nonbleeding shop coat.

6. All valves not designated on the drawings as to type shall be subject to approval of the Contractor.

B. General Requirements for Accessories:

Pressure Gauges: Provide shutoff valves for all pressure gauges. Conform to additional requirements in this Section below.

C. Valves and Accessory Systems:

1. Resilient Wedge Gate Valves 4-12 inches.

a. All valves shall be new and of current manufacture.

b. Valves shall be furnished and installed with the type of ends suitable for connecting to the type of pipe shown on the plans or as specified herein.

c. Valves shall be manufactured to meet all applicable requirements of the latest edition of AWWA C509-80. Flange drilling shall be in accordance with ANSI B16-1 standard for cast-iron flanges. All valves 12 inches and smaller shall be bubble tight at 200-psi water working pressure.

d. Valves shall have nonrising stems, opening by turning left and provided with a handwheel. Valves stems shall be cast integral with stem collar and furnished of cast, forged, or rolled bronze. Stem nuts shall be independent of the wedge and shall be made of solid bronze. All body bolts shall be 316 stainless steel.

e. Cast-iron wedge shall have sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM tests for rubber to metal bond ASTM D429.

f. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

g. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar.

h. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.

i. Valves shall have hydrostatic shell test of 400 psi and shutoff test of 200 psi. At the 200-psi shutoff test the valve must be bubble tight-zero leakage.

j. Valves shall be factory lined and coated with a 10-mil fusion bonded epoxy coating complying with AWWA C550 and NSF 61.

k. Resilient wedge gate valves shall be Mueller or equal.

2. Butterfly Valves, 6-inch and larger:

a. General: Tight closing, rubber-seat type that fully complies with AWWA Standard C504-87. Provide Class 150B minimum unless a higher class is shown on the Drawings or required in the Specifications. Valves shall be bubble-tight at rated pressures in either direction. Where a buried installation is indicated on the Drawings, valves shall be suitable for buried service. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. The 6-inch to 36-inch valves shall be Pratt or equal.

b. Valve Body: Cast iron per ASTM A126, Class B. All valves shall have flanged connections with 150-pound flanges faced and drilled in accordance with ANSI B16.1.

c. Valve Disc: Cast iron ASTM A48 or ductile iron ASTM A536 or fabricated steel with stainless steel seating edge. The valve disc shall be attached to the valve shaft by 18-8 stainless steel pins.

d. Valve Shaft: Turned, ground and polished and constructed of Type 304 or Type 316 stainless steel. Shafts shall be two-piece, stub-type keyed for operator connection. Shaft diameters shall meet minimum requirements established by AWWA C504-87 for their class where applicable. The shaft shall be keyed for attachment to the disc. The valve shaft shall be marked and corresponding marks placed on the valve body to indicate whether the valve is open or closed.

e. Valve Seat: Buna-N rubber. Seats shall be a full 360 degrees without interruption. Valve seats shall be field adjustable around the full 360-degree circumference and replaceable without

dismantling operator, disc or shaft and without removing the valve from the line. The rubber seat shall be field replaceable. Seat shall be in the valve body, not on the disc.

f. Valve Bearings: Sleeve-type bearings, corrosion resistant and self-lubricating. Bearing load shall not exceed 1/5 of the compressible strength of the bearing or shaft material.

g. Finish: Factory lined with epoxy, minimum dry film thickness of 16 mils, and factory applied exterior finish of universal primer suitable to receive epoxy, coal tar epoxy, or alkyd base machinery enamel top coats. For valves for buried service, factory coat with coat tar epoxy, minimum dry film thickness of 16 mils. Coatings shall be NSF 61 compliant.

h. Manual Operator (non-buried service): Traveling nut, self-locking type. Equip with mechanical stop-limiting devices, adjustable in place in the field, to prevent overtravel of the disc in the closed and open positions. Provide handwheel or chainwheel in accordance with Paragraph 2.04 B. designed to produce the specified torque with a maximum pull of 80 lb. on the handwheel or chainwheel. Operator components shall withstand an input torque of 300 ft. lbs. at extreme operator positions without damage. Conform to AWWA C504-87. Provide exterior finish as specified for the valve body.

i. Manual Operator (buried service): Where a buried installation is indicated on the Drawings, provide operators specifically designed for buried service. Buried service operators shall conform to the requirements above for manual non-buried.

j. Manufacturer's Identification: The manufacturer's name and catalog number shall be molded or stamped on the valve where it can be easily seen after the valve is installed.

k. Submittals for Approval. The following submittals shall be furnished to be approved by the Engineer before the valve is installed (this article only applies to Contractor supplied material):

1) Certification from the valve manufacturer that both the valve and the operator conform to all requirements of AWWA C-504.

2) Certified drawings of valve and operator as specified in Section 3.2 of AWWA C-504.

3) Certified copies of reports of the torque rating of the manual operator as specified in Section 11.2.3 of AWWA C-504.

l. Manufacturer: Butterfly valves shall be Pratt or equal.

3. Ball Valves, 6-inch through 48-inch

a. General:

1) The ball valve shall be metal to metal seated with flanged ends, drilled to the applicable ANSI B16.1 standard Class 125. Valve shall have a clear unobstructed waterway, which will result in no significant head loss, when the valve is in the full open position.
2) The valve shall be drop tight and meet or exceed the AWWA C507-(latest revision) inspection and testing standard. The valve shall be single seated for pump control and rated at 150 or 300 psi. The valve shall be as manufactured by Henry Pratt Company.
3) The valve shall consist of a body, ball and operating unit (actuator).

b. Body:

1) The body shall be cast ductile iron ASTM A 536 grade 65-45-12 having an inlet and outlet flanged waterway equal to the required valve size. Flanges shall be flat-faced and machined parallel to each other to within .005 inch. Valve body shall have both a drain and vent hole drilled and tapped.
2) The body shall have bronze bearings installed in each half accurately located in the center of the housing to receive the trunnion bearings on the ball and place the ball in the central position. The bearing load shall not exceed 2000 lb/sq. inch at 250 psi differential pressure. The body seat shall be Monel electronically fused to the base metal, then accurately machined to form the seating seal, or other C507-(latest revision) approved materials. The body seat shall not protrude into the waterway.

c. Ball

1) The ball shall be cast ductile iron ASTM A 536 grade 65-45-12. It shall have integrally cast trunnions which will be bronze-bushed. One trunnion holds the operating shaft which passes through a packing seal area and connects to the actuator. To prevent leakage around the shaft, V-Type packing is installed to form a seal. The ball seat shall be stainless steel 300 series. It shall be a pressure-assisted design and by using an offset on the body and ball, the seats will only be in contact at the actual point of closing. The seat is connected to the ball by means of a stainless steel mounting ring which is securely attached and pinned into position after the correct setting has been attained.

Seats threaded directly on to the ductile iron ball shall not be acceptable.

2) Valve seat assembly shall be fully adjustable and replaceable in the field without removing the valve from the line. The ball seat shall be located at the top, when the valve is in the open position.

d. Valve Actuators
Valve actuators shall conform to the operating requirements of AWWA Standard C507-(latest revision) and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering.

e. Bearings
Bearings for ball and body trunnions shall be bronze of dissimilar hardness as per AWWA C507-(latest revision) standard to prevent galling or binding. Self-lubricating Teflon reinforced would also be acceptable.

f. Shafts
Acceptable materials for valve shafts shall be: ASTM A 564 Type 630, H1150 (17-4-PH) Stainless steel.

g. Valve Testing
All ball valves shall be subjected to hydrostatic, shop leakage and performance tests as specified in AWWA Standard C507-(latest revision). Maximum seat leakage allowance 1 fl. oz. per diameter inch per hour as per AWWA C507-(latest revision).

h. Valve Painting
All internal ductile iron surfaces, except finished or bearing surfaces, shall be shop painted, and AWWA C550. All exterior steel or cast or ductile iron surfaces of each valve, except finished or bearing surfaces, shall be shop painted with one or more coats of Alkyd primer.

4. Combination Air Release and Vacuum Valve Assemblies

Combination air release and vacuum valve shall allow large volumes of air to escape out the large orifice when filling a pipeline and close when liquid enters the valve. During large orifice closure, the small air release orifice will open to allow small pockets or air to escape automatically and independently of the large orifice.

The large orifice shall also allow large volumes of air to enter during pipeline drainage to break the vacuum. The body inlet must be baffled to protect the lower float from direct forces of rushing air and water to

prevent premature valve shut-off. The top large orifice plug or float must be protected in similar manner for the same purpose.

The Buna-N seat must be fastened to the valve cover, without distortion, for drop tight shut-off. The floats shall be heavy stainless steel, hermetically sealed; designed to withstand 1000 psi. The top plug or float shall be center guided thru hex bushings for positive shut-off.

Valve exterior to be painted with Red Oxide Phenolic Primer Paint as accepted by the FDA for use in contact with Potable Water.

All materials of construction shall be certified in writing to conform to A.S.T.M. specifications as follows:

Body & cover	Cast Iron	ASTM A126 GR.B
Float	Stainless Steel	ASTM A240
Needle & Seat	Buna-N	ASTM B124
Plug	Bronze	ASTM D2133
Leverage frame	Delrin/Cast Iron	ASTM A126 GR.B

Air release and vacuum valve assemblies shall be APCO or equal.

5. Pressure Reducing Valves (Chlorinator Water Supply)

A Water Pressure Reducing Valve with integral strainer shall be installed as shown on the construction drawings. The water pressure reducing valve shall be constructed using Lead Free materials. The valve shall feature a lead-free brass body suitable for water supply pressures up to 300 psi. Provision shall be made to permit the bypass flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main supply. Water pressure reducing valve with built-in bypass check valves will be acceptable. Approved valve shall be listed to ASSE 1003 and IAPMO and verified to CSA B356. Valve shall be Watts Series LF25AUB-Z3 or equal.

6. Swing Check Valves

Cushioned Swing Check Valves shall comply with all applicable provisions of ANSI/AWWA C508, with an iron body, bronze mounted with rubber faced disc, adjustable tension spring and lever design with adjustable pneumatic cylinder to control opening and closing speed of clapper, flanged end dimensions and drilling that comply with ANSI B16.1, class 123, and O-ring stuffing box. Materials of construction shall conform to the following specifications:

Body, Cover, Disc – Cast Iron – ASTM A126 Grade B
Seat Ring, Clapper Arm – Cast Bronze – ASTM B584 Alloy C84400
Disc Facing – Rubber – ASTM D2000 2BG715

Cushioned Swing check valves shall incorporate the following design features:

1. Clear full opening waterway when disc in the fully open position.
2. Operating parts accessible through the top opening.
3. Clapper arm clamped to the hinge pin with stainless steel screws and jam nuts.
4. Heavy bronze bearings support pin and pressure sealed O-rings.
5. Check valves shall be lined and coated with a 10-mil fusion bonded coating complying with AWWA C550 and NSF 61.
6. Rated at 150 psi working pressure. Swing check valves shall be Kennedy, Mueller A-2600-06-01 or equal.

7. HDPE Plastic Flap Gates

1. General
   a. The 6-inch and 12-inch flap gates for this project shall be provided as specified and as shown in the contract drawings.
   b. Leakage for the flap gates shall be restricted to 0.1 gpm/ft or less of the seal perimeter at the design seating head.
   c. Submittals shall include, at a minimum, detailed custom drawings of the gate assembly with dimensional and mounting information and a listing of the materials of construction. General arrangement drawings and cut sheets are not considered acceptable drawings.
   d. The basis for the design of the flap gates is the Model RW5000-P as manufactured by RW Gate, Troy, NY.
   e. All gates shall be shop inspected for proper operation prior to shipment.
   f. The gate manufacturer shall be ISO 9001 certified.

2. Body and Bolts
   a. The flap and frame shall be manufactured from HDPE, ASTM D4801.
   b. All stainless steel referenced in this specification shall be Type (304)(316) or Type (304L)(316L), ASTM A240 or ASTM A276 unless otherwise indicated herein.
   c. All stainless steel components, excluding anchor bolts and assembly bolts, shall be Type (304)(316) or Type (304L)(316L) stainless steel.
   d. Anchor bolts and assembly bolts shall be Type 316 stainless steel.

3. Flap
   a. The flap shall consist of a reinforced HDPE plastic plate that is reinforced to withstand the specified head conditions.
   b. The flap shall be reinforced restrict deflection to ensure full seal contact
   c. A lifting lug shall be provided on the lower portion of the flap.

4. Frame
   The frame shall be constructed of HDPE plastic and shall be reinforced to withstand the specified operating conditions.
   a. The frame shall be a rigid, one-piece assembly of the configuration shown on the Contract Documents.
   b. The frame shall be outfitted with a resilient seal around the perimeter of the opening.
   c. HDPE hinge arrangement connects the flap to the frame.
   d. Hinge pins shall be stainless steel.

5. Seals
   a. The seal shall consist of a continuous rubber seal mounted around the perimeter of the opening.
   b. Seals shall be affixed to the frame.
   c. Seal shall be EPDM or neoprene rubber.

6. Anchorage
   a. Anchor bolts shall be 316 stainless steel, fully threaded and shall have a minimum diameter of ½-inch.
   b. Anchor bolts shall be of the epoxy type.

7. Installation
   a. Installation shall be performed in accordance with the gate manufacturer's installation instructions and the approved installation drawings.
   b. Installation instructions and installation drawings shall be found in the O&M manual.
   c. Non-shrink grout or a resilient gasket shall be applied, by the Contractor, between the frame and the wall to ensure that there is no leakage around the gate.
   d. The material used to mount the gate shall be indicated on the approved installation drawings.

8. Duck Bill Check Valve

a. Duck bill check valves shall be manufactured by Tideflex Technologies, Series 35 and be the size and installed as shown on the contract drawings.

b. The valve shall have an integral elastomer flange as part of the valve. Standard flange size and drilling shall conform to ANSI B16.5 and ANSI B16.47, Class 150 standards.

c. A 3/8-inch thick steel back-up ring shall be provided for installation.

H. Backflow Preventer

The backflow prevention assembly shall be the reduced-pressure principal type and shall conform to the requirements of ANSI/AWWA C511-89. The unit shall consist of two independent spring-loaded poppet-type check-valve assemblies and a relief valve. The relief valve shall be a diaphragm actuated, spring loaded, double seat assembly. Two gate valves and four test cocks for field testing shall also be provided. The backflow assembly shall be FEBCO 860 Series or equal.

I. Shower/Eye Wash

1. The Contractor shall provide an emergency shower/eye wash fountain, as shown on the plans.

2. The valve shall be an instant-action, self-closing, stainless steel ball valve that shall activate the shower and eye wash simultaneously.

3. The supply and standard shall be 1 ¼ - inch stainless steel pipe with a 9-inch floor flange. The emergency shower/eye wash fountain shall be Haws Model 8330 or equal.

J. Flexible Expansion Joints

1. Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53.

2. Each flexible expansion joint shall be pressure tested against its own restraint to a minimum of 350 psi (250 psi for flexible expansion joints 30 inches and larger).

3. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum of 15 degrees deflection per ball and 4-inches minimum expansion.

4. All internal surfaces and seal contact surfaces parts shall be lined with a minimum of 15 mils of fusion-bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be holiday tested with a

1500-volt spark test conforming to said specification. The exterior is coated with coal tar epoxy.

5. All flexible expansion joints shall be double ball with 8-inch expansion capability and shall be FLEX-TEND as manufactured by EBAA Iron Inc., Eastland, TX or equal.

K. Pipe to Wall, Modular Mechanical Type Sealing Elements

1. The pipe to wall penetration closures shall be “Link-Seal” as manufactured by Thunderline Corporation or equal. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall opening. The seal shall be constructed so as to provide electrical insulation between the pipe and wall, thus reducing chances of cathodic reaction between these two members.

2. Contractor shall determine the required inside diameter of each individual wall opening or sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water-tight joint. If pipe O.D. is non-standard due to coating, insulation etc. consult manufacturer for Contractor assistance and recommendation before proceeding with wall opening detail.

PART 3 - EXECUTION

3.1 General

Pipe, valves and accessories shall be installed in accordance with the requirements of section 15060 of the specifications. Final coating shall conform to the requirement in Section 09904.

END OF SECTION

SECTION 15060

PIPING - INSTALLATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work included in this section of the specifications consists of furnishing, installing and testing all piping, fittings and appurtenances, as indicated on the Drawings and specified herein or as required to complete the work.

B. Whenever the word "piping" is used in this section, it shall be understood to refer to all exposed and buried pipes, fittings, valves, flanges, gaskets, hangers and supports or bedding comprising any given system, plastic piping and instrument tubing included.

C. All piping shall be installed to the lines and grades shown on the Drawings or as required for the mechanical equipment. All piping shall be properly supported and provisions shall be made for expansion and contraction.

D. Dissimilar metals shall be properly insulated with the use of insulating bushings, gasket sets or wrappings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Piping, Valves, and Accessories- Section 15050.

B. Earthwork – Pipeline and Miscellaneous Structures - Section 02350.

1.3 CODES AND PERMITS

A. Installation shall comply with all applicable federal, state and local laws whether or not explicitly specified.

B. The Contractor shall furnish to the Engineer a certificate of final inspection and approval from the inspecting authority having jurisdiction.

1.4 INSPECTION AND TESTING

A. The quality of all materials, the process of manufacture and finished pipe shall be subject to inspection and approval of the Engineer. Pipe may be inspected at the place of manufacture, and on the work site, and shall be subject to rejection at any time even though submitted samples may have been approved. In addition, the Owner reserves the right to have any or all pipe or fittings inspected or tested, or both, by an independent inspection service at either the manufacturer's plant or elsewhere. Such inspections and/or tests shall be at the Agency's expense.

B. All pipe, fittings and appurtenances shall be carefully inspected in the field before installation. All piping found to be defective, as determined by the Engineer, shall be pulled out and not installed. Such rejected pipe shall be clearly tagged in such a manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense. Results of shop tests which may be required shall be submitted to the Engineer prior to installation of the pipe for which such tests were ordered.

PART 2 - PRODUCTS

2.1 MATERIALS

Piping materials shall conform to requirements specified in Section 15050.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATION PRACTICES

A. Any conflict arising during the erection of piping shall be brought to the attention of the Engineer. No improvising or field changes shall be permitted without the approval of the Engineer.

B. All piping shall be erected in such a manner as to obtain sufficient flexibility and to prevent excessive stresses in materials and excessive bending moments at joints or connections to equipment.

C. Full lengths of pipe shall be used wherever possible. Short lengths of pipe with couplings will not be permitted, except as may be approved by the Engineer to eliminate overstressing or misalignment. All pipe shall be cut to exact measurement and shall be installed without forcing or springing.

D. Tool marks and unnecessary pipe threads shall be avoided. Burrs formed when cutting pipe shall be removed by reaming. Before installing any pipe, care shall be taken that the inside is thoroughly cleaned and free of cuttings and foreign matter.

E. Where piping is pitched for drainage, an accurate grade shall be maintained. Piping shall be supported in such a manner as to prohibit deflection due to gravity that would be sufficient to pocket the lines when full of liquid. All changes in direction shall be made by using pipe fittings unless otherwise shown on the Drawings or as approved by the Engineer.

F. Unions shall be installed in all piping connections to equipment, regulating valves, and wherever necessary to facilitate the dismantling of piping and removal of valves and other items requiring maintenance. Flanges on equipment may be considered as unions. At least one union shall be provided in every straight run of pipe unless otherwise noted or permitted.

G. Raised face flanges shall not be used for connection to 125 psi cast iron flanges. The raised face shall be removed before use and full-face gaskets shall be employed.

H. In general, all service piping shall come off the top of headers, and if possible, service piping shall slope for drainage.

I. Pipe anchors, thrust blocks, expansion joints, loops and bends shall be installed as indicated on the Drawings, and as required to properly protect the piping against vibration, misalignment and overstressing.

J. Exposed piping shall be neatly arranged, straight, run parallel to or at right angles to walls and shall be so graded that the entire system can be drained. Drain valves shall be installed at the low points of piping. Vent valves shall be installed at all high points of the piping.

K. Installed piping shall not interfere with the operations or accessibility of doors or windows and shall not encroach on aisles, passageways and equipment and shall not interfere with the servicing or maintenance of any equipment. Adjacent piping shall be grouped in the same horizontal or vertical plane.

L. All buried bolts, nuts, lugs, rods, brackets, etc., except stainless steel, shall be given one coat of coal tar epoxy prior to backfilling. All exposed steel pipe supports and hangers shall be cleaned and painted similar to structural steel items as specified under Section 09904.

M. When a pipe joint is made at the intersection of a pipeline with a pump nozzle, all bolts and nuts shall be installed loose until after the entire pipeline has been installed, aligned and checked.

N. All piping shall be installed in such a manner that it shall be free to expand and contract without injury to itself, structural steel or anchors. On all piping, self-equalizing type expansion joints of an approved make and quality shall be installed in all straight runs of 90 feet or more, unless otherwise shown on the Contract Drawings.

O. When pipe is cut in the field, the cut end shall be tapered back approximately 1/8 inch, at an angle of 30 degrees with the centerline of the pipe, with a coarse file or grinder to remove any rough edges which might injure a gasket, where applicable.

P. Dissimilar metals shall be properly insulated to preclude galvanic corrosion.

3.2 BURIED PIPING INSTALLATION PRACTICES

A. Installation shall be in accordance with AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances, AWWA C600-93, AWWA C900-89 and

WPCF Manual of Practice No. 9, Design and Construction of Sanitary and Storm Sewer, except as otherwise noted in the Specifications.

B. Joining Push-On, Mechanical Joint and Restraint Joint Piping: After placing a length of pipe in the trench, the spigot end shall be centered in the socket and the pipe forced "home" and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under and around it. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, the amount of deflection allowed shall not exceed that required for making a satisfactory joint and shall be subject to the approval of the Engineer.

C. Where it is necessary to join pipes of different types, the Contractor shall furnish and install the necessary adapter. Adapters shall have ends conforming to specifications for the appropriate type of joint to receive the adjoining pipe.

D. The Contractor shall furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner at the lines and grades indicated on the Drawings or as directed by the Engineer.

E. Where required, bends, tees and other fittings in pipelines buried in the ground shall be backed up with concrete, as specified in Section 03305, placed against undisturbed earth where firm support can be obtained. If the soil does not provide firm support, then suitable bridle rods, clamps and accessories to brace the fitting properly shall be provided. Such bridle rods, etc. shall be coated thoroughly and heavily with an approved bituminous paint after assembly or, if necessary, before assembly.

F. All buried ductile iron pipe shall be polyethylene wrapped in accordance with ANSI/AWWA C105/A21.5.

3.3 WELDED PIPE

A. All welding of steel piping shall be in accordance with the AWWA Standard for Field Welding of Steel Water Pipe, AWWA C206-11, latest edition. All welders and machine operators shall be certified as qualified under the above code.

B. All other metallic pipe welding shall be in accordance with the ANSI Code for Pressure Piping, ANSI B31.1 Power Piping, latest edition. All welders and welding machine operators shall be certified as qualified under the above code. The Contractor shall submit a list of welding personnel with certification to the Owner for approval.

C. Contractor shall submit his proposed welding procedures to the Engineer for review. Proposed procedures shall be in accordance with the above codes and the recommendations of the manufacturers of the piping and welding materials. The Engineer shall have the right at any time to call for and witness the making of test specimens by any welder, in accordance with the above, and to observe the

physical testing of specimens. Materials shall be furnished and all tests shall be made by and at the expense of the Contractor.

Welding of fusion bonded epoxy lined and/or coated pipe shall not be allowed after the application of the fusion bonded epoxy.

3.4 PUSH-ON TYPE JOINTS

A. Inspect gasket, socket and spigot for cleanliness. Remove any foreign matter and excessive coating. When cast iron or ductile iron pipe is cut in the field, the cut end can be readily conditioned so that it may be used to make up the joint. The outside of the cut end should be tapered back approximately 1/4 inch, at an angle of about 30 degrees with the centerline of the pipe, with a coarse file or a portable grinder. All sharp or rough edges which otherwise might injure the gasket shall be removed.

B. Insert the gasket in the socket, bulb end toward the inside. Heel of gasket shall be uniformly seated around the inside of the socket.

C. Lubricate the exposed face of the gasket and the spigot using push-on joint lubricant. Do not use lubricant other than that furnished with pipe and fittings.

D. The fittings and the pipe shall be aligned and the spigot entered into the socket until it just makes contact with the gasket. Joint assembly shall be completed by forcing the spigot of the entering pipe past the gasket (which is thereby compressed) until it makes contact with the bottom of the socket.

E. If assembly is not accomplished with the application of reasonable force by the methods indicated, the spigot end of the pipe shall be removed to check for the proper positioning of the gasket. The joint shall be kept in straight alignment during assembly.

3.5 MECHANICAL JOINT PIPING

Spigot ends and bells of pipe and the rubber gaskets shall be washed thoroughly with soapy water to remove all foreign matter which may damage the gaskets. The gaskets shall be either plain rubber, metal tipped, duck tipped, polysulfide rubber tipped, or other special type. The gland shall be placed on the pipe with its raised lip facing the spigot end and at least 3-1/2 inches from that end. The spigot shall be inserted in the socket until it is "home". The gasket shall be pushed into position with the fingers, making sure that it is evenly seated in the socket. Place the gland against the face of the gasket, insert the tee head bolts and tighten the nuts on all bolts by opposite pairs until they are finger-tight. The bolts shall then be tightened in a similar manner until they are snug and bearing evenly against the gland around the circumference of the pipe.

3.6 RESTRAINED JOINT PIPING

Restrained joint piping shall be integrally restrained joint ductile iron pipe of the push-on type with low steel alloy bolting. Installation shall be in accordance with the manufacturer's recommended procedures.

3.7 PVC PIPING

PVC piping shall be installed in accordance with the manufacturer's recommended procedures.

3.8 COPPER PIPING

A. Solder joints for copper tubing shall be prepared by cleaning the ends of the tubing and the inner surfaces of the fittings with steel wool until they are bright. The cleaned surfaces shall be given a thin coating of approved soldering flux, and the tubing end inserted into the fitting as far as possible. Heating and finishing of the joint shall be done in accordance with the recommendations of the manufacturer of the fittings, using lead free silver solder. All joints shall be allowed to self-cool to prevent chilling of solder.

B. Flared joints for copper tubing shall be cut and deburred. The sleeve nut shall be slipped on the tubing and the end flared with a flaring tool. Care shall be taken in flaring not to crack or slit the flared portion. If inspection reveals such damage, the flare shall be cut off and a new flare made. The flared end shall be squarely seated on the fitting and the nut tightened.

C. All changes in direction shall be made by using the pipe and fitting unless other means are approved by the Engineer.

3.9 PIPE HANGERS

A. The Contractor shall furnish all necessary hangers including all clamps, rods, angles, channels, plates, etc., for supporting the various piping installed by him under this Contract. The Contractor shall obtain the Engineer's approval of the method of supporting the piping before installation. Drawings shall be referenced for standard pipe hanger design.

B. Pipes close to the floor may be supported from the floor by structural shapes or by poured concrete blocks or piers as approved by the Engineer. In such cases, care shall be taken to avoid blocking floor drainage.

C. Building steel, as indicated on the structural drawings, shall be used wherever possible for supporting pipe hangers. Structural members shall not be drilled or welded for hangers without the approval of the Engineer.

D. Expansion bolts shall be used only upon the approval of the Engineer.

E. All vertical piping shall be properly supported with suitable steel brackets to prevent swinging or sagging, per the latest edition of UBC, UPC and UMC. A minimum of two supports shall be provided on all vertical piping. Spacing shall be no more than 6 feet on centers.

F. Heavy valves or fittings shall be supported by hangers, poured concrete blocks or other special provisions that may be necessary to avoid undue line deflection.

G. A minimum of two hangers shall be provided for steel and cast-iron piping.

The maximum spacing of hangers for steel and cast-iron piping shall be in accordance with the following table, except where otherwise indicated on the Contract Drawings.

Pipes 1/2" and 3/4"	-	not more than 6' - 6" on centers
Pipes 1" and 1-1/4"	-	not more than 8' - 0" on centers
Pipes 1-1/2" and 2"	-	not more than 10' - 0" on centers
Pipes 3" and 4"	-	not more than 14' - 0" on centers
Pipes 6" and 8"	-	not more than 16' - 0" on centers
Pipes 10" and larger	-	not more than 20' - 0" on centers

H. Hose and plastic tubing shall be continuously supported in steel angle, channel or tray.

I. The maximum spacing of pipe supports for PVC piping shall be in accordance with the following table:

Pipes 1" and 1-1/2"	-	not more than 5' - 0" on centers
Pipes 2"	-	not more than 6' - 0" on centers
Pipes 3"	-	not more than 7' - 0" on centers
Pipes 4"	-	not more than 7' - 0" on centers
Pipes 6"	-	not more than 9' - 0" on centers
Pipes 8"	-	not more than 9' - 0" on centers

J. Hangers for flanges, cast-iron pipe and cast-iron flanges, soil, waste and vent piping shall be adjustable, wrought-bank hangers with iron rods. Hangers for water and other pipes shall be of the cast, split-ring type with turnbuckle adjuster. Hangers for copper tubing shall be copper-plated. Hangers for chromium-plated pipes shall be chromium-plated cast brass. The maximum hanger spacing for all sizes of soil, waste and vent piping is five (5) feet.

3.10 APPURTENANCES

A. The Contractor shall furnish and install all valves and piping not mentioned in the piping classification, but shown on the Drawings.

B. All valves and drains not mentioned in the classification of piping material specifications and furnished under this specification shall be as specified on the Drawings.

C. Flanged joints shall be made up with approved full-face gaskets and carbon steel ASTM A307 bolts and nuts except where otherwise noted in the Specifications.

D. All joints shall be made drop tight under all pressures up to the specified field test pressure of the line in which installed.

3.11 FIELD TESTING

A. All pressure piping shall be subjected to hydrostatic pressure of 200 psi (or the pump shut-off pressure) but not exceeding the maximum allowable working pressure of the piping. The normal operating pressures shall be defined by the Engineer. No air testing shall be permitted.

B. Pressure mains shall be tested at 200 psi. Gravity lines shall be subjected to hydrostatic pressure 150 percent of the maximum head that can be imposed upon the piping during operation as defined by the Engineer.

C. Test of buried piping shall be made only after completion of partial or complete backfill as specified and not until at least 36 hours after the last joint to be tested has been made, and at least 36 hours after the last concrete thrust or reaction blocking has been cast with high early strength cement, ASTM C150 Type III. Joints shall be left clear for examination during tests on pressure pipe.

D. Each section of pipeline shall be slowly filled with water and the specified test pressure measured at the point of lowest elevation. Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner. The pump, pipe connection, gauges, pipe taps and all necessary apparatus, shall be furnished by the Contractor. The Contractor shall provide all necessary assistance for conducting the test. The duration of the test shall be 2 hours, unless otherwise directed by the Engineer. All air must be expelled from the pipeline prior to the test period.

E. During the test, all pipes, fittings, valves, hydrants and joints shall be carefully examined. If found to be cracked or defective, they shall be removed and replaced by the Contractor with sound material in the manner prescribed. The test shall then be repeated until satisfactory to the Engineer.

F. No pipe installation will be accepted until or unless the leakage for the section of line tested is less than the rate of leakage specified below:

Flanges, welded or screwed piping – No measurable leakage

Push-on or mechanical joints – In accordance with AWWA Standard for Installation of Cast-Iron Water Mains, AWWA C600, Sect. 13.7

G. Should any test of a section of pipeline disclose leakage greater than that permitted, the Contractor shall, at his own expense, locate and repair the defective joints and/or pipe until the leakage is within the permitted allowances.

3.12 DISINFECTING

Prior to placing in service, all potable water piping shall be disinfected in accordance with AWWA Standard for Disinfecting Water Mains, AWWA C651.

3.13 PIPE SUPPORT DETAILS

Pipe support shall be selected and furnished as required for proper installation.

END OF SECTION

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SECTION 15110

PUMP CONTROL VALVES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included in this Section: The Contractor shall furnish and install a pump control valve with each new vertical turbine pump including fittings and accessories as shown on the Drawings, described in the Specifications and as required for a complete and operable system.

B. Work Specified in Other Sections:

1. Section 01730 – Operation and Maintenance Manuals
2. Section 01800 – Testing, Training and Facility Start Up
3. Section 09904 – Coating Systems for Other Non-Concrete Surfaces
4. Section 15060 – Piping - Installation

1.2. QUALITY ASSURANCE

All materials and equipment furnished under this Section shall be of a manufacturer who has been engaged in the design and manufacture of the specific materials and equipment for a period of at least 5 years.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings in accordance with the Special Provisions, Section 1.23.0 “Shop Drawings”.

B. Submit dimensional drawings.

C. Submit a listing of materials of construction, with ASTM reference and grade. Show valve lining and paint primer coating with coating manufacturer and coating system number or designation.

D. Submit electrical drawings, showing wire and terminal connections.

E. Submit manufacturer's recommended maximum operating pressure and maximum recommended flow.

F. Submit operations and maintenance data in accordance with Specification Section 01730, “Operation and Maintenance Manuals”.

1.4 APPURTENANCES

Furnish and install all necessary guides, inserts, anchors and assembly bolts; washers nuts, hangers, supports, gaskets, and flanges; all other appurtenant items shown on the Drawings, specified or required for the proper installation and operation of the pump control valve.

PART 2 - PRODUCTS

2.1 GENERAL

A. Diaphragm-actuated control valves shall be manufactured by Cla-Val Company, Costa Mesa, California or Owner approved equal .

B. Valves shall be hydraulically actuated diaphragm type complying with AWWA C530 except as modified herein.

C. Pump Control Valves:

1 The valve shall be closed when the pump starts. After the pump starts, a solenoid control valve on the pump control valve pilot shall energize and the main valve shall slowly open. When the pump is signaled to shut off, the solenoid control valve shall de-energize and the main valve shall slowly close. When the main valve is completely closed, a limit switch assembly shall shut off the pump. Provide a built-in lift-type check valve to close should flow reverse, regardless of the solenoid, diaphragm, or piston position. The valve shall have field adjustable rate of valve opening and closing.

2 Control of valve operation shall be by means of an externally mounted, four-way, solenoid pilot valve. Provide self-cleaning strainers or wye strainers to protect the control system. Provide a limit switch, adjustable over the entire valve travel. Limit switch shall be single pole, double throw in a NEMA 4 enclosure. 4-way solenoid valve shall have a NEMA 4 enclosure. Voltage shall be 120-volt a-c, 60 hertz.

3 Valves shall be Class 300, globe pattern with flange ends. Valves shall be Cla-Val Series 660-11 or Owner approved equal.

D. All major components of the control system shall be manufactured by the same company that manufactures the main valve.

E. Valves shall have internal and external fusion-bonded epoxy coating in accordance with Specification Section 09904, “Coating Systems for Non-Concrete Surfaces”. Internal coating material shall be NSF certified for potable water

2.2 GENERAL MATERIAL REQUIREMENTS

A. Gaskets: Unless specifically specified otherwise, all gaskets shall be non-asbestos synthetic fiber bound by nitrile rubber; Garlock 3000 or equal.

B. Bolts and Tie Rods: Unless specifically specified otherwise, flange bolts and nuts, tie rods and other flange hardware shall be as follows:

1. Exposed: Type 316 stainless steel.

C. Flexible Sealant: Flexible sealant for pipe joints, where shown on the Drawings, shall be a two-component polysulfide, non-sag; Sikaflex 412, Dualthane, or equal.

2.3 MATERIALS

A. Materials of construction for valves shall be as follows:

Item	**Material**
Main valve body and cover	Ductile iron, ASTM A536, Grade 65-45-12
Main valve trim, seat, disc guide, and cover bearings	Type 316 stainless steel, ASTM A276, A 351, or A 743
Diaphragm washer and disc retainer	cast iron
Pilot control system	Bronze Type 303 stainless steel trim
Piping and tubing	Type 316 Stainless steel
Stem	Type 303 stainless steel
Elastomers	Buna-N
Cover screws, caps, and nuts and bolts	Type 316 stainless steel
Lining and coating	Fusion bonded epoxy, 16 Mils DFT, Conforming to AWWA C213

2.4 SPARE PARTS

A. Provide the following spare parts for each valve:

Quantity	**Description**
1	Diaphragm, disc, and spacer washer set (for diaphragm-actuated valves).
1	Strainer.
2	Isolation valves for each valve pilot system.
1	Solenoid control valve for each solenoid-controlled valve.
1	Limit switch for each valve having a limit switch assembly
1	Throttling valve for opening/closing speed control

PART 3 - EXECUTION

3.1 General

Pipe, valves and accessories shall be installed in accordance with the requirements of Section 15060 of the specifications. Final coating shall conform to the requirement in Section 09904 – Coating Systems for Non-Concrete Surfaces.

*** END OF SECTION ***

SECTION 16000

GENERAL ELECTRICAL PROVISIONS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to complete the electrical Work. The provisions of this section apply to all the following Division 16 Sections whether specifically referred to in those sections or not.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the formwork, walls, partitions, ceilings and panels.

2. Contractor shall be responsible for the installation of all conduits, inserts and other items to be embedded in the concrete, or built into walls, partitions, ceilings or panels constructed by other Contractors. Contractor shall provide other Contractors with detailed plans or sketches of the location of said conduits and other built-in items as may be required. Contractor shall keep himself fully informed of the construction where conduits and other built-in items are to be installed. Contractor shall install said conduits and other built-in items in such a manner and within such time periods as will not unnecessarily delay the Work of the other Contractors.

C. General:

1. Interpretation of Drawings:

a. Dimensions shown on the Drawings that are related to equipment are based on one manufacturer's equipment. Coordinate the dimensions of the equipment furnished with the space allocated for that equipment.

b. The Drawings show the principal elements of the electrical installation. They are not intended as detailed working drawings for the electrical Work but as a complement to the Specifications to clarify the principal features of the electrical systems.

c. It is the intent of this Section that all equipment and devices, furnished and installed under this and other Sections, be properly connected and interconnected with other equipment so as to render the installations complete for successful operation, regardless of whether all the connections and interconnections are specifically mentioned in the Specifications or shown on the Drawings.

D. Utilities:

1. Contractor shall furnish and install underground pull section, metering section and main breaker lineup, empty primary conduits from service point to the pull section, and complete grounding system.

E. Temporary Power:

1. Contractor shall be responsible for providing temporary light and power for construction purposes.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Permits: Obtain all permits required to commence work and, upon completion of the Work, obtain and deliver to the Engineer a Certificate of Inspection and Approval from the State Board of Fire Underwriters or other authority having jurisdiction.

2. Codes: Material and equipment shall be installed in accordance with the current standards and recommendations of the National Electrical Code, the National Electrical Safety Code, and with local codes which apply. Where discrepancies arise between codes, the most restrictive regulation shall apply.

3. Tests by Independent Regulatory Agencies: All electrical material and equipment shall be new and shall bear the label of the Underwriters' Laboratories, Inc., or other nationally-recognized, independent testing laboratory, wherever standards have been established and label service regularly applies.

4. Utilities:

a. Electric Utility: Southern California Edison. Work in connection with the electric service and metering shall be done in strict conformance with the requirements of SCE.

5. Inspection Requirements: All equipment shall be inspected and tested at the site as specified in these Contract Documents.

B. Reference Standards: Electrical material and equipment shall conform in all respects to the latest approved standards of the following:

1. National Electrical Manufacturers Association (NEMA).

2. The American National Standards Institute (ANSI).

3. The Institute of Electrical and Electronic Engineers (IEEE).

4. Insulated Power Cable Engineers Association (IPCEA).

5. National Electrical Code (NEC).

6. National Electrical Safety Code (NESC).

C. Assembled Products: The major components of any assembly such as motor Control Centers, switchboards and panels shall be manufactured by the assembly manufacturer.

1.3 SUBMITTALS

A. General:

1. Conform to requirements of Section 01340 and the General Conditions.

B. Shop drawings shall include the following information to the extent applicable to the particular item:

1. Manufacturer's name and product designation or catalog number.

2. Electrical ratings.

3. Conformance to applicable standards or specifications of ANSI, ASTM, ICEA, IEEE, ISA, NEC, NEMA, NFPA, OSHA, UL, or other organizations.

4. Dimensioned plan, section, and elevations showing means for mounting, conduit connection, and grounding.

5. Materials and finish specification, including paints.

6. List of components including manufacturer's names and catalog numbers.

7. Internal JIC schematic and wiring diagrams indicating all connection to components and numbered terminals for external connections.

8. All equipment and material of a similar nature and use shall be of one manufacturer.

1.4 PRODUCT DELIVERY

A. Operation and Maintenance Data:

1. Conform to requirements of Section 01730 and the General Conditions.

B. Record Documents:

1. In addition to the requirements of Section 01340 and the General Conditions, record drawings shall include the following:

a. One-line wiring diagram of the distribution system.

b. Actual in place conduit and cable layouts with schedule of conduit sizes and number and size of conductors.

c. Layouts of the grounding system and lighting arrangement.

d. Control wiring diagrams with terminal numbers and all control devices identified.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Contractor shall instruct the manufacturers and vendors as to the maximum shipping sizes of equipment that can be accommodated at the site. Storage and handling of materials shall conform to the manufacturer's recommendations.

1.6 JOB CONDITIONS

A. Contractor shall examine the site and existing facilities in order to compare them with the Drawings and Specifications with respect to the conditions of the premises, location of and connection to existing facilities and any obstructions which may be encountered.

B. Contractor is cautioned to perform his work with due regard to safety and in a manner that will not interfere with installed equipment or in any way cause interruption of any of the functions of the plant.

C. Work on energized circuits is prohibited. Contractor shall provide and install temporary feeders, control circuits and necessary equipment to allow shutdown of the circuits to be worked on. The temporary installation shall be removed on completion of the tie-in or modification work.

1.7 AREA CLASSIFICATIONS

All materials, equipment and incidentals provided for the project shall meet NEC and NEMA requirements for corrosive locations. Enclosures installed in corrosive locations shall be NEMA 4X non-metallic or 316 stainless steel. Conduits shall be PVC jacketed and terminated at enclosures with watertight, threaded hubs. All fittings shall be PVC jacketed.

1.8 GROUNDING

A. Ground rods shall be 3/4-inch by 10 feet long of copper-clad steel with drive heads.

B. Ground conductors shall be medium hard drawn, standard copper, bare for direct burial and green insulated for installation in conduits. They shall be sized to comply with the National Electrical Code.

C. All ground connections shall be made by the exothermic weld method, except ground connections at ground rods shall be of the bolted clamp type.

D. The grounding system shall be installed in accordance with the National Electrical Code and all State and local codes and regulations.

E. All non-metallic conduit shall have a code sized ground wire installed.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION

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SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

This Section includes materials, installation, and testing of the electrical system.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical Testing: 16950

1.3 SUBMITTALS

A. Submit shop drawings in accordance with the General Provisions and the following.

B. Complete fabrication, assembly, and installation drawings, wiring and schematic diagrams; and details, specifications, and data covering the materials used and the parts, devices, and accessories forming a part of the equipment furnished shall be submitted in accordance with the submittals section. Submittal data shall be grouped and submitted in three separate stages. The submittal for each stage shall be substantially complete. Individual drawings and data sheets submitted at random intervals will not be accepted for review. Instrument tag numbers indicated on the contract drawings shall be referenced where applicable. Submittal data for multifunctional instruments shall include complete descriptions of the intended functions and configurations of the instruments.

1. First Stage Submittal

   a. Product catalog cut sheets clearly marked to show the model number, optional features, and intended service of the device.

   b. A detailed list of any exceptions, functional differences, of discrepancies between the supplier's proposed system and the contract requirements.

2. Second Stage Submittal

   a. Complete panel fabrication drawings and details of panel wiring, piping, and painting. Panel and subpanel drawings shall include overall dimensions, metal thickness, door swing, mounting details, and front of panel arrangement to show general appearance, with spacing and mounting height of instruments and control devices.

   b. System wiring and installation drawings for all interconnection Wiring between components of the systems furnished and for all interconnecting wiring between the related equipment and the

equipment furnished under this section. Wiring diagrams shall show complete circuits and indicate all connections.

c. If panel terminal designations, device interconnections, device features and options, or other features are modified as a result of the fabrication process or factor testing, revised drawings shall be resubmitted.

d. Electronic Files of Shop Drawings: Submit electronic files for all shop drawings in AUTOCAD 2015 (latest version) format.

e. At the supplier's option, and for projects with very few fabrication drawings, the first stage and second stage submittal may be combined.

3. Third Stage Submittal

a. Complete system documentation, in the form of operation and maintenance manuals, shall be provided. Manuals shall include complete product instruction books for each item of equipment furnished.

b. Where instruction booklets cover more than one specific model or range of instrument, product data sheets shall be included which indicate the instrument model number, calibrated range, and all other special features. A complete set of "as-built wiring, fabrication, and inter connection drawings shall be included with the manuals.

c. Electronic files for shop drawings: Submit as-built electronic files for all shop drawings in AUTOCAD 2015 (latest version) format.

1.4 REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installations, materials, equipment, and workmanship shall conform to the applicable provisions of the following agencies:

1. National Electrical Code (NEC), 2011 Edition.

2. State Department of Industrial Safety (CAL/OSHA).

3. Local authorities having lawful jurisdiction pertaining to the work required.

B. Underwriters' Laboratories, Inc. (UL): Materials, appliances, equipment, and devices shall conform to the applicable UL standards. The label of, or listing by, UL is required wherever applicable.

C. Standards: Where referenced in these specifications or on the drawings, the publications and standards of the following organizations apply:

1. American Society of Testing and Materials (ASTM)

2. National Electrical Manufacturers Association (NEMA)

3. National Fire Protection Association (NFPA)

4. American National Standards Institute (ANSI)

5. Institute of Electrical and Electronic Engineers (IEEE)

6. Insulated power Cable Engineers Association (IPCEA).

1.5 INDUSTRY REGULATIONS AND LAWS

In case of difference between the building codes, Specifications, State law, local ordinances, industry standards, utility company regulations, fire insurance carrier's requirements, and the contract documents, the most stringent shall govern. The Contractor shall promptly notify the Engineer in writing of such differences.

1.6 UTILITY COMPANY REQUIREMENTS AND FEES

A. The Agency will make application for electric and telephone service. The Agency will pay utility company fees, cable charges, and added facilities charges.

B. The Contractor shall make any service and installation agreements that the utility companies may require.

PART 2 - MATERIALS

2.1 GENERAL

A. Similar materials and equipment shall be the product of a single manufacturer.

B. Provide only products which are new, undamaged, and in the original cartons or containers.

C. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current design.

D. Materials and equipment shall be suitable for storage, installation, and operation in an ambient of 0°C to 50°C except where more stringent conditions are stated in individual equipment specifications.

E. Electrical equipment and panels shall be factory finished with manufacturer's standard primer and enamel topcoats, unless stated otherwise in the individual equipment specifications. Provide one pint of the equipment manufacturer's touchup paint per 500 square feet of painted surface for repair of damaged enamel topcoats.

2.2. OPERATION, MAINTENANCE, AND REPAIR MANUAL

A. The organization of the initial submittals as required by these contract documents shall be compatible to eventual inclusion as one volume of the operation, maintenance, and repair manuals.

B. Operation manuals shall be prepared and submitted to the Engineer for preliminary review in six copies. When the Engineer is satisfied that these are complete and properly prepared, six final sets shall be delivered to the Engineer.

C. The complete operation manual shall contain all the information included in the preliminary equipment submittal, the detailed installation submittal, programming instructions, and the additional information required herein, all bound in hard cover binders and arranged for convenient use including tab sheets, all indexed and cross referenced, and all final as-built drawings.

D. The operation manuals shall contain:

1. Calibration and Maintenance Instructions
2. Trouble-Shooting Instructions
3. Instructions for Ordering Replacement Parts

2.3 AS-BUILT DRAWINGS

A. As-built drawings shall be submitted at the completion of work, which depict the final configuration of all installed equipment. All shop drawings shall be updated by the originator to "As-Built" status. As-Built drawings shall be provided to the Engineer in both hardcopy and digital formats. Digital format shall be in AUTOCAD 2015 (latest version).

B. The Contractor shall clearly indicate on As-Built plans the following information:

1. All conduit runs exactly as installed.
2. Location of all underground conduits.
3. Forming, cabling, and identification of all power and control circuits within pull boxes, and terminal boxes.
4. All changes and/or deviations in locations, routing, or dimensions or additions to any part of the Electrical work.
5. Interior views of each pull box identifying each conduit entrance by conduit number.
6. Complete and accurate wiring, schematic, and interconnecting wiring diagrams for all equipment supplied and all work performed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The drawings indicate connections for typical equipment only. If the equipment furnished is different from what is shown, provide the modifications necessary for a safe and properly operating installation in accordance with the equipment manufacturer's recommendations.

B. The drawings indicate diagrammatically the desired location and arrangement of outlets, conduit runs, equipment, and other items. Field determine exact location

based on physical size and arrangement of equipment, finished elevations, and obstructions.

C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the electrical systems shall be accomplished without additional cost to the Owner.

3.2 FOREIGN POWER ISOLATION IN EQUIPMENT ENCLOSURES

A. Provide foreign power circuit isolation devices in equipment enclosures. PLC input/output circuits for example, are a source of foreign power when they exist in an equipment enclosure such as a local control panel which has a separate source of control power. Circuits which are a source of foreign power shall pass through an isolation device where the wiring enters the equipment enclosure. Isolation devices are required in control cabinets, MCC buckets, etc., to provide an easily accessible isolation point, whenever the power source for the circuit would be considered foreign power in the enclosure. Isolation devices shall be clearly labeled.

B. Equipment manufacturers shall supply isolation devices integral with their equipment whenever possible (isolation switches integral with disconnect handles on MCC buckets for example).

C. Devices shall allow for the operation of equipment with doors open to allow for testing and/or maintenance.

D. The Contractor shall be responsible for supplying isolation devices as needed such that the complete system of power distribution installed at the facility complies with this specification.

3.3. IDENTIFICATIONS AND SIGNS

Mark each individual panelboard, motor controller, power panel, transformer, circuit breaker, disconnect switch, timer, relay, and contactor to identify each item with its respective service or function and unique identification number as shown on the drawings. Provide nameplates with engraved lettering not less than 1/4 inch high. Use black-on-white phenolic plastic, attached with sheet metal screws or self-adhesive backs.

3.4 PERFORMANCE TESTS

A. After the electrical installation is complete, test it to demonstrate that the entire system is in proper working order and in accordance with the drawings and specifications.

B. Perform General Electrical Testing requirements per section 16950, "Electrical Testing". The testing shall demonstrate the proper installation and integrity of the electrical power distribution, electrical protection, and major equipment (large motors, etc.).

3.5 COORDINATION STUDY

A. The Contractor shall provide a complete coordination study of relays, fuses, circuit breakers, and all other protective devices.

B. The coordination study shall include the entire distribution system starting with the smallest 480 volt, 3 phase, 60 Hz circuit protective device on the load end, to the nearest protective device on the power company's line side, or for work in the Agency's existing facilities, to the nearest protective device on the Agency's distribution system.

C. The study shall include, but not be limited to, the following:

1. A tabulation of all protective relay and circuit breaker trip settings and recommended medium-voltage fuse sizes and types.

2. Motor starting profiles for all motors sized 50 hp and above.

3. Transformer damage curves and protection evaluated in accordance with ANSI/IEEE C57.109.

4. Coordination curve(s) from the power company if available.

D. The Contractor shall be responsible for obtaining all of the required relay, fuse, and circuit breaker coordination curves; transformer damage curves; motor data; etc., for all new and existing electrical equipment.

E. The Contractor shall be responsible for coordinating with the Power Company to obtain the required protective device curves.

F. The Contractor shall be responsible for all field work required to obtain necessary data on existing relays, circuit breakers, fuses, and transformers to be included in the coordination study.

G. The coordination study shall be bound in a standard 8½ by 11 inch size report. The study shall be provided in accordance with the submittal section. Final selection of all protective device settings or sizes shall be subject to review and acceptance by the Engineer.

END OF SECTION

SECTION 16111

RIGID CONDUIT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install conduit and fittings to form complete, coordinated and grounded raceway systems.

2. Exposed routing of conduits on the walls, ceiling, or floor will not be allowed unless pre-approved by the Engineer.

B. Coordination:

1. Conduit runs shown are diagrammatic.

2. Coordinate conduit installation with piping, ductwork, lighting fixtures and other systems and equipment and locate so as to avoid interferences and eliminate tripping hazards.

C. Related Section:

Section 16112 Flexible Conduit

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1.	NEC Article 347	Rigid Nonmetallic Conduit
2.	UL Standard No. 514	Electrical Outlet Boxes and Fittings
3.	UL Standard No. 651	Schedule 40 and 80 PVC Conduit
4.	UL Standard No. 886	Electrical Outlet Boxes and Fittings for Use in Hazardous Locations
5.	NEMA TC2	Electrical Plastic Tubing, Conduit and Fittings
6.	NEMA TC3	PVC Fittings for Use with Rigid PVC Conduit and Tubing

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's catalog cuts and technical information for the conduit, fittings and supports proposed for use.

2. Layout drawings showing proposed routing of exposed conduits, conduits embedded in structural concrete and conduits directly buried in earth. Drawings shall show locations of pull and junction boxes and all penetrations in walls and floor slabs.

3. All material and equipment of similar nature and use shall be of one manufacturer.

B. Record Drawings: Include the actual routing of exposed and concealed conduit runs on record drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Non-metallic Conduit (buried locations):

1. PVC Plastic:

a. Material: Schedule 40 PVC plastic, NEMA Type EPC-40-PVD, 90° C rated, conforming to UL No. 651.

b. Manufacturer: Provide non-metallic conduit of one of the following:

1) Amoco Chemicals Corporation.

2) Carlon, Division of Indian Head, Incorporated.

3) Or equal.

2. Non-metallic Fittings: Form elbows, bodies, terminations, expansions and fasteners of same material and manufacturer as base conduit. Provide cement by same manufacturer as base conduit.

B. PVC-Coated Conduit (all above grade exposed locations and in vaults)

PVC coated conduit shall be hot-dip galvanized including the threads. The interior and exterior surfaces shall be coated with a heat polymerizing lacquer 0.005 inch thick. The exterior of the conduit shall be PVC coated to a minimum 40 mil thickness. The PVC coating shall be permanently bonded to the conduit. The coating shall have a minimum tensile strength of 3500 psi. The bond between the

conduit and PVC coating shall be greater than the tensile strength of the PVC coating. A PVC coated coupling shall have a 1.5 mils phenolic coating. A PVC coated coupling shall be furnished with each length of the conduit. The PVC sleeve of the coupling shall equal the OD of the coated conduit and shall extend 1-1/2 inches from each end of the coupling.

C. Conduit Tags:

1. Material: 19 gauge, 1-1/2-inch diameter round brass with backfilled legend, Style #250-BL as manufactured by Seton Nameplate Corporation or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in conformance with National Electrical Code.

B. Supports:

1. Rigidly support conduits by clamps, hangers or Unistrut channels.

2. Support single conduits by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the support surface. Support multiple runs of conduits on trapeze type hangers with steel horizontal members and threaded hanger rods, Kindorff or equal. Rods shall be not less than 3/8-inch diameter, and shall be cadmium coated.

3. For PVC coated rigid steel conduit runs, supports and hardware shall be PVC coated or 316 stainless steel.

C. Fastenings: Fasten raceway systems rigidly and neatly to supporting structures by the following methods:

1. To Hollow Masonry Units: Toggle bolts.

2. To Brick Masonry: Price expansion bolts, or equal.

3. To Concrete: Phillips; Hilti Corporation; or equal, anchors.

4. To Steel: Welded threaded studs, beam clamps or bolts with lockwashers or locknuts.

5. All hardware, clamps and spacers shall be 316 stainless steel.

D. Exposed Conduit (not allowed without pre-approval by the Engineer):

1. Install parallel or perpendicular to structural members or walls.

2. Install on structural members in protected locations.

3. Locate clear of interferences.

4. Maintain 1/4 inch from walls.

5. Install vertical runs plumb. Unsecured drop length not to exceed 12 feet.

E. Conduit Embedded in Concrete:

1. Separation: Three times outer diameter of larger conduit center to center.

2. Minimum Slab Thickness:

a. With no crisscrossing of conduit, three times outer diameter of conduit.

b. With crisscrossing of conduits, four times outer diameter of larger conduit.

3. Run conduit in center of slabs and walls.

4. Before concrete is placed, make the necessary location measurements of the conduit to be embedded so that the information is available to prepare record drawings.

5. RGS conduit in below grade walls and slabs shall be PVC jacketed or wrapped with an approved tape.

F. Underground Conduits:

1. Install underground conduits a minimum of 24 inches below grade unless otherwise indicated.

2. Perform all excavation, bedding, backfilling and surface restoration including pavement replacement where required.

3. Make conduit connections watertight.

G. Field Bends: No indentations. Diameter of conduit shall not vary more than 15 percent at any bend.

H. Joints:

1. Apply conductive compound to all joints before assembly.

2. Make up joints tight and ground thoroughly.

3. Use standard tapered pipe threads for conduit and fittings.

4. Cut conduit ends square and ream to prevent damage to wire and cable.

5. Use full threaded couplings. Split couplings not permitted.

6. Use strap wrenches and vises to install conduit. Replace conduit with wrench marks.

I. Terminations:

1. Install insulated bushings on conduits entering boxes or cabinets, except threaded hub types.

2. Provide locknuts on both inside and outside of enclosure for grounding.

3. Bushings not to be used in lieu of locknuts.

J. Moisture Protection:

1. Plug or cap conduit ends at time of installation to prevent entrance of moisture or foreign materials.

2. Make underground and embedded conduit connections watertight.

3. Thruwall Seals: Install for conduits passing through new exterior subsurface walls or base slabs of buildings and for conduits passing through existing exterior walls. For individual exposed conduits passing through interior walls, install non-metallic sleeves to protect the conduit against action of alkaline substances which may be present. Conduits passing through fire rated walls shall have approved seals. Conduits passing through hazardous area walls shall be grouted with epoxy-based cement to develop a gas tight seal.

4. Drainage: Pay particular attention to drainage for conduit runs. Wherever possible, install conduit runs so as to drain to one end and away from buildings. Avoid pockets or depressions in conduit runs.

K. Core drill for individual conduits passing through existing concrete slabs and walls. Obtain authorization from Engineer prior to core drilling. Seal spaces around conduit with epoxy grout. Restore surfaces to original condition unless otherwise noted.

L. Non-metallic Conduit:

1. Install in accordance with manufacturer's recommendations.

2. Join sections in accordance with manufacturer's installation procedures for push-fit, bell and spigot type joints, if applicable or with manufacturer's recommended cement.

3. During installation provide expansion fittings for expansion and contraction to compensate for temperature variations. Expansion fittings shall be watertight and of the type suitable for direct burial.

4. Provide watertight expansion/deflection fittings at all wall and floor penetrations of all buildings and equipment concrete pads.

3.2 TESTING

A. Test conduits by pulling through each conduit a cylindrical mandrel not less then two pipe inside diameters long, having an outside diameter equal to 90 percent of the inside diameter of the conduit.

B. Maintain a record, by number, of all conduits testing clear.

3.3 IDENTIFICATION

A. Tag all conduits at the ends and in all intermediate boxes, chambers, handholes and other enclosures. Fasten tags to conduits with No. 14 AWG insulated copper wire. Where this method is not practical, fasten to the adjacent masonry by means of stainless steel expansion bolts.

B. Use numbers on all conduits as designated in the cable and conduit list and record the conduit numbers and the cable content by cable designation, size, quantity, origin of conductors, and name of equipment served.

END OF SECTION

SECTION 16112

FLEXIBLE CONDUIT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install flexible metallic conduit and fittings.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.

1. NEC Article 351 Liquid-Tight Flexible Metal Conduit

2. UL Standard No. 360 Liquid-Tight Flexible Steel Conduit

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's catalog cuts and technical information for flexible conduit and fittings proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Flexible Conduit

All Flexible metal conduit shall be PVC coated, and formed from spirally wound galvanized steel strip with successful convolutions that are securely interlocked. Minimum size of the flexible metal conduit shall be 1/2 inch. Fittings shall be of the compression type. Lengths shall not exceed 60 inches. Flexible metal tubing shall include a code size insulated green ground conductor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install at motors and equipment which are subject to vibration or require movement for maintenance purposes. Provide necessary reducer where equipment furnished cannot accept 3/4-inch size flexible conduit. Limit flexible conduit length to three feet maximum.

B. Install in conformance with National Electrical Code requirements.

END OF SECTION

SECTION 16122

600 VOLT CABLE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install 600-volt cable.

2. Insulated cable is required for installation.

B. Related Sections:

1. Section 16126 Instrumentation Cable

2. Section 16450 Grounding Systems (for ground cable)

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Codes: Cable shall be installed in accordance with the standards and recommendations of the National Electrical Code. Where discrepancies arise between codes, the most restrictive regulation shall apply.

2. Tests by Independent Regulatory Agencies: Cable shall bear the label of the Underwriters' Laboratories, Inc.

B. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. ASTM B 3 Soft or Annealed Copper Wire

2. ASTM B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-hard or Soft

3. IPCEA S-66-524, NEMA WC7-1971 Cross-linked-thermosetting- polyethylene-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

4. National Electrical Code

5. UL Standard No. 44 Wires and Cables, Rubber-Insulated

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's literature, specifications, and engineering data for 600-volt insulated cable.

B. Test Records: Submit for review copies of written records of field insulation resistance test results.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Insulated Cable:

1. Material: Copper cable conforming to ASTM B 3 and B 8 with flame-retardant, moisture and heat resistant thermoplastic insulation with nylon outer jacket rated 90C in dry locations and 75C in wet locations and listed by UL as Type THHN/THWN.

2. Application: Use THHN/THWN for all applications.

3. Wire Sizes: Not smaller than No. 14 AWG for all circuits.

4. Stranding: All 600-volt cable shall be stranded.

5. Manufacturer: Provide cable of one of the following:

a. Pirelli Cable Corporation.

b. Triangle PWC, Incorporated.

B. Cable Connectors, Solderless Type:

1. For wire sizes up to #4/0 AWG, use compression indent type.

2. Product and Manufacturer: Provide one of the following:

a. T & B Sta-Kon.

b. Burndy Hylug.

c. Or equal.

3. For sizes #250 MCM and larger, use connectors with at least 2 compression indents and provision for at least 2 bolts for joining to apparatus terminal.

4. Properly size connectors to fit fastening device and wire size.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all cables complete with proper terminations at both ends. Check and correct for proper phase sequence and proper motor rotation. Check for proper control connection. All electrically common wires shall have the identical wire tag number at all points and ends.

B. Pulling:

1. Use insulating types of pulling compounds containing no mineral oil.

2. Pulling tension shall be within the limits recommended by the wire and cable manufacturer.

3. Use a dynamometer where mechanical means are used.

4. Cut off section subject to mechanical means of gripping and pulling.

C. Bending Radius: Limit to 6 times cable overall diameter.

D. Slack: Provide maximum slack at all terminal points.

E. Splices:

1. Where possible, install cable continuous, without splice, from termination to termination.

2. Where required, splice in junction box using terminal boards.

3. Splices in conduits not allowed.

4. Splices in below grade pull boxes or manholes not allowed without specific written approval from the Engineer for method in each instance.

F. Identification: Identify all conductors by circuit number and phase at each terminal or splice location.

G. Color code power cables in accordance with Agency's standards.

3.2 TESTING

A. Test each electrical circuit after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.

B. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and again before they are put

in service with a Megger whose rating is suitable for the tested circuit. Tests shall meet with the applicable specifications of IPCEA S-66-524 and NEMA WC7-1971.

C. The insulation resistance for any given conductor shall not be less than the value recommended by the IPCEA or a minimum of 1 megohm for 600 volt and less service, if not IPCEA listed. Any cable not meeting the recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.

END OF SECTION

SECTION 16126

INSTRUMENTATION CABLE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install instrumentation cable.

2. The types of cable include the following:

   a. Twisted shielded instrument cable.

   b. Twisted unshielded pairs.

1.2 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for shielded instrumentation cable proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Single Pair or Triplex Shielded Instrument Cable:

1. Tinned copper, stranded conductors, #18 AWG minimum, twisted with 100 percent aluminum-polyester shield, stranded tinned #20 AWG copper drain wire and overall chrome vinyl jacket. Rated for 600 volts minimum.

2. Manufacturer: Provide shielded cable of one of the following:

   a. Okonite Company.

   b. Belden Company.

   c. Dekoron Wire and Cable Company.

   d. Alpha Cable Company.

B. Multipair Shielded Instrument Cable:

1. Tinned copper, 7 strand XLPE insulated conductors, #18 AWG minimum, 600V, twisted in pairs with aluminum-mylar shield over each pair, silicone

rubber fiberglass fire barrier tape, tinned copper drain wire, aluminum mylar overall shield, Hypalon outer jacket.

2. Manufacturer: Provide shielded cable of one of the following:

   a. Okonite Company.

   b. Dekoron Wire and Cable Company.

   c. Belden Company.

   d. Alpha Cable Company.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in rigid PVC coated conduit separate from power and 110V control circuit cables unless otherwise noted.

B. Ground shield on shielded cables at one end only and as recommended by instrument manufacturer.

C. Terminate stranded conductors with pre-insulated crimp type spade or ring type terminals properly sized to fit fastening device and wire size.

D. Install and terminate vendor furnished cable in accordance with vendor equipment requirements.

E. Install in conformance with the National Electrical Code.

F. Conduit sizing is based on single .304 diameter #16 TWSH pair cables, Belden #8179. Cable of larger diameter or multi-pair cable may require conduit size increases over that shown in the Contract Documents. Engineer shall bear all additional costs for required revisions.

3.2 TESTING

A. Test all 600-volt wiring in conformance with the requirements of Section 16122, 600 Volt Cable.

B. Test shielded instrumentation cable shields with an ohmeter for continuity along the full length of the cable and for shield continuity to ground.

C. Connect shielded instrumentation cables to a calibrated 4-20 milliamp DC signal transmitter and receiver. Test at 4, 12, and 20 milliamp transmitter settings.

D. All tests shall be reviewed and approved by the I & C Engineer.

END OF SECTION

SECTION 16131

PULL AND JUNCTION BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install pull and junction boxes.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1.	NEC Article 370	Outlet, Switch and Junction Boxes, and Fittings
2.	UL Standard No. 50	Electrical Cabinets and Boxes
3.	UL Standard No. 886	Electrical Outlet Boxes and Fittings for Use in Hazardous Locations

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for pull and junction boxes proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pull and Junction Boxes

1. Material and Construction:

   a. Cast gray iron alloy, cast malleable iron bodies and covers, with cadmium finish.

   b. Neoprene gaskets. Gaskets to be of an approved type designed for the purpose. Improvised gaskets not acceptable.

   c. Stainless steel Type 316 cover screws, hinges and hardware.

   d. External mounting lugs.

   e. Drilled and tapped conduit holes.

   f. Boxes where conduits enter a building below grade shall have 1/4-inch drain hole.

2. Manufacturer: Provide pull and junction boxes of one of the following:

   a. Crouse-Hinds Company.

   b. Appleton Electric Company.

   c. Hoffman.

   d. Carlon

   e. Or equal.

3. Large boxes not generally available in cast or non-metallic construction may be fabricated of copper-free aluminum alloy or stainless steel code gage sheet metal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount boxes so that sufficient access and working space is provided.

B. Securely fasten boxes to walls or other structural surfaces on which they are mounted. Provide independent hot dipped galvanized steel support where no walls or other structural surface exists. Space one inch out from walls minimum.

C. Where required for ease of pulling and as necessary to meet code, the Engineer shall provide junction and pull boxes even though not shown on the drawings.

D. Size junction and pull boxes in accordance with the requirements of the National Electrical Code plus minimum 20% height, width and depth.

E. Provide terminal blocks in all junction boxes where cable terminations or splices are required.

END OF SECTION

SECTION 16134

OUTLET BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install outlet boxes for mounting wiring devices and lighting fixtures.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 370 — Outlet, Switch and Junction Boxes and Fittings
2. UL Standard No. 514 — Electrical Outlet Boxes and Fittings

PART 2 - PRODUCTS

2.1 MATERIALS

A. Device Boxes (Non-Classified Locations):

1. Material: Cast gray iron alloy, or cast malleable iron, with zinc electroplate finish in all exposed locations. Zinc-coated sheet steel may be furnished for wall recessed installations.

2. Device Cover Plates:
   a. Stainless steel Type 302 alloy for indoor finished areas.
   b. Gasketed spring door type for devices designated as weather proof.
   c. Integral with device for hazardous locations.
   d. Stainless steel screws and hardware.

3. Manufacturer: Provide device boxes of one of the following:
   a. Crouse-Hinds Company.
   b. Appleton Electric Company.
   c. Or equal.

B. Device Boxes (Classified Locations):

In all Class I, Divisions 1 and 2, hazardous areas, boxes and fittings shall be explosion proof and shall comply with Article 500 of the NEC. Seals for conduit systems in hazardous atmosphere locations shall be of hot-dip galvanized cast ferrous alloy, and each seal shall be of a suitable configuration for the individual circumstance. Sealing compound shall be UL listed for explosionproof sealing fittings and shall be of the same manufacture as the fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten boxes rigidly and neatly to supporting structures.

B. For units mounted on masonry or concrete walls, provide suitable 1/2-inch spacers to prevent mounting back of box directly against wall.

C. Leave no open conduit holes in boxes. Close unused openings with capped bushings.

D. Label each circuit in boxes and identify with durable tag.

E. Install in conformance with National Electrical Code.

END OF SECTION

SECTION 16135

SNAP SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install snap switches for lighting and other systems.

B. Related Sections:

1. Section 16134 Outlet Boxes

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.

1. National Electrical Code
2. UL Standard #20 General Use Snap Switches
3. UL Standard #894 Switches for Use in Hazardous Locations

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for switches proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Switches for Non-Hazardous Locations:

1. Single pole AC toggle switch, quiet type, 120/277 volt AC, 20 ampere, Ivory, specification grade.
   a. Product and Manufacturer: Provide one of the following:
      1) Cat. #1221-I, by Harvey Hubbel Incorporated.
      2) Cat. #1991-I, by Arrow-Hart Incorporated.
      3) Or equal.

2. Single pole, 3-way AC toggle switch, quiet type, 120/277 volt AC, 20 ampere, Ivory, specification grade.

   a. Product and Manufacturer: Provide one of the following:

      1) Cat. #1223-I, by Harvey Hubbell Incorporated.

      2) Cat. #1993-I, by Arrow-Hart Incorporated.

      3) Or equal.

3. Two pole AC toggle switch, quiet type, 120/277 volt AC, 20 ampere, Ivory, specification grade.

   a. Product and Manufacturer: Provide one of the following:

      1) Cat. #1222-I, by Harvey Hubbel Incorporated.

      2) Cat. #1992-I, by Arrow-Hart Incorporated.

      3) Or equal.

B. Switches for Hazardous Locations

Switches located in classified areas shall be Crouse-Hinds, Appleton EFS Series, or equal.

Explosion proof switches for control of lighting and small single-phase power loads shall consist of a factory assembled combination of a general duty type switch as specified herein and an explosion proof housing. The complete unit shall be UL listed for the explosion hazard listed but shall be suitable for Class I, Group D atmospheres as a minimum requirement. The external operating mechanism shall consist of wing-type handle having the “On” and “Off” positions clearly visible from the front. Switch units shall be Crouse-Hinds EFSC 2129, Appleton EFSC 175-F1, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wiring devices in outlet or device boxes in accordance with Section 16134 in non-hazardous locations.

B. Mount wall switches 4 feet-6 inches above finished floor unless otherwise noted.

C. Install switches in conformance with National Electrical Code.

END OF SECTION

SECTION 16136

RECEPTACLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install receptacles.

B. Related Sections:

1. Section 16134, Outlet Boxes.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.

2. UL Standard #1010, Electrical Receptacle - Plug Combinations for Use in Hazardous Locations.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for receptacles proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Receptacles for Non-Hazardous Locations:

1. Duplex grounding receptacle, two pole, three wire, 125 volt AC, 20 amperes.

a. Product and Manufacturer: Provide one of the following:

1) Cat. #53CM62, by Harvey Hubbell Incorporated.

2) Cat. #5362-CR, by Arrow-Hart Incorporated.

3) Or equal.

2. Standard locking receptacle, three pole, four wire grounding, 480 volt AC, 50 amperes.

a. Product and Manufacturer: Provide one of the following:

1) Cat. #CS8164C, by Hubbell Incorporated.

2) Or equal.

B. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown on the Drawings. Coordinate with equipment plugs. Provide matching plug for each receptacle.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wiring devices in outlet or device boxes in accordance with Section 16134 in non-hazardous locations.

B. Install receptacles in rigid metallic conduit systems in hazardous locations.

C. Install receptacles with ground pole in the down position.

D. Mount receptacles 30 inches above finished floor in non-hazardous locations and 4 feet-6 inches above finished floor in hazardous or wet locations and process areas unless otherwise noted.

E. Install in conformance with National Electrical Code.

END OF SECTION

SECTION 16360

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install disconnect switches.

B. Related Sections

1. Section 16135 Snap Switches for disconnect switches on 120 volt, single phase circuits

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code

2. UL #98 Enclosed Switches

3. NEMA KS-1 Enclosed Switches

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for disconnect switches proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Service Disconnect Switches:

1. Type: Heavy-duty, single throw, quick-make, quick-break mechanism, visible blades in OFF position and safety handle. Provide fused switches where shown on the plans.

2. Rating: Voltage, number of poles and short circuit rating as shown on the Drawings. Switch shall bear a UL label and shall be suitable for use as service equipment.

B. Single Throw, Circuit Disconnect Switches:

1. Type: Unfused, horsepower rated, heavy-duty, single throw, quick- make, quick-break mechanism, visible blades in the OFF position and safety handle.

2. Rating: Voltage and number of poles as required for motor or equipment circuits being disconnected. Switches shall bear a UL label.

3. Accessories: Auxiliary contact rated 5A, 250V single pole double throw, mechanically linked and internally mounted. Required as indicated on the Drawings.

C. Double Throw Safety Switches:

1. Type: Unfused, double throw with center OFF position, quick-make, quick-break mechanism, visible blades in the OFF position and safety handle.

2. Rating: Voltage and number of poles as required for the circuits being disconnected.

D. Enclosure:

1. NEMA 12 for indoor dry, above grade, non-corrosive areas.

2. NEMA 4X 316SS for wet, below grade or corrosive locations and all outdoor locations.

3. Type Phenolic nameplate identifying equipment for which switches serve as the disconnecting means.

E. Manufacturer: Provide disconnect switches of one of the following:

1. Square D Company.

2. General Electric Company.

3. Or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other structural surfaces on which they are mounted. Provide independent hot dipped galvanized steel supports where no wall or other structural surface exists.

C. Install in conformance with National Electrical Code.

END OF SECTION

SECTION 16404

MANHOLES & HANDHOLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install manholes and handholes.

B. Coordination: Coordinate manhole and handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

C. Related Sections:

1. Section 02350, Earthwork – Pipeline and Miscellaneous Structures

2. Section 03300, Cast-In-Place Concrete.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code

2. National Electrical Safety Code

3. ASTM A48, Gray Iron Castings

4. ANSI A14.3, Safety Requirements for Fixed Ladders

5. OSHA

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for manholes, handholes and accessories proposed for use.

2. Drawings showing interior and exterior dimensions and details of openings, jointing, inserts and reinforcing.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Material and Construction:

1. Precast or cast-in-place type of reinforced concrete.

2. Minimum interior dimensions as indicated on the Drawings.

3. Duct entrances sized and located to suit duct banks.

B. Accessories:

1. Frames and Covers:

a. Material: Cast iron conforming to ASTM A 48, Class 30A.

b. Covers: Watertight, round sealed type marked "ELECTRICAL" in raised two inch letters.

c. Frame shall be grouted on the manhole or handhole.

d. Manufacturer: Provide frames and covers of one of the following:

1) Neenah Foundry Company

2) Flockhart Foundry Company

3) Campbell Foundry Company

4) Or equal

2. Pulling Irons:

a. Material: Galvanized steel.

b. Cast in the wall opposite to the centerline of each incoming duct bank and 12 inches below centerline of bottom line of ducts.

c. Product and Manufacturer: Provide one of the following:

1) Cat. No. DU2T3 by McGraw Edison Company

2) Cat. No. 8119 by A.B. Chance Company

3) Or equal

3. Cable Racks:

a. Material: Galvanized steel

b. Cable racks shall adequately support cables with space allowed for future cables.

c. Each rack shall be a vertical assembly of 24-inch cable racks extending from within 6 inches of the manhole roof slab to within 6 inches of the manhole floor.

d. Product and Manufacturer: Provide one of the following:

1) Cat. No. J-5125 by Joslyn Manufacturing and Supply Company

2) Cat. No. 2125 by Hubbard and Company

3) Or equal

4. Cable Hooks:

a. Material: Galvanized steel

b. Length: 7-1/2-inch minimum

c. Product and Manufacturer: Provide one of the following:

1) Cat. No. J-5132 by Joslyn Manufacturing and Supply Company

2) Cat. No. 2132 by Hubbard and Company

3) Or equal

5. Insulators:

a. Material: Porcelain.

b. Product and Manufacturer: Provide one of the following:

1) Cat. No. J-5122 by Joslyn Manufacturing and Supply Company

2) Cat. No. 2120 by Hubbard and Company

3) Or equal

6. Manhole Steps:

a. Material: Extruded aluminum.

b. Steps spaced evenly at approximately twelve to sixteen inch centers and shall project evenly from manhole walls.

c. Manufacturer: Provide manhole steps of one of the following:

1) Flockhart Foundry Company

2) Neenah Foundry Company

3) Or equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install manholes and handholes where shown on drawings or as otherwise required. Verify final locations in field. Contractor shall be responsible for all excavation and backfilling required for installation.

B. Install pull boxes in runs containing more than three (3) 90 degree bends, (two [2] 90 degree bends for AT&T telephone service conduits), runs exceeding 200 feet, and where required to conform with the National Electric Code.

C. Where required for ease of pulling and as necessary to meet code, the Contractor shall provide junction and pull boxes even though not shown on the drawings.

D. Complete installation of manholes and handholes so that structures are watertight.

E. Cable Racks:

1. Attach with 3-inch by 3/8-inch diameter "tamp-in" studs mounted in 1-inch holes drilled into walls of manholes in the absence of inserts.

2. Provide cable hooks to support each cable on each rack along the cable run within the manholes.

3. Individually support each cable at each hook-on porcelain insulators.

4. In the manhole securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4-inch strapping tape as manufactured by 3M or tie down with nylon straps.

F. Grounding: Install a 0.75 inch OD, 10-foot ground rod for each pull box. Bond all exposed metal pull box accessories and the concrete reinforcing rods with No. 4 AWG minimum bare copper wire and connect to the ground rod and to the duct bank ground cable. Extend #3/0 ground cable to ground grid.

G. Sump: Provide a 12" x 12" x 6" sump in pull box floors.

H. Provide grading rings or brick stacks for pull boxes when required to adjust pull box cover to proper grade. Stacks shall be a minimum of 12 inches in height, constructed on the roof slab or cone section on which the pull box frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the pull box frame to the proper grade.

END OF SECTION

SECTION 16450

GROUNDING SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install complete grounding for the electrical systems. The grounding system shall consist of green wire grounding from power sources, and a supplemental well facility wide ground grid, ground rods, and UFER grounds.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 250 Grounding

2. UL Standard #467 Electrical Grounding and Bonding Equipment

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for grounding materials proposed for use.

2. Listing of grounding connector types identifying where they are to be used.

3. Layouts of each structure ground grid.

4. Test point construction details.

5. Results of ground resistance tests at each test point.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bare Ground Cable:

1. Material: Annealed, bare, stranded copper, No. 6 AWG minimum size for equipment grounding, No. 4/0 minimum for ground loops.

2. Manufacturer: Provide ground cable of one of the following:

a. Continental Wire and Cable Corporation.

b. General Cable Corporation.

c. Rome Cable Company.

d. Or equal.

B. Ground Rods:

1. Material: Copperclad rigid steel rods, 3/4-inch diameter, 10 feet long.

2. Manufacturer: Provide ground rods of by one of the following:

a. Copperweld, Bimetallics Division.

b. ITT Blackburn Company.

c. Or equal.

C. Grounding Connectors:

1. Welded connections shall be by exothermic process utilizing molds, cartridges and hardware designed specifically for the connection to be made.

a. Welded Connections:

1) Cadweld by Erico Products, Incorporated.

2) Therm-O-Weld by Burndy Corporation.

3) Or equal.

D. Insulated Ground Cable: Sizes as shown on the Drawings and required by the NEC, green insulation, type THHN/THWN.

E. Hardware: Silicon bronze.

PART 3 - EXECUTION

3.1 GROUND SYSTEM

A. Provide individual and grouped ground rods and connecting ground loop as shown on the Contract Drawings.

B. Install No. 4/0 bare copper cable around the exterior perimeter of structures linking rods, minimum 2 feet-6 inches below grade, unless otherwise shown on Drawings.

C. Install sufficient ground rods to provide a resistance to ground of less than 5 ohms at each point on the ground grid.

D. For structures with steel columns, install 2/0 ground cable from grid to each column around the perimeter of the structure. Connect cable to steel using exothermic welds.

E. Connect grids to a continuous underground water pipe system when practical. Provide a UFER grounds at all structures and buildings and connect to grid.

F. Extend bare copper grounds from the ground grid to all railing, electrical equipment, tanks, pumps, process equipment, piping, structural steel and to all building and structure loops throughout the site.

G. Provide accessible test points for measuring the ground resistance of each grid, as shown on the Drawings.

H. Weld all buried connections except for test points.

3.2 EQUIPMENT GROUNDING

A. Ground all electrical equipment in compliance with the National Electrical Code and other applicable codes.

B. Equipment supplemental grounding conductors shall be bare stranded copper cable of adequate size installed in Schedule 80 PVC conduit where necessary for mechanical protection.

C. Connect supplemental ground conductors to metallic conduit with copper clamps, straps or with grounding bushings.

D. Connect supplemental ground conductors to piping by welding or brazing. Use copper bonding jumpers on all gasketed joints.

E. Connect supplemental ground conductors to equipment by means of an indent compression type lug. Bolt lug to equipment frame using holes or terminals provided on equipment specifically for grounding. Do not use holddown bolts. Where grounding provisions are not included, drill suitable holes in locations designated by Engineer.

F. Connect supplemental ground conductor to motors by bolting directly to motor frames, not to sole plates or supporting structures.

G. Connect supplemental ground and green wire ground to service water piping by means of copper clamps. Use copper bonding jumpers on all gasketed joints.

H. Scrape bolted surfaces clean and coat with a conductive oxide- resistant compound.

I. Run green insulated wire grounds with all power conductors, and in all PVC conduit runs.

3.3 TESTING

A. Test the completed ground systems for continuity and for resistance to ground using an electrical ground resistance tester and submit test reports for all ground rods and ground loops.

END OF SECTION

SECTION 16501

LIGHTING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install lighting fixtures.

B. Coordination: Coordinate location of fixtures with piping, ductwork, openings and other systems and equipment and locate clear of interferences.

C. Related Work Specified Elsewhere:

1. Section 16134 Outlet Boxes

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code
2. UL Standard #57 – Electric Lighting Fixtures
3. UL Standard #844 – Electric Lighting Fixtures for Use in Hazardous Locations
4. UL Standard #1571 – Incandescent Lighting Fixtures

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's catalog costs and technical information for lighting fixtures proposed for use.

2. Fixture construction details.

3. ETL photometric and isocandle curves for each fixture proposed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type: Lighting fixtures are noted on the plans. Fixtures to be complete with supports, ballasts, lamps and incidentals as required.

B. Fixtures located in an area which is identified as a hazardous location shall be UL approved as a complete assembly for the hazardous location classification indicated on the Drawings, shall be clearly marked to indicate maximum wattage of lamps for which they are approved, and shall be protected against physical damage by suitable guards.

C. Hardware: All necessary supports, conduit adapters, reducers, brackets and other hardware required for safe fixture mounting shall be furnished. All hardware shall be Type 316 stainless steel, unless otherwise shown on the Contract Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Fixture mounting heights and locations indicated on the supplemental Drawings in the Appendix are approximate and are subject to revision in the field where necessary to clear conflicts and obstructions.

B. Surface Mounted Fixtures: Attach to appropriate outlet box.

C. Boxes and Fixtures:

1. For units mounted against masonry or concrete walls, provide suitable 1/2-inch spacers to prevent mounting back of box directly against wall.

2. Bolt units rigidly to building with expansion anchors, toggle bolts, hangers or Unistrut.

3. No boxes shall be installed with open conduit holes.

4. Cable each circuit and identify with tag.

D. Mounting Heights: Mounting heights or elevations are to bottom of the fixture or to centerline of device.

E. Install fixtures in conformance with the National Electrical Code.

END OF SECTION

SECTION 16923

PANEL INSTRUMENTS AND DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install pushbuttons, selector switches, indicators and other panel instruments.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.

1. NEMA Standard ICS2-216 Pushbuttons, Selector Switches, Indicating Lights and Pushbutton Stations

2. National Electrical Code

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's technical information for control stations proposed for use.

PART 2 - PRODUCTS

2.1 PANEL DEVICES

A. Relays

1. Relays shall be dust tight and suitable for installation in the distribution section of the main and meter panel.

2. The coil shall be suitable for operation at 120 volts, A/C, and contacts shall be rated not less than 10 amperes.

3. Relays shall be Allen Bradley 700 HA or equal.

4. Timing relays shall be All Bradley 700 HR or equal.

B. Selector Switches

Selector switches shall be heavy-duty oil tight type.

Switches shall be provided complete with cover, front escutcheon, handle and with the legend plate engraved by the switch manufacturer in accordance with the Drawings. Selector switches shall be GE CR104P or equal.

C. Pushbuttons

Pushbuttons shall be recessed, heavy duty, oil tight, non-illuminated, momentary or maintained type as shown on the Drawings. Pushbuttons shall be furnished with escutcheon and engraved name plate. Pushbuttons shall be GE CR 104P or equal.

D. Elapsed Time Meters

Elapsed time meters shall be of the 2½-inch square case type for flush panel mounting. The totalizing meter shall have 8 digit register with the last digit indicating tenths of an hour, non-resettable type.

E. Indicating Lamps

Indicating lamps shall be heavy duty, oil tight, push-to-test units. Indicating lamps shall be furnished with escutcheon lens cap and engraved legend plate. Indicating lamps shall be GE 104P or equal.

F. Digital Indicators

Digital indicators shall accept a 4-20 analog signal input and display the value of the process variable on a large (0.56 inch), easy to read 4 ½ digit LED display. The value of the process variable shall be displayed in engineering units, complete with overload indication. The display shall be updated four times per second for accurate indication of short term variations. The indicator shall be suitable for front panel mounting. Zero and span adjustments shall be provided. Decimal point indication shall be field adjustable. Over-range indication shall be provided. Response time shall be 500 MS, to 0.1% accuracy.

Indicator shall operate as specified over a temperate range of 0 to 60 degrees C. Indicator shall operate from a 120 VAC +/- 10%, 60 Hz, single phase power source. Indicator shall provide A4-20 mA output. Digital indicator shall be Action Instruments Model V508 or approved equal.

2.2 SINGLE PHASE MOTOR STARTER

Motor starter shall be NEMA rated, 2-pole single phase 600 volt AC 60 Hz 120V coil rated. Full voltage non-reversing with motor overload protection melting alloy-type thermal overload relays. Starters shall be G.E. CR306 or equal. Provide starting capacitor as recommended by the motor supplier.

2.3 FAN THERMOSTAT

Fan thermostats shall be line voltage type and shall be as follows:

Quantity – 2
Rating – 277 VAC, 22 amps
Set Point Range – 50˚ - 100˚F
Switch Type – SPDT
Manufacturer – McMaster-Carr 1856K12 or equal

2.4 MANUAL MOTOR STARTERS

Manual motor starter shall be toggle operated, horsepower rated with thermal overload protection, as noted on the drawings. Provide NEMA 4x enclosure and phenolic nameplate identifying the equipment. Manual motor starters shall be General Electric or equal.

2.5 LIMIT SWITCHES

Limit switches shall be Type C, heavy duty precision, turret head type with a leaver arm. Switches shall incorporate 2 N.O., and 2 N.C. contacts rated at 120 VAC, 10 AMPS. The enclosure shall be a standard box NEMA 6P rated. Limit switches shall be Square D, Class 9007 or equal.

2.6 NAMEPLATES

Nameplates shall be fabricated from white-center, black face, laminated plastic engraving stock. Nameplates shall be fastened securely using fasteners of brass, cadmium plated steel, or stainless steel, screwed into inserts or tapped holes. Engraved characters shall be block style of adequate size to be easily read, with no character being smaller than 1/8-inch high.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Securely fasten equipment to walls or other surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other surface exists.

C. Install in conformance with National Electrical Code.

D. Provide nameplates for all disconnect switches, breakers, switches, lights, indicators, starters, and cabinets.

*** END OF SECTION ***

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SECTION 16950

ELECTRICAL TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes requirements for acceptance testing of the electrical system, wiring, equipment, and grounding.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. General Electrical Requirements: 16010

B. Testing, Training, and Facility Startup: 01730

1.3 REFERENCES

A. National Electric Testing Association (NETA):

1. ATS-2013 -Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.

1.4 SUBMITTALS

A. Pre-Test Submittals:

1. Testing service qualifications.
2. Test personnel qualifications (resumes).
3. Equipment testing schedule.
4. Test data forms.

B. Post -Test Submittals;

1. Summary of testing for the project.
2. Description of the equipment tested.
3. Description of the test and test procedures.
4. Test results.
5. Conclusions and recommendations.

6. Completed test forms, including witness's signatures.

7. List of test equipment and calibration documents.

8. Date and time.

9. Include the following data tabulated for each piece of equipment:

   a. Circuit number.

   b. Equipment or motor name and tag number (where applicable).

   c. Nameplate full-load-ampere rating.

   d. Motor service factor.

   e. Motor ambient temperature rating.

   f. Overload relay rating.

   g. Measured full load current.

   h. Measured discharge pressures (where applicable).

C. Submit equipment test schedule no later than 7 days prior to scheduled date of testing.

D. Project Record Documents: Note or indicate wiring deviations from Contract Documents on Project Record Documents.

1.5. QUALITY ASSURANCE

A. The Contractor shall retain a qualified Engineering appraisal and testing organization to provide inspections, tests, and evaluation to determine that the equipment designated herein is furnished in accordance with specifications and is installed and adjusted for successful energization and operation.

B. Testing Firm:

1. Obtain services of an independent testing service firm that meets the Federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1910.7 and has a work history and qualifications acceptable to the Engineer.

2. The appraisal and testing organization shall have two or more years of experience related to the appraisal and testing of equipment designated herein.

3. The managing or supervising representatives of the appraisal and testing organization shall have extensive knowledge of the products involved and at least two years experience conducting appraisals and tests. All testing shall be conducted under the supervision of the managing or supervising representatives.

4. Testing technicians shall be trained and experienced in the testing they perform.

5. The engineering appraisal and testing organization shall utilize comprehensive report forms to document engineering appraisal and test results on all equipment's and products. Upon completion of the work, the report forms shall be signed by the managing or supervising engineering representative and included in the final report.

6. Testing shall be done in accordance with the manufacturer's instructions, these specifications, and applicable ANSI, ASTM and NEMA standards. Applicable product instructions shall be furnished to the Engineer for review.

7. Prequalified Testing Services and Manufacturing Firms:

   a. Electro-Test Inc.

   b. Square D Company Technical Services Divisions.

   c. General Electric Company.

   d. Eaton

   e. Emerson

8. Qualifications of other testing services firms may be submitted.

9. Testing service or testing personnel may be accepted or rejected based on, but not limited to, the testing equipment intended to be used, the qualifications of the firm, and personnel.

PART 2 – NOT USED

PART 3 - EXECUTION

3.1 <u>EXAMINATION</u>

A. Verify that electrical work is free from improper grounds, short circuits, and overloads.

B. Verify correctness of wiring first by visual comparison of the conductor connections with connection diagrams.

C. Make individual circuit continuity checks by using electrical circuit testers.

3.2 ACCEPTANCE TESTING

A. Perform testing and allow Engineer and Contractor to witness testing. Notify the Engineer three days or more in advance when any test is to take place.

B. Perform electrical acceptance testing in accordance with NETA Standards

C. Perform tests to assure that electrical equipment specified to be tested will operate within industry and manufacturers published tolerances, and will perform safely. Record test result data, to be used as a baseline for future tests.

D. Testing of installed equipment shall result in acceptable test data. Equipment for which acceptable test data has not been submitted, or has been submitted but rejected, shall be deemed as not meeting Contract requirements.

E. Conduct 3 point fall of potential ground test by using equipment of one of the following manufacturer, or equal:

1. Biddle Company.

2. Associated Research.

F. Test insulation resistance of circuits. Test each complete circuit prior to energizing. Insulation resistance between conductors and between each conductor and ground shall not be less than 25 megohms. Repair or replace wires or cables in circuits that do not pass this test, and repeat the test.

G. Test project electrical equipment, including 600 volt electrical distribution equipment, motor control centers, and grounding. Complete test reports for each individual piece of equipment. The following types of electrical equipment shall be tested according to the requirements of this specification section. Refer to the project documents to identify the equipment related to a specific project:

1. Power Distribution Switch

2. Molded Case Circuit Breaker.

3. Motor Circuit Protector, 100 amp and above.

4. Motors, 100 hp and above.

5. Grounding Electrode Systems and Equipment Grounding System (refer to section 16450 for additional requirements).

6. Protective Relays (relay settings shall be as documented in the project coordination study, see section 16010).

7. Three Phase Power Transformers.

H. Ground Fault Protective Equipment: The ground-fault protection system shall be performance tested after installation in accordance with NEC 230-95C. Submit a written record of the test to the Owner's representative. Label on panel above the device with certification and values. Record current pickup level and time delay settings to which the equipment was finally adjusted. Measure and record relay pickup current and the relay time delay at two values above pickup. Test for correct system operation at 57% rated voltage. If relay pickup current is not within 5% of the manufacturer's calibration marks or fixed setting or relay timing does not conform with manufacturer's published time-current characteristic curves, repair or replace equipment and repeat test.

I. Motor Operating Test: Run each motor as nearly as possible to rated operating conditions. Record current in each phase of each motor 1/2 hp and larger and submit to the Owner's representative. Repair or replace motor or driven equipment if current exceeds motor nameplate current.

J. Power Company Voltage Test: When the installation is essentially complete and the facility is in operation, check the voltage at the point of termination of the power company supply system to the project. Check voltage amplitude and balance between phases for loaded and unloaded conditions. If the unbalance (as defined by NEMA) exceeds 1%, or if the voltage varies throughout the day and from loaded to unloaded conditions more than +5% of nominal, make a written request to the Power Company that the condition be corrected. If corrections are not made, request that the Power Company official provide a written statement that the voltage variations and/or unbalance are within their normal standards.

3.3 SUMMARY TEST REPORT

Upon completion of testing in every area, submit summary test report.

END OF SECTION

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SECTION 17500

PROGRAMMABLE LOGIC CONTROLLER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Programmable logic controller (PLC) control system(s), including software, programming, and training.

B. Related Sections include but are not necessarily limited to:

1. Section 11010 – Mechanical Equipment General

2. Section 16122 - 600 Volt Cable

C. Description of Work:

1. Existing Pump Station PLC and HMI controls and modifications for items shown on the P&ID drawings.

2. Modifications to the PLC controls.

3. Controls, instrumentation PLC and HMI programming for the new Chemical Feed Systems.

4. Addition of IO Cards, terminals and wiring and accessories to existing Pump Station PLC wired to terminate new IO at the existing Pump Station PLC. Updated as-built panel drawings shall be provided for the existing panel completely documenting all panel modifications.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

a. C37.90.2, Trial-Use Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
b. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

2. National Electrical Manufacturers Association (NEMA):

a. ICS 1, General Standards for Industrial Control and Systems.

B. Qualifications:

1. Installation supervisor shall have had experience in overseeing installation and startup of at least three (3) similar installations.

2. Programmer(s) shall have had experience in programming PLCs for at least two (2) projects of similar size and complexity.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Section 01340 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Annotated hard copies of PLC software programs.

1) Submit program for logic in ladder diagram format as used for the specific PLC system.
2) Annotate program listing to include the following:

a) Written description of each rung's function.

b) Reference to control loop number for each rung where applicable.

c) Reference to instrumentation tag number of I/O devices for each rung where applicable.

3) Provide written descriptions completely defining all function blocks used in program.

4) Provide list of all addresses referenced in logic diagram with description of data associated with each address.

b. Results of factory testing procedures.

c. Drawings containing the following information:

1) Arrangement drawings for PLC system components.

2) Panel and enclosure plans, sections and details.

3) Access opening locations and required clearances for each panel and enclosure.

4) Enclosure internal wiring and terminal blocks.

d. Catalog cut sheets containing information on PLC components to be submitted as part of this Specification Section submittals.

3. Certifications:

a. Qualifications of installation supervisor.

b. Qualifications of programmer(s).

B. Operation and Maintenance Manuals:

1. See Section 01340 for requirements for:

a. The mechanics and administration of the submittal process.

b. The content of Operation and Maintenance Manuals.

2. Submit maintenance procedures available to Owner.

a. Include the location and phone numbers of service centers (including 24 HR "hot lines").

b. Provide specific information including operation and maintenance requirements, programming assistance, troubleshooting guide, parts ordering, field service personnel requests, and service contracts.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Allen Bradley MicroLogix 1200 series.

2. Connections between I/O cards and field terminations shall be with IFM Modules.

3. PLC application software shall be Allen Bradley RSLogix 500.

B. . No other PLC model or manufacturer is acceptable.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. System Operating Criteria:

1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two (2) cycles per minute or a magnitude of movement of 0.5 percent full travel.

2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.

3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3 percent of full scale over a 6:1 operating range.

4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 percent of full travel regardless of force required to position final element.

5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0 percent of full scale.

6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

B. The PLC system shall accomplish the control requirements of the Drawings, and Specifications.

C. PLC programming shall be documented and factory tested.

D. The PLC system shall operate in ambient conditions of 32 to 140 DegF temperature and 5 to 95 percent relative humidity without the need for purging or air conditioning.

E. Environmental Controls:

1. Furnish circulation fans in solid state control system enclosures.

2. Over-temperature switches shall be utilized to provide special cooling if required to maintain operating temperatures within the manufacturer's specified range.

3. Air conditioning applications shall include means of preventing moisture condensation.

F. Where the PLC is utilized to control multiple trains of equipment and where the equipment in each train operates as a unit relatively independent of other equipment trains (e.g., facility with multiple boiler units or filter trains), the PLC components (I/O modules, power supplies, etc.) shall be assigned so that the failure of any one (1) component does not affect equipment on all trains.

1. I/O modules shall be segregated on a train basis unless required otherwise for safety reasons.

2. Where several equipment units operate in parallel, but are not considered assigned to a particular equipment train (e.g., multiple raw water pumps or chemical feed pumps all discharging into a common system), the PLC I/O modules associated with each equipment unit shall be assigned so that the failure of any one (1) I/O module does not affect all of the parallel operating equipment units.

G. All PLC control system components shall be capable of meeting or exceeding electromagnetic interference tests per IEEE C37.90.2.

H. Incorporate the following minimum safety measures:

1. Watchdog function to monitor:

   a. Internal processor clock failure.

   b. Processor memory failure.

   c. Loss of communication between processor and I/O modules.

   d. Processor ceases to execute logic program.

2. Safety function wiring: Emergency shutdown switches shall not be wired into the controller.

3. Safe wiring:

   a. Unless otherwise specified, activation of alarms and stopping of equipment shall result from the de-energization of control circuits, rather than the energization of control circuits.

   b. Low voltage control signal wires:

      1) Place in conduit segregated for that purpose only.

      2) Twisted shielded wire pair.

      3) Not located in the same conduit or bundle with power wiring.

4. Initial safety conditions:

   a. Utilize program module to dictate output states in a known and safe manner prior to running of control program.

   b. Utilize program each time PLC is re-initiated and the control program activated.

5. Monitoring of internal faults and display:

   a. Internal PLC system status and faults shall be monitored and displayed.

      1) Monitored items shall include:

         a) Memory ok/loss of memory.

         b) Processor ok/processor fault.

         c) Scan time overrun.

2) PLC diagnostics shall be viewable via a web browser.

6. Control of programs: Protect access to PLC program loading with password protection or with locked, key operated selector switches.

7. Design PLC system with high noise immunity to prevent occurrence of false logic signals resulting from switching transients, relay and circuit breaker noise or conducted and radiated radio frequency interference.

8. Operator intervention:

a. Logic system failure shall not preclude proper operator intervention.

b. Safety shutdown of equipment or a system shall require manual operator intervention before the equipment or system operation may be reestablished.

2.3 COMPONENTS

A. PLC System Central Processor Unit (CPU):

1. CPU shall provide ethernet communications with other control systems and human-machine (HMI) interfaces as specified.

2. Memory:

a. Battery-backed RAM.

b. EEPROM program back-up:

1) Automatically download to RAM in the event RAM is corrupted.

3. Memory battery backup shall be capable of 60 days memory retention with fresh battery.

a. Provide visual indication of battery status and alarm low battery voltage.

b. Memory battery backup shall be capable of 14 days memory retention after the "Battery Low" indicating LED is on.

4. Plug-in card design to allow quick field replacement of faulty devices.

a. Provide unit designed for field replacement and expansion of memory without requiring rewiring or use of special tools.

5. 20 percent minimum spare useable memory capacity after all required programming is in place and operating.

6. Capable of executing all control functions required by the Specifications and Drawings.

7. Built-in three-mode (proportional-integral-derivative) control capabilities.

    a. As directly selectable algorithms requiring no user knowledge of programming languages.

8. On-line reconfigurable.

9. Lighted status indicators for "RUN" and "FAILURE."

10. Capable of manual or automatic control mode transfer from the operating console stations or from within the control strategy.

    a. Transfer shall be bumpless and balanceless.

B. Input/output (I/O) Modules:

1. Provide plug-in modular-type I/O with cables to connect to all other required PLC system components.

2. Provide I/O system with:

    a. I/O solid state boards with status lights indicating I/O status.

    b. Electric isolation between logic and field device.

    c. Capability of withstanding low energy common mode transient to 1000 V without failure.

    d. Incorporate noise suppression design.

    e. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.

    f. Install 20 percent spare of each I/O type.

3. Input/output connection requirements:

    a. Make connections to I/O subsystem by terminating all field wiring on IFM terminal blocks within the I/O enclosure.

    b. Prewire I/O modules to terminal blocks using IFM cables and modules.

    c. .Provide terminals for individual termination of each signal shield.

    d. Field wiring shall not be disturbed when removing or replacing an I/O module.

4. Discrete I/O modules:

a. Interface to ON/OFF devices.

b. I/O status indicator on module front.

c. Voltage rating to match circuit voltage.

d. Output module current rating:

1) Match maximum circuit current draw.

2) Minimum 1.0 continuous A/point for 120 Vac applications.

e. Isolated modules for applications where one (1) module interfaces with devices utilizing different sources of power.

5. Discrete outputs shall be fused:

a. Provide one (1) fuse per common or per isolated output.

b. Provide blown fuse indication.

c. External fusing shall be provided if output module does not possess internal fusing.

d. Fuses provided external to output model shall:

1) Be in accordance with module manufacturer's specifications.

2) Be installed at terminal block.

6. Analog I/O modules:

a. Input modules to accept signals indicated on Drawings or Specifications.

b. Minimum 12 bit resolution.

c. I/O chassis supplied power for powering connected field devices.

d. Differential inputs and outputs.

e. User configurable for desired fault-response state.

f. Provide output signals as indicated on Drawings and Specifications.

g. Individual D/A converter for each output module.

h. Individual A/D converter for each input module.

C. Communications:

1. PLC shall utilize an Ethernet network for communication between network components.

D. Power Supply Units:

1. Provide regulated power units:

a. Designed to operate with PLC system and shall provide power to:

1) All components of PLC system.

2) All two-wire field instruments.

3) Other devices as indicated on Drawings or Specifications.

b. Capable of supplying PLC system when all of the specified spare capacity is utilized.

c. Each power supply shall be sized such that it will carry no more than 75 percent of capacity under normal loads.

2. Electrical service to PLC system is 105 to 125 V, 60 Hz, +1 percent, 1 PH power.

3. Separate AC circuit breakers shall be provided for each power supply.

4. If the PLC system is field expandable beyond the specified spare capacity, and if such expansion requires power supply modification, note such requirements in the submittals and allow room for power supply modification in the PLC system enclosure.

5. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.

6. Power distribution:

a. Immune to transients and surges resultant from noisy environment.

b. Shall provide constant voltage level DC distribution to all devices.

7. Provide uninterruptible power supply (UPS) to sustain full power to UPS powered loads listed below for a minimum of 20 minutes following loss of primary power and to ensure that the transient power surges and dips do not affect the operation of the PLC system.

a. UPS powered loads:

1) All rack mounted PLC components.

2) Local operator consoles.

3) All power supplies furnished with the PLC and associated loads.

b. Input:

1) 120 Vac +10 percent.

2) 60 Hz.

3) Line fuse protection.

c. Output:

1) 120 Vac (5 percent.

2) 60 Hz.

3) Short circuit protected.

4) Instantaneous transfer time.

d. IEEE C62.41 Class A voltage surges of 6000 V attenuated to less than 50 V on the output.

e. Battery: Maintenance free lead acid.

E. PLC System Enclosure:

1. All additional components shall be installed in the existing enclosure.

2. Component placement:

a. Mount all controller components vertically within the enclosure to allow maximum convection cooling.

b. Either install power supplies above all other equipment with at least 10 IN of clearance between the power supply and the enclosure top, or adjacent to other components, but with sufficient spacing for circulation of cooling air.

c. Do not place I/O racks directly above the CPU or power supply.

d. Locate incoming line devices (isolation or constant voltage transformers, local power disconnects, surge suppressors, etc.) so as to keep power wire runs within an enclosure as short as possible.

e. If items such as magnetic starters, contactors, relays, and other electromagnetic devices must be located within the same enclosure as the PLC system components, place a barrier with at least 6 IN of separation between the magnetic area and the control area.

f. Place circulating fans close to major heat generating devices.

g. Segregate input/output modules into groups of identical type.

3. Internal Panel Wiring:

a. Panel wire duct shall be installed between each row of components, and adjacent to each terminal strip.

1) Route wiring within the panel in wire-duct neatly tied and bundled with tie wraps.

2) Follow wire-duct manufacturer's recommended fill limits.

3) Wire-duct shall have removable snap-on covers and perforated walls for easy wire entrance.

4) Wire-duct shall be constructed of nonmetallic materials with rating in excess of the maximum voltage carried therein.

b. Wiring shall be installed such that if wires are removed from one (1) device, source of power will not be disrupted to other devices.

c. Splicing and tapping of wires permitted only at terminal blocks.

d. Wire bunches to doors shall be secured at each end so that bending or twisting will be around longitudinal axis of wire.

1) Protect bend area with sleeve.

e. Arrange wiring neatly, cut to proper length, with surplus wire removed.

1) Arrange wiring with sufficient clearance.

2) Provide abrasion protection for wire bundles that pass through openings or across edges of sheet metal.

f. AC circuits shall be routed separate from analog signal cables and digital signal cables.

1) Separate by at least 6 IN, except at unavoidable crossover points and at device terminations.

g. Provide at least 6 IN of separation between intrinsically safe devices and circuits and non-intrinsically safe devices and circuits.

h. Wiring to pilot devices or rotary switches shall be individually bundled and installed with a "flexible loop" of sufficient length to permit the component to be removed from panel for maintenance without removing terminations.

i. Conductors for AC and DC circuits shall be type MTW stranded copper listed for operation with 600 V at 90 DegC.

1) Conductor size shall be as required for load and 16 AWG minimum.

2) Internal panel wiring color code:

a) AC circuits:

(1) Power wiring: Black.

(2) Control interconnections: Yellow.

(3) Neutral: White.

(4) Ground: Green.

b) Low voltage DC circuits:

(1) Power wiring: Blue.

(2) Control interconnections: Violet.

c) Foreign voltage circuits: Pink.

d) Annunciator circuits: Red.

e) Intrinsically safe circuits: Orange.

j. Analog signal cables shall be of 600 V insulation, stranded copper, twisted-shielded pairs.

1) Conductor size: 18 AWG minimum.

2) Terminate shield drain conductors to ground only at one (1) end of the cable.

k. High precision 250 ohm resistors with 0.25 percent accuracy shall be used where 4-20 mA DC analog signals are converted to 1-5 Vdc signals.

1) Resistors located at terminal strips.

2) Resistors terminated using individual terminal blocks and with no other conductors.

3) Resistor leads shall be un-insulated and of sufficient length to allow test or calibration equipment (e.g., HART communicator, loop calibrator) to be properly attached to the circuit with clamped test leads.

l. Analog signals for devices in separate enclosures shall not be wired in series.

1) Loop isolators shall be used where analog signals are transmitted between control enclosures.

m. Wire and cable identification:

1) Wire and cables numbered and tagged at each termination.

2) Wire tags:

a) Slip-on, PVC wire sleeves with legible, machine-printed markings.

b) Adhesive, snap-on, or adhesive type labels are not acceptable.

3) Markings as identified in the Shop Drawings.

4. Grounding requirements:

a. Equipment grounding conductors shall be separated from incoming power conductors at the point of entry.

b. Minimize grounding conductor length within the enclosure by locating the ground reference point as close as practical to the incoming power point of entry.

c. Bond electrical racks, chassis and machine elements to a central ground bus.

1) Nonconductive materials, such as paint, shall be removed from the area where the equipment contacts the enclosure.

d. Bond the enclosure to the ground bus.

1) It is imperative that good electrical connections are made at the point of contact between the ground bus and enclosure.

e. Panel-mounted devices shall be bonded to the panel enclosure or the panel grounding system by means of locknuts or pressure mounting methods.

f. Sub-panels and doors shall be bonded to ground.

5. Termination requirements:

   a. Wiring to circuits external to the panel connected to interposing terminal blocks.

   b. Terminal blocks rigidly mounted on DIN rail mounting channels.

   c. Terminal strips located to provide adequate space for entrance and termination of the field conductors.

   d. One (1) side of each strip of terminal blocks reserved exclusively for the termination of field conductors.

   e. Terminal block markings:

      1) Marking shall be the same as associated wire marking.

      2) Legible, machine-printed markings.

      3) Markings as identified in the shop drawings.

   f. Terminal block mechanical characteristics, and electrical characteristics shall be in accordance with NEMA ICS 4.

   g. Terminal blocks with continuous marking strips.

      1) Each terminal block shall be identified with machine printed labels.

   h. Terminals shall facilitate wire sizes as follows:

      1) 120 Vac applications: Conductor size 12 AWG minimum.

      2) Other: Conductor size 14 AWG minimum.

   i. Analog signal cable shield drain conductors shall be individually terminated.

   j. Install minimum of 20 percent spare terminals.

   k. Bladed, knife switch, isolating type terminal blocks where control voltages enter or leave the panel.

   l. Fused terminal blocks shall be used in the following circuits:

      1) Control voltage is used to energize a solenoid valve.

      2) DC power is connected to 2-wire, loop-powered instruments.

   m. Fused terminal blocks shall be provided with blown fuse indicators.

n. When control circuits require more than one (1) field conductor connected to a single wiring point, a sufficient number of terminal points shall be connected internally to allow termination of only one (1) field conductor per terminal block.

o. DIN rail mounting channels shall be installed along full length of the terminal strip areas to facilitate future expansion.

p. Connections to devices with screw type terminals shall be made using spade-tongue, insulated, compression terminators.

q. Make connections to I/O subsystem by terminating all field wiring on IFM terminal blocks within the enclosure.

r. Prewire I/O modules to IFM terminal blocks.

s. Layout IFM modules to accommodate all active database points and spares.

t. Provide terminals for individual termination of each signal shield.

u. Field wiring shall not be disturbed when removing or replacing an I/O module.

F. PLC System Software and Programming:

1. Development of the PLC program shall be started from the existing PLC program.

2. Provide all hardware and programming required to provide communication between the PLCs and the Agency SCADA System.

3. Provide programming to accomplish all control and monitoring requirements of the Drawings and Specifications.

4. Provide two (2) copies of control logic program on CD.

5. Microsoft Windows compatible software.

6. Full documentation capability.

a. Provide description for each rung.

7. On/off line programming.

8. Offline simulation prior to download.

9. Two-step commands requiring operator verification prior to deletion of any programming.

2.4 ACCESSORIES

A. Provide all accessories required to furnish a complete PLC control system to accomplish the requirements of the Drawings and Specifications.

2.5 SOURCE QUALITY CONTROL

A. Provide a performance test after factory completion and prior to shipment.

1. Conduct a test where the system is operated continuously and checked for correct operation including loop controls, displays, printing, keyboard functions, alarm responses, and on/off sequencing control.

2. Conduct testing with dummy I/Os to verify each control loop operation.

3. Allow for Owner and Engineer representatives to witness testing program.

a. Provide minimum of 15 days notice prior to testing.

4. Do not ship prior to successful completion of this testing program.

2.6 MAINTENANCE MATERIALS

A. Furnish Owner with the following extra materials:

1. One (1) spare I/O card of each card type for every 10 cards or fraction thereof installed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install PLC control system in accordance with manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

A. Employ and pay for services of equipment manufacturer's field service representative(s) to:

1. Inspect equipment covered by these Specifications.

2. Supervise adjustments and installation checks.

3. Maintain and submit an accurate daily or weekly log of all commissioning functions.

a. All commissioning functions may be witnessed by the Engineer.

b. All reports shall be cosigned by the Contractor and the Engineer if witnessed.

4. Conduct startup of equipment and perform operational checks.

5. Provide Owner with a written statement that manufacturer's equipment has been installed properly, started up, and is ready for operation by Owner's personnel.

3.3 DEMONSTRATION

A. Demonstrate system in accordance with section 01800.

B. On-Site Training:

1. Provide employee of the manufacturer or certified representative to provide one (1) week of operating and maintenance training at the Project site after the system has successfully undergone all field testing and acceptance procedures.

a. As a minimum, training shall cover:

1) Hardware overview.

2) Software overview.

3) Maintenance.

4) Troubleshooting.

5) Operation, e.g., changing set points, passwords, etc.

END OF SECTION

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APPENDIX "A"

REQUIRED PERMITS AND CITY OF UPLAND BUSINESS LICENSE

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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Construction Permit No._____

Inspector: _____

Final Inspection By: _____

Street/Lane Closure Permit No._____

NOTE TO PERMITTEES: ANY WORK NOT LISTED ON THE CITY'S ACTIVE CONSTRUCTION MONITORING LIST, WILL BE SHUT DOWN IMMEDIATELY. PERMIT HOURS 7:00 AM TO 3:30 PM (M-F)

This Permit is not valid without the following items completed.

☑ Pre-Construction Meeting is **MANDATORY** before work begins; please contact Inspection at (909) 291-2963 to schedule your meeting. **WORK SHALL NOT COMMENCE UNTIL THE PRE-CON MEETING HAS TAKEN PLACE, OR PERMIT WILL BE REVOKED AND PROJECT WILL BE SHUT DOWN IMMEDIATELY. PRE-CONSTRUCTION MEETINGS MAY BE SCHEDULED AFTER A MINIMUM OF THREE WORKING DAYS FROM THE PERMIT ISSUANCE DATE.**

☐ A "Temporary Street Closure Permit" is required. No Street shall be closed, vehicular traffic, or pedestrian access impeded in any way without said permit, please allow 4 to 8 City business days for permit processing. Please contact the Permit Engineer at **PWPERMITS@CI.UPLAND.CA.US** for permit information.

☐ A "Truck Access Plan" is required before the work begins; please contact the Permit Engineer at **PWPERMITS@CI.UPLAND.CA.US** for necessary information to complete the Access Plan.

☐ "At Risk Improvements" applies to Contractors requesting to work in the Public Right-Of-Way without approved plans. The Developer/Contractor is proceeding at their own risk in commencing this work without City Approved Plans. The Developer/Contractor has supplied the appropriate bonding and Indemnity Letter.

☐ Undeground Service Alert at 1-800-227-2600 shall be notified by applicant at least 2 working days in advance of any excavation and an Underground Service Alert Inquiry Identification Number shall be obtained from Underground Service Alert. CONTACTING U.S.A. DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR LOCATING OR PROTECTING EXISTING UTILITIES.

Reference (Tract, P.M., S.P., C.U.P., or Address): _____

General Location/City Plan#/Project #: _____

Contact Name: _____ E-mail Address: _____

Contractor: _____ Telephone: _____

License Number: _____ Expiration Date: _____

Address: _____

Developer (Owner): _____ Telephone: _____

Address: _____

Applicant's Statement

The undersigned hereby applies for permission to undertake, or to have undertaken, construction work within public right-of-way in the City of Upland. Said undersigned has read the conditions **provided as Supplemental Permit Information**. Said undersigned hereby agrees to observe and comply with all permit provisions. All applicable Sections of the Upland Municipal Code and all applicable Sections of the City of Upland Standard Specification for Public Works Construction, and to complete said construction work all in accordance with the approved plan, and/or standard drawing and/or engineering directives and/or special conditions.

_____ _____ _____

Applicant's Printed Name | Signature | Date Signed

This Permit Expires on: _____ Extension _____ Approved By _____

Permit Approval: _____

City Engineer or Authorized Representative | Date

☐ Finance ☐ Permittee ☐ Inspector ☐ Water ☐ Environmental ☐ Clerical ☐ File ☐ Permit Log Book ☐ Other

Items to be constructed or activities with this Permit

Street

- ☐ AC Paving
- ☐ Curb & Gutter
- ☐ Drive Approach
- ☐ Sidewalk
- ☐ Miscellaneous Items
- ☐ Per Attached Plans

Sewer

- ☐ Sewer Main
- ☐ Manhole
- ☐ Sewer Lateral

Paid with Receipt Number

_____

Water

- ☐ Water Main
- ☐ Water Lateral
- ☐ Fire Hydrant

Storm drain

- ☐ Storm drain Main

Miscellaneous

- ☐ Pavement Repairs
- ☐ Parkway Landscaping
- ☐ Utility Trench
- ☐ Splice Pit
- ☐ Aerial Work
- ☐ Traffic Control Inspection
- ☐ Grading
- ☐ Stockpile/Material Placement
- ☐ Square Feet Soil Disturbed

_____

Fees	**Account Number**
Permit Fee: _____	101-300-0000-3205
Inspection Deposit: _____	101-300-0000-3645
Total Due this Permit: _____	

REFUND REMAINING DEPOSIT TO: _____

Permit Work Hours

Permit work hours are from **7:00 AM to 3:30 PM**, Monday through Friday (excluding holidays). Any work after 3:30 PM is subject to the overtime inspection rate. Any work outside of the permit hours must be submitted in writing a minimum of four (4) business days/permit hours in advance.

NO WORK ON WEEKENDS AND HOLIDAYS ALLOWED BY THIS PERMIT PERMIT IS VALID ONLY WITHIN CITY RIGHT OF WAY; WORKS ON PRIVATE PROPERTY NEED PRIVATE OWNER'S PERMISSION. ALL PERTINENT ORDINANCES APPLY. PRE-CONSTRUCTION MEETING IS MANDATORY. PAVING WORKS MUST BE COMPLETED WITHIN 30 DAYS FROM BACKFILL IF INCLUDED IN THE SCOPE OF WORKS AND MUST USE ORDINANCE 841.

Temporary Street Closure

Temporary Street Closures require a separate permit and a minimum of 3 to 7 permit business days for processing. Prior to the start of any temporary street and/or lane closure, the applicant is required to notify and receive City approval a minimum of 72 permit business hours in advance. Permit business hours are Monday through Thursday from 8:00 AM to 4:00 PM.

Permit Fee Structure

The minimum fee for a Construction Permit is $325.00 and is non-refundable. This minimum fee is for minor construction usually for a utility tie-in for a single-family home. Projects that are more extensive require a review on a case-by-case basis.

Public Works Inspection Deposit (Defined)

Inspections are based on an hourly rate. Staff performs an audit when the Inspector finals a Construction Permit. This audit consists of deducting the Inspector's documented time (shown on their time sheet) from the deposit.

Permit Extensions

Each permit extension will be assessed a new processing fee. The minimum fee is $130.00 for each extension. Extension fees will automatically be assessed until the Permittee provides written notification to the City that the construction and all associated activities have been completed and that the permit has been finaled/signed-off by the Public Works Inspector.

Business License Fee Schedule

Effective January 18, 1988, a $15.00 one-time application fee is added to all new Business License fees. This includes previous City of Upland business license holders who have closed their businesses and wish to re-open. Unless otherwise stated, all license fees (exclusive of application fee) are not to exceed $864.00 per year.

Retail, Wholesale, Contractor, Service, or any business not otherwise specified will be based on gross receipts as follows:

0	**to**	**20,000**	**=**	**$ 54.00**	***This category limited to Upland Based Businesses Only***
0	to	40,000	=	$ 75.60	
40,001	to	60,000	=	97.20	
60,001	to	100,000	=	140.40	
100,001	to	200,000	=	183.60	
200,001	to	300,000	=	216.00	
300,001	to	400,000	=	279.00	
400,001	to	500,000	=	324.00	
500,001	to	600,000	=	378.00	
600,001	to	700,000	=	432.00	
700,001	to	800,000	=	486.00	
800,001	to	900,000	=	540.00	
900,001	to	1,000,000	=	594.00	
1,000,001	to	1,100,000	=	648.00	
1,100,001	to	1,200,000	=	702.00	
1,200,001	to	1,300,000	=	756.00	
1,300,001	to	1,400,000	=	810.00	
1,400,001	to	1,500,000	=	864.00	

ADDITIONAL CATEGORIES

Administrative Offices
- Base fee ..... 54.00 per year
- Each employee ..... 4.50 per year

Manufacturing
- One to five employees ..... 54.00 per year
- Six to fifteen employees ..... 108.00 per year
- Sixteen to thirty employees ..... 216.00 per year
- Over thirty employees ..... 324.00 per year

Professional / Semi-Professional
- Each practicing member of the firm (including real estate agents) ..... 54.00 each per year
- Each non professional/semi professional employee ..... 4.50 each per year

Recreation & Entertainment
- Rides or games of skill ..... 54.00 per year
- Arcade games ..... 54.00 per year
- Social club, Dancing club ..... 108.00 per year

Residential Property Rentals
- Three units or rooms ..... 54.00 per year
- Each additional unit or room ..... 4.50 per year

Solicitations
- Solicitors, canvassers, peddlers ..... 216.00 per year / per person

Transportation
- Delivery by Vehicle ..... 54.00 per year / per vehicle
- Taxicabs ..... 54.00 per year / per vehicle

Other
- *Circus, carnival, etc* ..... (issued by permission of City Manager) ..... 540.00 per year
- *Public Utilities* ..... 216.00 per year

CITY OF UPLAND
Business Support Center
Business Licensing Division
8839 N Cedar Ave #212
Fresno, CA 93720

(909) 348-0460 , 8:00 a.m. – 5:00 p.m., M-F
support@hdlgov.com

Business License Number

Business License Application

This application is for:

- ☐ CITY OF UPLAND BUSINESS
- ☐ CITY OF UPLAND HOME OCCUPATION BUSINESS LICENSE
- ☐ CONTRACTOR OR OUTSIDE SERVICE DOING BUSINESS IN UPLAND
- ☐ CHANGE OF BUSINESS NAME*
- ☐ CHANGE OF BUSINESS ADDRESS*

*Prior Business Name: _____ *Prior Business Address: _____

GENERAL BUSINESS INFORMATION

Business Name (DBA): _____ Start Date: _____
Business Location: _____ City: _____ State: ____ Zip: _____
Mailing Address: _____ City: _____ State: ____ Zip: _____
Business Telephone: ( ) - _____ No. of Employees: _____ Gross Receipts (Projected Next 12 Months): _____
Business Description (detailed summary): _____

OWNERSHIP TYPE/ IDENTIFICATION NUMBERS/OTHER INFORMATION

OWNERSHIP TYPE: ☐ Corporation Corporation Name: _____
☐ Sole Proprietorship ☐ Husband & Wife Sole Proprietorship ☐ Partnership ☐ Non-Profit Org. (Exempt) ☐ LLC
Federal Employer ID: _____ State Employer ID: _____ State Sales Tax/Resale #: _____
Contractor License #: _____ Class: _____ Social Security: – – _____ SIC Code: _____

OWNER/PARTNER/OFFICER INFORMATION

(1)	(2)	(3)
Name:	Name:	Name:
Title:	Title:	Title:
Home Address:	Home Address:	Home Address:
City/State/Zip:	City/State/Zip:	City/State/Zip:
Email Address:	Email Address:	Email Address:
Home Telephone:	Home Telephone:	Home Telephone:
Cell Telephone:	Cell Telephone:	Cell Telephone:
Drivers License #:	Drivers License #:	Drivers License #:
Social Security #: – –	Social Security #: – –	Social Security #: – –

***NOTICE*: I declare under penalty of perjury that the information I have provided is true and correct. I certify I will operate my business in accordance with all applicable Federal, State, and City laws and regulations. I understand that any false statements made are in violation of the City of Upland Municipal Code and are grounds for revocation of the Certificate of Business License. I understand that the term of the Certificate issued for this application will expire if I cease to meet the issuance qualifications. I authorize the City of Upland and its agents to seek information and/or conduct an investigation on this application.**

_____ _____ _____
Authorized Signature Print Signature Name Date

☐ **Please check to sign up for our Economic Development mailing list** E-mail: _____

CITY OF UPLAND

BUSINESS LICENSE & ZONING CLEARANCE
APPLICATION PACKAGE

Starting a Business in the City of Upland?

Great!

The City of Upland would like to welcome you to its business community. We know that starting a new business can be exciting and challenging. We wish you success in your new venture!

To operate any business within the City of Upland you must first obtain a business license and meet all zoning requirements. For your convenience we have included a business license application, zoning clearance form, and a list of some of the additional requirements that you may need to consider when applying for your business license.

The City of Upland has contracted with The HdL Companies to provide assistance to the business community for all of their business licensing needs. The Business Support Center offers extended telephone support hours via their toll free telephone number as well as email contact options.

You may contact the Business Support Center for your entire business license needs anytime Monday through Friday from 8am to 5pm at:

- Toll-Free by Phone: 888-602-0239
- E-mail: businesstax@hdlcompanies.com
- Apply online: https://upland.hdlcompanies.com/
- Apply by mail: 8839 N. Cedar Avenue #212
  Fresno, CA 93720

A GUIDE FOR STARTING A NEW BUSINESS IN UPLAND

The City of Upland is excited that you have chosen to operate a business in our community and we value the many businesses that have made Upland their home. This guide is intended to assist you through our business approval process. The process includes three steps:

Outside contractors who perform work in Upland at the request of individual property owners and who do *not* have a physical location in Upland do not need zoning approval and may skip Step 2 (Zoning Clearance).

The process mentioned above is outlined in more detail below including a description of the specific steps and the agency to contact. Some businesses also have special circumstances. Please read the details below for more information:

Step	What to Do	Who to Contact
Step 1	**Obtain Business License Tax Certificate**	
1.1	**Name The Business** This is a very important part of beginning your business since it is the item that will identify you, your service and/or your product to the consumer. Once you have decided your business name, ascertain if the name is available for use. Make inquiries to confirm availability with the Secretary of State for corporate names and San Bernardino County Recorder's office for fictitious name filings.	**City of Upland** Business Support Center 888-602-0239 ➡ You can also apply online at: https://upland.hdlcompanies.com/
1.2	**File And Publish A Fictitious Name Statement** If the business is not a legal entity registered with the State of California, or it does not contain the owners surname, such as Jones Roofing, a Fictitious Name Statement must be filed with the County Recorder's office in the county in which the business is based (San Bernardino). This is also a requirement for partnerships not recognized by the State.	**San Bernardino County** Recorder's Office 855-732-2575

Step	What to Do	Who to Contact
1.3	**Determine The Legal Status Of Your Business** Most businesses are classified under one of the following categories of legal status: • Sole-Proprietor – A business owned by a single person or husband and wife who receives profits. • Partnership – Two or more persons who are co-owners of a business for profit. • Corporation – An independent legal tax entity, which remains intact even if its officers and/or directors change; must provide *Articles of Incorporation or DBA (Doing Business As), if applicable.* • Limited Liability Corporation (LLC) – A non-corporate business whose owner actively participates in the organization's management and are protected against personal **liability.** • Non-Profit – Must be recognized by the IRS as an exempt entity; *must provide supporting documentation – (Section 501C(3)).* • Other Check with your legal or financial advisor for the status best suited for your business. Questions concerning incorporation of a business should be directed to the Secretary of State, an attorney, financial advisor, or trade association.	Legal or Financial Advisor
1.4	**Apply For Tax ID Numbers** If you plan to hire employees for your business, you must obtain tax identification numbers for reporting purposes. These numbers are used to identify your business on payroll and business income tax returns. To apply for a Federal number, contact the IRS, for a state number contact EDD.	State of California Employment Development (EDD) 800-300-5616 US Department of Treasury Internal Revenue Service 800-829-1040
1.5	**Workers Comp Insurance** Workers Compensation Insurance is required by the State of California for any business with employees. Contact the State Industrial Relations Department for information and requirements. Some insurance agencies may also be able to assist.	State of California Industrial Relations Department 800-963-9424
1.6	**Obtain Required Permits** Depending upon the type of business, certain permits may be required. Below is a list of possible permits that may apply to your business.	
	Sellers Permit: All retail and wholesale businesses must obtain a Sellers Permit or Resale Permit from the State Board of Equalization. This may be applied for at any local office. Every business that sells goods must collect and then remit sales tax to the State of California. This process is set in motion with the application for the sellers permit.	State of California State Board of Equalization 951-680-6400 800-400-7115
	Health Permit: Eating establishments - food sales and handling. Any business dealing with consumable products must obtain a permit from the County Environmental Health Services Department.	San Bernardino County Environmental Health Services 800-782-4264

Hazardous Materials: Any business which handles hazardous materials (i.e. automotive repair) is also required to obtain a permit from the County Environmental Health Services Department. All businesses should contact the County to verify whether or not a permit is required.	**San Bernardino County** Environmental Health Services 800-782-4264
Child/Day Care: Although daycare businesses operated from a private residence are exempt from City business licensing if there are six or fewer children, a State license is required regardless of the number of children. The County and Development Services Department should also be contacted for any additional requirements.	**State of California** Community Care Licensing 951-782-4200 800-300-5616
Alcohol Sales: Businesses selling alcohol products consumed on or off the premises must obtain a permit from the California Department of Alcoholic Beverage Control (ABC). The City's Development Services Department should also be contacted for any additional requirements.	**State of California** Department of Alcoholic Beverage Control (ABC) (951) 782-4400
Secondhand Dealers and Pawn Shops: Businesses are required by the Department of Justice (DOJ) to possess and display a Secondhand Dealer or Pawn Broker license. The Upland Police Department serves as a liaison between the DOJ and the business owner. Contact the Upland Police Department Detective Bureau and request an application for license and Live Scan Service. Also, the Upland Planning Division can tell you whether the proposed business location is zoned for secondhand dealers and pawn shops.	**City of Upland** Planning Division 909-931-4130 Upland Police Department *909-946-7624 **Non-Emergency Number*
Massage Industry: Businesses are required to obtain and display certification from the California Massage Therapy Council. Contact the California Massage Therapy Council for information on certification. Please note certifications for all employees must be obtained prior to issuance of a zoning clearance from the Upland Planning Division.	**City of Upland** Planning Division 909-931-4130 **State of California** Massage Therapy Council 916-669-5336
1.7 Complete and Submit the Business License Application Submit your **Business License Application** to the Business Support Center. Be sure to include a copy of your signed zoning clearance application. After filing with all required agencies, a business is ready to obtain a business license. Submit the zoning clearance, all State and County licenses and permits, your fictitious name filing, corporate or partnership documentation and your Tax ID numbers to the Business Support Center. You may also file online at: https://upland.hdlcompanies.com/ No payment will be required until your application has been reviewed and accepted. You will receive an email verifying the receipt of application. After the business tax fees are paid a business license number issued. A hard copy certificate will be mailed in approximately 6-8 weeks. Upon receipt, the Upland Municipal Code requires it be posted in a conspicuous place within the business.	**City of Upland** Business Support Center 1142 S. Diamond Bar Blvd #502 Diamond Bar, CA 91765 888-602-0239

➡ *Please continue to the zoning clearance section (STEP 2) if your business will be located or based inside the City of Upland.*

Step	What to Do	Who to Contact
Step 2	**Obtain Zoning Approval For Your Location**	
2.1	**Local Zoning And Building Codes** Visit the Planning Division section of the City's website and review the zoning forms in this package to find out more about the zoning, land use, and building code requirements for your proposed business location. Be sure to do this before you sign leases or sales agreements, and before making any interior or exterior alterations. The Business Support Center staff will assist you determine what zoning clearance, home occupation permit, or other type of prerequisite your business will required based on the activity and location of your proposed business. If your business only requires a zoning clearance or home occupation permit, you may go to Step 2.2	City of Upland Planning Division 909-931-4130
2.2	**Complete and Submit the Zoning Clearance Forms** All new business must complete and submit a **Zoning Clearance Application.** Please submit all zoning related documentation to the Business Support Center with your Business License Application. If you plan to conduct your business from a residence (home based business) located in the City of Upland you will also need to complete a **Home Occupation Application**.	City of Upland Business Support Center 888-602-0239
	*** Please note that once a zoning clearance is approved, it is only active for 30 day period. It is very important that you complete all the required prerequisites for your business type in order to obtain a business license certificate. **	
	Building Permit: Businesses wishing to make interior or exterior alterations to a tenant space must obtain any necessary permits from the Development Services Department.	City of Upland Planning Division Development Services 909-931-4130
Step 3	**Construction** After obtaining building permits, perform any construction or building modifications required by the City as necessary for the successful operation of your business. Once you have passed a final inspection or received a certificate of use and occupancy, you may open for business.	City of Upland Building & Safety Division 909-931-4110
Step 4	**GRAND OPENING!** Congratulations! We hope your business thrives in the City of Upland.	

ADDITIONAL INFORMATION

Additional sources for information pertaining to starting or relocating a business include: Chamber of Commerce, the Small Business Administration, counselors, attorneys, your local library, financial advisors, tax consultants, and the City of Upland website and Municipal Code.

DISCLAIMER

This handout is intended as a guideline and tool for business owners. The City of Upland does not guarantee these are the only steps your particular business may need prior to opening. Any technical questions should be directed to the responsible agency or your professional consultant. Upland cannot take responsibility for operation of your business.

HELPFUL NUMBERS

There are a number of entities involved in the process of obtaining all necessary licenses and permits when opening a business at the local, State, and federal level. The following is a list of helpful numbers of these various agencies:

UPLAND CITY OFFICES

www.ci.upland.ca.us

CITY HALL
460 N. Euclid Avenue
Upland, CA 91785
(909) 931-4100

BUILDING DIVISION
460 N. Euclid Avenue
Upland, CA 91785
(909) 931-4110

BUSINESS LICENSES
Business Support Center
8839 N. Cedar Avenue #212
Fresno, CA 93720
(888) 602-0239

CODE ENFORCEMENT
460 N. Euclid Avenue
Upland, CA 91785
(909) 931-4260

PLANNING DIVISION
460 N. Euclid Avenue
Upland, CA 91785
(909) 931-4130

FIRE DEPARTMENT
475 N. 2nd Avenue
Upland, CA 91785
Non-Emergency (909) 931-4180

PUBLIC WORKS
1370 N. Benson Avenue
Upland, CA 91785
(909) 931-4230

POLICE DEPARTMENT
1499 W. 13th Street
Upland, CA 91785
Non-Emergency (909) 946-7624

COUNTY OFFICES

http://www.sbcounty.gov/

AUDITOR/CONTROLLER/RECORDER
Fictitious Business Name
222 W. Hospitality Lane, First Floor
San Bernardino, CA 92415-0022
(855) REC-CLRK or (909) 387-8306

DEPARTMENT OF PUBLIC HEALTH
County Government Center
385 N. Arrowhead Avenue
San Bernardino, CA 92415
(800) 782-4264

MISCELLANEOUS

CHAMBER OF COMMERCE
215 N. 2nd Ave., #D
Upland, CA 91785
www.uplandchamber.org
(909) 204-4465

BETTER BUSINESS BUREAU
www.bbb.org
(909) 825-7280

CALIFORNIA MASSAGE THERAPY COUNCIL
One Capitol Mall, Suite 320
Sacramento, CA 95814
www.camtc.org
(916) 669-5336

INLAND EMPIRE SMALL BUSINESS DEVELOPMENT CENTER
3780 Market Street
Riverside CA 92501
www.iesmallbusiness.com
(951) 781-2345

STATE AND FEDERAL OFFICES

www.ca.gov

ALCOHOLIC BEVERAGE CONTROL (ABC)
www.abc.ca.gov
(951) 782-4400

ATTORNEY GENERAL
www.caag state.ca.us
(800) 952-5225

BOARD OF EQUALIZATION
www.boe.ca.gov
Riverside Office
(951) 680-6400 or (800) 400-7115

CONSUMER AFFAIRS
www.dca.ca.gov
(800) 952-5210

CONTRACTOR'S STATE LICENSING BOARD
www.cslb.ca.gov
Sacramento
(800) 321-2752

DEPARTMENT OF JUSTICE (DOJ)
www.oag.ca.gov
Sacramento
(800) 952-5225

DEPARTMENT OF SOCIAL SERVICES COMMUNITY CARE LICENSING
www.ccld.ca.gov
Riverside/San Bernardino Office
(951) 782-4200

EMPLOYMENT DEVELOPMENT
www.edd.ca.gov
(800) 300-5616

FRANCHISE TAX BOARD
www.ftb.ca.gov
(800) 338-0505

INTERNAL REVENUE SERVICE (IRS)
www.irs.gov
(800) 829-1040

SECRETARY OF STATE
www.sos.ca.gov
Sacramento
(916) 653-3795

SMALL BUSINESS ADMINISTRATION
www.sbaonline.sba.gov
(800) U-ASK-SBA

Additional Information

Business License Requirements

Businesses operating within Upland City limits are required to have a business license. This includes home-based businesses, contractors, and outside services doing business in Upland. Chapter 5.04 of the Upland Municipal Code states in part, "It is unlawful for any person to transact and carry on any business, trade, profession, calling, or occupation in the city (Upland) without first having procured a license . . ."

Filing Your Business License Application

The Business License Application is a general form used for all types of businesses; complete only applicable information pertinent to your business.

Contractors: Must include their State Contractors License Number.

Residential Property Rental: If there are less than 3 total rental units NO business license is required in the City of Upland.

Fictitious Name Statement: If surname is not included in the business name, a Fictitious Name Statement and proof of publication must be provided.

Business Description

Provide a detailed description of the type of business you intend to operate. It may be necessary to attach a written operations summary to include a detailed analysis of what your business operations entail.

Renewal

The City will mail one courtesy renewal notice annually. It is your responsibility to renew your business license during the month following the expiration of your license. Penalties will be assessed if the City does not receive your renewal payment during this timeframe. Business licenses will expire either on June 30th or on December 31st of each year.

Closure

You must notify the Business Support Center in writing when you close your business.

Changes

Notify the Business Support Center in writing if you have a change of address or a change of business name; fee is $2.00. Licenses are non-transferable. If you sell your business, it is your responsibility to notify the City and close your license. The new business owner or entity must apply for a new license.

SB-1186 Fee

State Law SB-1186 requires the City to charge a fee of $1 on any application for a business license or similar instrument, permit, or renewal thereof. The purpose of this fee is to increase disability access and compliance with construction-related accessibility requirements, and to develop educational resources for businesses in order to facilitate compliance with federal and state disability laws, as specified. SB-1186 was signed into law by Governor Jerry Brown on September 19, 2012 and became effective on January 1, 2013.

**** The above information provides general information on applying for a Business License in the City of Upland. Should you require additional information, please contact Customer Service at 888-602-0239 ****

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APPENDIX "B"

STANDARD DRAWINGS
FOR

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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CITY OF UPLAND

Standard Drawings

City of Upland
Index to Standard Drawings

AREA MASTER PLAN

CU-A-1	Precise Plan No. 5, Foothill Blvd. (1-21-65) Service Roads, Benson Ave. to Euclid Ave.
CU-A-2	Precise Plan No. 5, Foothill Blvd. Service Road Detail (11-18-64)
CU-A-3	Precise Plan No. 7, Foothill Blvd. Service Roads, Euclid Ave. to Campus Ave. (3-22-67)
CU-A-4	Precise Plan No. 7, Foothill Blvd. Service Roads, Campus Ave. to Grove Ave. (12-15-69) As-built Rev. (1-25-71)
CU-A-5	Precise Plan No. 8, Foothill Blvd. Service Roads, Monte Vista Ave. to Benson Ave. (4-16-73)
CU-A-6	Foothill Blvd. Service Roads, Standard Openings (1-7-66)
CU-A-7	P.P.A. #5 Alternate Plan to P.P. #7 (5-3-71)
CU-A-8	P.P.A. #4 Alternate Plan to P.O. #7 (5-26-70)
CU-A-9	Precise Plan No. 9, Alignment of Central Ave., n/o Foothill Blvd. & 13th St. w/o Benson (1-5-72)
CU-A-10	Restricted Use of Certain City Streets (5-18-72)
CU-A-11	Precise Plan No. 12 Circulation Element, n/w Section of General Plan (10-3-77)
CU-A-11S	Precise Plan No. 12 Implementation (1-30-85)
CU-A-12	Precise Plan No. 12 Section Details (10-3-77)
CU-A-13	Precise Plan No. 3 - Richland (2-21-85)

DRAWINGS AND PLANS

CU-D-1	Plan Symbols (7-26-65)
CU-D-2	General Notes & Abbreviations (5-13-70)
CU-D-3	Improvement Plan Sheet, General Information & Samples (8-5-65)
CU-D-4	Typical Street Improvement Plan (7-30-65)
CU-D-5	Typical Street Improvement Profile (8-3-65)

CU-D-6	Sewer & Water Improvement Plan, General Info. (9-1-75)
CU-D-7	Sewer & Water Improvement, General Notes (9-1-75)
CU-D-8	Typical Sewer & Water Improvement Plan (9-1-75)

EARTHWORK

CU-E-1	Lot Grading Limits (10-5-65)
CU-E-2	Lot Grading Limits, Rear Yard Excavations at Exterior Lot Lines (5-16-75)
CU-E-3	Lot Grading Limits, Side Yard Grading Limits (5-16-75)
CU-E-4	Lot Grading Limits, Interior Lots (5-16-75)
CU-E-5	Lot Grading Limits, Interior Lot Sideyard (9-3-80)
CU-E-6	Miscellaneous Site Grading Details (9-3-80)
CU-E-7	Drainage Channels & Miscellaneous Lot Drains (9-3-80)
CU-E-8	Wall Details (9-26-86)
CU-E-9	Wall Details (1-4-84)
CU-E-10	Grading Details for Extended Depth Footings (9-30-80)

GENERAL ITEMS

CU-G-1	Steel Guide Markers (1-24-74)
CU-G-2	Sign Posts & Signs (5-13-75)
CU-G-3	Sign Posts & Signs (5-13-75)
CU-G-4	Location of Regulatory & Street Name Signs (5-13-75)
CU-G-5	Regulatory Sign Specifications (5-21-75)
CU-G-6	Warning Signs & Specifications (5-21-75)
CU-G-7	Construction Signs Specifications (5-21-75)

LAND DEVELOPMENT

CU-L-1	Optional Plan for Cul-de-Sacs (4-16-75)
CU-L-2	Standard Cul-de-Sac & Knuckle (4-17-75)

CU-L-3 Exterior Boundary Monumentation (7-28-72)

CU-L-4 Interior Street and Alley Monumentation (7-28-72)

CU-L-5 ~~Utility Line Markers (9-85)~~ Parking Lot Design Std.

CU-L-6 Utility Line Markers (9-85)

CU-L-7 Utility Line Markers (9-85)

PARKWAY DEVELOPMENT

CU-P-2 Landscape Plan for Foothill Blvd. (5-15-70)

CU-P-3 Sidewalk Details (12-16-66)

CU-P-4 Driveways

CU-P-5 Driveway Locations (12-13-73)

CU-P-6 Tree Planting

INSERT - APPROVED TREES (NO DATE)

INSERT - TREE STAKING & PLANTING DETAIL

INSERT - TREE PRUNING INFO

INSERT - TREE WELLS DETAIL

CU-P-7 Parkway Treatment with Masonry Materials (10-1-70)

INSERT - CONSTRUCTION PERMITS FOR WORK IN PARKWAYS

CU-P-8A Parkway Ramps for the Physically Handicapped (~~6-20-73~~) Caltrans Std NSP A 88

CU-P-9 Clearances for Placing Street Trees & Street Lights (10-25-73)

CU-P-10 Parkway Landscaping Mountain Avenue & Secondary Highways (2-11-81)

ROADWAY DEVELOPMENT

CU-R-1 Typical Sections for Stage Construction of Select System Streets (2-24-72)

CU-R-2 Combination Curb & Gutter and Curb Only (10-28-71)

CU-R-3 Spandrel Details & Cross Gutters (7-8-69)

CU-R-4 Alley Sections & Details (7-16-65)

CU-R-5 Roadway Section (5-26-71)

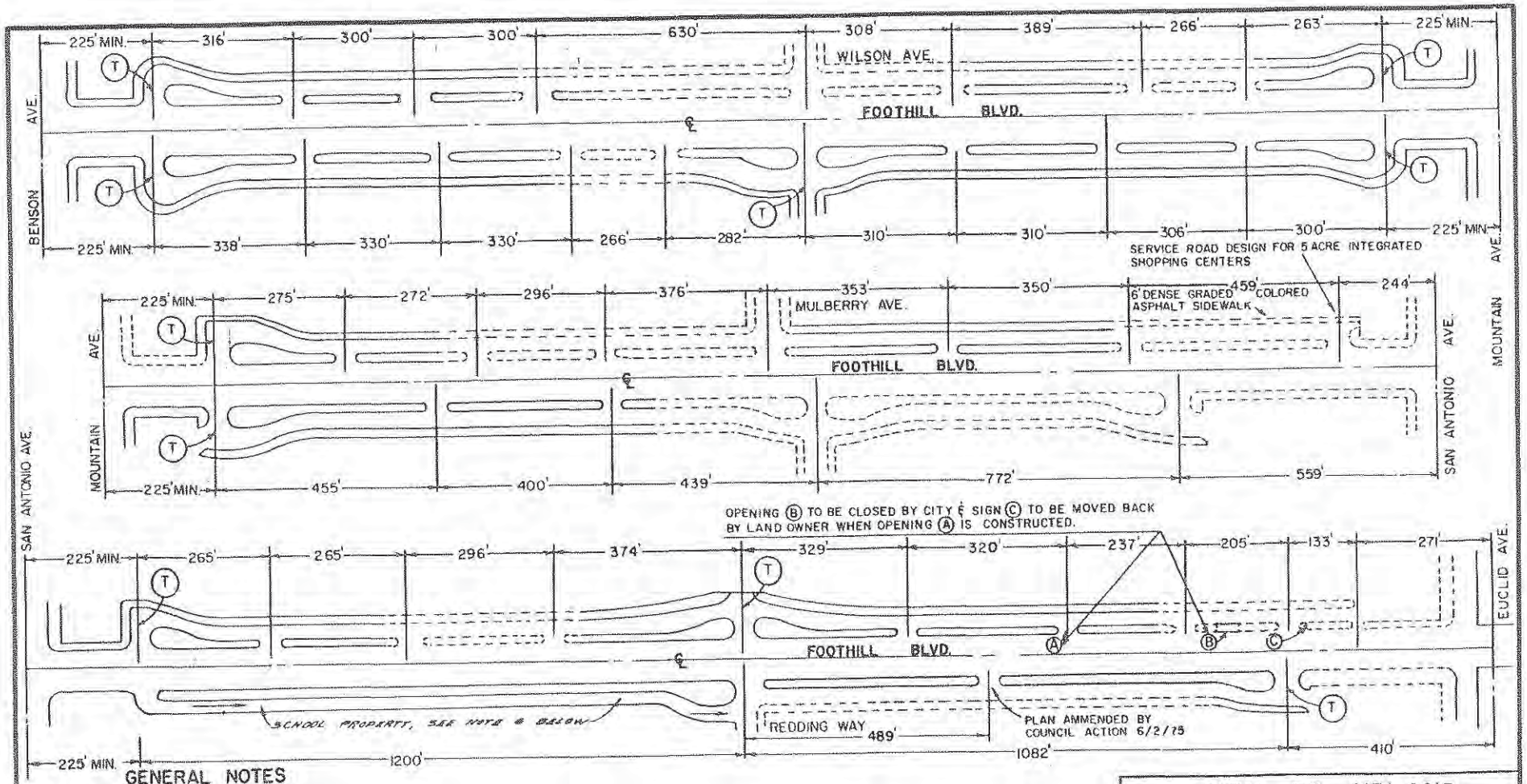
CU-R-6	Required Method for Establishing Curb & Return Grades (3-21-74)

STORM DRAINS

CU-S-1	Curb Inlets, Type A-1 & A-2 (12-22-66)
CU-S-2	Curb Inlets, Type B-1, B-2 & B-3 (12-21-66)
CU-S-3	Curb Inlets, Type C-1 & C-2 (12-21-66)
CU-S-4	Frame, Grating & Reinforcing Steel (9-28-71)
CU-S-5	Curb Outlet Structure (7-1-65)
CU-S-6	Standard Gutter Depressions for Curb Inlets & Outlets (12-21-66)

SANITARY SEWER

CU-Z-1	Precast Concrete Manholes Type A & B (10-21-65)
CU-Z-2	Brick Manhole Type C (10-21-65)
CU-Z-3	Trenching, Backfilling, Adjusting to Grade & Associated Pavement Repairs (12-1-70)
CU-Z-4	Main Lines, Lateral Line & Clean Outs (12-12-73)



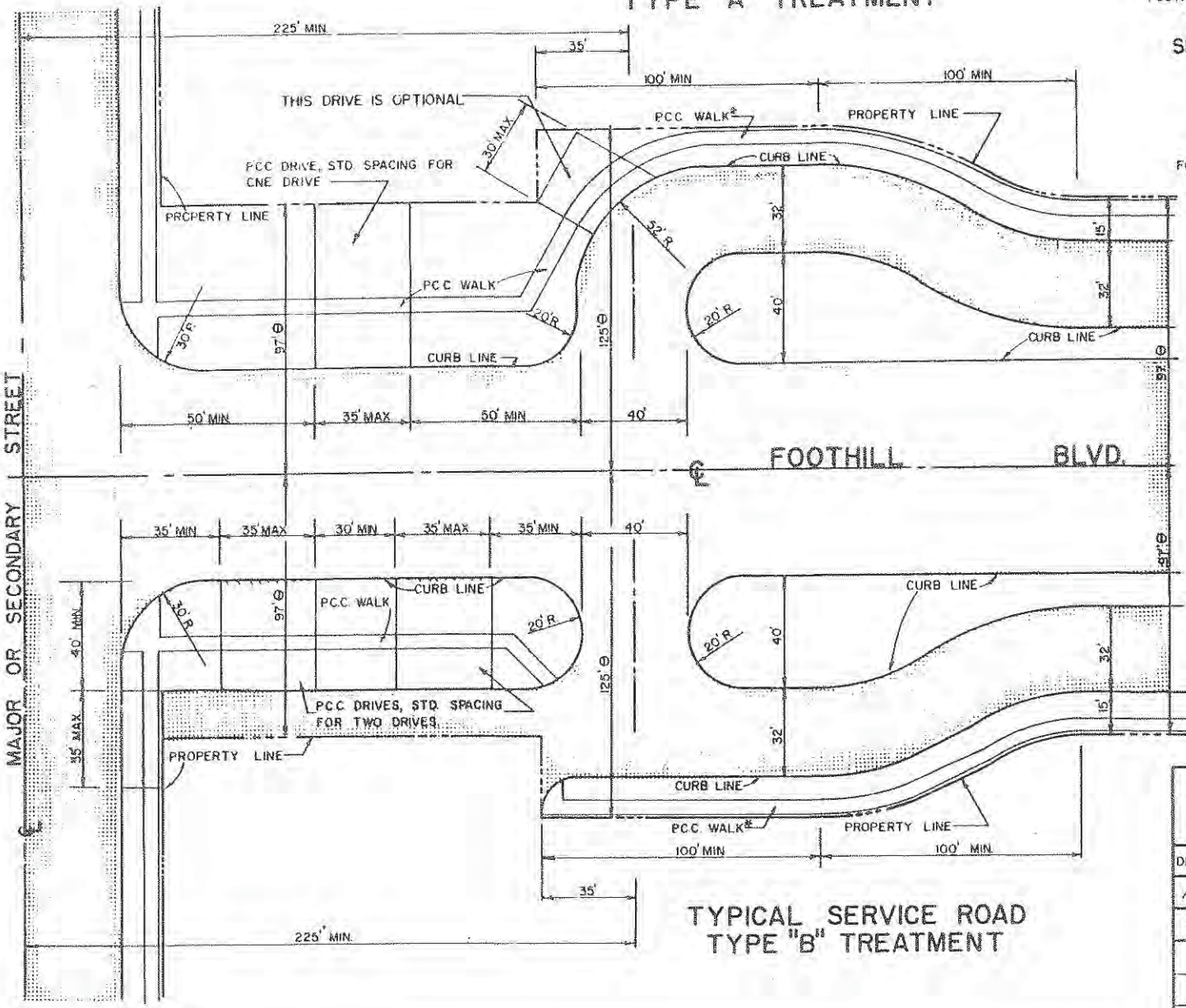
GENERAL NOTES

1. ALL PERMANENT SERVICE ROAD OPENINGS SHALL BE LOCATED AS SHOWN HEREON, EXCEPT FOR MINOR ADJUSTMENTS TO COINCIDE WITH PROPERTY LINES.
2. ALL FUTURE TERMINAL SERVICE ROAD OPENINGS, DESIGNATED HEREON BY THE LETTER "T", SHALL BE EITHER TYPE "A" OR TYPE "B" AS INDICATED ON FOOTHILL BOULEVARD SERVICE ROAD DETAILS, STANDARD DRAWING NO. CU-A-2.
3. THE MAXIMUM WIDTH OF ANY OPENING BETWEEN THE SERVICE ROAD AND FOOTHILL BLVD. SHALL BE 40 FEET.
4. DEDICATION OF ACCESS RIGHTS TO FOOTHILL BLVD SHALL BE INCLUDED IN THE DEED GRANTING SERVICE ROAD R/W TO THE CITY.
5. ALL SERVICE ROAD PLANS MUST BE SUBMITTED TO THE CALIFORNIA DIVISION OF HIGHWAYS FOR ENCROACHMENT PERMITS BEFORE CONSTRUCTION.
6. AS PERTAINS TO THESE PLANS, A 5 ACRE INTEGRATED SHOPPING CENTER SHALL BE DEFINED AS A DEVELOPMENT UNDER ONE OWNERSHIP OF 5 ACRES OR MORE HAVING 75% OR MORE OF ITS PARKING LOCATED BETWEEN THE SERVICE ROAD AND THE DEVELOPMENT STRUCTURES, WITH NORTH—SOUTH PARKING LOT ACCESS LANES.
7. SERVICE ROAD SHOWN ALONG SCHOOL PROPERTY SHALL BE OF SPECIAL DESIGN FOR ONE WAY TRAFFIC (22' FT. WIDE PVMT.); EXACT DESIGN TO BE SUBJECT TO APPROVAL BY THE CITY ENGINEER.

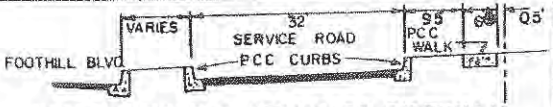
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 5
H.T.G.	11-18-64	FOOTHILL BLVD. SERVICE RDS.
REVISION BY	DATE	BENSON AVE. TO EUCLID AVE.
P.H.	1-21-65	APPROVED BY
B.F.	10-7-76	Fred C. Blanchard, CITY ENGINEER
		DRAWING NUMBER CU-A-1

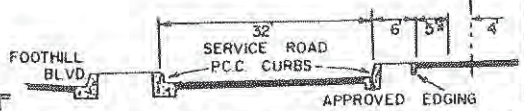
TYPICAL SERVICE ROAD TYPE "A" TREATMENT



TYPICAL SERVICE ROAD TYPE "B" TREATMENT



SERVICE ROAD & STANDARD SIDEWALK



SERVICE ROAD & SPECIAL SIDEWALK*

NOTES:

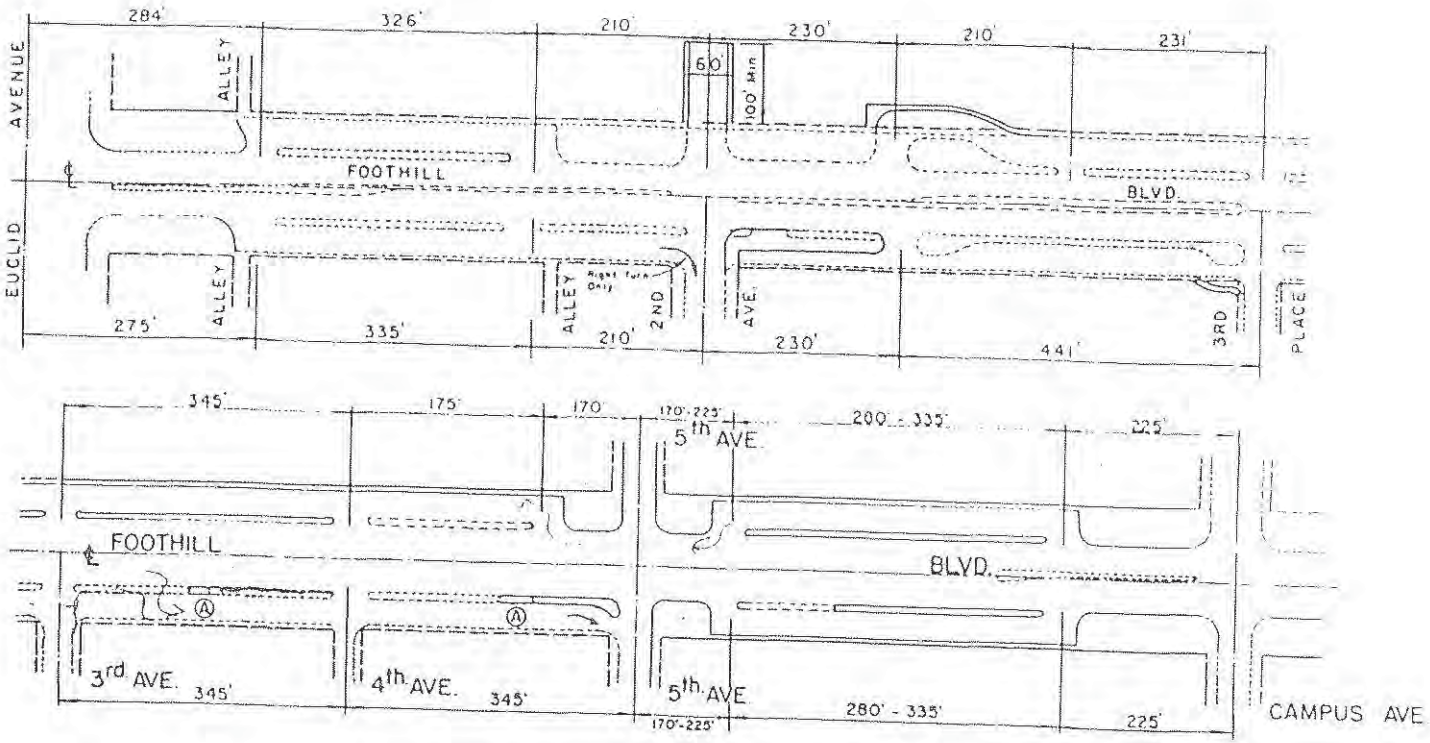
* SPECIAL GREEN COLORED, FINE GRADED ASPHALT MAY BE USED FOR SIDEWALK, AS SHOWN ABOVE, FOR A 5 ACRE INTEGRATED SHOPPING CENTER WHEN OFF-STREET PARKING IS PROVIDED ADJACENT TO THE SERVICE ROAD.

⊕ ADD 10 FEET TO THESE DIMENSIONS FOR SECTIONS BETWEEN MOUNTAIN AVE. & BENSON AVE.

⊗ 6 FOOT SIDEWALK WIDTHS SHALL BE CONSIDERED STANDARD.
5 FOOT SIDEWALK WIDTHS MAY BE USED UNDER SPECIAL CONDITIONS SUBJECT TO APPROVAL BY THE CITY ENGINEER.

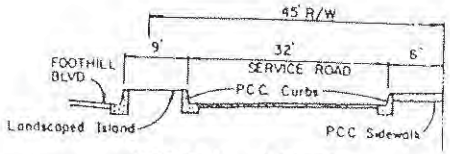
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 5 FOOTHILL BOULEVARD SERVICE ROAD DETAILS
H.T.G.	11-18-64	
REVISION BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NUMBER CU-A-2



GENERAL NOTES

1. All Permanent Service Road Openings Shall Be Located As Shown Hereon, Except For Minor Adjustments To Coincide With Property Lines.
2. The Maximum Width Of Any Opening Between The Service Road And Foothill Blvd. Shall Be 50 Feet.
3. Dedication Of Access Rights To Foothill Blvd. Shall Be Included In The Deed Granting Service Road R/W To The City.
4. All Service Road Plans Must Be Submitted To The California Division Of Highways For Encroachment Permits Before Construction



TYPICAL SECTION

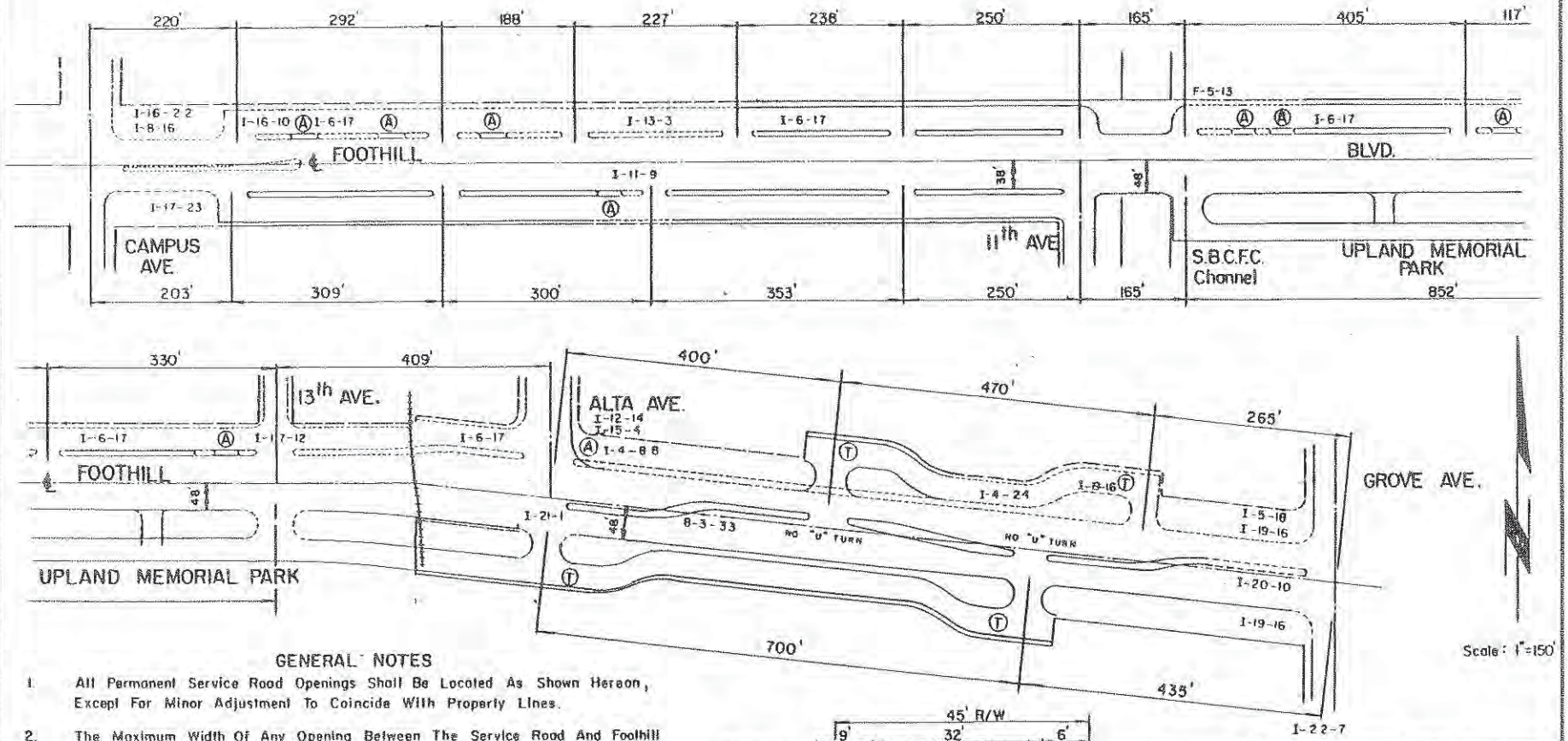
LEGEND

- Existing Curb
- Existing R/W
- Proposed Curb
- Proposed R/W
- Existing Opening
- Existing Opening To Be Closed Ⓐ
- Opening To Be Created In Existing Curb Ⓑ

PFL	6-5-69

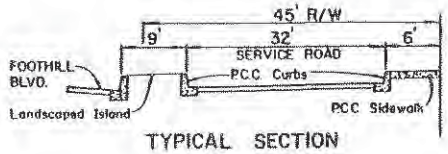
CITY OF UPLAND STANDARD DRAWING

Drawn By	Date	PRECISE PLAN
JCH	8-25-65	NO. 7
Revision By	Date	FOOTHILL BLVD SERVICE RDS EUCLID AVE TO CAMPUS AVE
WGH	1-6-66	Approved By
PPA #2	3-22-67	CITY ENGINEER
[illegible]	[illegible]	DRAWING NUMBER CU-A-3



GENERAL NOTES

1. All Permanent Service Road Openings Shall Be Located As Shown Hereon, Except For Minor Adjustment To Coincide With Property Lines.
2. The Maximum Width Of Any Opening Between The Service Road And Foothill Blvd. Shall Be 50 Feet.
3. Dedication Of Access Rights To Foothill Blvd. Shall Be Included In The Dead Granting Service Road R/W To The City.
4. All Service Road Plans Must Be Submitted To The California Division Of Highways For Encroachment Permits Before Construction.
5. Terminal Service Road Openings Designated Hereon By The Letter "T" Shall Be Either Type "A" Or Type "B" As Indicated On Foothill Boulevard Service Road Details, Standard Drawing No. CU-A-2.



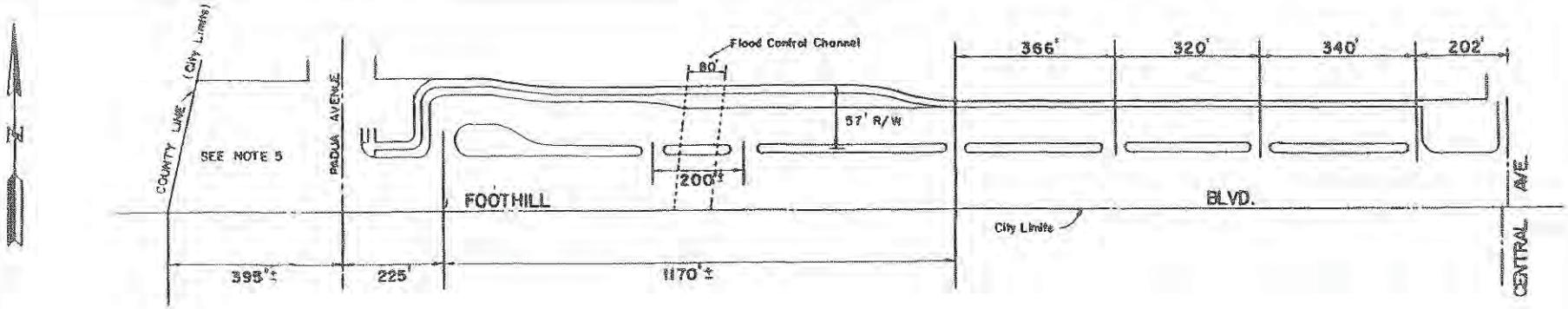
TYPICAL SECTION

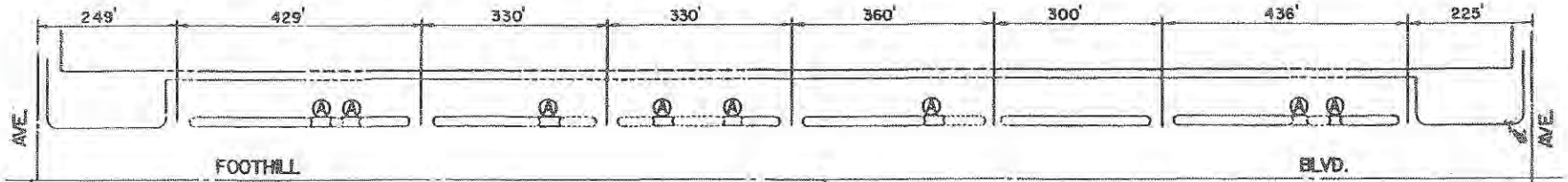
LEGEND

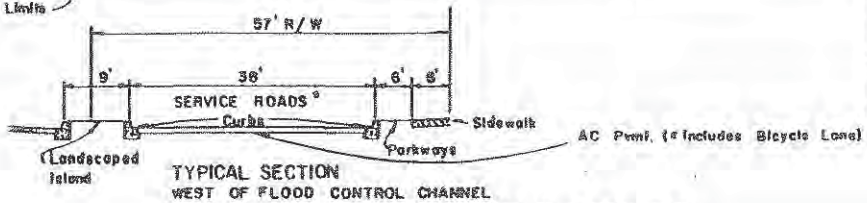
- Existing Curb
- Existing R/W
- Proposed Curb
- Proposed R/W
- Existing Opening
- Existing Opening To Be Closed (A)
- Opening To Be Created In Existing Curb (B)

CITY OF UPLAND STANDARD DRAWING

Drawn By	Date	PRECISE PLAN
j.c.h.	8-26-65	NO. 7
Revision By	Date	FOOTHILL BLVD. SERVICE RDS. CAMPUS AVE. TO GROVE AVE.
w a h	1-6-66	Approved By
LWA	PPA #3 12-15-69	Fred C. Blanchard CITY ENGINEER
As Built	Revisions	DRAWING NUMBER CU-A-4
JC & AB	1-25-71	

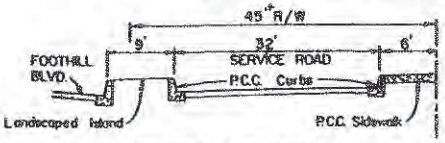






TYPICAL SECTION
WEST OF FLOOD CONTROL CHANNEL

* Except as otherwise noted.



TYPICAL SECTION
EAST OF FLOOD CONTROL CHANNEL

GENERAL NOTES

1. All Permanent Service Road Openings Shall Be Located As Shown Hereon, Except For Minor Adjustment To Coincide With Property Lines.
2. The Maximum Width Of Any Opening Between The Service Road And Foothill Blvd. Shall Be 50 Feet.
3. Dedication Of Access Rights To Foothill Blvd. Shall Be Included In The Deed Granting Service Road R/W To The City.
4. All Service Road Plans Must Be Submitted To The California Division Of Highways For Encroachment Permits Before Construction.
5. Actual Design of Service Road Facilities Within Right of Way West of Padua Avenue to be Coordinated With City of Claremont Before Construction.

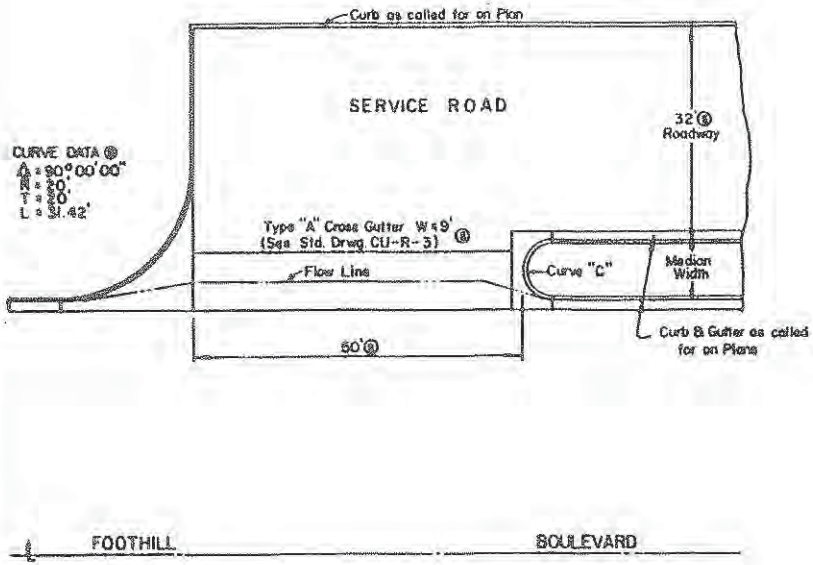
LEGEND

- Existing Curb
- Existing R/W
- Proposed Curb
- Proposed R/W
- Existing Opening
- Existing Opening To Be Closed (A)

CITY OF UPLAND STANDARD DRAWING

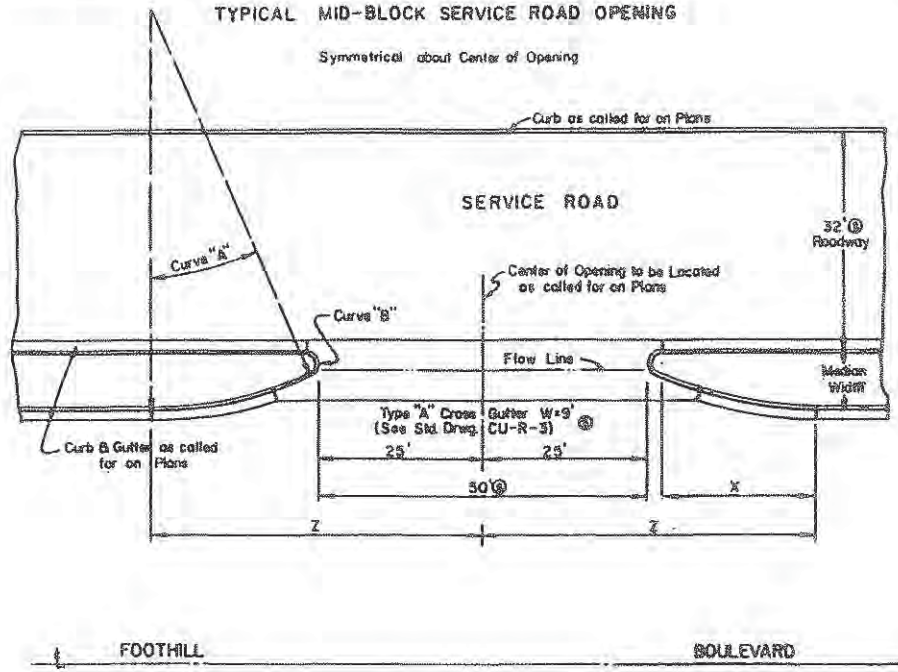
Drawn By	Date	PRECISE PLAN NO. 8A FOOTHILL BLVD. SERVICE ROADS COUNTY LINE to BENSON AVE.
w a h	12-29-65	
Revision By	Date	
B. G.	4-16-73	Approved By Fred C. Blanchard CITY ENGINEER
		DRAWING NUMBER CU-A-5

TYPICAL TERMINAL SERVICE ROAD OPENING



TYPICAL MID-BLOCK SERVICE ROAD OPENING

Symmetrical about Center of Opening



CURVE DATA

			CURVE "A" Radius = 60 Feet			CURVE "B" Radius = 2 Feet		CURVE "C" Δ = 180°	
Median Width	X	Z	Δ	L	T	Δ	L	R	L
9'	23.56'	50.56'	23°-57'-54"	25.10'	12.73'	156°-02'-06"	5.45'	4.5'	14.14'
11'	27.82'	54.64'	28°-26'-27"	29.78'	15.20'	151°-33'-33"	5.29'	5.5'	17.28'
12'	29.39'	56.39'	30°-27'-01"	31.89'	16.33'	149°-32'-59"	5.22'	6'	18.85'
40'								20'	62.83'

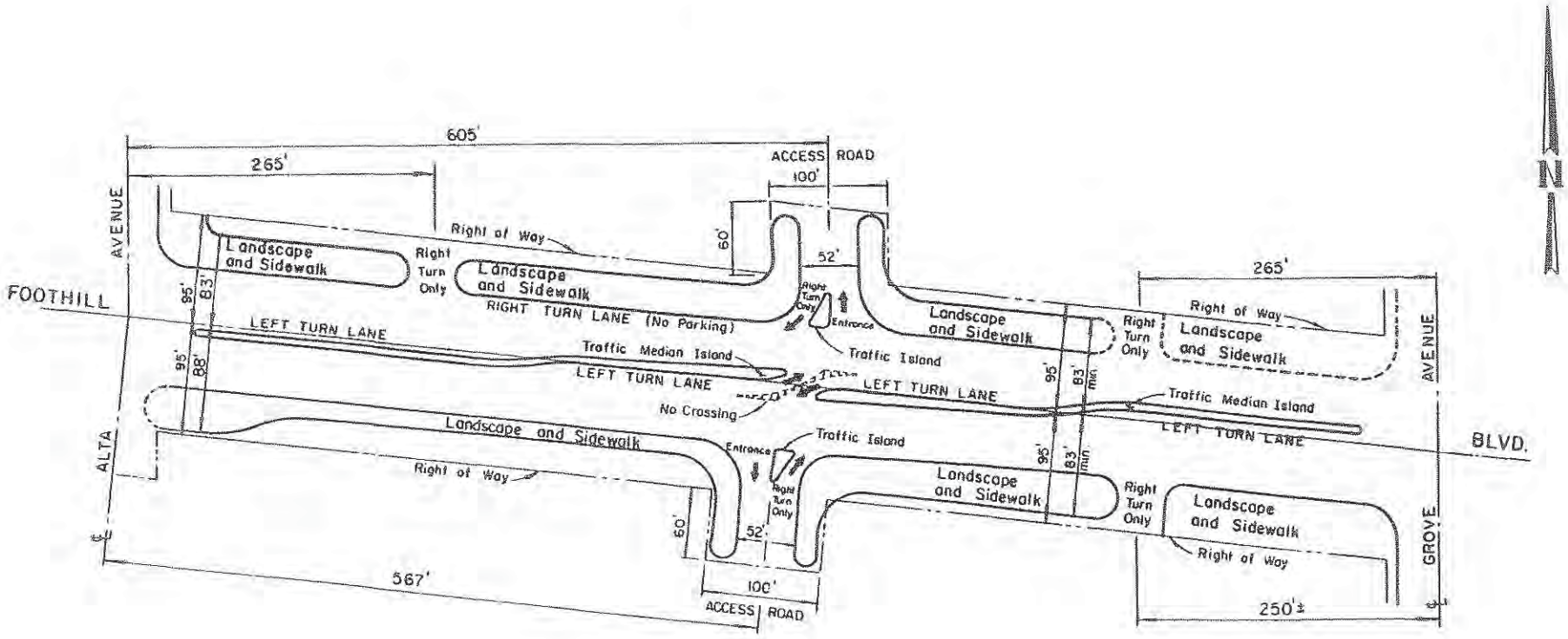
GENERAL NOTES

1. Terminal Service Road Openings Designated by the Letter "T" on Drawings Number CU-A-1 and Number CU-A-4 shall be 40 Feet Wide and Curve "C" shall have a Radius of 20 Feet.
2. Flow Line Elevations Across Service Road Openings are to be Indicated on the Profile Portion of the Plan.

Ⓢ STANDARD UNLESS OTHERWISE NOTED ON PLANS.

CITY OF UPLAND
STANDARD DRAWING

Drawn By	Date	FOOTHILL BOULEVARD SERVICE ROADS STANDARD OPENINGS
w a h	1-7-66	
Revision By	Date	Approved By Fred C. Blanchard CITY ENGINEER
		Drawing Number CU-A-6



GENERAL NOTES:

1. See Drwg. CU-A-8 For Additional Dimensions For Access Road Openings At Mid-Block.

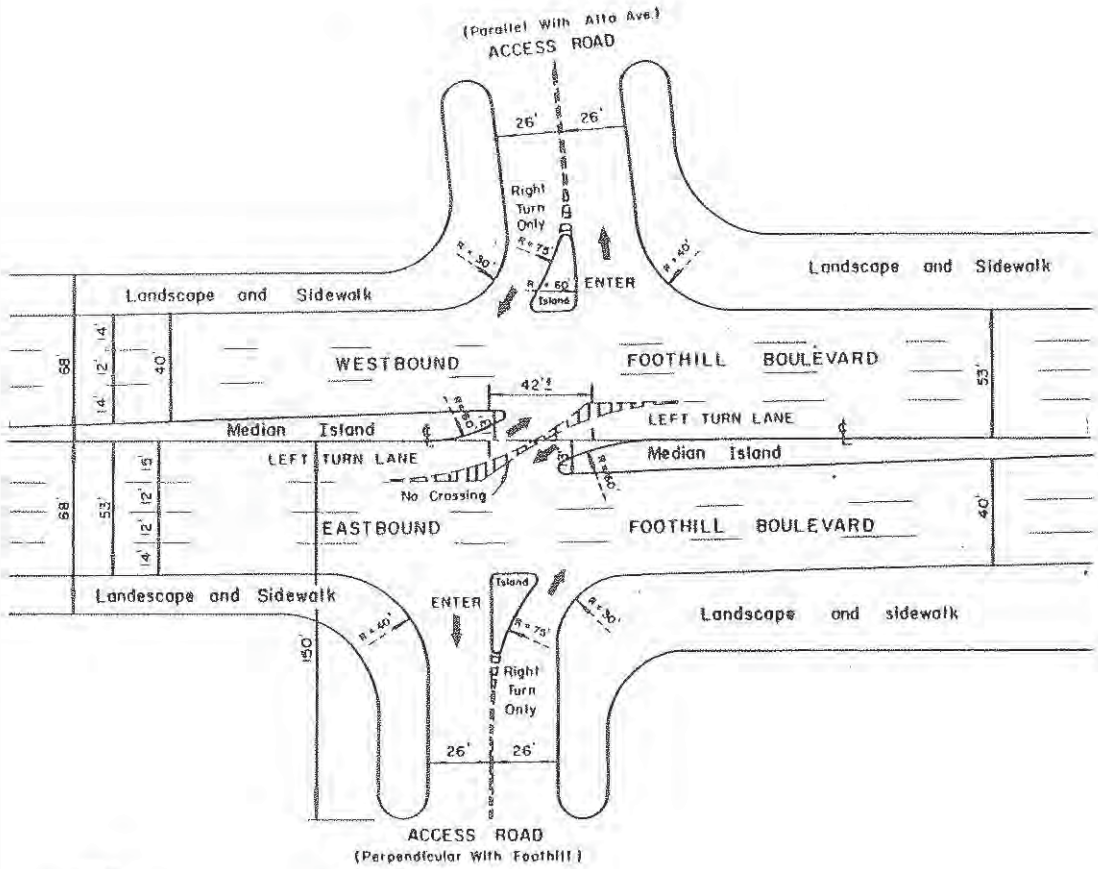
2. This Plan Is An Alternate To A Portion Of The Plan Shown On Drawing No. CU-A-4; The General Notes Listed Thereon Shall Be Considered A Part Of This Plan And Apply To The Plan, Wherever Applicable.

3. Left Turn Storage Islands On Foothill Blvd. To Serve The Adjacent Properties Shall Be Fully Constructed By The Developers Of Said Properties.

4. Traffic Median Island In The Center Of Foothill Blvd. Shall Be Constructed Prior To The Opening Of The "Right Turn Only" Entrance Located 265' East Of Alta Avenue To Insure Against Left Turn Movements Into Said "Right Turn Only" Entrance.

CITY OF UPLAND STANDARD DRAWING

Drawn By	Date	PRECISE PLAN AMMENDMENT No. 4 & 5
Lwa	5-26-70	
REVISIONS BY	DATE	Alternate Plan To P.P. No. 7
W.A.B.	5/3/71	Foothill Blvd. Service Roads Alta Ave to Grove Ave.
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING No. CU - A - 7

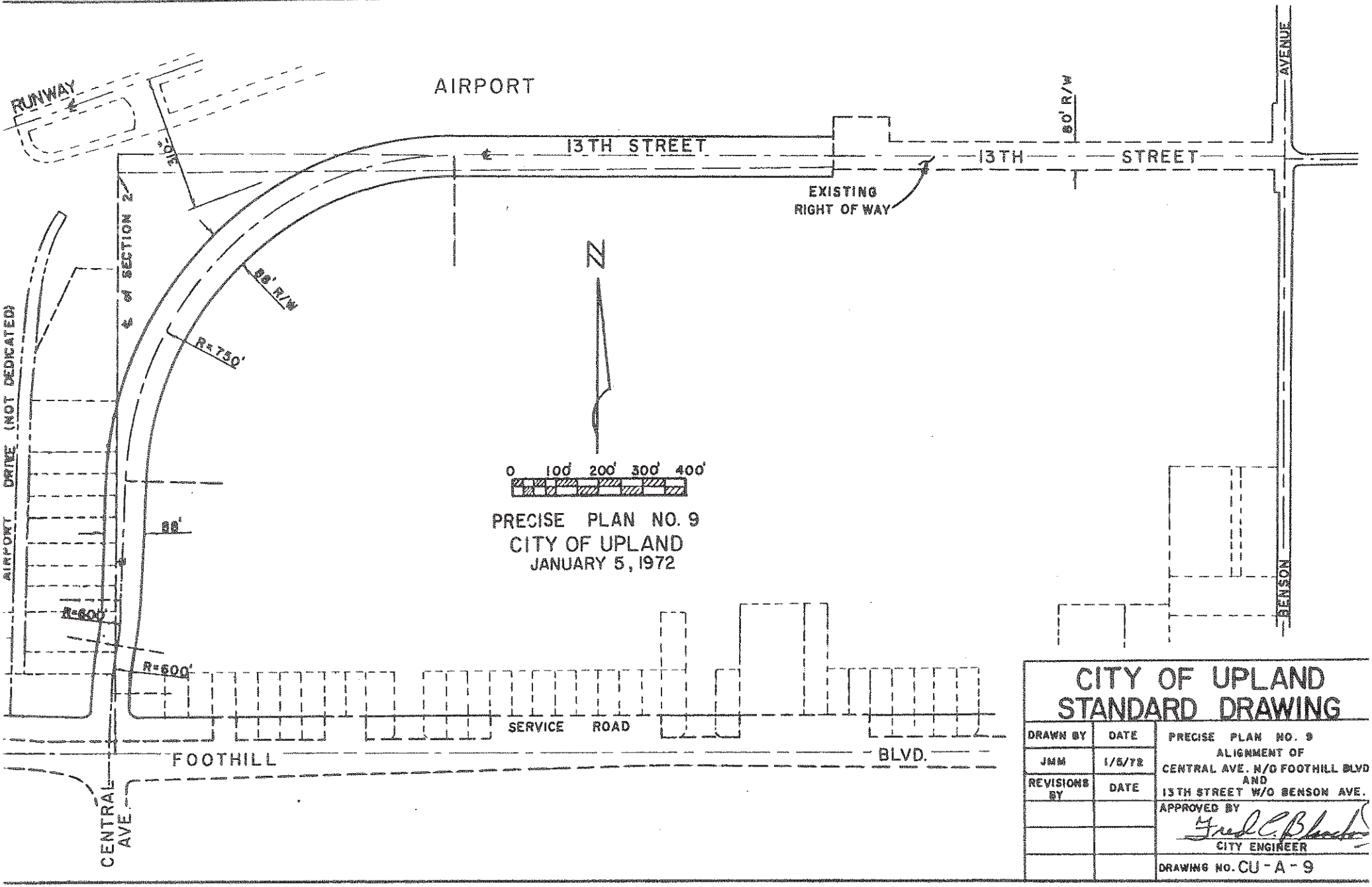


NOTE

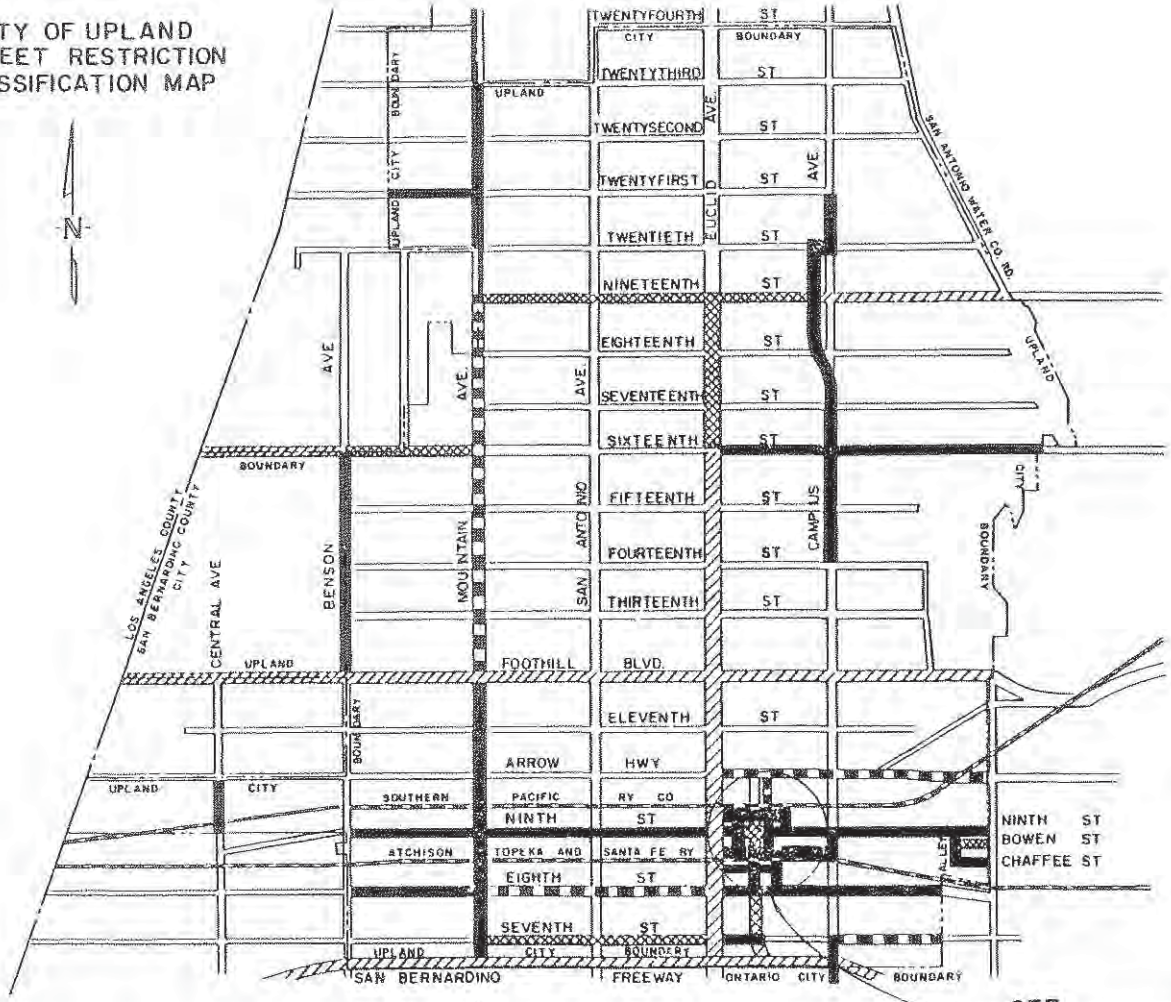
1. See Drawing No. CU-A-7 For Overall Plan Between Alta Avenue and Grove Avenue.

CITY OF UPLAND STANDARD DRAWING

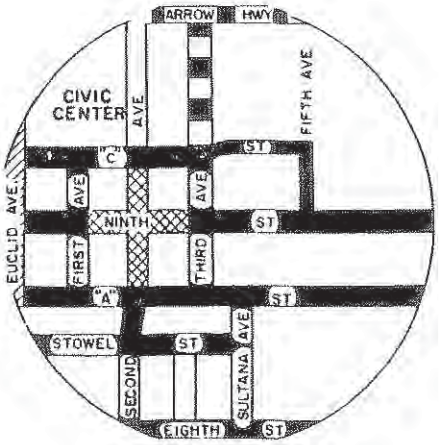
DRAWN	DATE	PRECISE PLAN AMENDMENT NO. 4
Lwa	5-26-70	ALTERNATE PLAN TO P.P. No. 7 Detail of Access Road Openings on N & S Sides of Foothill Blvd. Midway between Alta Avenue and Grove Avenue
		APPROVED BY Fred C. Blowers CITY ENGINEER
		DRAWING NO. CU-A-8


RUNWAY
AIRPORT
13TH STREET
13TH STREET
80' R/W
AVENUE
EXISTING RIGHT OF WAY
N
0 100' 200' 300' 400'
PRECISE PLAN NO. 9
CITY OF UPLAND
JANUARY 5, 1972
AIRPORT DRIVE (NOT DEDICATED)
℄ of SECTION 2
88' R/W
R=750'
88'
R=600'
R=600'
SERVICE ROAD
FOOTHILL
BLVD.
CENTRAL AVE.
BENSON
CITY OF UPLAND
STANDARD DRAWING
DRAWN BY
DATE
JMM
1/6/72
REVISIONS BY
DATE
PRECISE PLAN NO. 9
ALIGNMENT OF
CENTRAL AVE. N/O FOOTHILL BLVD
AND
13TH STREET W/O BENSON AVE.
APPROVED BY
CITY ENGINEER
DRAWING NO. CU-A-9

CITY OF UPLAND STREET RESTRICTION CLASSIFICATION MAP



SEE CIVIC CENTER INSERT



CIVIC CENTER INSERT

LEGEND

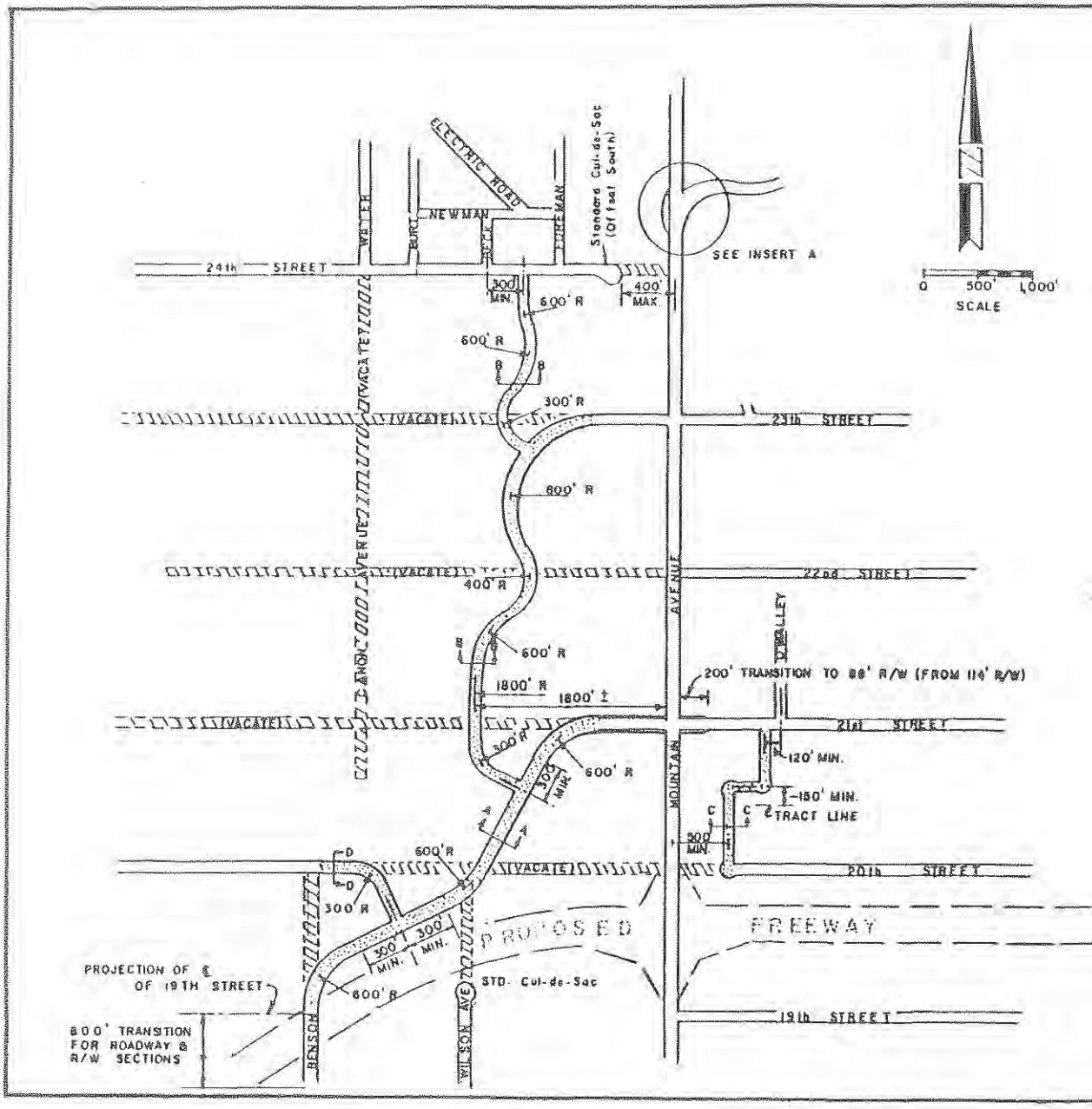
- STATE HWY.
- UNRESTRICTED
- INTERMEDIATE LOAD
- SPECIALLY IDENTIFIED
- ALL OTHER STREETS ARE RESTRICTED

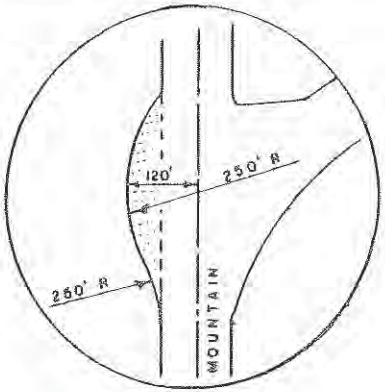
LOAD LIMITS

UNRESTRICTED: ACCORDING TO STATE LAW
INTERMEDIATE LOAD: 36,000 LBS. MAX.
SPECIALLY IDENTIFIED: SEE SECT. 3311 OF MUNICIPAL CODE
ALL OTHERS, RESTRICTED TO 10,000 LBS. MAX.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	RESTRICTED USE OF CERTAIN CITY STREETS
J.E.K.	5-18-72	CLASSIFICATION AND DESIGNATED STREETS
REVISIONS BY	DATE	PER SECTION 3311 MUNICIPAL CODE
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-A-10





INSERT A

STREET LEGEND

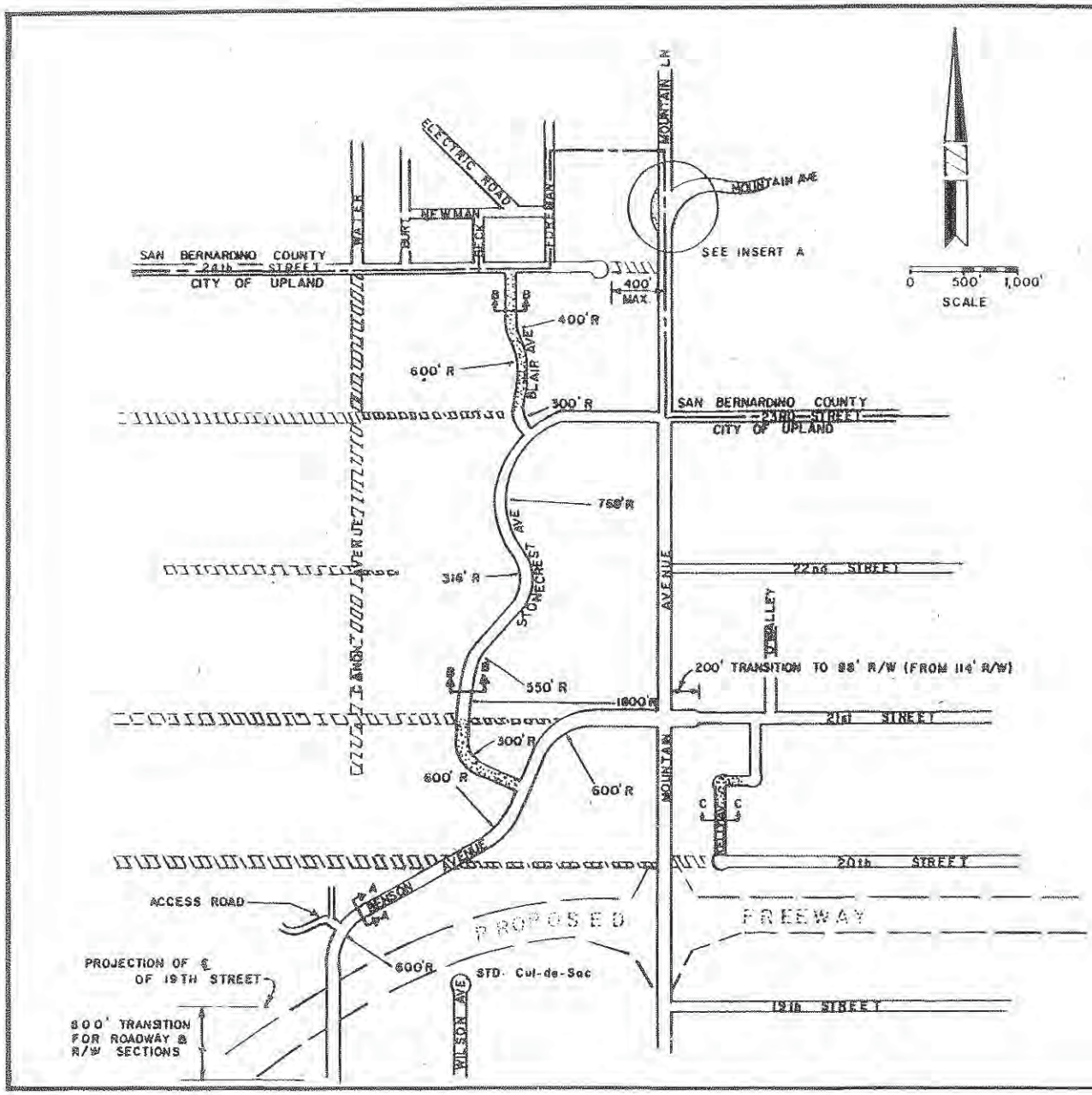
EXISTING STREET TO REMAIN	
NEW RIGHT OF WAY	
EXISTING TO BE VACATED	
PROPOSED FREEWAY	

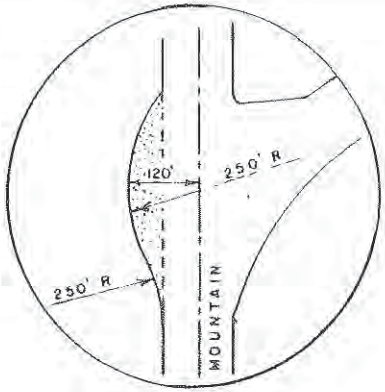
GENERAL NOTES

1. Refer to City of Upland Standard Drawing No. CU-L-2 for all Cul-de-Sac and Knuckles (Right Angle Turns).
2. All Radii may be increased up to 25% or decreased up to 10%.
3. See Standard Drawing No. CU-A-12 for typical sections.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 12 CIRCULATION ELEMENT NORTHWEST SECTOR OF THE GENERAL PLAN
L A L	10-3-77	
REVISION BY	DATE	APPROVED BY
		Fred C. Blanchard
		CITY ENGINEER
		DRAWING NO. CU-A-11





INSERT A

STREET LEGEND

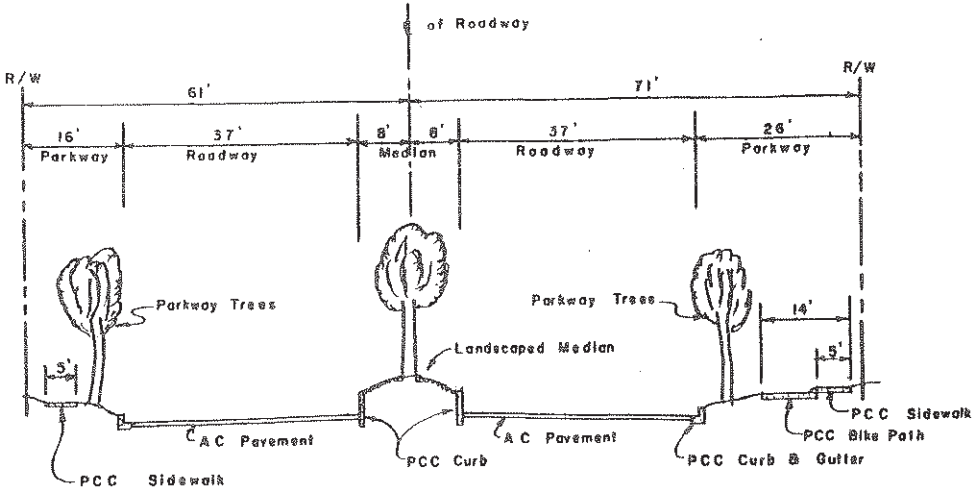
EXISTING STREET	
NEW RIGHT OF WAY	
EXISTING TO BE VACATED	
PROPOSED FREEWAY	

GENERAL NOTES

1. Refer to City of Upland Standard Drawing No. CU-L-2 for all Cul-de-Sac and Knuckles (Right Angle Turns).
2. This drawing is a supplement to drawing CU-A-11 (Precise Plan No. 12), showing accomplished street changes.
3. See Standard Drawing No. CU-A-12 for typical sections.

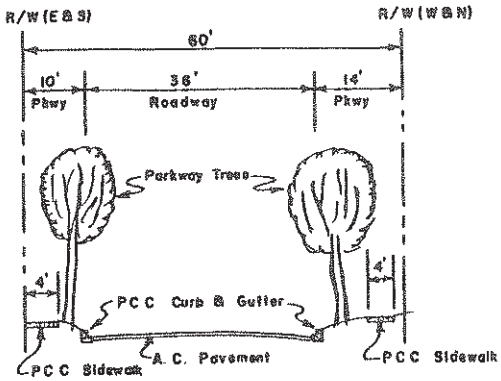
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 12 IMPLEMENTATION
JN	1-30-85	
REVISION BY	DATE	APPROVED BY
		CITY ENGINEER
		DRAWING NO. CU-A-11S



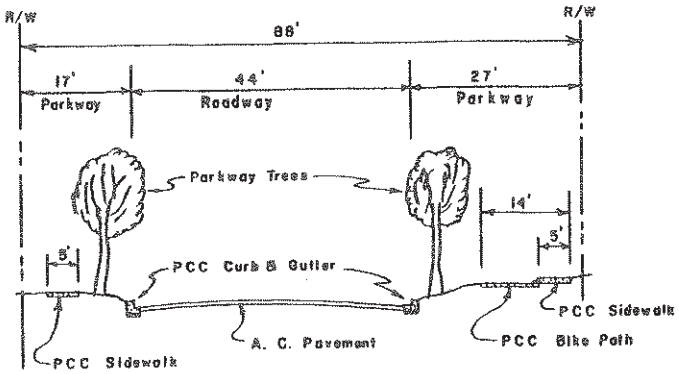
SECTION A-A

BENSON AVENUE NORTH OF 19th STREET
21st STREET WEST OF MOUNTAIN AVENUE



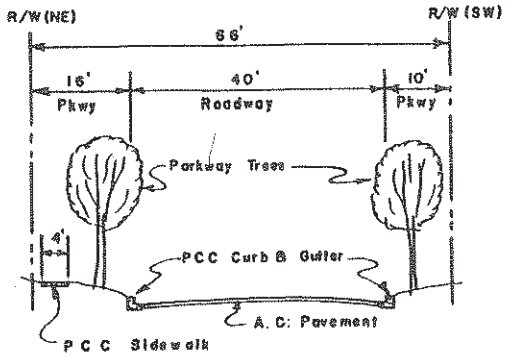
SECTION C-C

NORTH-SOUTH ALIGNMENT CONNECTING 20th STREET
TO 21st STREET EAST OF MOUNTAIN AVENUE



SECTION B-B

23rd STREET WEST OF MOUNTAIN AVENUE
AND
NORTH-SOUTH ALIGNMENTS CONNECTING
BENSON AVENUE TO 23rd STREET AND 24th
STREET



SECTION D-D

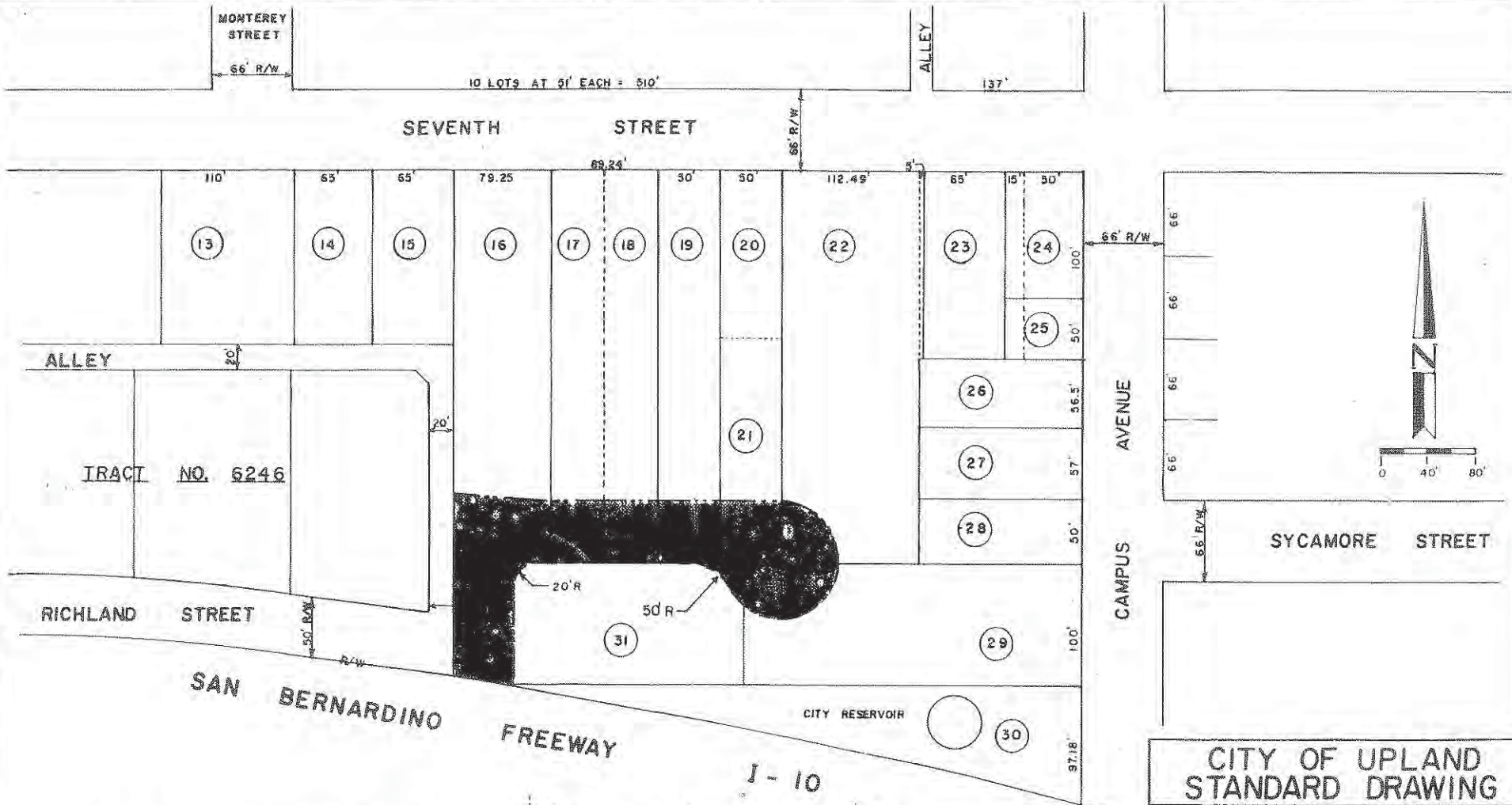
20th STREET NORTHWEST
OF BENSON AVENUE

GENERAL NOTE

1. See Standard Drawing CU-A-11 for plan and other details.

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 12
L A L	10-3-77	CIRCULATION ELEMENT NORTHWEST SECTOR OF THE GENERAL PLAN
REVISION BY	DATE	SECTION DETAILS
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-A-12



CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PRECISE PLAN NO. 3 : REVISION 1 RICHLAND STREET EXTENSION 510'± EASTERLY TO CAMPUS AVE.
LAL	11/7/77	
REVISIONS BY	DATE	
JN	2/21/85	APPROVED BY CITY ENGINEER
		DRAWING NO. CU - A - 13

PLAN SYMBOLS

- Center Line
- Point Of Intersection
- Right Of Way Line
- Property Line
- Existing Curb
- New Curb
- Existing Curb And Gutter
- New Curb And Gutter
- Existing Sidewalk
- New Concrete Sidewalk
- New Concrete Driveway
- New Pavement
- New Pavement To Be Overlaid Over Existing Pavement
- 24" RCP — Existing Reinforced Concrete Culvert Or Storm Drain
- 18" x 11" CMP — Existing Corrugated Metal Culvert Or Storm Drain
- Existing Curb Inlet
- Existing Inlet With Grating
- 18" CMP — New Storm Drain, Curb Inlet And Gutter Depression
- 8" CP — I — Existing Concrete Irrigation Line
- 12" ST — I — Existing Steel Irrigation Line
- I — S — Existing Irrigation Standpipe
- 12" ST - I — New Steel Irrigation Line
- 6" — W — Existing Water Line
- W — Water Meter
- W — Water Valve
- Fire Hydrant
- W — Existing Sprinkler Or Bubbler Head
- 2" — G — Existing Gas Line
- G — Gas Meter
- G — Gas Valve
- T — T — Existing Telephone Conduit
- E — E — Existing Electric Conduit
- Telephone Pole
- Power Pole
- Pole Anchor
- Guy Pole
- Telephone & Power On Same Pole
- SL — SL — Existing Street Lighting Conduit
- Existing Street Light
- New Street Light
- SIG — SIG — Existing Traffic Signal Conduit
- Existing Traffic Signal
- D — Existing Traffic Signal Detector
- Existing Traffic Signal Controller
- PB — Pull Box
- S — New Stop Sign
- Y — New Yield Sign
- New Informational Sign
- Existing Street Name Sign
- New Street Name Sign
- Railroad Tracks
- Existing Railroad Crossing Sign
- Existing Railroad Crossing Signal
- Existing Chain Link Fence
- Existing Wire Fence
- Existing Wood Fence
- Existing Masonry Wall
- Existing Hedge
- Shrub
- Existing Tree
- Proposed Tree
- Palm Tree
- Diameter Of Tree Outlines In Feet Should Be Approximately Equal To Trunk Size In Inches
- Building
- Monument
- Existing Natural Flow Line
- Existing Top Of Slope
- Existing Toe Of Slope
- Direction Of Flow
- New Top Of Slope
- New Toe Of Slope
- 8" — S — Existing Sanitary Sewer
- Existing Manhole
- S — Existing Sewer Cleanout
- 8" — New Sanitary Sewer And Manhole
- 8" — New Sewer Cleanout
- 8" — New Sanitary Sewer Main With Wyes And Lateral

PROFILE SYMBOLS

- Existing Pavement Profile
- Existing Curb Profile
- Existing Sidewalk Profile
- Existing Ground Profile
- Finished ℄ Grade
- Top Of Curb Grade
- Back Of Sidewalk Grade
- Point Of Intersection
- 24" RCP — New Culvert Or Storm Drain And Curb Inlet
- Existing Sanitary Sewer, Manhole & Cleanout
- New Sanitary Sewer, Manhole & Cleanout

CITY OF UPLAND STANDARD DRAWING		
Drawn By	Date	PLAN & PROFILE SYMBOLS
J.C.H.	7-26-65	
Revision By	Date	
		APPROVED BY Fred E. Kirschbaum CITY ENGINEER
		DRAWING NUMBER CU-D-1

GENERAL NOTES

1. All work called for on the Plans shall be in compliance with current City of Upland Standard Specifications, adopted by City Council, unless otherwise noted on the Plans or in the Special Provisions for the subject Project.

2. The Contractor, before undertaking any grading or construction work of any type within the public right of way, must first obtain a Construction Permit from the City Engineering Dept.

3. A Temporary Street Closure Permit is required in all cases where work will in any way interfere with either vehicular or pedestrian traffic. The Contractor is advised that City Council Resolution No 1656, dealing with prompt restoration of city streets torn up during construction, will be enforced in all cases where the provisions thereof are applicable.

4. Inspection by the City of the work called for on the Plans shall not, in any way, relieve the Contractor and/or the Developer of their obligation to perform the work in compliance with the Plans and Specifications.

5. Any alterations or variances from the Plans, except minor adjustments in the field to meet existing conditions, shall be requested in writing and may not be instituted until approved by the City Engineer or his representatives acting specifically upon his instructions.

6. All elevations shown on the Plans are established from City of Upland datum plane.

7. Quantities, as shown on the plans, are estimated, and the Contractor is advised that final quantities of material and work in place may be somewhat greater or less than those indicated on the Plans.

8. Concrete gutters, alley approaches, driveways or other concrete items, which will be subject to vehicular traffic, shall be barricaded, and no vehicular traffic permitted thereon, for a period of at least seven days following the placing of said concrete item. When the general provisions call for use of a concrete item by vehicular traffic sooner than seven days after placing, or when the Contractor for convenience of operation so desires, concrete containing eight sacks of cement per cubic yard may, and shall if so directed by the Engineer, be used, and traffic will be permitted thereon seventy-two hours after the placing of said eight sack concrete.

9. Irrigation lines within any City right of way shall have a twenty-four inch minimum cover from finish surface, unless said irrigation line is encased in concrete or bedded in a special concrete cradle.

10. The Contractor shall operate in a manner compliant with all applicable sections of the Municipal Code and compliant with all applicable City Council Resolutions.

11. The location of underground utility or irrigation lines, as shown on the Plans, is approximate, and since the actual location may be somewhat different from that shown, the Contractor is required to contact the interested utility or water company before excavating in the vicinity of any such lines.

12. Parkway trees, installed by the developer, shall be planted and maintained in accordance with City of Upland Standard Drawing No. CU-P-6.

13. All street name and traffic regulatory signs indicated on the Plans will be installed by the developer in accordance with City of Upland Std. Drwg. Nos. CU-G-2, CU-G-3, CU-G-4.

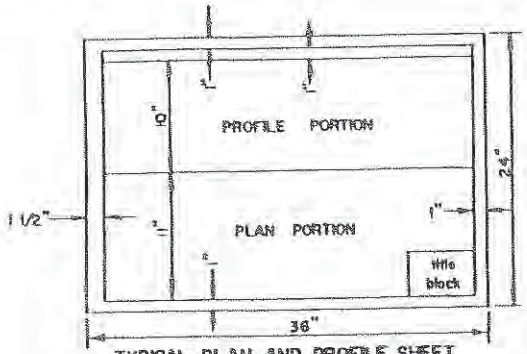
14. All street lights indicated on the Plans shall be installed by the Southern California Edison Company. The Developer shall pay the City, in advance, for the installation of lights to be served from overhead systems, and the City will, in turn, arrange for their installation. The Developer shall work directly with the Edison Company when the lights are to be served from an underground system.

15. An approved weed killer shall be applied to the prepared base prior to asphalt paving in all areas where there is any evidence of humus or organic material present in the base (either native or imported) material. All weed killers used shall be applied in strict accordance with the manufacturers specifications and instructions.

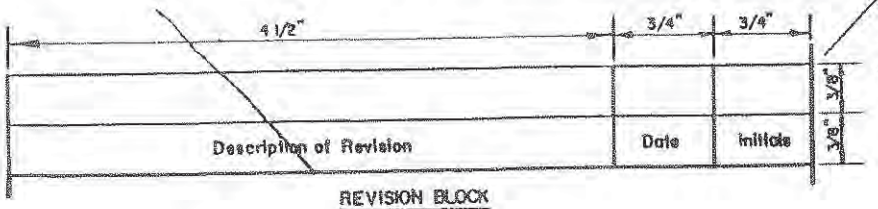
ABBREVIATIONS

A.C.	Asphaltic Concrete	A.C.P.	Asbestos Cement Pipe
&	and		
@	at		
Ave.	Avenue		
B.C.	Begin Curve		
B.C.R.	Begin Curb Return		
Bit.	Bituminous		
Bldg.	Building	Bk.	Book
Blvd.	Boulevard	B.M.	Bench Mark
B.V.C.	Begin Vertical Curve		
B/W	Back of Sidewalk		
C	Correction at center of Vertical Curve	C.B.	Catch Basin
c.c.	Center to Center	C.F.	Curb Face
C.I.	Cast Iron		
℄	Center Line		
C.M.P.	Corrugated Metal Pipe	C.O.	Cleanout
Conc.	Concrete	Constr.	Construct
C.U.P.	Conditional Use Permit	D.A.	Drive Approach
Dia.	Diameter		
D.M.H.	Drop Manhole		
Drwg.	Drawing	Dwy.	Driveway
E.	East		
E.C.	End Curve		
E.C.R.	End Curb Return		
El.	Elevation		
E.V.C.	End Vertical Curve		
Exist.	Existing		
F.B.	Field Book		
F.H.	Fire Hydrant		
F.L.	Flow Line	F.S.	Finished Surface
G.P.	Grading Plan	G.L.	Ground Line
G.T.P.	Gas Tax Project	Gr.	Grade
I	Central Angle or Delta		
L	Length or Length of Arc		
Lt.	Left		
M.H.	Manhole	M.B.	Map Book
N	North	Mon.	Monument
No.	Number		
%	per cent		
P.C.C.	Point of Compound Curve	or Portland Cement Conc.	
℞	Property Line		
P.R.C.	Point of Reverse Curve		
Proj.	Project	P.I.	Point of Intersection
P.V.I.	Point of Vertical Intersection		
R.	Radius	P.P.	Power Pole
R.C.P.	Reinforced Concrete Pipe		
Rd.	Road	Pvmt.	Pavement
R.R.	Railroad	Rdwy.	Roadway
R/S	Record of Survey		
Rt.	Right		
R/W	Right of Way		
S.	South		
Sect.	Section		
Sl.	Slope		
S.P.	Site Plan	Sp.M.H.	Special Manhole
Spec.	Specification	S.S.	Sanitary Sewer
St.	Street	Std.	Standard
Sta.	Station	S.W.	Sidewalk
T	Tangent Length for Curve		
Tr.	Tract		
V.C.P.	Vitrified Clay Pipe	V.C.	Vertical Curve
W	West or Width		
2:1	Slope of one foot measured vertically for every two feet measured horizontally		

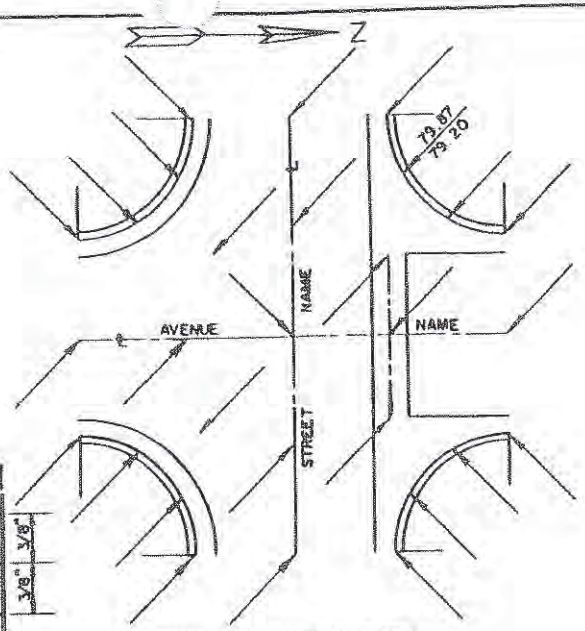
CITY OF UPLAND STANDARD DRAWING		
Drawn By	Date	GENERAL NOTES AND ABBREVIATIONS
jch	7-29-65	
Revision By	Date	
L.w.a.	10-24-66	APPROVED BY Fred C. Blanchard CITY ENGINEER
L.G.F.	12-15-66	
L.w.a.	5-13-70	DRAWING NUMBER CU-D-2



TYPICAL PLAN AND PROFILE SHEET



REVISION BLOCK



TYPICAL INTERSECTION DETAIL

Scale: Use 1" = 10"

ELEVATIONS TO BE SHOW

Show finish elevations at points as indicated in this example, and at all other points needed to grade intersection correctly. For curb grades, list top of curb over flow line elevations. Elevations for curb returns should normally be given at third points.

GENERAL NOTES

The following general note shall be included on the first sheet of every set of plans. [The following City of Upland Standard Drawings apply to this project and shall be considered as a part of these Plans:] This note is to be followed by a list of all applicable Std. Drwgs.

The General Notes listed on Std. Drwg. CU-D-2 need not be repeated on the plans; reference to Drwg. CU-D-2 will be acceptable. Any additional general notes should be listed on the first sheet of the plans.

ESTIMATED QUANTITIES

List estimated quantities in table form on first sheet of plans.

List estimated asphalt paving quantities in both square feet and in tons.

List roadway excavation and embankment in cubic yards.

List all removal items as well as new construction.

List all manholes and water valves to be adjusted to grade.

INDEX MAP

An index map should be located at the right side of the first sheet. The normal scale for index maps is 1"=200'.

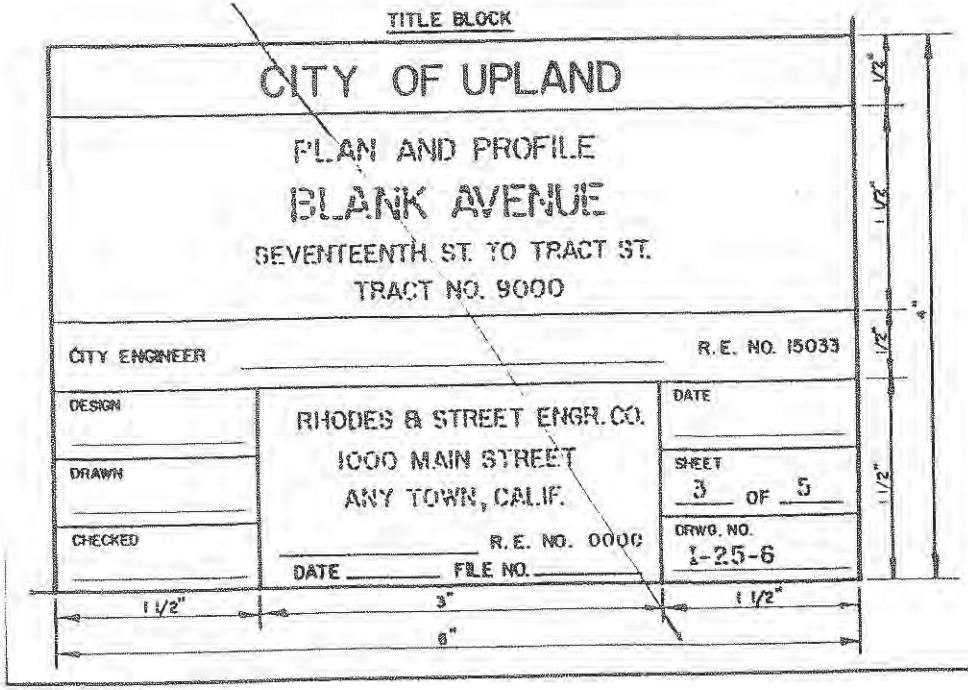
TYPICAL SECTIONS

Show typical sections on the plan and profile sheets to which they apply wherever possible.

TYPICAL INTERSECTION DETAILS

Show typical intersection details for all intersections. Wherever possible intersection details should be included on the plan and profile sheet to which they apply. Otherwise they may be shown on either the first sheet or on a special detail sheet.

TITLE BLOCK



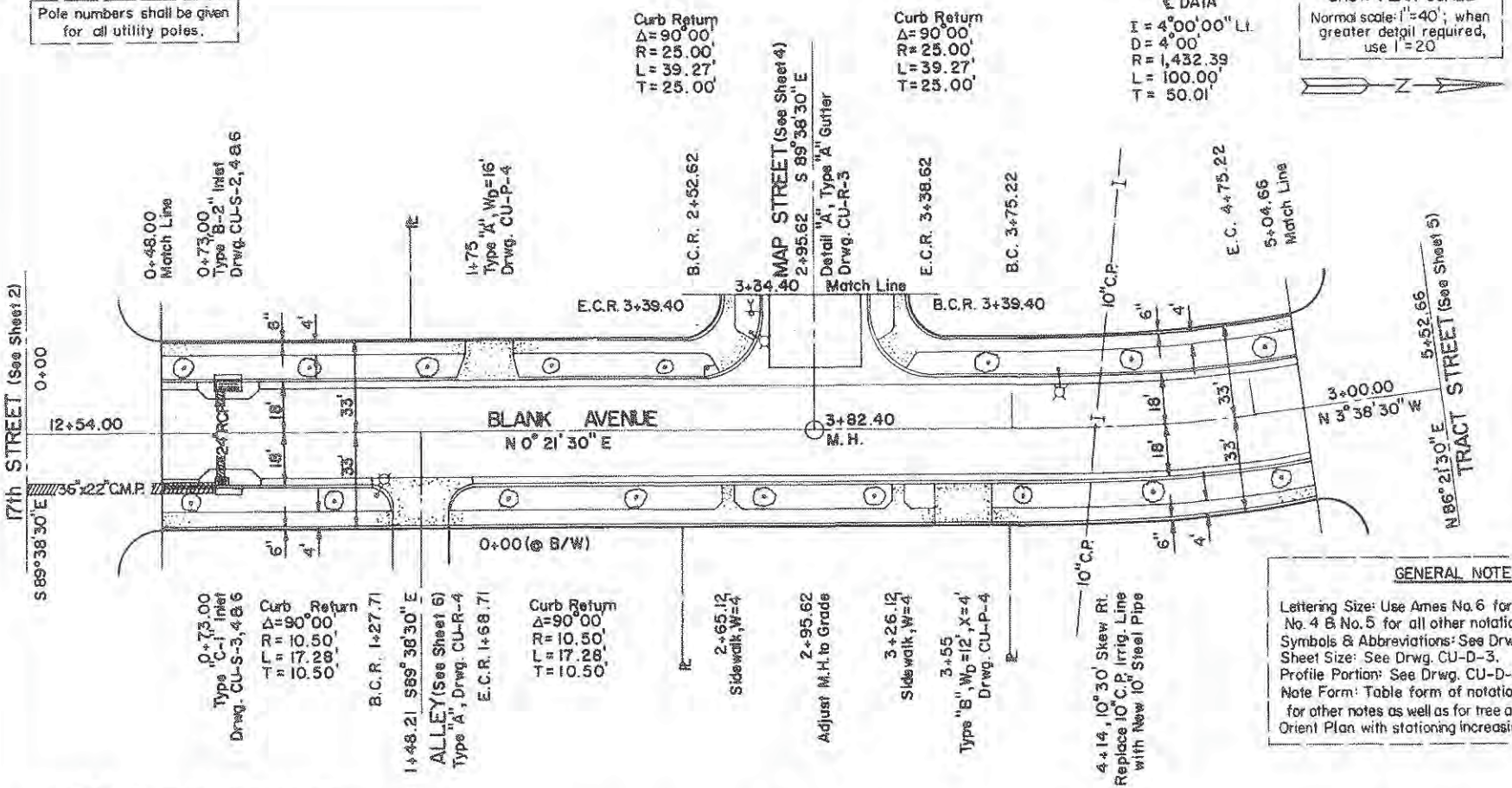
See new title block 10-18-85

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	IMPROVEMENT PLAN SHEETS GENERAL INFORMATION
wah	8/5/85	
REVISIONS BY	DATE	APPROVED BY Fred C. Bonebrake CITY ENGINEER
		DRAWING NO. CU-D-3

Pole numbers shall be given for all utility poles.

SHOW PLAN SCALE
Normal scale: 1"=40'; when greater detail required, use 1"=20'

℄ DATA
I = 4°00'00" Lt.
D = 4°00'
R = 1,432.39
L = 100.00'
T = 50.01'

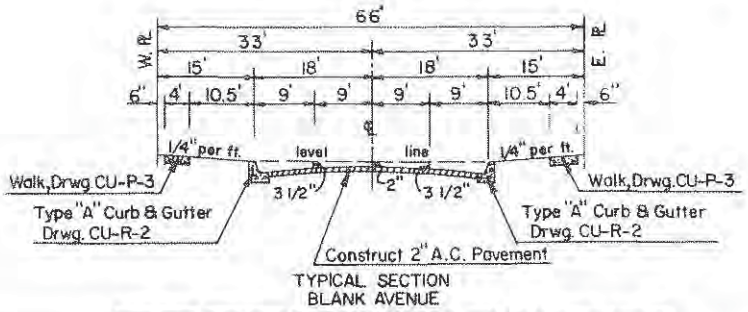


GENERAL NOTES

Lettering Size: Use Ames No. 6 for street names; No. 4 & No. 5 for all other notations.
Symbols & Abbreviations: See Drwg. CU-D-1 & 2.
Sheet Size: See Drwg. CU-D-3.
Profile Portion: See Drwg. CU-D-5.
Note Form: Table form of notations may be used for other notes as well as for tree and light locations.
Orient Plan with stationing increasing to the right.

NEW TREES & STREET LIGHTS

LEFT PARKWAY		RIGHT PARKWAY	
Sta.	Item	Sta.	Item
0+55	Magnolia Tree	0+55	Magnolia Tree
1+00	" " "	1+10	" " "
1+45	" " "	1+33	"R-1" Light
2+00	" " "	1+85	Magnolia Tree
2+40	" " "	2+30	" " "
2+72	"R-1" Light	2+75	" " "
3+55	Magnolia Tree	3+15	" " "
3+95	"R-1" Light	3+80	" " "
4+35	Magnolia Tree	4+30	" " "
4+90	" " "	4+80	" " "

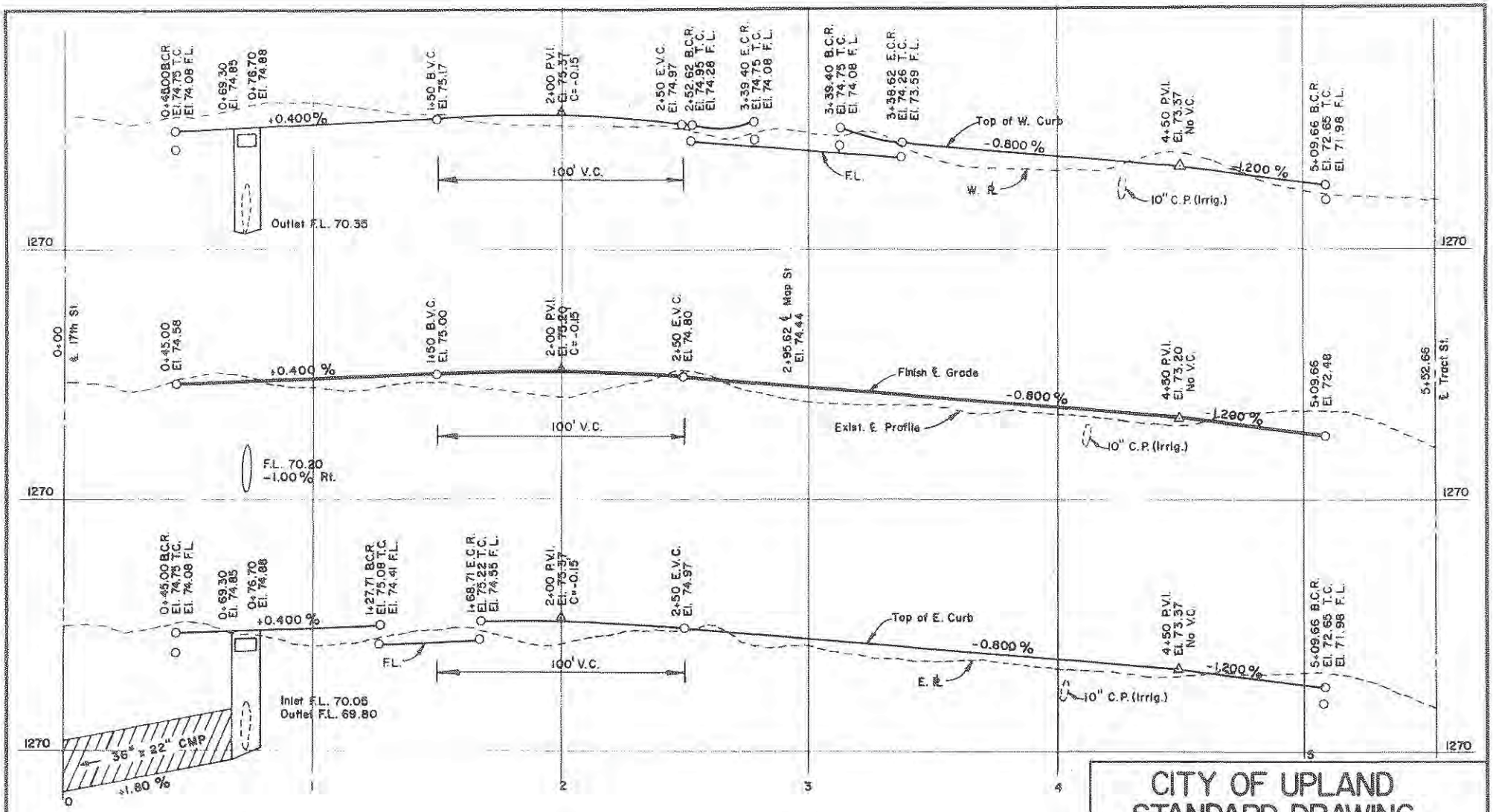


TYPICAL SECTION
BLANK AVENUE

Draw Typical Section to 1"=10' Horiz. Scale & 1"=4' Vert. Scale

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	TYPICAL STREET IMPROVEMENT PLAN
w a h	7/30/65	
REVISION BY	DATE	APPROVED BY
		CITY ENGINEER
		DRAWING NO. CU-D-4



CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	TYPICAL STREET IMPROVEMENT PROFILE
w a h	8/3/65	
REVISIONS BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-D-5

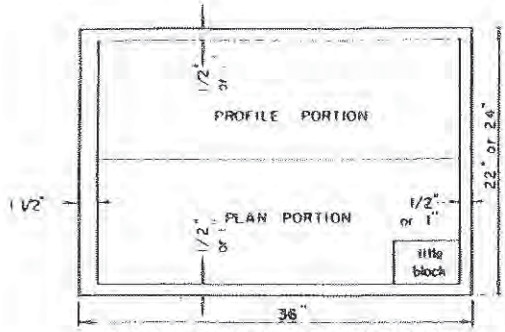
Vertical Control: Reference to City of Upland Bench Marks used to establish control elevations should be given on the profile portion on the Plan. This reference note should include: the B.M. No.; the established elevation; the location; and a description of the B.M.. Also if other bench marks exist in the immediate area they should be tied in through a Level Equation.

Gradients and Breaks in Grade: The normal minimum gradient for new roads shall be 0.400%. All breaks in grade in excess of 0.60% change shall normally require a vertical curve.

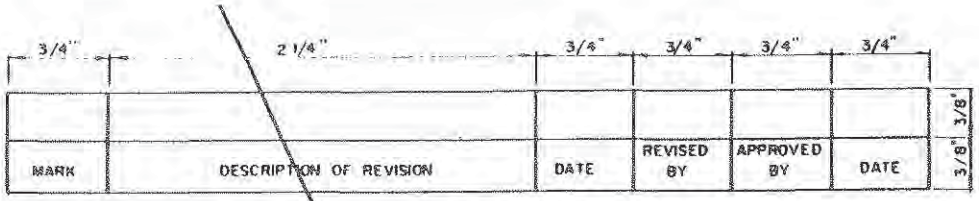
Profile Scales: The horizontal scale used on the profile portion shall be the same as the plan scale. The vertical scale shall be ten times the horizontal scale.

Stationing and Horizontal Distances: Unless specifically noted all stationing shall be related to center line stationing for all profile lines, and all horizontal measurements shall be as projected on center line.

Intersection Grades: Detailed elevations at intersections shall be given on intersection details as indicated on Drwg. CU-D-3.

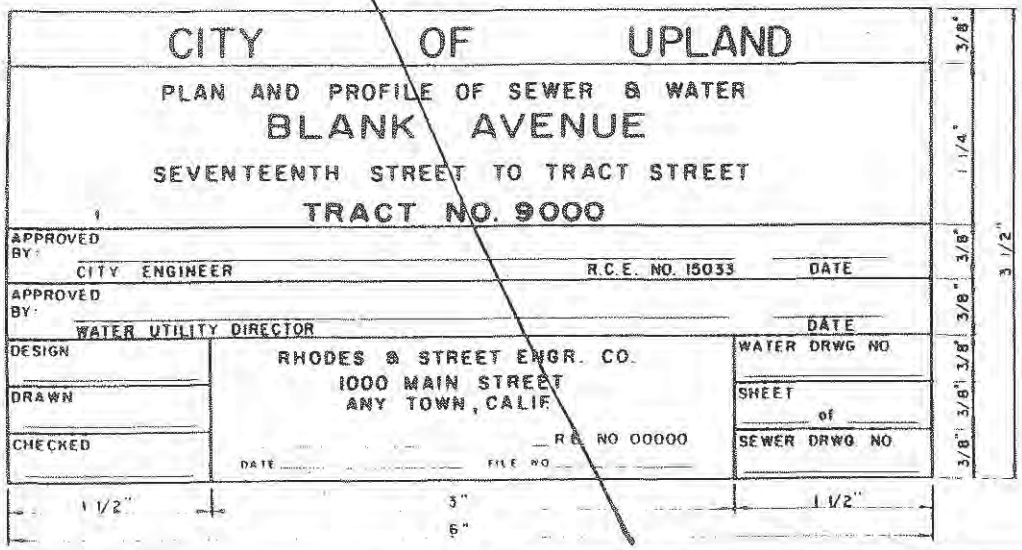


TYPICAL PLAN AND PROFILE SHEET



REVISION BLOCK

TITLE BLOCK



See new title block 10-18-85.

GENERAL NOTES

THE FOLLOWING GENERAL NOTES SHALL BE INCLUDED ON THE FIRST SHEET OF EVERY SET OF PLANS:

The following City of Upland Standard Drawings apply to this project and shall be considered as a part of these plans: (This note is to be followed by a list of all applicable Standard Drawings).

Any additional general notes special to this project.

ESTIMATED QUANTITIES

List estimated quantities in table form on the first sheet of the plans.

List all removal items as well as new construction.

List sewer main and service laterals in linear feet of each.

List standard manholes and cleanouts in number of each.

List water main in linear feet.

List all valves, flanges, fire hydrant assemblies, and water service laterals in number of each.

List all manholes and valves to be adjusted to grade in number of each.

INDEX MAP

An index map should be located at the right side of the first sheet. The normal scale for index maps is 1"=200'.

GENERAL INFORMATION

Water mains in the City of Upland are normally located 6 feet west of the east curb on north & south streets and 6 feet north of the south curb on east & west streets.

Sewer mains are normally located in the center of the street.

See Standard Drawing No. CU-D-9 For Standard Utility Locations.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	SEWER & WATER IMPROVEMENT PLAN SHEETS GENERAL INFORMATION
S.K.	9-1-75	
REVISIONS BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-D-8

GENERAL NOTES

FOR SEWER AND WATER IMPROVEMENTS WHICH ARE TO BE INCORPORATED INTO THE CONSTRUCTION PLANS BY REFERENCE TO THIS STANDARD DRAWING

1. All work and material shall conform to the higher standard in either "Standard Specifications for the Construction of Water Mains and Appurtenances, July 1972," on file at the City Water Department, City of Upland, OR "Standard Specifications for Public Works Construction," latest issue and amendments, known as the "Green Book."

2. The contractor shall be fully responsible for locating and protecting from damage all existing facilities and improvements whether or not shown on these plans. The facilities and improvements are believed to be correctly shown but the sewer contractor is required to satisfy himself as to the completeness and accuracy of the locations.

3. San Antonio Water Company, 139 N. Euclid Avenue, Upland, 982-4107, may have water lines in this area. Contact them for location, size and depth of lines, and other pertinent information.

4. Quantities shown on the plans are estimated. The contractor shall satisfy himself as to the accuracy of quantities before bidding on any item.

5. The contractor shall obtain a permit from the State of California, Department of Industrial Relations, Division of Industrial Safety, before starting the excavation of any trench five feet or more in depth. Shoring, bracing, sloping and all other provisions for worker protection shall conform to the provisions contained in Article 6 of the State of California, Department of Industrial Relations Construction Safety Orders, effective August 8, 1965 and as amended July 27, 1973. If a variation from these standards is desired, a detailed plan shall be prepared by a registered civil engineer and submitted to the City Engineer for approval.

6. All water and sewer mains shall meet the State of California, Department of Health, requirements for the separation between water mains and sanitary sewer.

7. The contractor is required to repair the existing pavement which is removed or damaged by his operations in accordance with Standard Drawing CU-2-3 unless arrangements are made which coordinate street paving in a manner acceptable to and approved by the City Engineer.

8. Before connecting to the City water system, the developer must meet the requirements of Section 7720.12(a) of the Upland Municipal Code relating to the transfer of water stock to the City of Upland.

9. Service laterals are to be placed at the center third of the lot unless otherwise approved by City.

10. Service laterals are to be installed per Standard Drawing W6-6, on file at the City of Upland Water Department.

11. Fire hydrants shall be installed per Standard Drawing W6-4 and W6-5, on file at the City of Upland Water Department.

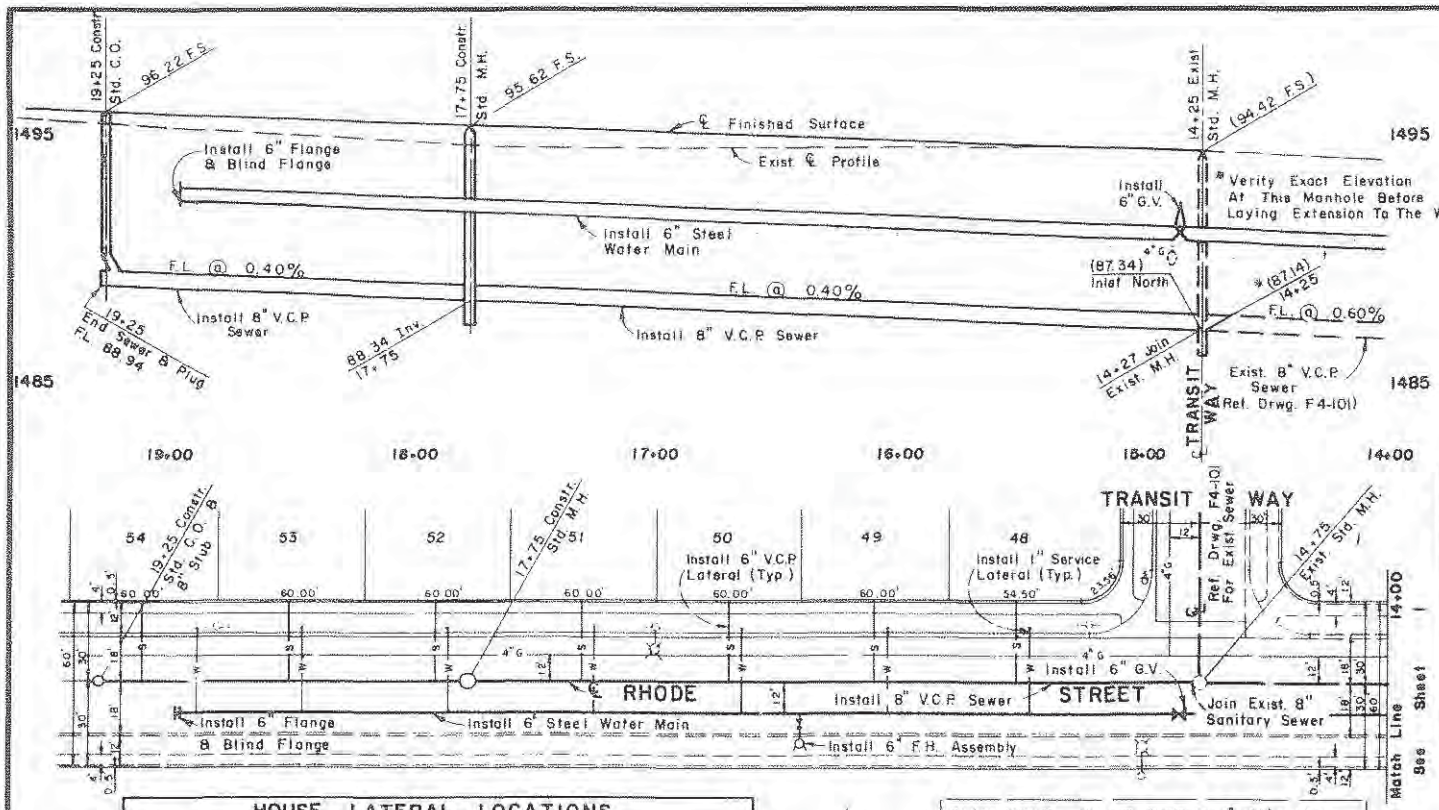
12. Connection to existing water mains shall be by "Hot Tap."

13. Minimum cover of water lines shall be as follows:

Diameter of pipe	Minimum cover
2"	24"
4"	30"
6"	36"
8"	42"
10"	48"
12"	48"
14"	52"

14. Saddle connections are not permitted to the sewer main. New connections require a "Tee" or "Wye" section to be placed in the main line.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	SEWER & WATER IMPROVEMENT GENERAL NOTES
S.K.	9-1-75	
REVISIONS BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-D-7



GENERAL NOTES

1. The following City of Upland Standard Drawings apply to this project and shall be considered as a part of these plans: CU-D-1, 2, 7; CU-Z-1 thru 4.

ESTIMATE OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT	REMARKS
1.	8" V.C.P. Sewer (Inc. Tees & Plugs)		L.F.	Excludes Length Thru Manhole
2.	6" V.C.P. Lateral		L.F.	
3.	Std. Manhole		EA.	
4.	Std. Cleanout		EA.	
5.	6" Steel Water Main		L.F.	
6.	1" Service Lateral		EA.	
7.	6" Fire Hydrant Assy.		EA.	
8.	6" Gate Valve		EA.	
9.	6" Flange & Blind Flange		EA.	

HOUSE LATERAL LOCATIONS

SEWER			WATER		
Lot Nº	Design Location	"As Built"	Lot Nº	Design Location	"As Built"
48	15+42.75		48	15+38.75	
49	16+07.50		49	16+03.50	
50	16+67.50		50	16+63.50	
51	17+27.50		51	17+23.50	
52	17+87.50		52	17+83.50	
53	18+47.50		53	18+43.50	
54	19+07.50		54	18+90.00	

PLAN SCALE: Normal Scale is 1" = 40'; When Greater Detail Is Required, Use 1" = 20'.

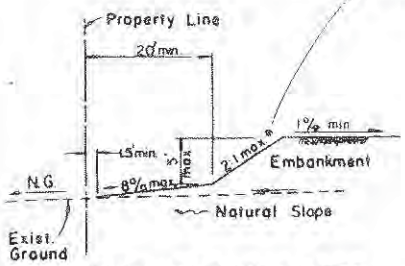
PROFILE SCALE: The Horizontal Scale Used On The Profile Portion Shall Be The Same As The Plan Scale. The Vertical Scale Shall Be Ten Times The Horizontal Scale.

VERTICAL CONTROL: Reference To City Of Upland Bench Marks Used To Establish Control Elevations Should Be Given On The Profile Portion Of The Plan.

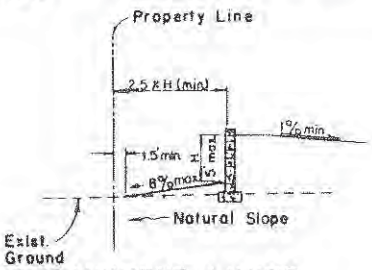
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	TYPICAL SEWER & WATER IMPROVEMENT PLAN
S.K.	9-1-75	
REVISION BY	DATE	
		APPROVED BY Fred C. Blanford CITY ENGINEER
		DRAWING NO. CU-D-8

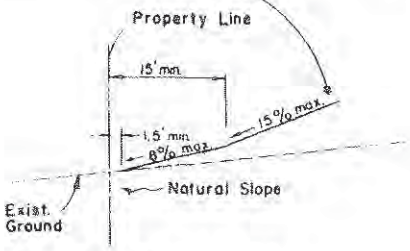
* NOTE: Provide Erosion Control For All Slopes In Excess Of 10%



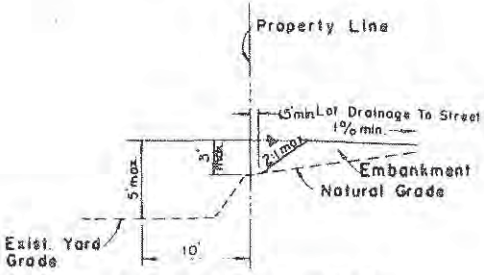
EMBANKMENT LIMITS USING TERRACING TYPE "A"



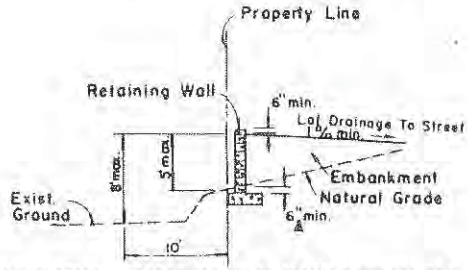
EMBANKMENT LIMITS USING TERRACING WITH RETAINING WALL TYPE "B"



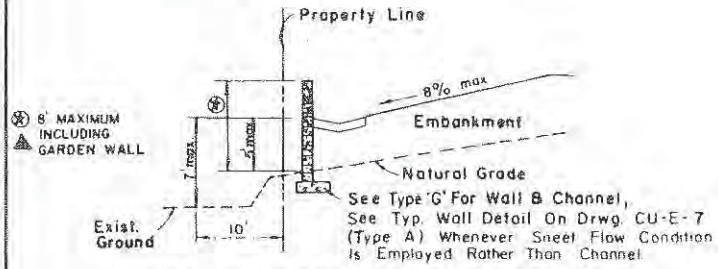
EMBANKMENT LIMITS MAXIMUM SLOPES WITHOUT TERRACING TYPE "C"



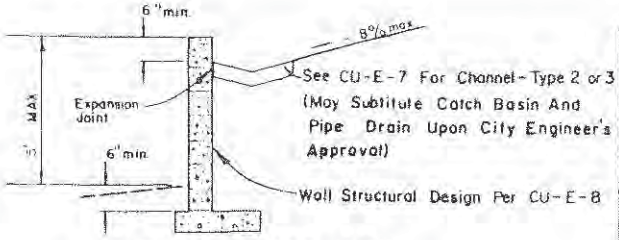
MAXIMUM LIMITS FOR EMBANKMENT WITH DRAINAGE TO STREET AND WITHOUT RETAINING WALLS TYPE "D"



MAXIMUM LIMITS FOR EMBANKMENT WITH DRAINAGE TO STREET AND WITH RETAINING WALLS TYPE "E"



LIMITS AND REQUIREMENTS FOR LOTS DRAINING TO REAR LINE TYPE "F"

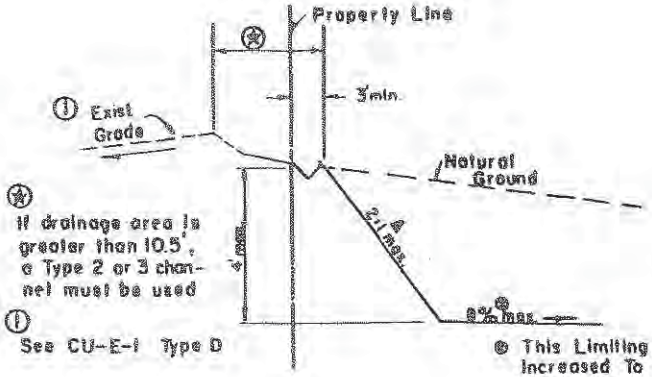


TYPICAL DETAIL FOR RETAINING WALL & CHANNEL TYPE "G"

GENERAL NOTES

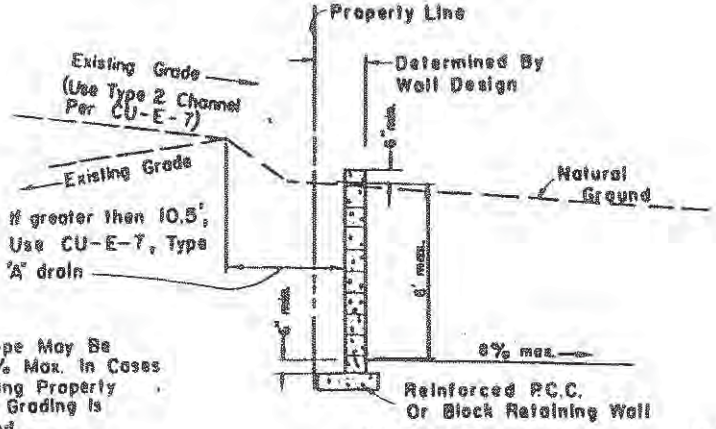
1. Notes Regarding Type "C" Embankments
   (a) Use P.C.C. Channel at Bottom Of Slope If Adjoining Property Has Retaining Wall Or Cut Slopes Within 10 Feet Of Property Line.
   (b) Not Permitted If Existing Ground Of Adjoining Property Slopes Toward The Property Line.
2. See Section 8.11.9 Of The Municipal Code For General Requirements Of The City Grading Ordinance.
3. Interior Lot Line Provisions, Per Std. Drwg. CU-E-4, May Be Used For Exterior Lots If There Is A Signed Agreement From Adjoining Property Owners.
4. Full Lot Drainage To The Rear At Exterior Boundaries Will Be Permitted Subject To The Following Provisions:
   a. Runoff Shall Be Sheet Flow Only.
   b. Engineering Calculations Shall Be Performed Showing That Runoff Quantity Will Not Be Increased;
5. Wherever There Is Either An Existing Wall That Does Not Have Provisions For The Passage Of Runoff Or Some Other Blockage Of Sheet Flow That Has Existed Along The Development Boundary For A Period Of Time, Or An Existing Cut Slope Adjacent To The New Boundary, All Roof Water And Front Yard Drainage Shall Be Carried To The Street.
6. The Mark "▲" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Also Be Followed Unless A Variance Has Been Approved By The Administrative Comm.
7. See Gen. Note No. 3 CU-E-2.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	LOT GRADING LIMITS
W.A.H.	10/5/65	REAR YARD EMBANKMENTS AT EXTERIOR LOT LINES
REVISION BY	DATE	
F.C.B.	5/16/75	APPROVED BY
[illegible]	[illegible]	DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-1

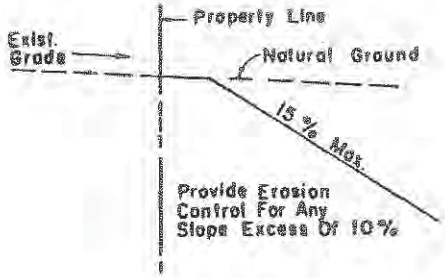


This Limiting Slope May Be Increased To 15% Max. In Cases Where The Existing Property Adjacent To The Grading Is Already Developed.

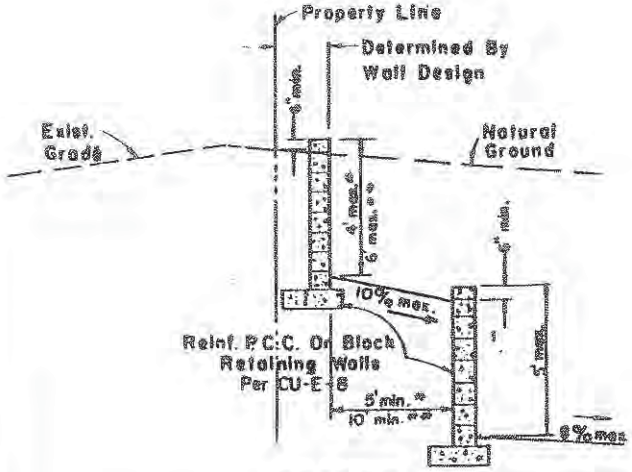
GRADING WITHOUT RETAINING WALL MAXIMUM HEIGHT WHEN SLOPE EXCEEDS 15% TYPE "J"



GRADING WITH RETAINING WALL TYPE "K"



GRADING WITHOUT RETAINING WALL MAXIMUM SLOPE WITHOUT HEIGHT LIMITATION TYPE "L"



GRADING WITH DOUBLE RETAINING WALLS TYPE "M"

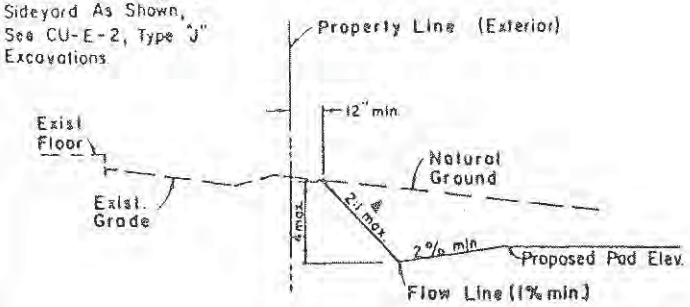
NOTES

1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinance.
2. The Mark "A" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Also Be Followed Unless A Variance Has Been Approved By The Administrative Committee.
3. All Slope Banks Exceeding 3' In Height And Visible From Main Thoroughfares (2 Lanes Each Way) Are Subject To Architectural Commission Review.

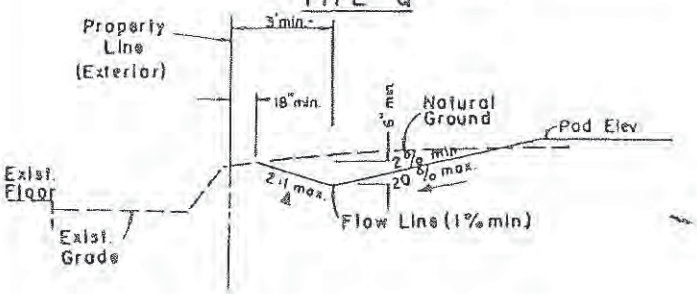
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	LOT GRADING LIMITS REAR YARD EXCAVATIONS AT EXTERIOR LOT LINES
W.A.H.	10/5/69	
REVISION BY	DATE	TYPICAL GRADING AT RESIDENCES
F.C.B.	5/16/75	APPROVED BY
JJW	9-3-80	DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-2

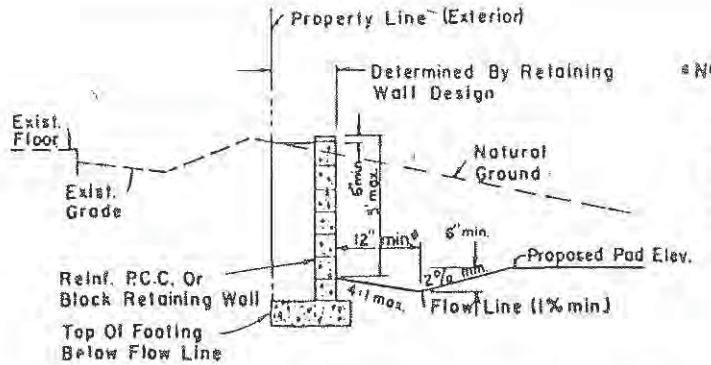
For Other Than Typical Sideyard As Shown, See CU-E-2, Type "J" Excavations



PROPOSED PAD BELOW NATURAL GROUND LINE
(WITHOUT RETAINING WALL)
TYPE "Q"

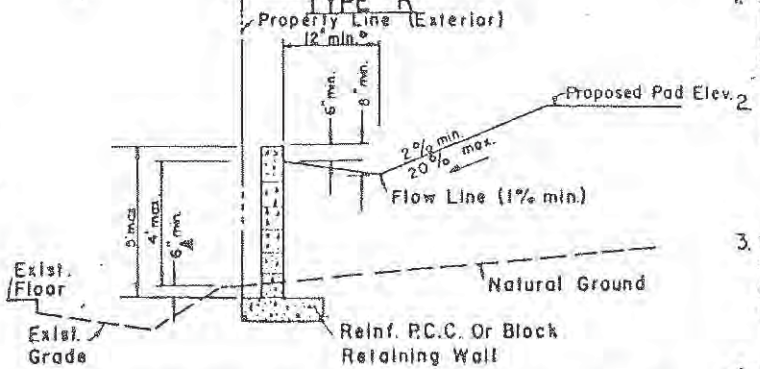


PROPOSED PAD ABOVE NATURAL GROUND LINE
(WITHOUT RETAINING WALL)
TYPE "S"



*NOTE:
Flow Line May Be Located At Face Of Wall, Dependent On Overall Lot Drainage Design, Subject To Approval By City Engineer

PROPOSED PAD BELOW NATURAL GROUND LINE
(WITH RETAINING WALL)
TYPE "R"



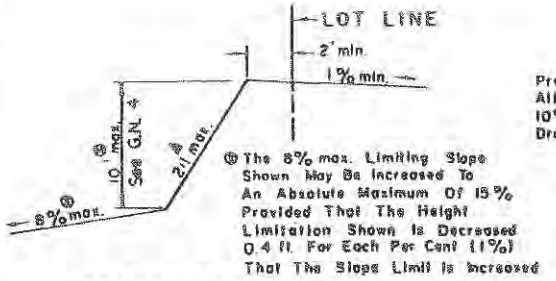
PROPOSED PAD ABOVE NATURAL GROUND LINE
(WITH RETAINING WALL)
TYPE "T"

NOTES

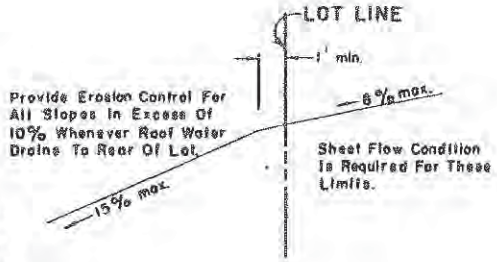
1. All Lots Shall Have Vehicular Access To The Rear Yard. If The Side Yard Is Used For Access It Shall Have A Cross Slope Less Than 8% Average In A 10' Width. See CU-E-10 For Details.
2. All Slope Banks Exceeding 3' Height And Visible From Main Thoroughfares Are Subject To Architectual Commission Review.
3. The Mark "&" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Also Be Followed Unless A Variance Has Been Approved By The Admin. Comm.
4. See Section 81.10 Of The Municipal Code For General Requirements Of The City Grading Ordinance.

CITY OF UPLAND STANDARD DRAWING

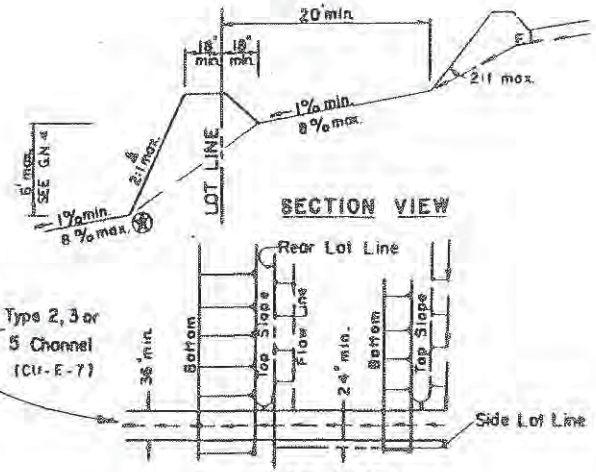
DRAWN BY	DATE	LOT GRADING LIMITS EXTERIOR SIDE YARD GRADING LIMITS
W.A.H.	10/5/63	
REVISION BY	DATE	
F.C.B.	5/16/75	APPROVED BY
B.F.	10/29/76	DEPUTY CITY ENGINEER
JJW	9-3-80	DRAWING NO. CU-E-3



DRAINAGE TO STREET
GRADING WITHOUT RETAINING WALL
TYPE "V"

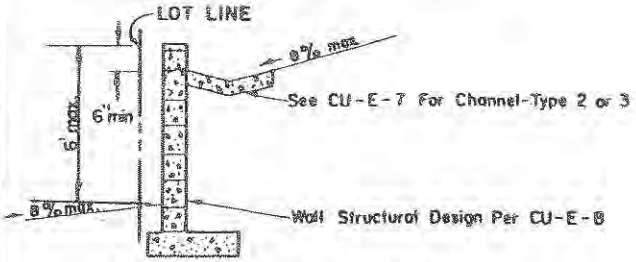


DRAINAGE OF HIGH LOTS TO REAR
MAXIMUM SLOPES WITHOUT HEIGHT LIMITATION
TYPE "W"



DRAINAGE OF HIGH LOT TO REAR
MAXIMUM HEIGHT WHEN SLOPE EXCEEDS 15%
TYPE "X" See G.N. 5

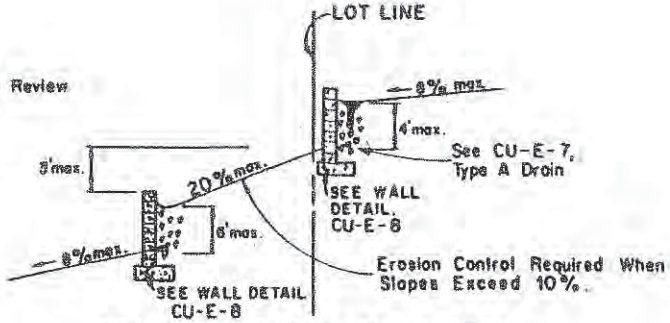
⊛ If Slope Is Less Than 3% Carry Channel 3' Beyond The Bottom Of Slope, And Place An Energy Dissipator At The Channel Terminus. When Slopes Exceed 3% Carry All Drainage To The Street In A Channel (Type 1-5) Or In A Pipe (6" min.).



DRAINAGE OF HIGH LOT TO REAR
GRADING WITH RETAINING WALL & CHANNEL
TYPE "Y"

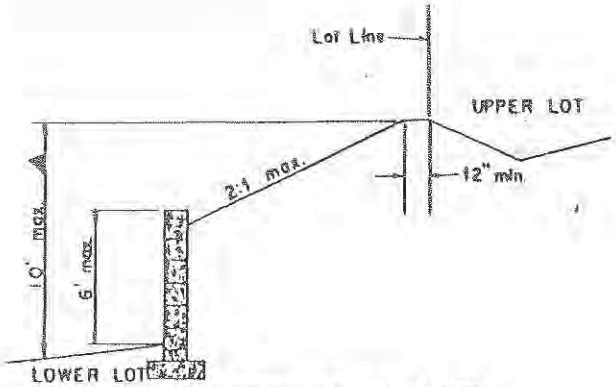
GENERAL NOTES

1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinance.
2. All Slope Banks Exceeding 3' In Height, And Visible From Main Thoroughfares Are Subject To Architectual Commission Review
3. The Mark "A" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Also Be Followed Unless A Variance Has Been Approved By The Administrative Committee.
4. This Maximum Height May Be Increased By Three Feet For Each Per Cent That The Natural Ground Slope Exceeds Four Percent (4%). (Natural Slope As Used Here Shall Be The Average Grade Between The Tract Or Site Boundaries. Where Adjacent To Public R/W The ℄ Is Considered As Boundary Line).
5. Use Only Where A Maximum Of 2 Upstream Lots Are Tributary To One Downstream Lot.

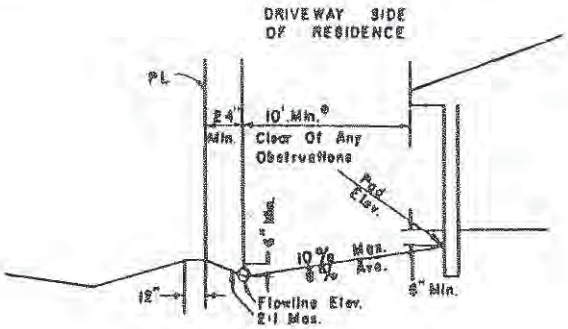


DRAINAGE OF HIGH LOT TO REAR
GRADING USING RETAINING WALLS
TYPE "Z"

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	LOT GRADING LIMITS
	5/16/75	INTERIOR LOTS:
REVISION BY	DATE	REAR YARD GRADING LIMITS
JJW	7-3-80	APPROVED BY
		DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-4

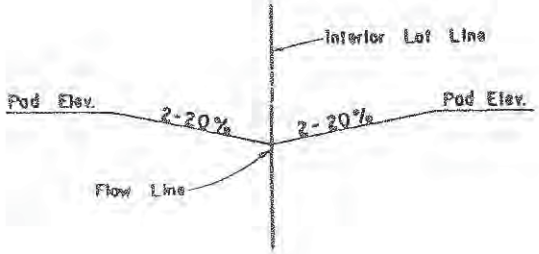


TYPICAL SIDEYARD COMBINATION SLOPE AND RETAINING WALL

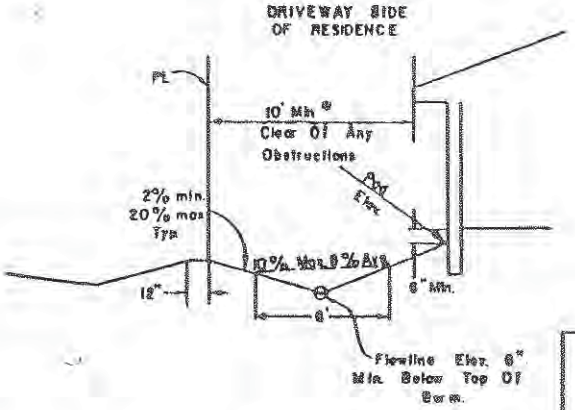


REQUIRED VEHICULAR ACCESS TO REAR YARD

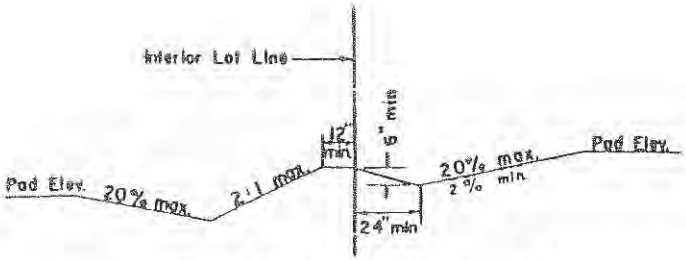
* May Be Measured To Wall Only When Eave Height Exceeds 12'



COMMON FLOWLINE



REQUIRED VEHICLE ACCESS TO REAR YARD (ALTERNATE)



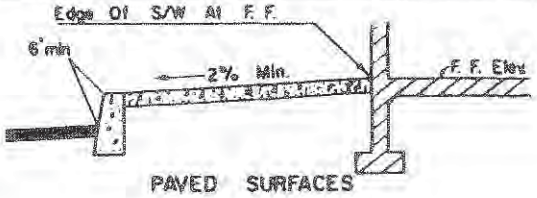
TYPICAL SIDEYARD LIMITS

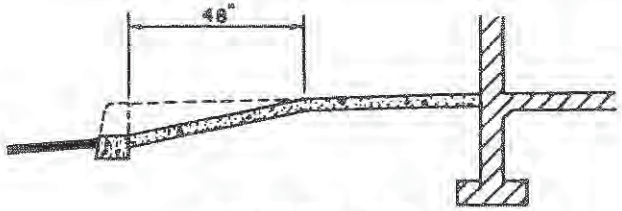
GENERAL NOTES

1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinances.
2. All Lots Shall Have Vehicular Access To The Rear Yard, If The Side Yard Is Used For Access It Shall Have A Cross Slope Less Than 8% Average In A 10' Width.
3. All Slope Banks Exceeding 3' In Height And Visible From Main Thoroughfares (2 Lanes Each Way) Are Subject To Architectual Commission Review.
4. The Mark "Δ" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Be Followed Unless A Variance Has Been Approved By The Administrative Comm.
5. Sideyard Vehicle Access Is Not Required When Lots Have Access From The Rear (i.e. Alley, etc.) Or In The Case Of A Corner Lot. The Vehicle Access In These Cases Cannot Have A Grade Exceeding 14%.

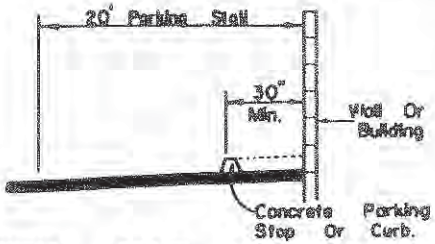
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	LOT GRADING LIMITS
		INTERIOR LOT SIDEYARD GRADING LIMITS
REVISIONS BY	DATE	
JJW	9-3-80	APPROVED BY DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-5

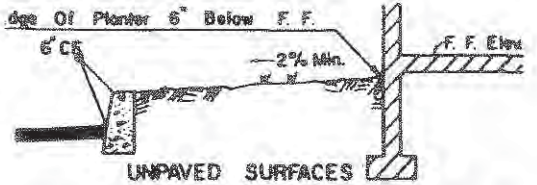




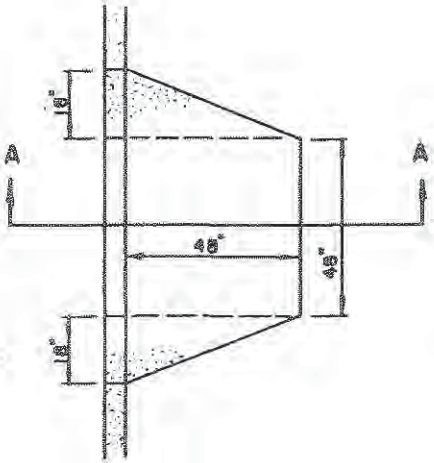
SECTION A-A



PARKING SPACE OBSTRUCTION



FINISHED SURFACES AROUND BUILDINGS

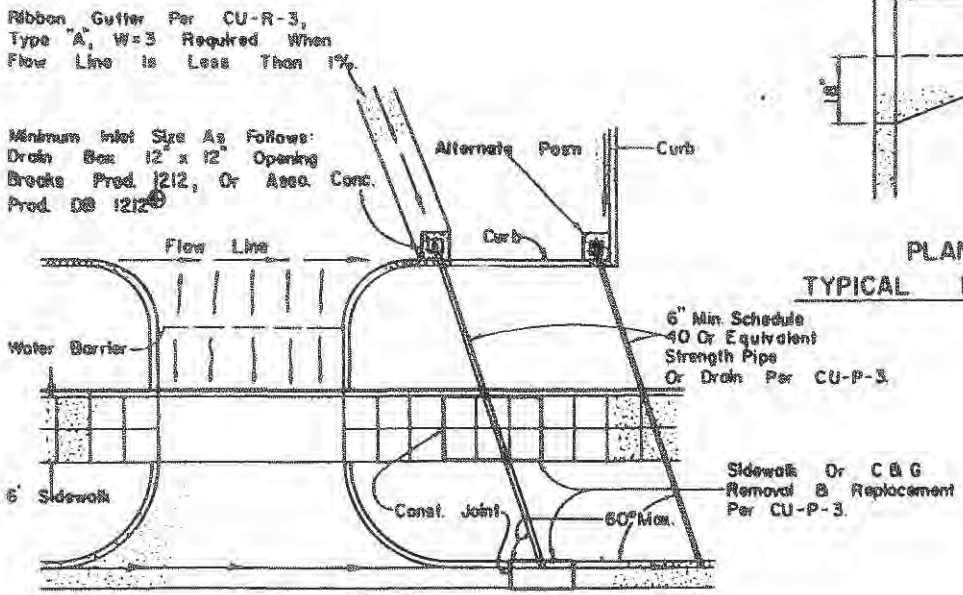


PLAN VIEW

TYPICAL HANDICAP RAMP

GENERAL NOTES

1. See Section 8110 Of The Municipal Code For General Requirement Of The City Grading Ordinances.
2. In Addition To The Other Applicable Grading Limits Shown, These Standard Drawings Shall Also Be Applied To All Commerical Or Industrial Developments Or Multiple Family Apartment Complexes, Unless Otherwise Approved By The Administrative Committee.
3. All Paved Parking And Driving Areas Shall Have A Minimum Of 20' Depth A.C.
4. SITE DRAINAGE SHALL NOT BE ALLOWED TO FLOW ACROSS PUBLIC SIDEWALKS.



REQUIRED UNDER SIDEWALK DRAIN FOR COMMERICAL DEVELOPMENTS

See CU-P-3 For Alternate.

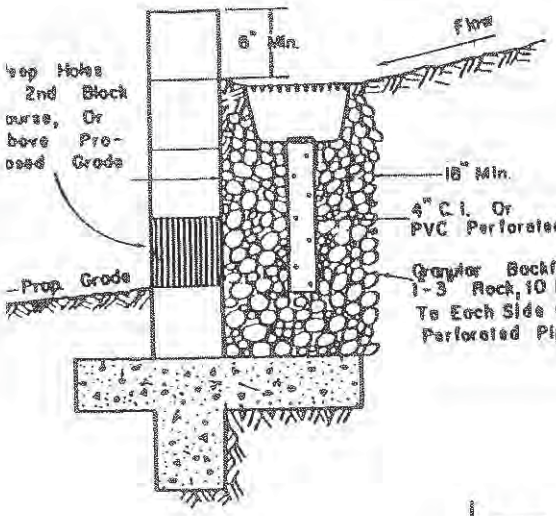
ALTERNATE

(6) WHERE CURB OPENING IS PROVIDED IN LIEU OF INLET STRUCTURE THERE SHALL BE PROVIDED A P.C.C. APRON STRUCTURE HAVING 20 SQ. FT. IN AREA AND WITH NO GREATER SLOPES THAN 8%.

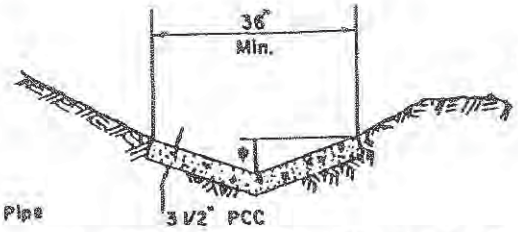
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	MISCELLANEOUS SITE GRADING DETAILS
JJW	9-3-80	
REVISION BY	DATE	
		APPROVED BY
		DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-6

Rearyard Drain (AFC No. A-344, With 10" x 10" Grate) Or Equal Maximum Spacing 40' Feet, For Lot Widths Greater Than 60 Feet. Minimum Of One Drain Is Required For Each Lot With Tributary Area Up To 8000 S.F.



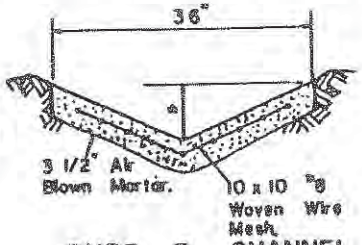
TYPE A DRAIN



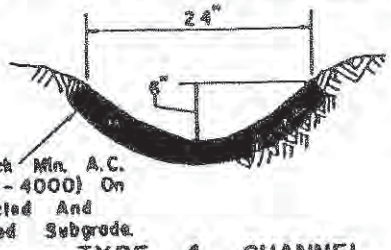
* 6" Minimum For Grades 1% Or Greater.
8" Minimum For Less Than 1%.

TYPE 2 CHANNEL

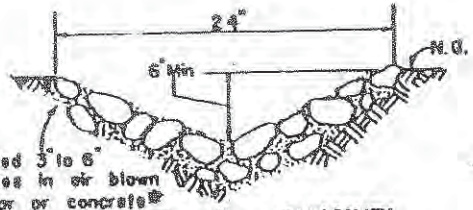
* 6" Minimum For Grades 1% Or Greater.
8" Minimum For Grades Less Than 1%.



TYPE 3 CHANNEL

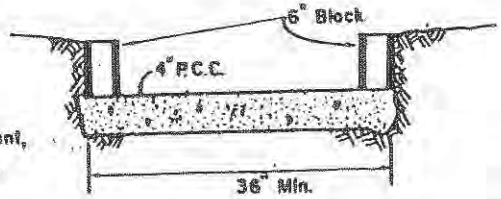


TYPE 4 CHANNEL

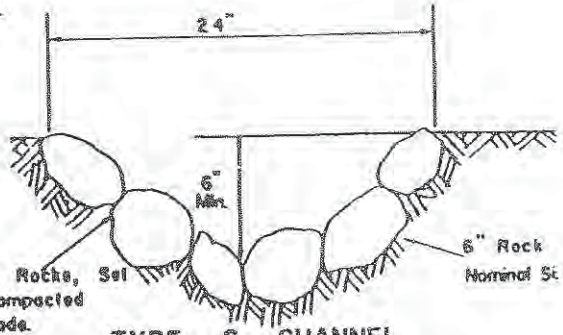


TYPE 5 CHANNEL

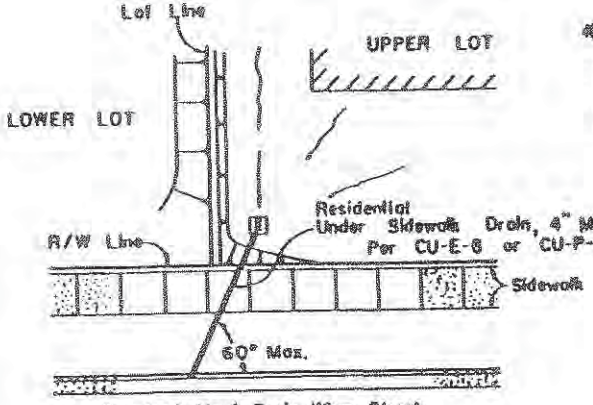
* A Dry Mixture Of Cement, Sand And Rock May Be Substituted. 3.5 Sacks Cement Per Cu. Yd. Min. Wet In Place.



TYPE 1 CHANNEL

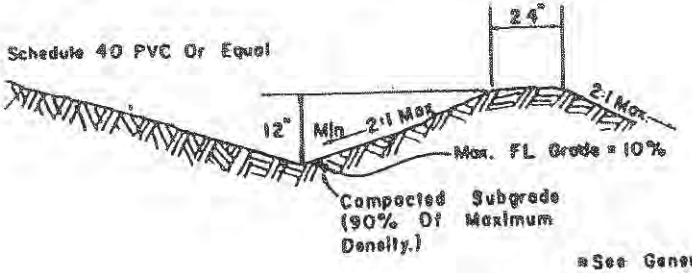


TYPE 6 CHANNEL



Required Yard Drain When Street Grade Exceeds 5%.

TYPE B DRAIN



TYPE 7 CHANNEL*

* See General Notes For Restrictions On Usage.

GENERAL NOTES

1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinances.
2. Type 7 Drain May Only Be Used As An Interim Solution Or As A Temporary Drain. Its Use Must Be Approved By The ADMINISTRATIVE COMMITTEE.
3. MINIMUM FLOWLINE GRADES:
   Type 1, 2, 3 .5%
   Type 4, 5, 6, & 7 1.0%
4. The Engineer Shall Perform Hydraulic Calculations To Verify Adequacy Of Channel Size. Freeboard Requirement Can Be Eliminated If City's Current Comprehensive Storm Drain Report (Moffat & Nichols, 1966) Shows Q_{100} < 1 C.F.S./Ac For Residential Areas Or 1.5 C.F.S./Ac. For Commercial & Industrial Areas.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	DRAINAGE CHANNEL AND MISC. LOT DRAINS
JJW	9-3-80	
REVISION BY	DATE	APPROVED BY
		DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-7

GARDEN WALLS

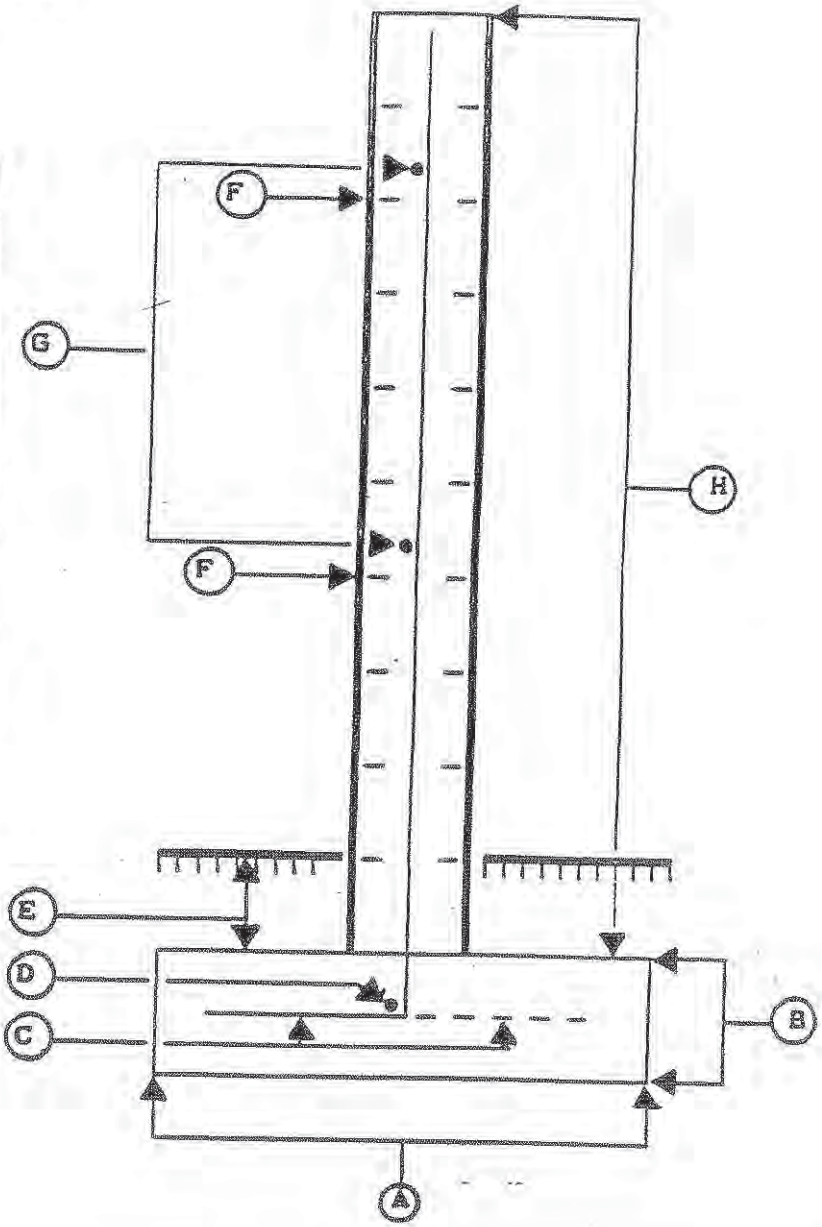
ED.101

(A) SEE CHART
(B) SEE CHART
(C) SEE CHART
(D) #4 HORIZONTAL REINFORCEMENT IN FOOTING
(E) 8" MINIMUM EARTH COVER
(F) WEB LOCATION FOR GROUTING BOND BEAMS
(G) MID-HEIGHT REINFORCEMENT REQUIRED IN ALL WALLS OVER 4 FEET IN HEIGHT. TOP REINFORCEMENT REQUIRED IN ALL WALLS.
(H) SEE CHART

H	A	B	C
2'	24"	8"	#4 @24"O.C.
3'	24"	8"	#4 @24"O.C.
4'	24"	8"	#4 @24"O.C.
5'	24"	8"	#4 @24"O.C.
6'	24"	8"	#4 @24"O.C.

WALLS SHALL BE AS DEFINED IN SEC. 2-2413 OF THE STATE MASONRY CODES AND SPECIFICATIONS.
CLEANOUTS SHALL BE AS PER STATE CODE REQUIREMENTS.
CONCRETE & GROUT-2000PSI@28DAYS

6" SLUMPSTONE WALLS MUST BE INSPECTED AND GROUTED IN 2' LIFTS. (LOW LIFT GROUTING)



CITY OF UPLAND - - STANDARD DRAWING

WALL DETAILS - - - - CU - E - 8 PAGE 1

CITY OF UPLAND - STANDARD DRAWING

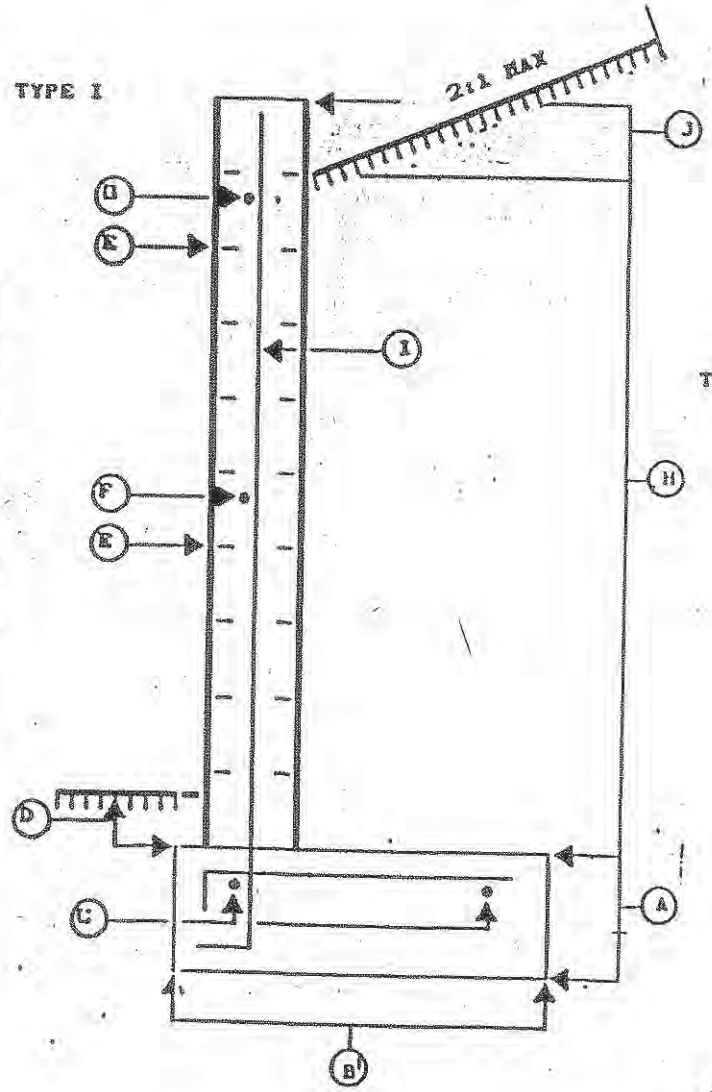
WALL DETAILS - - - - CU - E - 8

(A) SEE CHART
(B) SEE CHART
(C) #4 HORIZONTAL REINFORCEMENT
(D) 6" MINIMUM EARTH COVER
(E) WEB LOCATION
(F) 4'0" AND HIGHER WALLS REQUIRE MED-HEIGHT HORIZONTAL REINFORCEMENT
(G) UPPER HORIZONTAL REINFORCEMENT-1 #4
(H) SEE CHART
(I) SEE CHART
(J) 6" MINIMUM ABOVE EARTH RETENTION

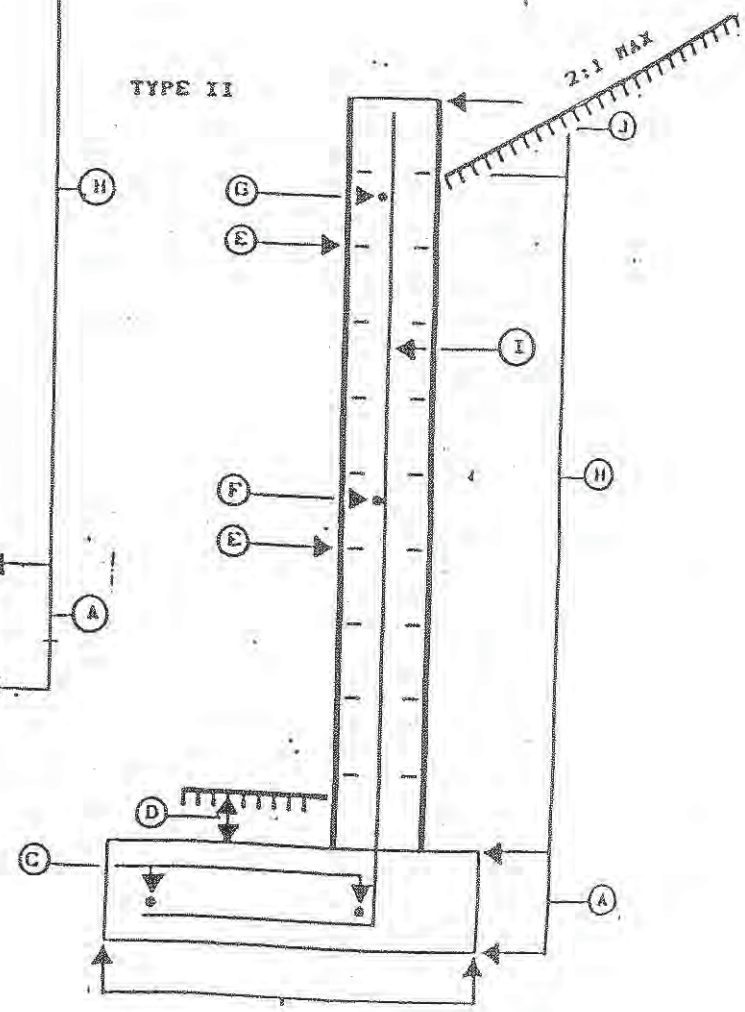
H	K	A	B	B'	I
2'	8"	12"	2'3"	2'9"	#3 @24"O.C.
3'	8"	12"	2'3"	2'9"	#3 @24"O.C.
4'	8"	12"	3'0"	3'6"	#4 @24"O.C.
5'	8"	12"	3'6"	4'0"	#5 @16"O.C.
6'	8"	12"	4'0"	4'9"	#5 @16"O.C.

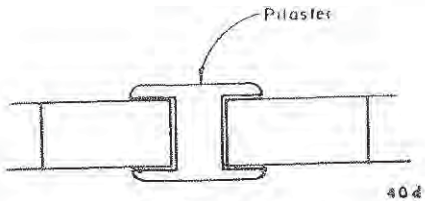
WALLS SHALL BE AS DEFINED IN SEC.2-2415 OF THE STATE MASONRY CODES AND SPECIFICATIONS.

TYPE I

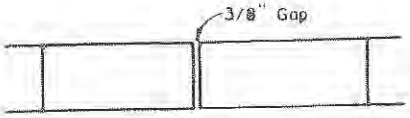


TYPE II





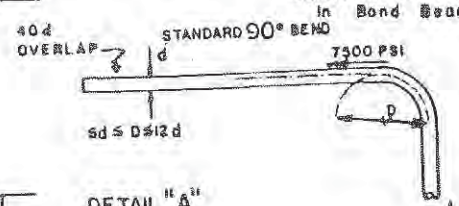
PLAN VIEW
TYPE I



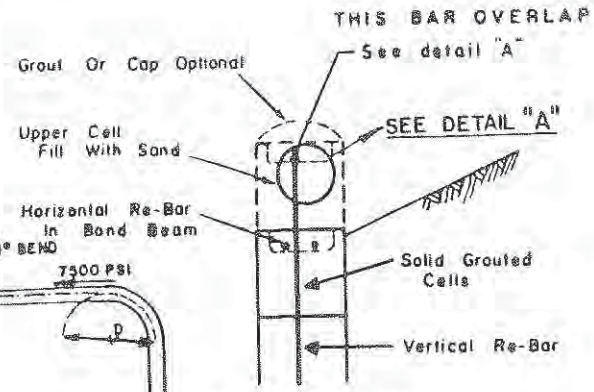
PLAN VIEW
TYPE II

GARDEN WALL EXPANSION JOINT DETAILS

See General Note 3.

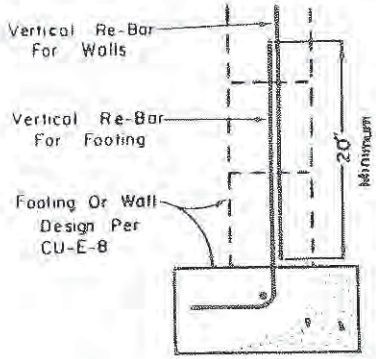


DETAIL "A"

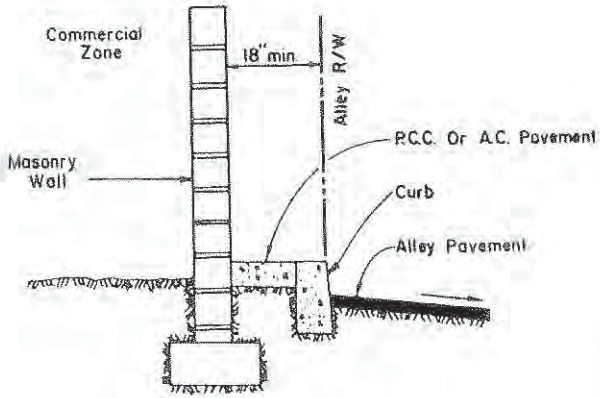


LOOP DETAIL FOR EXTENDABLE RETAINING WALLS

See General Note 4.



FOOTING TO WALL SPLICE RE-BAR DETAIL



WALL PROTECTION DETAIL

GENERAL NOTES

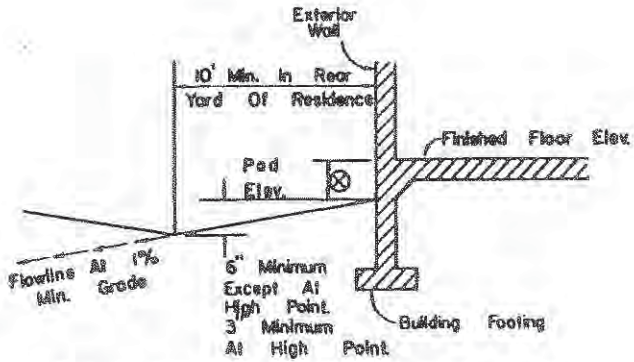
1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinance
2. Special Wall Conditions -
   See City Planning Department Exhibits "Wall Setbacks In R-1 Zones With And Without Alley" Location Requirements.

   Where Wall Is Built Less Than 18 Inches From A.C. Or P.C.C. Surfacing, The Intervening Area Shall Be Surfaced To Match Existing Surfacing.
3. Construct Expansion Joints Into All Garden Walls At A 100 Foot Maximum Spacing. The Use Of Type I Or Type II Is Optional With Builder Unless One Is Specified By The City Administrative Committee.
4. Retaining Walls As Shown Upon CU-E-8 May Have An Additional Garden Wall Built Upon Them Only If They Have Been Provided With Extension of Rebar. See Applicable Grading Limits Within The CU-E-Series For Height Limitations When Using Combination Retaining And Garden Walls.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	WALL DETAILS
REVISION BY	DATE	APPROVED BY 1-6-86
		CHIEF BUILDING OFFICIAL
		DRAWING NO. CU-E-9

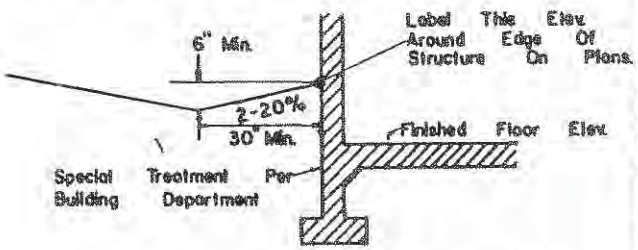
GENERAL NOTES

1. See Section 8110 Of The Municipal Code For General Requirements Of The City Grading Ordinances.
2. All Slope Banks Exceeding 3' In Height And Visible From Main Thoroughfares (2 Lanes Each Way) Are Subject To Architectural Commision Review.
3. The Mark "A" By Any Limit Shown Hereon Indicates An Absolute Limit. All Other Limits Must Be Followed Unless A Variance Has Been Approved By The Administrative Comm.



⊗ 6" Minimum. If An Extra Depth Footing Is Labeled Upon Plan, This Dimension Shall Be Increased By That Amount.

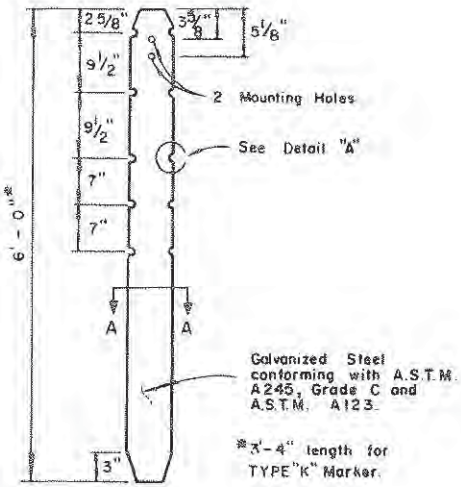
TYPICAL FLOWLINE GRADING LIMITS



EXTRA STEM HEIGHT WALL

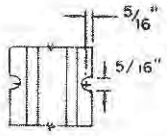
CITY OF UPLAND STANDARD DRAWING

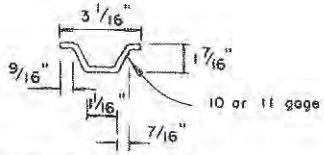
DRAWN BY	DATE	GRADING DETAILS FOR EXTENDED DEPTH FOOTINGS
JJW	9-3-85	
REVISION BY	DATE	APPROVED BY John L. Weiss
		DEPUTY CITY ENGINEER
		DRAWING NO. CU-E-10



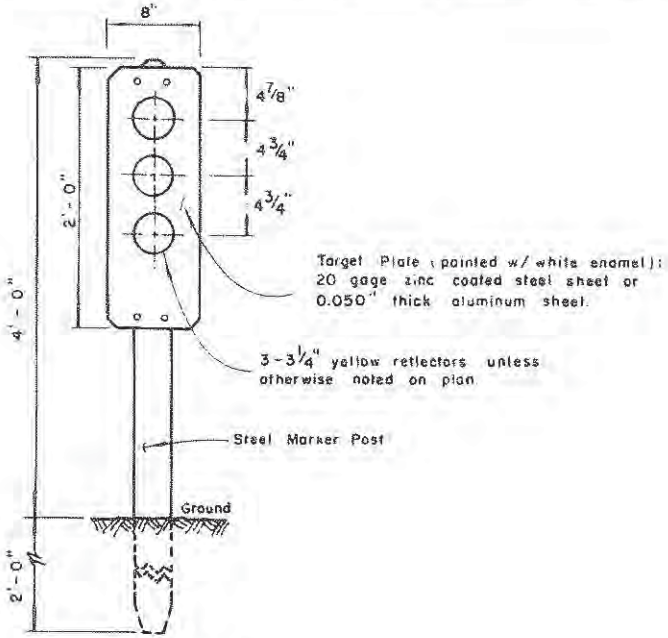
STEEL MARKER POST

DETAIL "A"

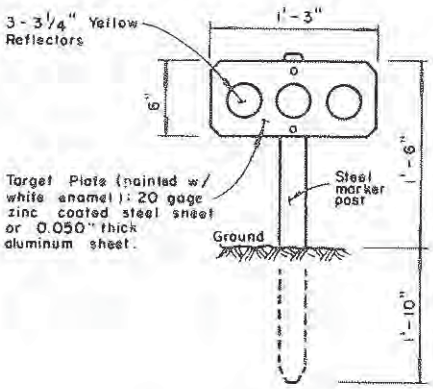




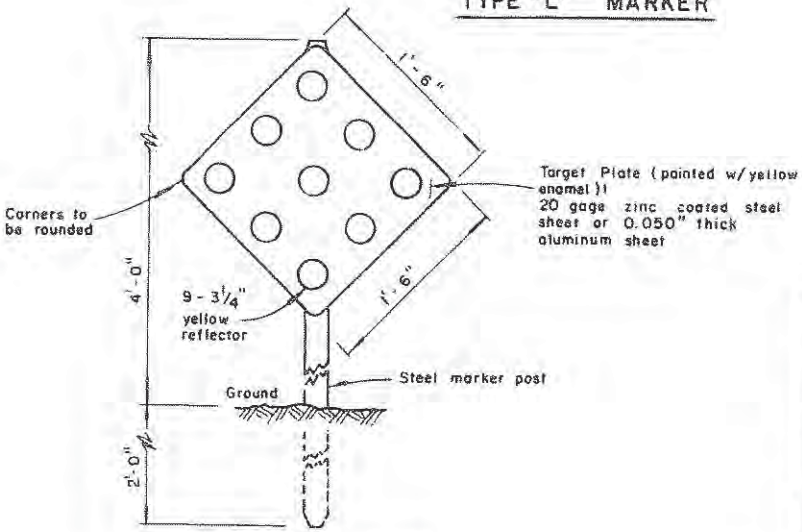
SECTION A-A



TYPE "L" MARKER



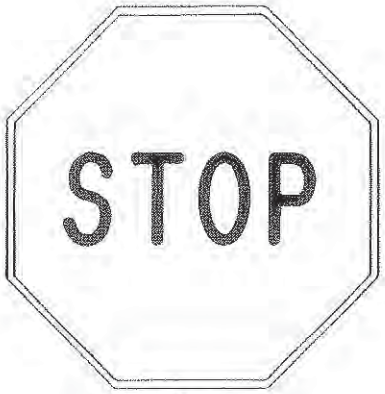
TYPE "K" MARKER



TYPE "M" MARKER

CITY OF UPLAND STANDARD DRAWING

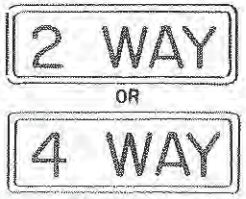
Drawn By	Date	STEEL GUIDE MARKERS
LWA	5-8-70	
Revisions By	**Date**	
B.G.	1-24-74	
		Approved By: Fred C. Blumberg, City Engineer
		DRAWING NO. CU-G-1



R-1

SPECIFICATIONS: (2) (3)

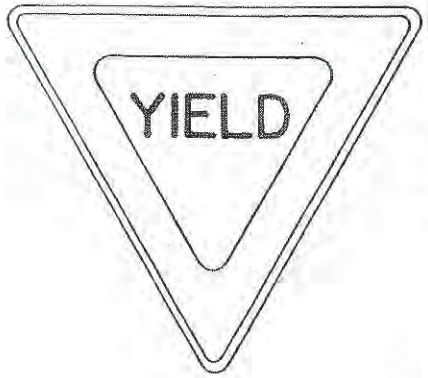
(a) 30" x 30" Octagonal Aluminum Sign (1)
(b) Reflectorized Porcelain Finish
(c) Location (8) (4) (See CU-G-3)
(d) Mounting Hardware (9)
(2 Straps)
(e) Stop Line And "STOP" Pavement Marking (11) (See CU-G-3)
(f) "STOP AHEAD" Pavement Markings (12) (See CU-G-3)



R-1 A

SPECIFICATIONS: (2) (3)

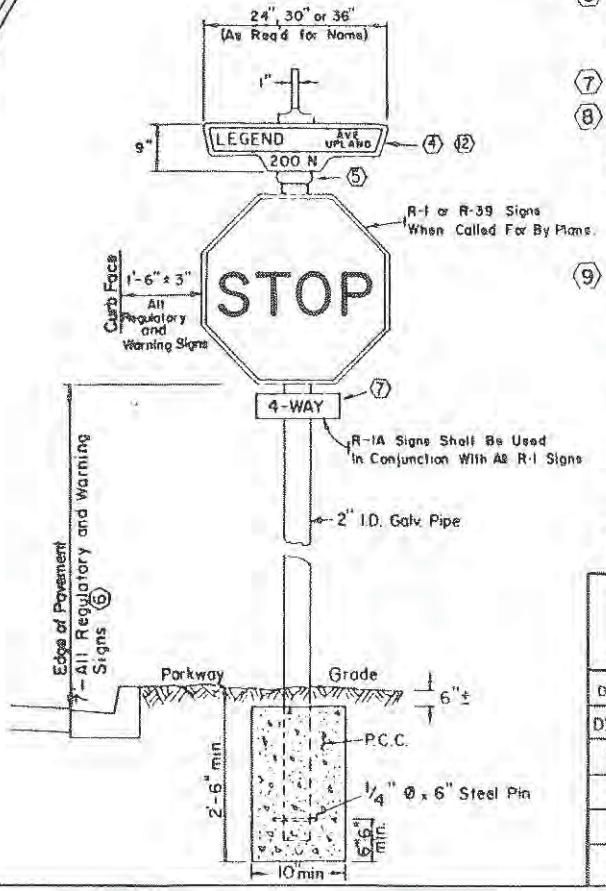
(a) 12" x 6" Rectangular Aluminum Sign (1)
(b) Reflectorized Porcelain Finish
(c) Mounting Hardware (9)
(2 Straps)



R-39

SPECIFICATIONS: (2) (3)

(a) 36" Tri Aluminum Sign (1)
(b) Reflectorized Porcelain Finish
(c) Location (8) (4) (See CU-G-3)
(d) Mounting Hardware (9)
(2 Straps)



NOTES:

(1) Unless otherwise noted on plans.
(2) "Manual on Uniform Traffic Control Devices".
(3) State of California "Traffic Manual".
(4) For Street Corner Location See Standard Drawing No. CU-G-4
(5) Cap to be located 1" above top of Regulatory Sign.
(6) If only the street name sign is to be mounted on the pole: The bottom of the sign should be placed 9' above the edge of the pavement.
(7) To be mounted 1" below Regulatory Sign.
(8) The Stop and Yield sign shall be erected at the point where the vehicle is to stop or as near thereto as possible.
See detail on Standard Drawing No CU-G-3
(9) Mounting Hardware:
(3/4" stainless steel strap
Western Highway Products Co.
No. H 13-032 or equivalent)
Strap-on Bracket
(Western Highway Products Co.
No. H 1-SL or equivalent)
Seal-tite Bolt
(Western Highway Products Co.
No. H 6 or equivalent)

Notes Continued On STANDARD DRAWING NO. CU-G-3

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	SIGN POST and SIGNS: STOP (R-1) 2 & 4 - WAY (R1-A) YIELD (R-39) STREET NAME
DVH & BG	5/13/75	
REVISION BY	DATE	
		APPROVED BY
		CITY ENGINEER
		DRAWING NO. CU-G-2

NOTES : (Continued From Drawing No. CU-G-2)

(10) STOP LINES And "STOP"* Pavement Markings Are Required To Be Used In Conjunction With All Stop Signs.
The STOP LINE Shall Be:
White In Color,
12" Wide, And Placed Across All Approach Lanes At The Same Location As The Stop Sign.
The "STOP" Pavement Marking Shall Be:
White In Color, And Shall Be Located 10'± Ahead Of The Stop Line.

(11) "STOP AHEAD"* Pavement Markings Shall Be Used As Required By The Improvement Plans. In No Case Shall The "STOP AHEAD" Be Placed Closer Than 200' Ahead Of The Stop Line. The "STOP AHEAD" Shall Be White In Color.

(12) STREET NAME SIGN SPECIFICATIONS
Western Highway Products, Inc.
No. P9 or Equivalent
Porcelain on Steel #4 Green Background With White Porcelain Beaded Legend, Border, Block Number, City Name and Suffix.
Legend = 4" High Letters
Block Number = 2" High Letters
Suffix = 2" High Letters
City Name = 1" High Letters

* Specifications For The Letters Used in Pavement Marking May be Obtained From The Engineering Deparment.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	SIGN POST and SIGNS: STOP (R-1) 2&4-WAY (R1-A) YIELD (R-39) STREET NAME
D.V.H	5/13/75	
REVISION BY	DATE	
		APPROVED BY Fred C. Shaffer CITY ENGINEER
		DRAWING NO. CU-G-3

SELECT SYSTEM STREETS

7 TH STREET (C)
8 TH STREET (A)
9 TH STREET (C)
ARROW HIGHWAY (C)
11 TH STREET: (West of Campus Ave) (C)
13 TH STREET (C)
14 TH STREET (C)
15 TH STREET (C)
16 TH STREET (A)
17 TH STREET (C)
18 TH STREET (C)
20 TH STREET (C)
21 ST STREET (C)
22ND STREET (C)
23RD STREET (C)
24 TH STREET (C)

2 ND AVENUE: (7th St to "A" St / "C" St to Foothill Blvd) (C)
SULTANA AVENUE: (South of 7th St) (C)
MOUNTAIN AVENUE (A)
SAN ANTONIO AVENUE (C)
EUCLID AVENUE: (19th St. to 24th St) (A)

CAMPUS AVENUE (C)
GROVE AVENUE (C)
SAN BERNARDINO ROAD (C)
CENTRAL AVENUE (A)
BENSON AVENUE (C)

(A) Arterial Streets
(C) Collector Streets

STATE HIGHWAYS

FOOTHILL BLVD. (Rt 66)

EUCLID AVENUE:
San Bernardino Freeway to 19th Street (Rt 83)

NINETEENTH ST (Rt. 30)

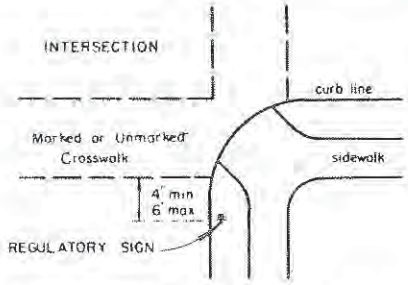
MOUNTAIN AVENUE:
16th Street to 19th Street (Rt. 30)

SIXTEENTH ST.:
County Line to Mountain Avenue (Rt 30)

SAN BERNARDINO FREEWAY (Interstate 10)

LOCAL STREETS

All other streets not listed as being "Select" or "State".



TYPICAL LOCATION FOR "STOP" & "YIELD" SIGNS
See Note (8) Standard Drawing No CU-G-2

STOP

STOP SIGNS REQUIRED. Stop signs are required for traffic control on all streets intersecting with any of the following traffic arteries (except where control is by a traffic signal system):

NAME OF ARTERY	LIMITS
7 TH STREET	ENTIRE LENGTH
8 TH STREET	" "
9 TH STREET	" "
11 TH STREET	" "
13 TH STREET	BENSON TO CAMPUS
14 TH STREET	MOUNTAIN TO CAMPUS
15 TH STREET	BENSON TO CAMPUS
16 TH STREET	ENTIRE LENGTH
17 TH STREET	MOUNTAIN TO CAMPUS
18 TH STREET	BENSON TO CAMPUS
19 TH STREET	ENTIRE LENGTH
20 TH STREET	MOUNTAIN TO EUCLID
21 ST STREET	" "
22ND STREET	" "
23RD STREET	" "
24TH STREET	ENTIRE LENGTH
ARROW HIGHWAY	" "
SAN BERNARDINO ROAD	" "
FOOTHILL BOULEVARD	" "
CENTRAL AVENUE	" "
BENSON AVENUE	" "
MOUNTAIN AVENUE	" "
SAN ANTONIO AVENUE	" "
CAMPUS AVENUE	" "
GROVE AVENUE	" "
EUCLID AVENUE	" "

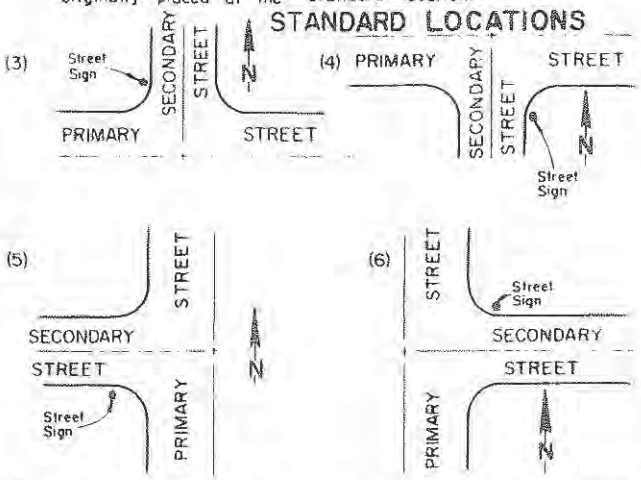
STREET

STREET NAME SIGNS REQUIRED

(1) At any corner that is the first or only corner developed.

(2) At any existing intersection with a PARTIAL STREET that is now being fully developed, the existing street name sign shall be relocated to the correct corner, if it was not originally placed at the "standard" location.

STANDARD LOCATIONS



Examples (3), (4), (5) & (6) are considered "Standard Locations" and the terms PRIMARY and SECONDARY are intended to denote which street is the more important: e.g.

PRIMARY		SECONDARY
Arterial	Vs.	Collector
Select	Vs.	Local
Thru Street	Vs.	Cul-de-sac

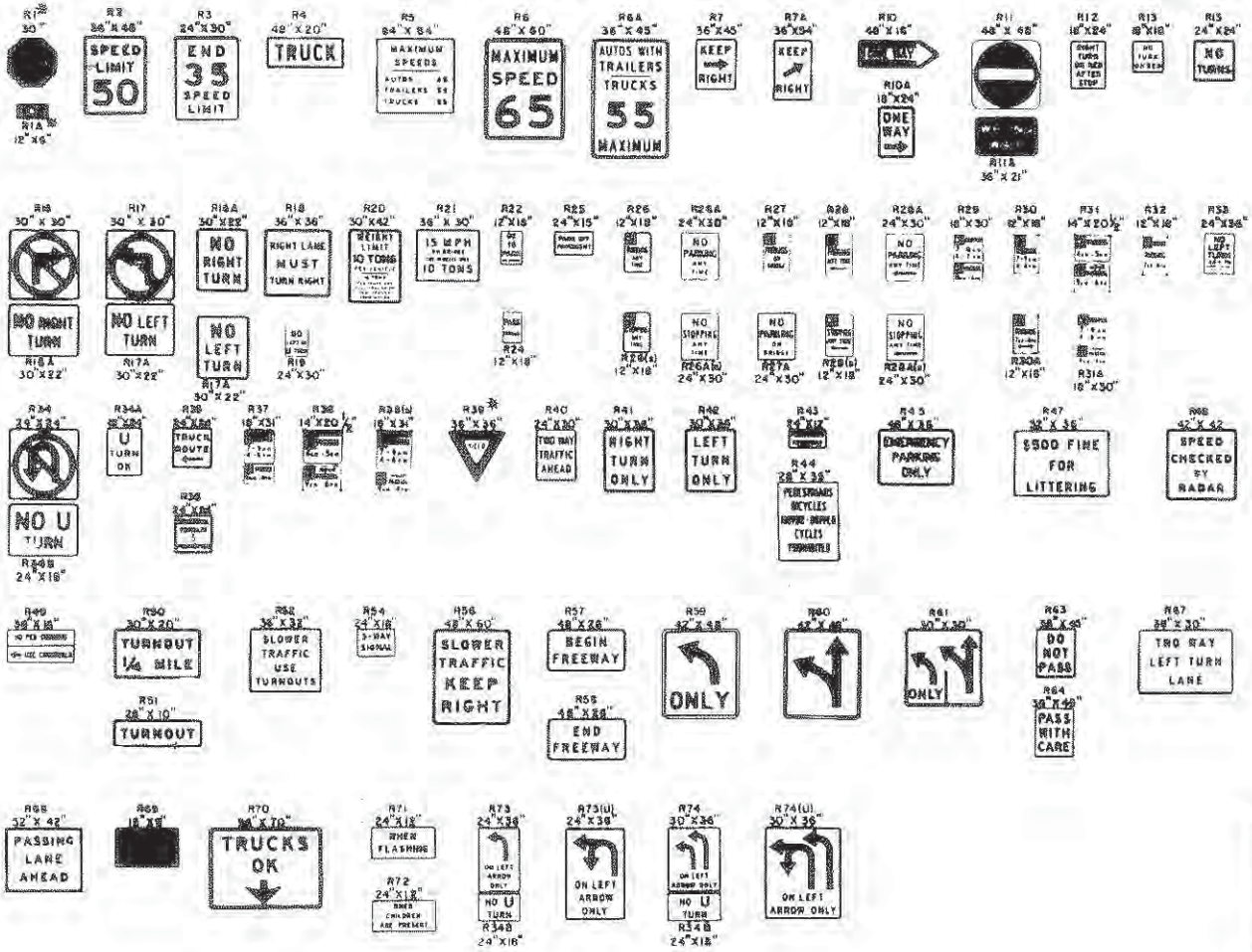
(7) On all 4-corners at the intersection of 2 Arterial Streets.

(8) At the intersection of 2 Local Streets, the street considered to be the thru street will be based on examination of neighborhood street patterns.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	LOCATION OF REGULATORY AND STREET NAME SIGNS
B.G.	5/21/75	
REVISION BY	DATE	
B.F.	4/1/76	APPROVED BY [signature] CITY ENGINEER
		DRAWING NO. CU-G-4

REGULATORY SIGNS



*SEE STANDARD DRAWING NO. CU-G-2

NOTES:

1. SPECIFICATIONS PER "MANUAL ON UNIFORM TRAFFIC CONTROL" AND STATE OF CALIFORNIA "TRAFFIC MANUAL".
   (a) SIZE SHOWN WITH EACH SIGN.
   (b) REFLECTORIZED-PORCELAIN.
2. LOCATION PER APPROVED IMPROVEMENT PLANS.
3. POST AND POST HOLE PER STANDARD DRAWING NO. CU-G-2.
4. MOUNTING HARDWARE (2 STRAPS) 3/4" STAINLESS STEEL STRAP WESTERN HIGHWAY PRODUCTS CO. NO. H13-032 OR EQUIVALENT.

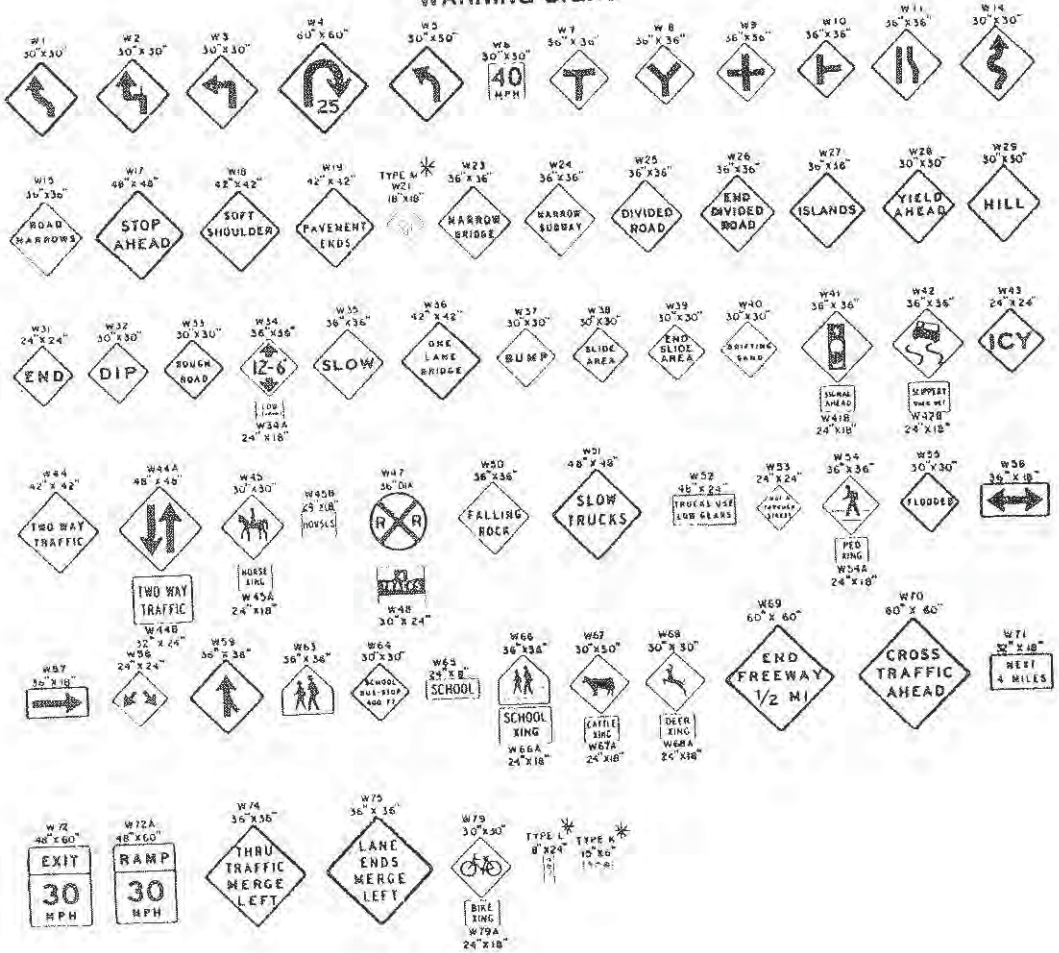
   STRAP-ON BRACKET WESTERN HIGHWAY PRODUCTS CO. NO. H1-SL OR EQUIVALENT.

   SEAL-TITE BOLT WESTERN HIGHWAY PRODUCTS CO. NO. H6 OR EQUIVALENT.

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	REGULATORY SIGNS SPECIFICATIONS
	5/21/75	
REVISION BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-G-5

WARNING SIGNS



* SEE STANDARD DRAWING NO. CU-G-1

NOTES:

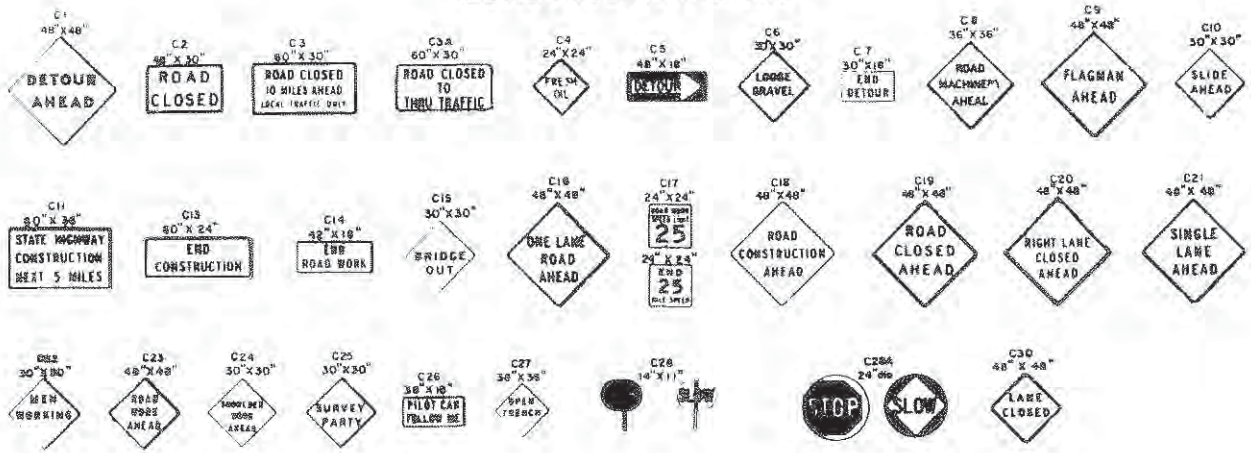
1. SPECIFICATIONS PER "MANUAL ON UNIFORM TRAFFIC CONTROL" AND STATE OF CALIFORNIA "TRAFFIC MANUAL".
2. LOCATIONS PER APPROVED IMPROVEMENT PLANS.
3. POST AND POST HOLE PER STANDARD DRAWING NO. CU-G-2.
4. MOUNTING HARDWARE (2 STRAPS) 3/4" STAINLESS STEEL STRAP WESTERN HIGHWAY PRODUCTS CO. NO. HI3-032 OR EQUIVALENT.

   STRAP-ON BRACKET WESTERN HIGHWAY PRODUCTS CO. NO. HI-SL OR EQUIVALENT.

   SEAL-TITE BOLT WESTERN HIGHWAY PRODUCTS CO. NO. H6 OR EQUIVALENT.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE 5/21/75	WARNING SIGNS SPECIFICATIONS
REVISION BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-G-6

CONSTRUCTION SIGNS



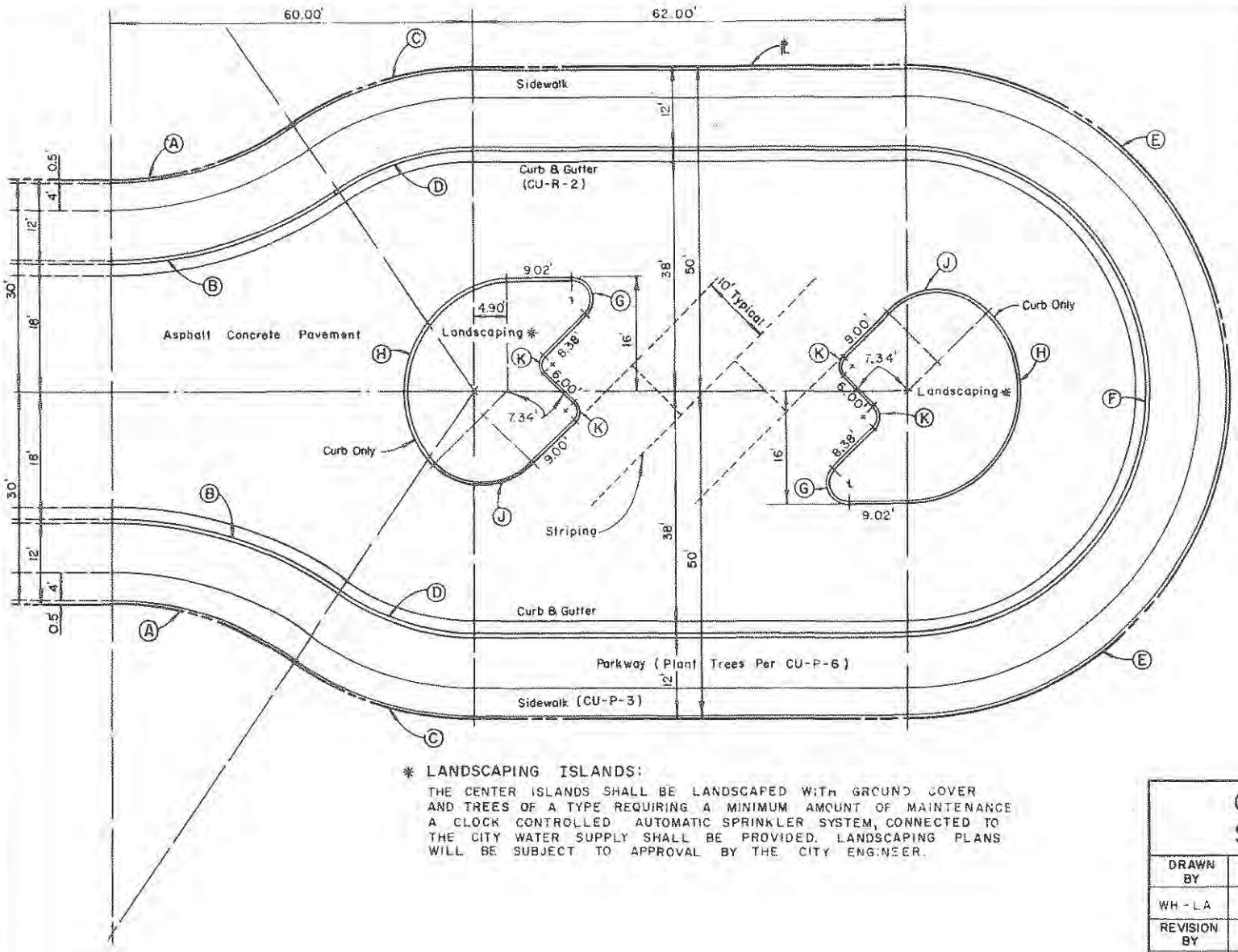
NOTES:

1. SPECIFICATIONS PER "MANUAL ON UNIFORM TRAFFIC CONTROL" AND STATE OF CALIFORNIA "TRAFFIC MANUAL".
   (a) SIZE SHOWN WITH EACH SIGN.
   (b) REFLECTORIZED-PORCELAIN.
2. LOCATION PER APPROVED IMPROVEMENT PLANS.
3. POST AND POST HOLE PER STANDARD DRAWING NO. CU-G-2.
4. MOUNTING HARDWARE (2 STRAPS)
   3/4" STAINLESS STEEL STRAP
   WESTERN HIGHWAY PRODUCTS CO.
   NO. HI3-032 OR EQUIVALENT.

   STRAP-ON BRACKET
   WESTERN HIGHWAY PRODUCTS CO.
   NO. HI-SL OR EQUIVALENT.

   SEAL-TITE BOLT
   WESTERN HIGHWAY PRODUCTS CO.
   NO. H6 OR EQUIVALENT.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE 5/21/75	CONSTRUCTION SIGNS SPECIFICATIONS
REVISION BY	DATE	
		APPROVED BY Fred C Blanchard CITY ENGINEER
		DRAWING NO. CU-G-7



CURVE DATA			
Curve	Radius	Delta	Length
A	50.00'	36°-52'-12"	32.18'
B	62.00'	36°-52'-12"	39.90'
C	50.00'	36°-52'-12"	32.18'
D	38.00'	36°-52'-12"	24.45'
E	50.00'	180°-00'-00"	157.08'
F	38.00'	180-00-00	119.38'
G	3.00'	135°-00'-00"	7.07'
H	16.00'	135°-00'-00"	37.70'
J	10.00'	90°-00'-00"	15.71'
K	2.00'	90°-00'-00"	3.14'

QUANTITIES	
Curb Only	198 L.F.
Curb & Gutter	372.08 L.F.
Sidewalk	1607.7 S.F.
Island Landscaping	1168 S.F.
Pavement	8352 S.F.

✱ LANDSCAPING ISLANDS:

THE CENTER ISLANDS SHALL BE LANDSCAPED WITH GROUND COVER AND TREES OF A TYPE REQUIRING A MINIMUM AMOUNT OF MAINTENANCE A CLOCK CONTROLLED AUTOMATIC SPRINKLER SYSTEM, CONNECTED TO THE CITY WATER SUPPLY SHALL BE PROVIDED. LANDSCAPING PLANS WILL BE SUBJECT TO APPROVAL BY THE CITY ENGINEER.

CITY OF UPLAND STANDARD DRAWING

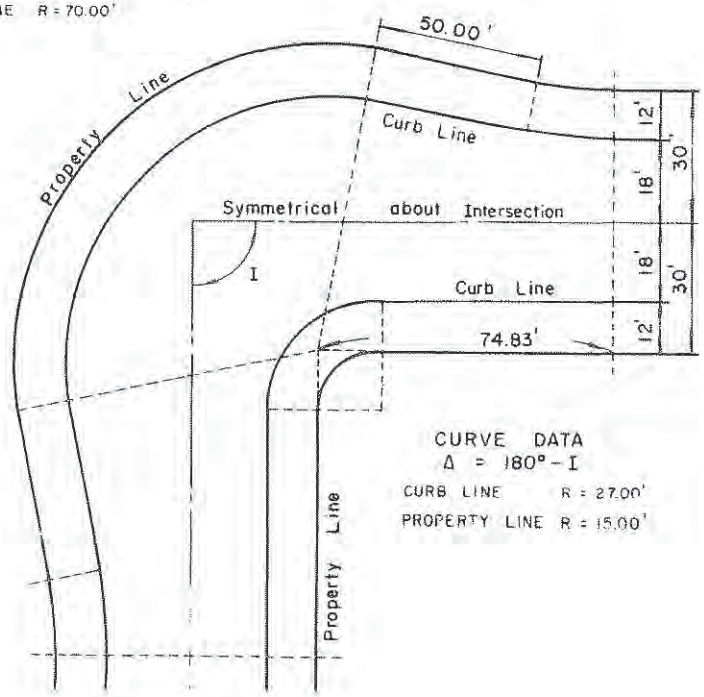
DRAWN BY	DATE	OPTIONAL PLAN for CUL - DE - SACS
WH - LA	9-5-68	
REVISION BY	DATE	
J.B.C.	4/16/75	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NUMBER CU-L-1

CURVE DATA
Δ = 198° 19' 12" – I

CURB LINE R = 58.00'
PROPERTY LINE R = 70.00'

CURVE DATA
Δ = 9° 09' 36"

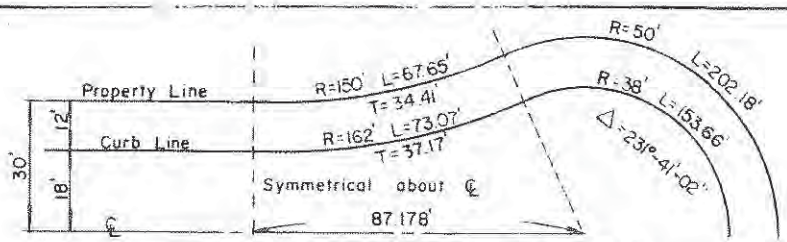
CURB LINE	PROPERTY LINE
R = 102.00'	R = 90.00'
T = 8.17'	T = 7.21'
L = 16.31'	L = 14.39'



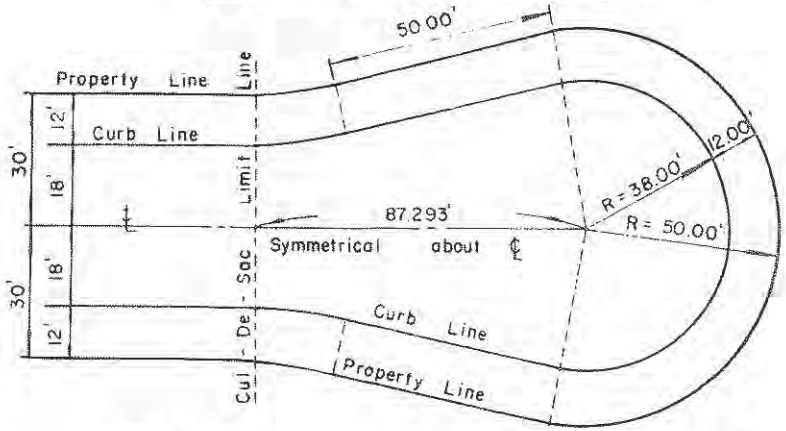
CURVE DATA
Δ = 180° – I

CURB LINE R = 27.00'
PROPERTY LINE R = 15.00'

STANDARD KNUCKLE
(Right Angle Turn)



ALTERNATE CUL - DE - SAC



CURVE DATA
Δ = 16°-34'-35"

CURB LINE	PROPERTY LINE
R = 100'	R = 88.00'
T = 14.57'	T = 12.82'
L = 28.93'	L = 25.46'

CURVE DATA
Δ = 213°-09'-10"

CURB LINE	PROPERTY LINE
R = 38.00'	R = 50.00'
L = 141.37'	L = 186.01'

STANDARD CUL - DE - SAC

Cul-de-Sac QUANTITIES

ITEM	STANDARD	ALTERNATE
Sidewalk (4' wide)	1,316.3 SF	1,318.5 SF
A.C. Pavement	6,498.1 S.F.	6,278.5 S.F.
Type 'A' Curb & Gutter. (8" cf, 18" gtr)	299.23 L.F.	299.80 L.F.

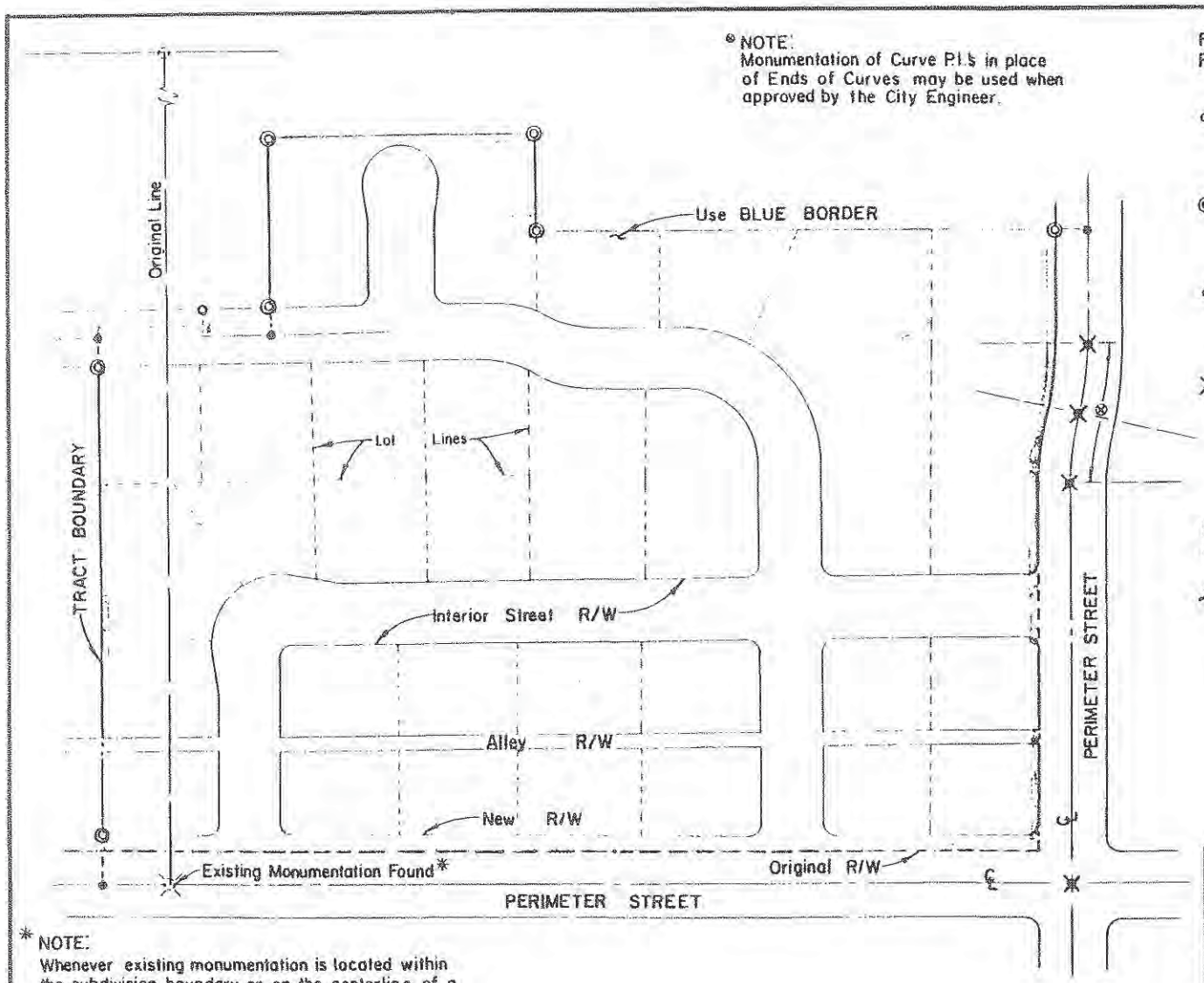
CITY OF UPLAND
STANDARD DRAWING

Drawn By	Date
LWA	5-1-70
Revisions By	Date
J.B.C.	4/17/75

STANDARD CUL-DE-SAC
STANDARD KNUCKLE

Approved By
Fred C. Blanchard
City Engineer

DRAWING NO. CU - L - 2



* NOTE:
Monumentation of Curve P.I.'s in place of Ends of Curves may be used when approved by the City Engineer.

* NOTE:
Whenever existing monumentation is located within the subdivision boundary or on the centerline of a perimeter street, ties shall be established and record per Standard Drawing No. CU-L-5, and said point shall be preserved or reset.

REQUIRED EXTERIOR BOUNDARY AND RELATED PERIMETER STREET MONUMENTATION

LEGEND

o ····· INDICATES SET 1" IRON PIPE WITH BRASS NAIL TAGGED WITH LS OR RCE TAG.

◎ ····· INDICATES SET 2" IRON PIPE WITH BRASS NAIL TAGGED WITH LS OR RCE TAG.

⊗ ····· INDICATES SET 6" BOAT SPIKE OR EQUIVALENT WITH CROSS OR PUNCH MARK.

✕ ····· INDICATES SET 6" BOAT SPIKE OR EQUIVALENT WITH CROSS OR PUNCH MARK. (TIES REQUIRED)

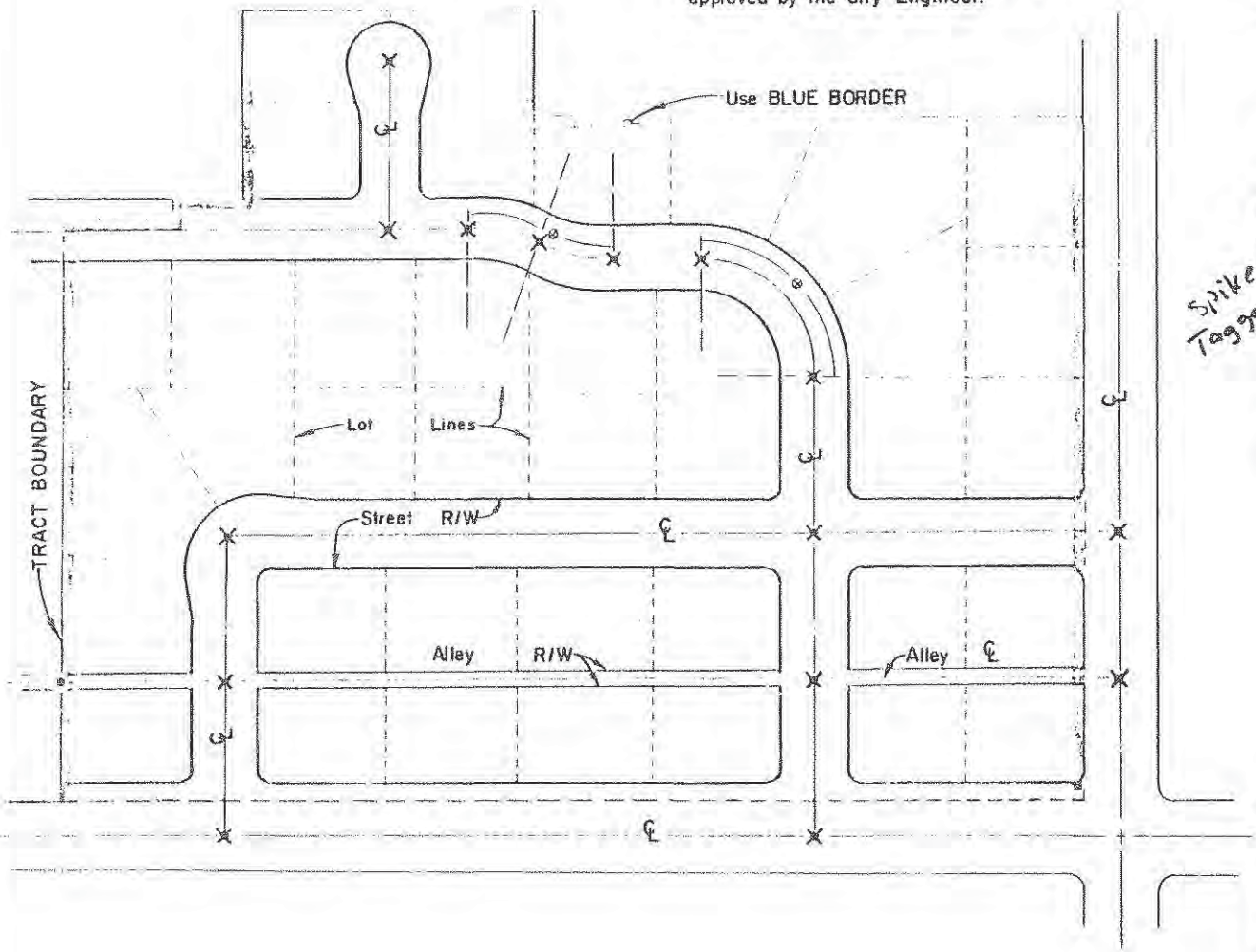
GENERAL NOTES

See Standard Drawing No. CU-L-4 for Required Monumentation For Interior Streets and Alleys.

~~See Standard Drawing No. CU-L-5 for Street Ties Requirements.~~

CITY OF UPLAND
STANDARD DRAWING

Drawn By	Date	EXTERIOR BOUNDARY & RELATED PERIMETER STREET MONUMENTATION
M a s.	7-28-72	
Revision By	Date	
		Approved By Fred P. Blocker CITY ENGINEER
		DRAWING NUMBER CU-L-3



⊗ NOTE:
Monumentation of Curve P.I.'s in place of Ends of Curves may be used when approved by the City Engineer.

REQUIRED MONUMENTATION FOR INTERIOR STREETS AND ALLEYS

LEGEND

o---- INDICATES SET 1" IRON PIPE WITH BRASS NAIL TAGGED WITH LS OR RCE TAG.

⊗---- INDICATES SET 6" BOAT SPIKE OR EQUIVALENT WITH CROSS OR PUNCH MARK.

X --- INDICATES SET 6" BOAT SPIKE OR EQUIVALENT WITH CROSS OR PUNCH MARK. (TIES REQUIRED)

Spike Tagged washed

GENERAL NOTES

See Standard Drawing CU-L-3 for Required Exterior Boundary and Related Perimeter Street Monumentation.
~~See Standard Drawing CU-L-5 for Street Ties Requirements.~~

CITY OF UPLAND
STANDARD DRAWING

Drawn By	Date	MONUMENTATION FOR INTERIOR STREETS AND ALLEYS
M.a.s	7-28-72	
Revision By	Date	
		Approved By Fred C. Blanchard CITY ENGINEER
		DRAWING NUMBER: CU-L-4

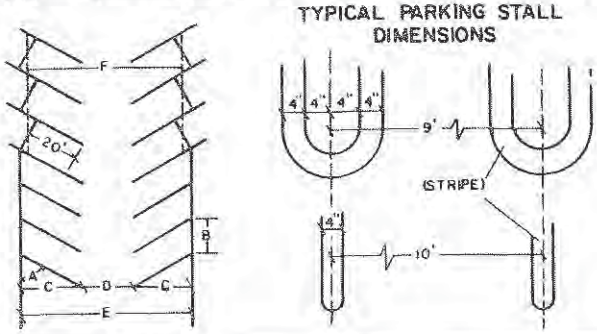
9' DOUBLE STRIPED SPACE

ANGLE	CURB LENGTH	STALL LENGTH	AISLE	BAY WIDTH	INTERLOCKING BAY WIDTH
30°	18'	17' 10"	12' 6"	48' 2"	39' 6"
40°	14'	19' 9"	13' 6"	53'	46' 1"
45°	12' 9"	20' 6"	14' 6"	55' 6"	49' 2"
50°	11' 9"	21' 1"	15' 6"	57' 8"	51' 11"
60°	10' 5"	21' 10"	19'	62' 8"	58' 2"
90°	9'	20'	26'	66'	66'
A	B	C	D	E	F

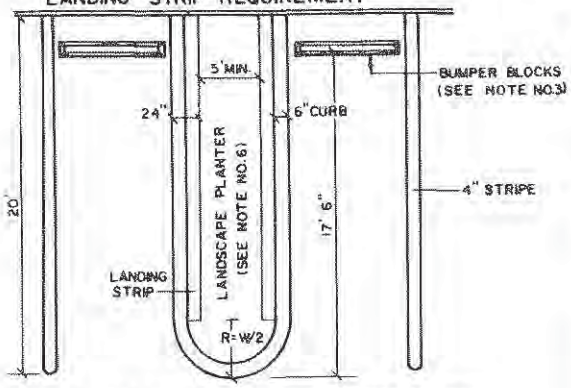
10' STANDARD SINGLE STRIPED SPACE

ANGLE	CURB LENGTH	STALL LENGTH	AISLE	BAY WIDTH	INTERLOCKING BAY WIDTH
30°	20'	18' 9"	12'	49' 4"	40' 8"
40°	15' 8"	20' 6"	12' 6"	53' 6"	45' 11"
45°	14' 2"	21' 3"	14'	56' 6"	49' 5"
50°	13' 2"	21' 9"	15'	58' 6"	51' 1"
60°	11' 6"	22' 4"	18'	62' 8"	57' 8"
90°	10'	20'	26'	66'	66'
A	B	C	D	E	F

TYPICAL PARKING STALL DIMENSIONS

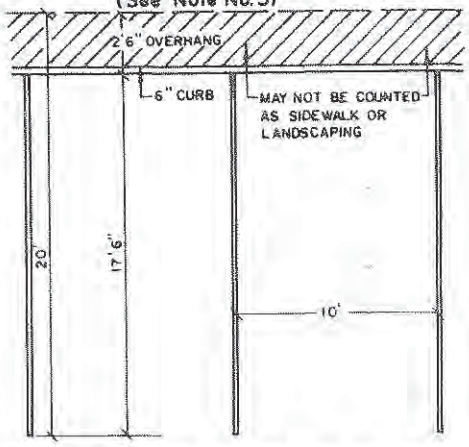


LANDING STRIP REQUIREMENT



WHEREVER A PARKING STALL ABUTS A LANDSCAPED PLANTER AREA, EITHER IN THE PARKING LOT OR ADJACENT TO A BUILDING, A 24" LANDING STRIP MUST BE PROVIDED.

DEVELOPER OPTION BUMPER BLOCK (See Note No. 3)



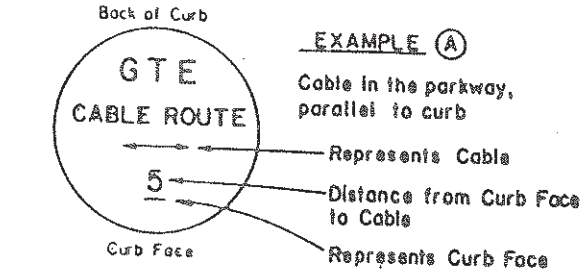
THIS OPTION MAY BE APPLIED TO EITHER THE TEN FOOT STALL OR THE 9' DOUBLE STRIPED PARKING STALLS.

GENERAL NOTES:

1. FIRE DEPARTMENT REQUIREMENTS:
   ANY PARKING AISLE THAT IS DESIGNATED BY THE FIRE DEPARTMENT AS A FIRE LANE IS A MINIMUM OF TWENTY-FOUR (24') FEET IN WIDTH. FIRE EQUIPMENT TURNING RADIUS SHALL BE DESIGNED TO THE SATISFACTION OF THE FIRE DEPARTMENT WITH A MINIMUM INSIDE TURNING RADIUS OF 20' AND A MINIMUM OUTSIDE TURNING RADIUS OF 45'
2. COMPACT CAR SPACES ARE NOT COUNTED AS BEING PART OF THE PARKING SPACES THAT ARE REQUIRED ON-SITE. FOR COMPACT CAR SPACES REFER TO DRAWING NO. CU-L-6 FOR DIMENSIONS.
3. BUMPER BLOCKS ARE REQUIRED TO BE PROVIDED ON ALL PARKING STALLS FRONTING A PROPERTY LINE, BUILDING, GARDEN WALL OR FENCE. IN LIEU OF PROVIDING BUMPER BLOCKS, THE DEVELOPER MAY UTILIZE THE "DEVELOPER OPTION BUMPER BLOCK" DETAIL ILLUSTRATED HEREIN ABOVE.
4. DIMENSIONS OF SPECIAL TYPES OF PARKING STALL:
   - PARALLEL PARKING STALL: 10' X 23'
   - LOADING SPACE: 10' X 20' WITH 14' VERTICAL CLEARANCE
   - HANDICAPPED STALL: 14' X 20'
   - STALLS ADJACENT TO WALL OR RAISED PLANTER OVER 18" IN HEIGHT: 12' X 20'
5. VEHICLES SHALL NOT EXTEND OVER THE PUBLIC SIDEWALK OR PROPERTY LINES, NOR SHALL PARKING STALLS BE LOCATED WHERE IT WOULD BE NECESSARY FOR THE DRIVER TO BACK UP ACROSS A PUBLIC SIDEWALK.
6. LANDSCAPING: LANDSCAPING SHALL BE PROVIDED AS REQUIRED BY THE UMC (5% MINIMUM OF THE PAVED PARKING AREA), & SHALL COMPLY WITH THE FOLLOWING CRITERIA:
   - MINIMUM INSIDE PLANTER WIDTH SHALL BE 5' & MINIMUM PLANTER AREA SHALL BE 40 SQ FT IN ORDER TO MEET THE 5% LANDSCAPING REQUIREMENTS.
   - THE LANDSCAPED AREA OVERHUNG BY A PARKED VEHICLE SHALL NOT BE INCLUDED IN MEETING THE 5% LANDSCAPING REQUIREMENT.

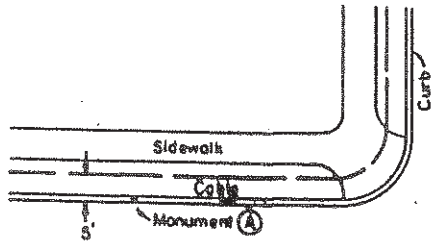
CITY OF UPLAND STANDARD DRAWING

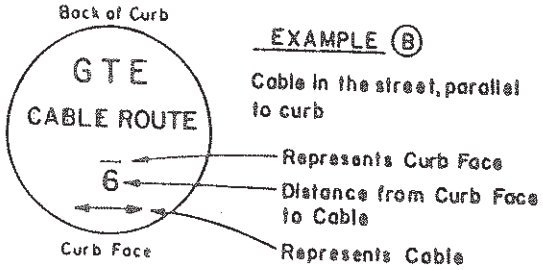
DRAWN BY	DATE	PARKING LOT DESIGN STANDARD
P. O.	9-27-82	
REVISION BY	DATE	
		APPROVED BY
		DEPUTY CITY ENGINEER
		DRAWING NO. CU-L-5



EXAMPLE (A)

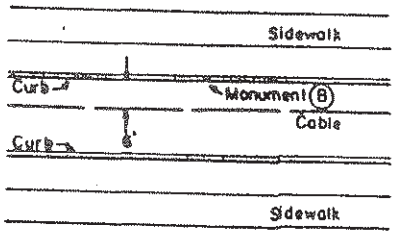
Cable in the parkway, parallel to curb

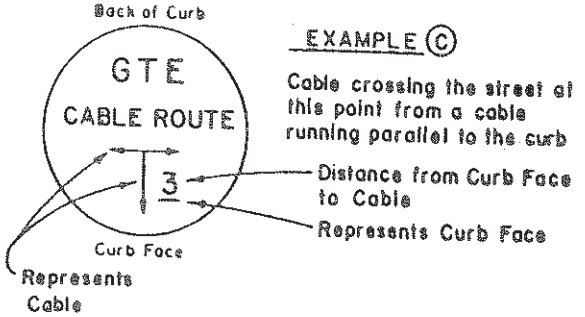




EXAMPLE (B)

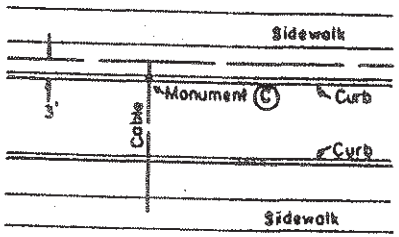
Cable in the street, parallel to curb

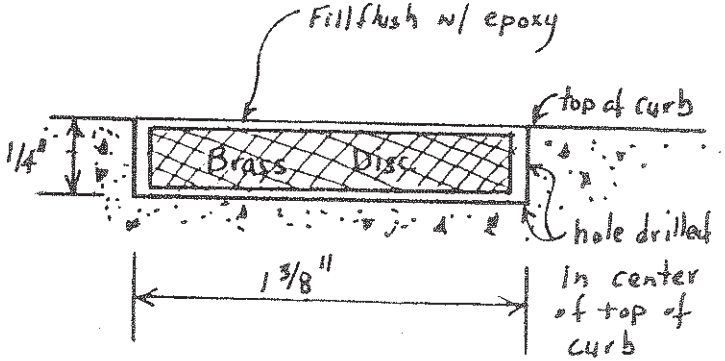




EXAMPLE (C)

Cable crossing the street at this point from a cable running parallel to the curb

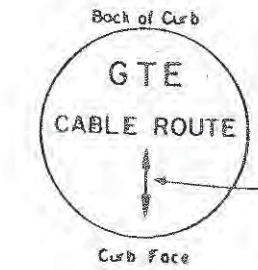




Installation Detail

(no scale)

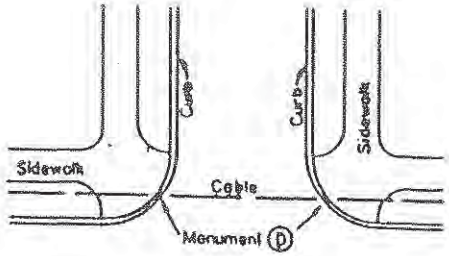
CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	Utility Line Markers
JJW	9/85	
REVISION BY	DATE	
		APPROVED BY
		DEP. CITY ENGINEER
		DRAWING NO. CU-L-6

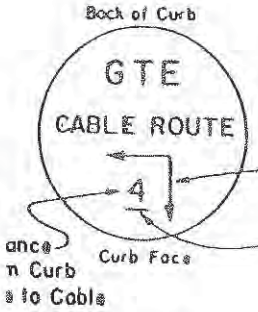


EXAMPLE (D)

A point on each side of street where cable crosses

Represents Cable



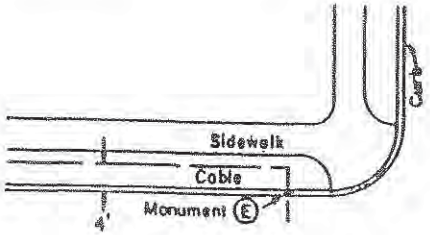


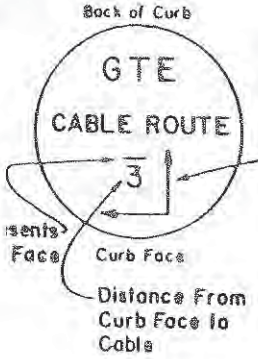
EXAMPLE (E)

Cable making a 90° turn and crossing the street

Represents Cable

Represents Curb Face

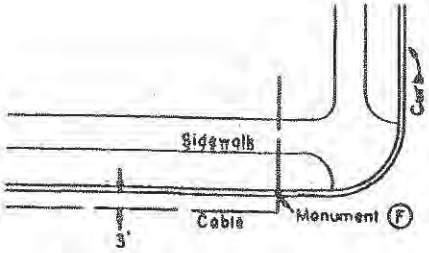




EXAMPLE (F)

End of cable in the park-way, or street

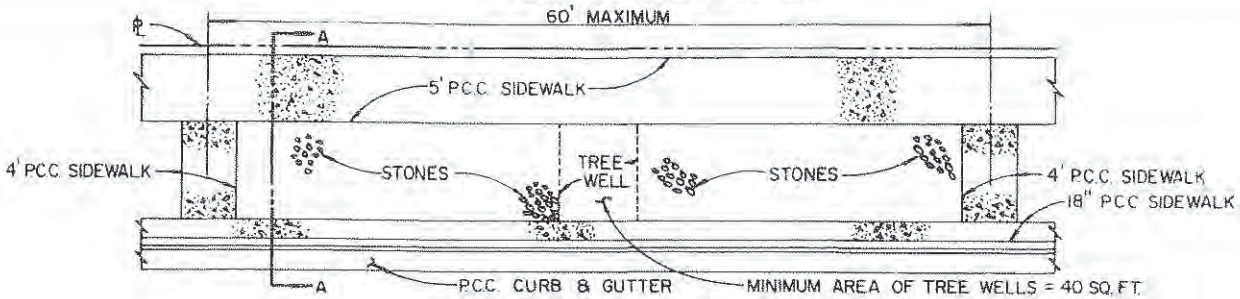
Represents Cable



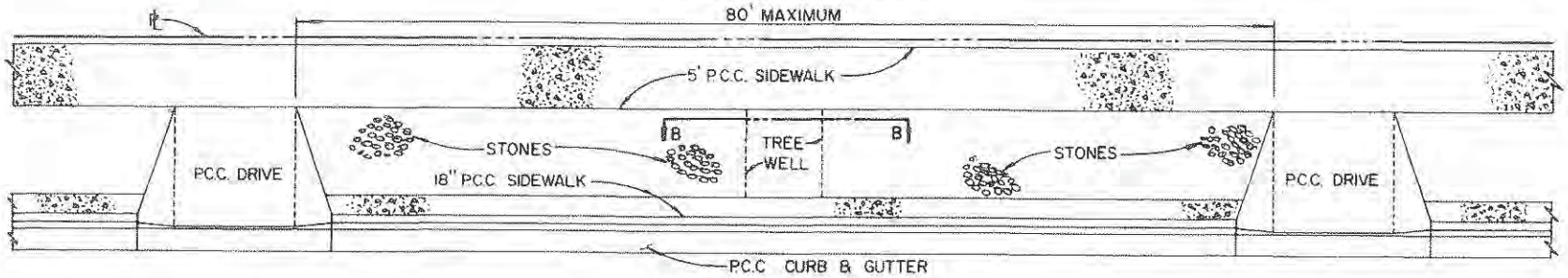
CITY OF UPLAND
STANDARD DRAWING

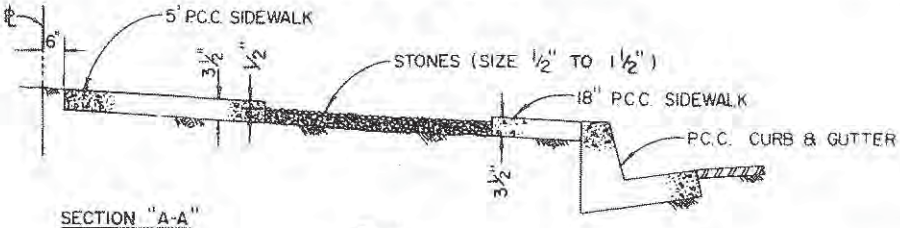
DRAWN BY	DATE	Utility Line Markers
JJW	9/85	
REVISION BY	DATE	
		APPROVED BY
		DEP. CITY ENGINEER
		DRAWING NO. CU-L-7

SPACING FOR 4' WALKS TO CURB



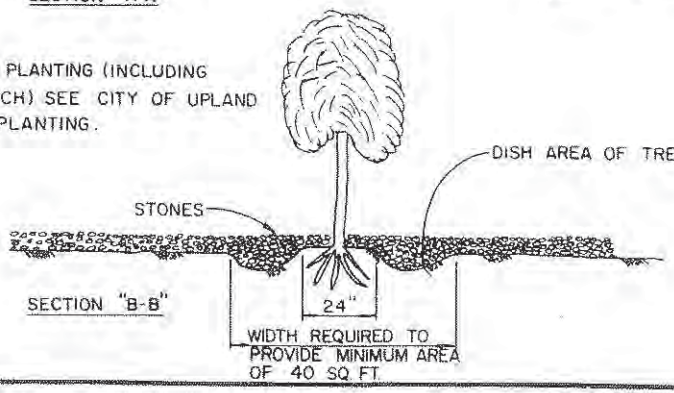
NO WALKS TO CURB REQUIRED





SECTION "A-A"

NOTE: FOR DETAILS ON TREE PLANTING (INCLUDING STAKES, TIES AND MULCH) SEE CITY OF UPLAND STANDARD FOR TREE PLANTING.



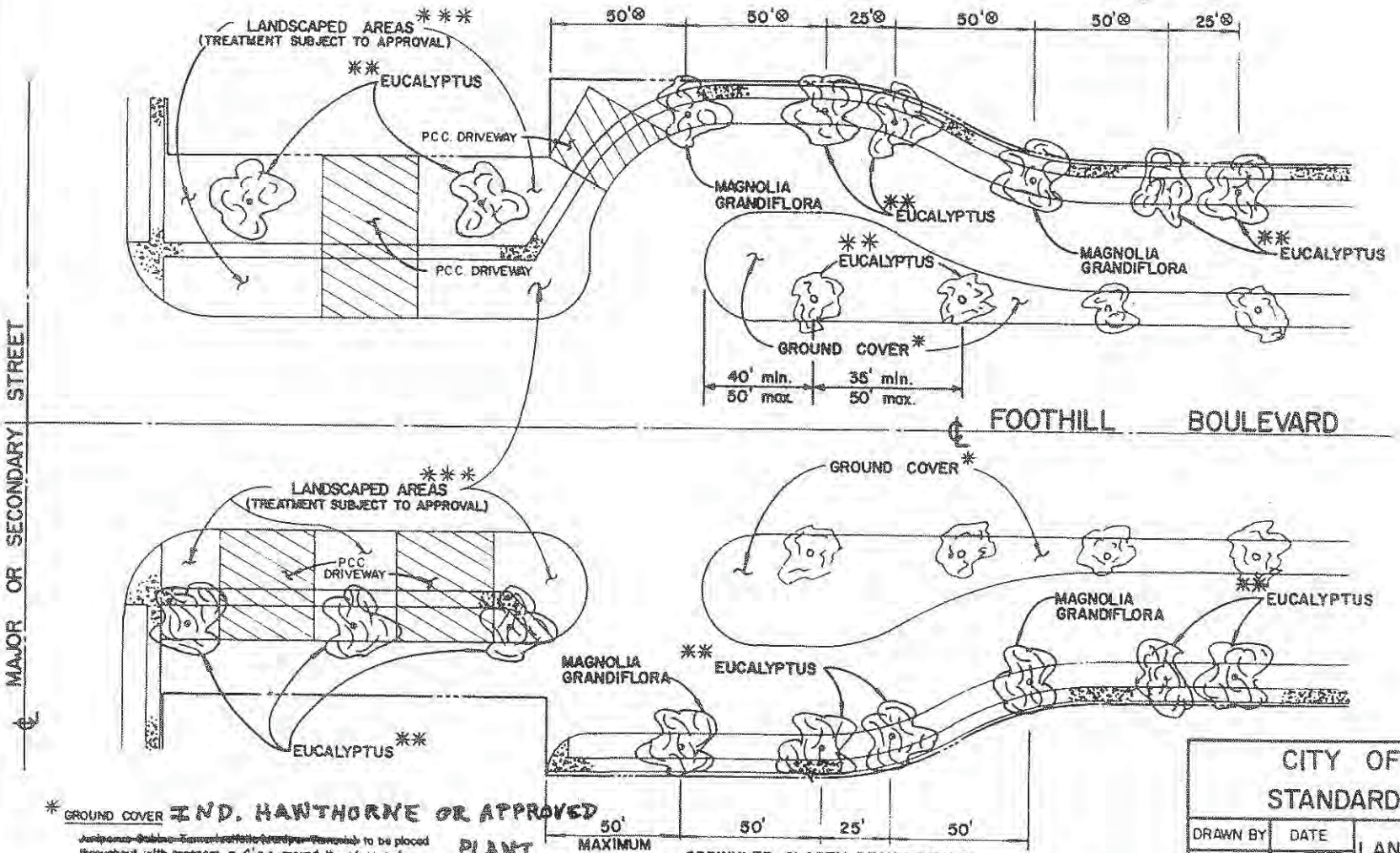
SECTION "B-B"

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	STANDARD DETAIL FOR USE OF CRUSHED ROCK IN COMMERCIAL PARKWAYS
J.C.H.	11-10-64	
REVISION BY	DATE	
H.G.	5-11-66	APPROVED BY: Fred C. Blanchard CITY ENGINEER
L.G.K.	12-15-66	
		DRAWING NUMBER: CU-P-1

⊗ LOCATION OF TREES

Tree spacing as indicated hereon is the desirable spacing; adjustments may be necessary to coordinate with drives, street lights, etc. Trees located in the island between Foothill Blvd. and the Service Road should have varied spacing, and said spacing should be coordinated with the location of trees in the parkway area along sections requiring parkway trees.



* GROUND COVER IND. HAWTHORNE OR APPROVED PLANT

~~Juniperus Sabina Tamariscifolia (Juniper Tamarix)~~ to be placed throughout with creepers a 4' c.c. around the edges and hi-growers a 4' c.c. in center areas. Sprinkler systems are required for all landscaped areas: islands, parkways, etc.

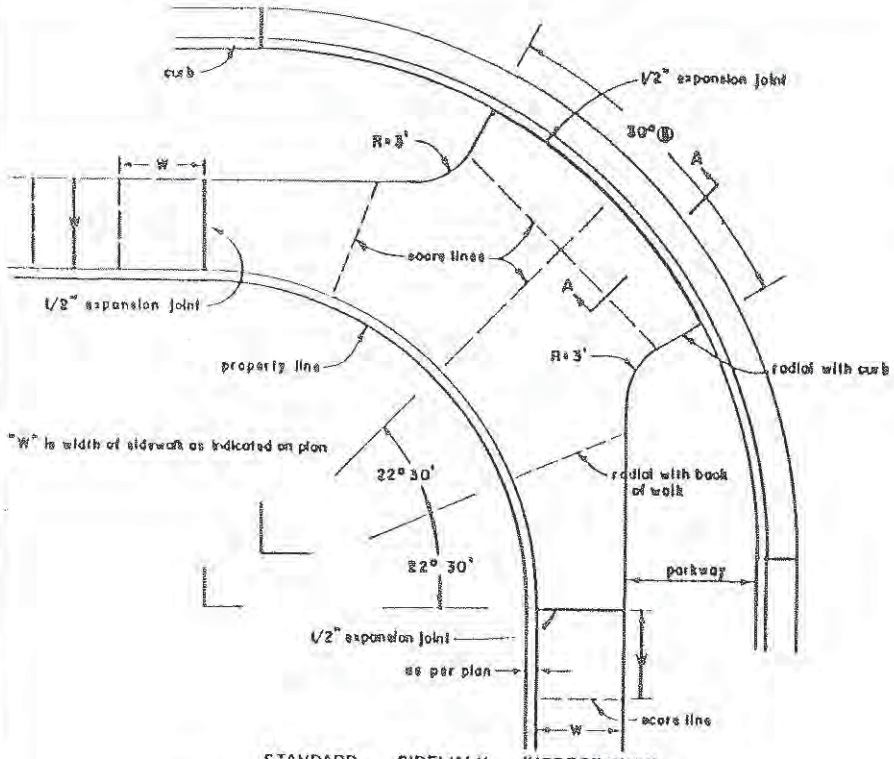
** EUCALYPTUS SIDEROXYLON ROSEA (min. height 18')

*** Corner Landscaped Areas shall include Junipers and Eucalyptus predominantly but may also include other planting for accent purposes

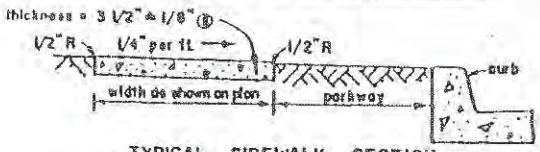
SPRINKLER SYSTEM REQUIREMENTS

Landscaped areas must be equipped with a sprinkler system designed to provide adequate irrigation to all plants and trees. See City of Upland Standard Drawing WG-10. Sprinkler system to be clock controlled, and connected to City water system.

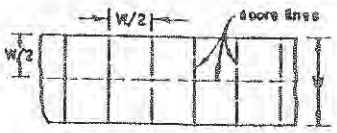
CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	LANDSCAPE PLAN FOR FOOTHILL BOULEVARD
J.C.H.	3-8-65	
REVISION BY	DATE	
W.A.H.	11-18-65	APPROVED BY
J.G.K.	6-2-67	CITY ENGINEER
L.W.O.	5-15-70	DRAWING NUMBER: CU-P-2



STANDARD SIDEWALK INTERSECTION

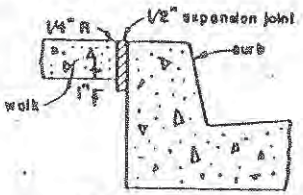


TYPICAL SIDEWALK SECTION

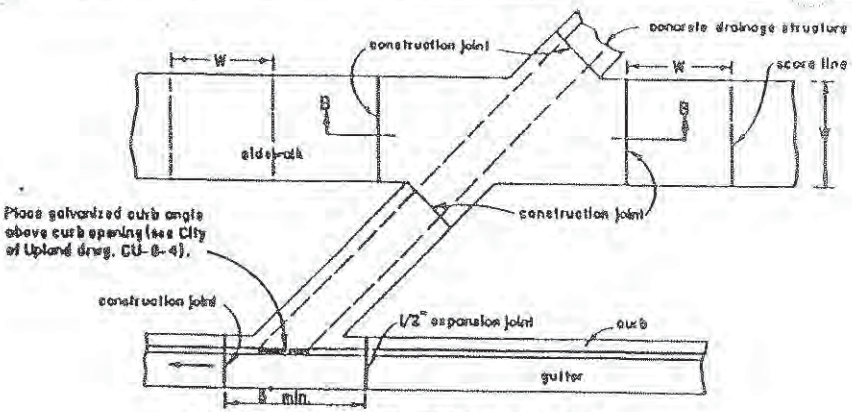


TYPICAL SCORING

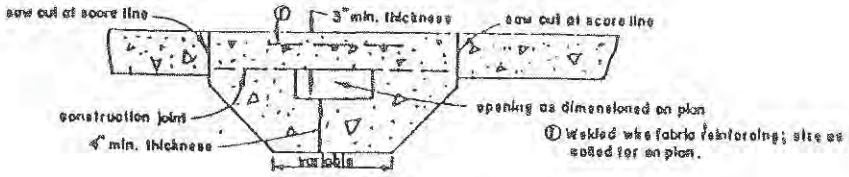
walks wider than 5'



SECTION "A-A"



TYPICAL DETAIL OF DRAIN THRU WALK

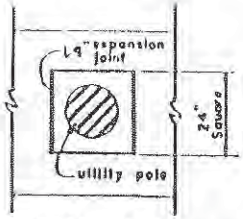


Ⓓ Welded wire fabric reinforcing; size as called for on plan.

SECTION "B-B"

GENERAL NOTES

1. Where a sidewalk is to be placed abutting a concrete curb or masonry wall the joint between the walk and curb or wall shall be a cold joint, except at walk returns where an expansion joint will be used as shown hereon.

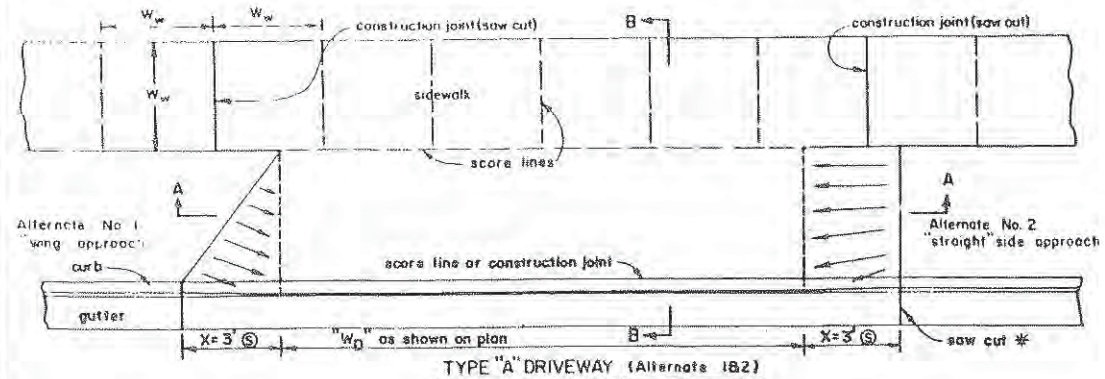


DETAIL FOR UTILITY POLES PLACED IN CONCRETE WALKS

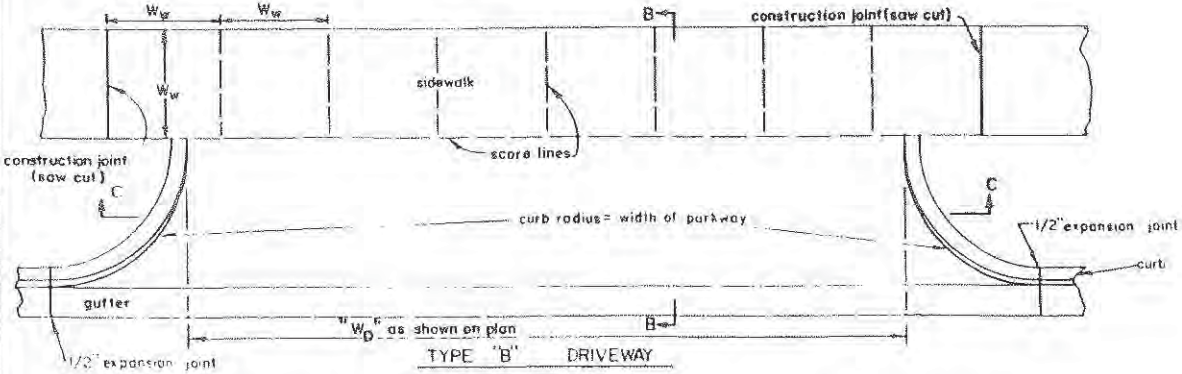
Ⓑ STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

CITY OF UPLAND STANDARD DRAWING

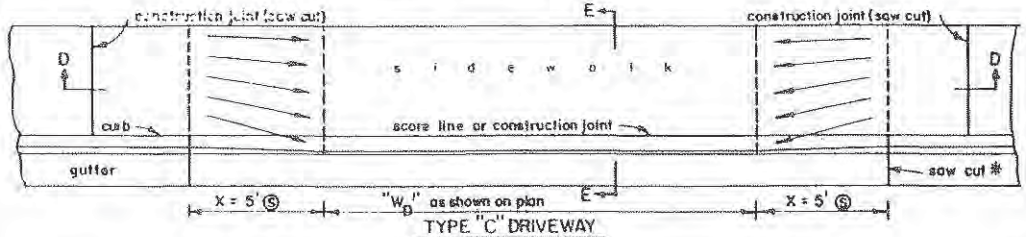
DRAWN BY	DATE	SIDEWALK DETAILS
w e h	7/15/68	
REVISION BY	DATE	
L.O.N.	12-16-86	APPROVED BY
		CITY ENGINEER
		DRAWING NO. CU-P-3



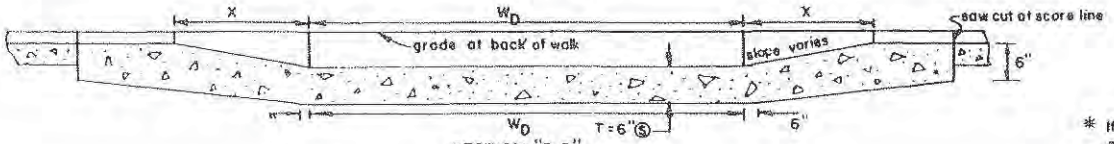
TYPE "A" DRIVEWAY (Alternate 1 & 2)



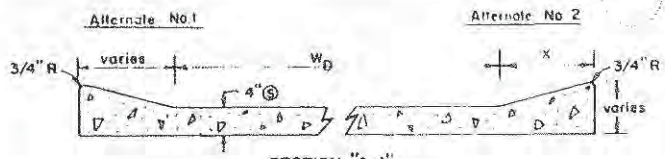
TYPE "B" DRIVEWAY



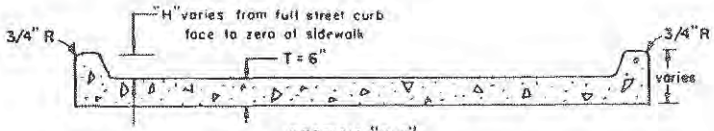
TYPE "C" DRIVEWAY



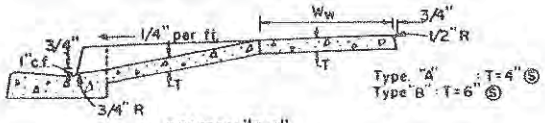
SECTION "D-D"



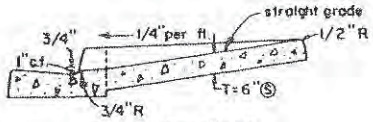
SECTION "A-A"



SECTION "C-C"



SECTION "B-B"



SECTION "E-E"

GENERAL NOTES

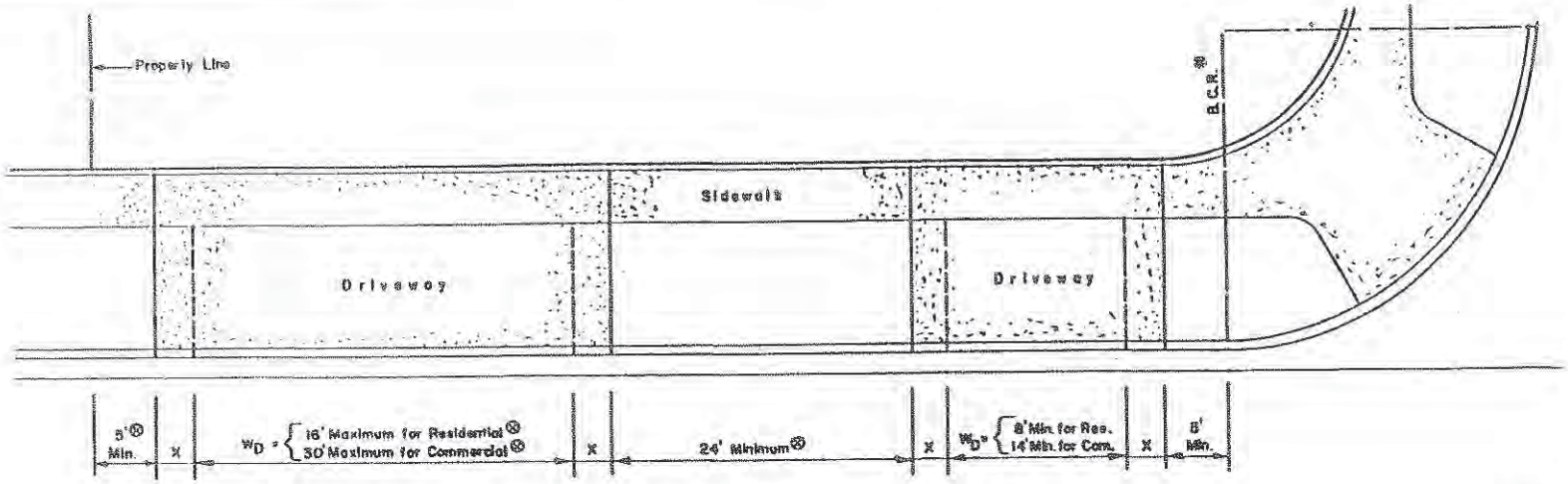
1. Type "A" (alternate 1 & 2) are residential driveways only
   Type "B" & "C" are commercial driveways

Ⓢ STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

* If new curb cut falls within 5 ft. of expansion joint, remove curb to joint.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	DRIVEWAYS
w a h	7/20/65	
REVISIONS BY	DATE	APPROVED BY
BQ	8-25-75	Fred C. Blanchard, CITY ENGINEER
		DRAWING NO. CU-P-4



STANDARD DRIVEWAY SPACING

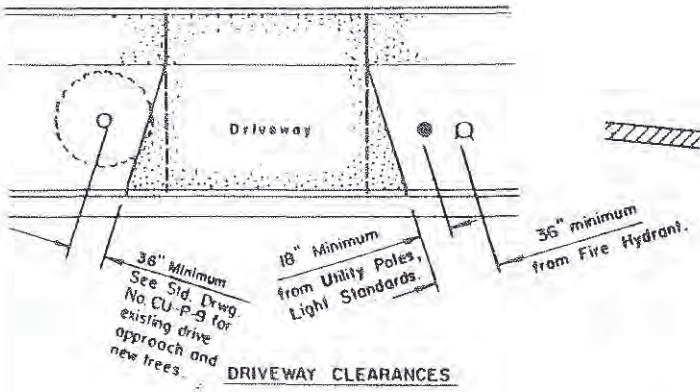
GENERAL NOTES

The maximum total width of driveways, including the "X" dimensions, to be allowed for a residential lot shall be 40% of the lot frontage.

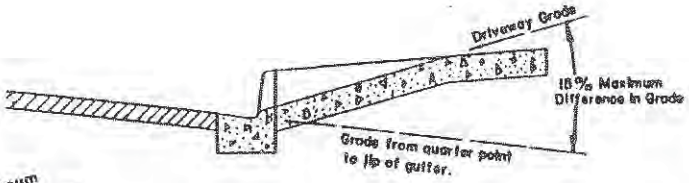
The maximum total width of driveways, including the "X" dimensions, to be allowed for a commercial lot shall be 60% of the property frontage.

⊗ Exceptions to these maximum and minimum dimensions may be granted by the City Engineer under special conditions.

* Curb return for either Street or Alley.



DRIVEWAY CLEARANCES



DRIVEWAY GRADIENT

CITY OF UPLAND STANDAND DRAWING

DRAWN BY	DATE	DRIVEWAY LOCATIONS
wah	8/6/65	
REVISIONS BY	DATE	
B.G.	12-13-73	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-P-8

APPROVED TREES FOR USE WITHIN CITY RIGHT OF WAYS

BOTANICAL NAME	COMMON NAME	Ref ✡ Page No.	Min Pkway Width	Tree Spacing Min.	Tree Spacing Max.
SMALL TREES 15'–20' IN HEIGHT					
Callistemon citrinus	Lemon Bottlebrush	207	4'	15'	30'
Pittosporum rhombifolium	Queensland Pittosporum	374	4'	18'	30'
Lagerstroemia indica	Crape Myrtle	316	4'	18'	30'
Prunus Krauter Vesuvius	Flowering Plum	387	5'	20'	35'
Eriobotrya deflexa	Bronze Loquat	260	5'	20'	30'
MEDIUM TREES 25'–40' IN HEIGHT					
Quercus ilex	Holly Oak	391	6'	25'	40'
Pittosporum undulatum	Victorian Box	374	6'	25'	35'
Liquidambar styraciflua (Palo Alto')	American Sweet Gum	324	6'	25'	35'
Koelreuteria bypinnata (or K. henryi)	Chinese Flame Tree	316	6'	30'	45'
Schinus terebinthifolius	Brazilian Pepper	413	7'	30'	45'
Pistacia chinensis	Chinese Pistache	374	6'	30'	45'
Cupaniopsis anacardioides	Carrot Wood, Tuckeroo	245	6'	30'	40'
LARGE TREES 40'–60' IN HEIGHT					
Liriodendron tulipifera	Tulip Tree	324	7'	30'	45'
Eucalyptus sideroxylon Rosea	Pink Ironbark or Red Ironbark	270	7'	30'	40'
		279	7'	30'	45'
		279	7'	30'	45'
CONIFEROUS EVERGREENS					
Calocedrus decurrens	Incense Cedar	208	7'	30'	40'
Pinus thunbergiana	Japanese Black Pine	373	7'	30'	40'
Pinus pinea	Italian Stone Pine	372	7'	30'	45'
Podocarpus gracilior	Fern Pine	378	7'	30'	45'
Pinus canariensis	Canary Island Pine	369	7'	30'	40'
PALMS					
Washingtonia robusta	Mexican Fan Palm	441	7'	25'	40'
Trachycarpus fortunei	Windmill Palm	432	7'	25'	40'

Page numbers listed are from publication: Sunset Western Garden Book

GENERAL NOTES

1. Trees to be planted shall be of the species specified on the plan.
2. A construction permit to plant trees must be obtained from the City Engineer before trees can be planted.
3. The planting of bare root trees must have special approval from the City Engineer.
4. Trees shall normally not be less than 6' in height above ground level when planted, shall be 5 gal. size (min.) and shall not be root bound.
5. The tree stake shall be set to the southwest side of tree
6. Developers (or Contractors) shall be responsible for care of trees for a period of one year a after the acceptance by the City of the street improvements.
7. It is the City's desire to maintain uniformity in tree planting. Every effort should be made to keep the same type and variety of tree throughout the limits of each block.
8. Tree planting shall comply with Section 308 of the Standard Specifications except as otherwise noted hereon.
9. Trees shall be spaced in accordance with the clearances indicated on Std. Drwg. CU-P-9 and the maximum and minimums shown hereon.

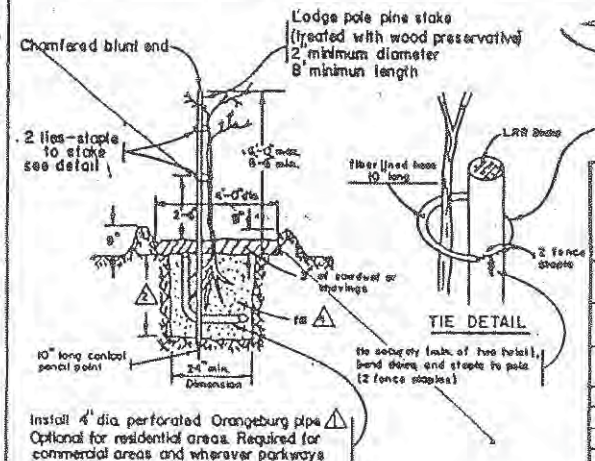
* Except that when homeowners move in and occupy properties, they shall be considered responsible for the parkway trees along their lot frontage(s).

(4) Fill with native soil after removing rocks larger than 3" Do not tamp, but water thoroughly.

(3) #9 wire (non-galvanized) may be substituted for #12 galvanized wire.

(2) 24" Minimum depth for bare root trees. 18" minimum depth for all others.

(1) Orangeburg pipe installation includes; 5 L.F. of straight pipe (in 3 sections); 2-90° elbows; plug at end; cast iron grate at surface - Entrance.



Install 4" dia. perforated Orangeburg pipe (1) Optional for residential areas. Required for commercial areas and wherever parkways are to be concrete.

TREE DESIGNATIONS FOR PRINCIPAL STREETS

STREETS	EAST OF EUCLID or NORTH OF FOOTHILL	WEST OF EUCLID or SOUTH OF FOOTHILL
Arrow Hwy.	Carrotwood	Evergreen Elm *
Benson Ave.	Flowering Plum	Flowering Plum
Campus Ave.	Canary Pine	Tulip
Central Ave.	Pittosporum	Pittosporum
Foothill Blvd.	Euc. & Magnolia	Euc. & Magnolia
Grove Ave.	Tulip	Tulip
Mountain Ave.	Bronze Loquat	Victorian Box
San Antonio	Liquidambar	Liquidambar
San Bernardino	California Oak **	California Oak **

STREETS	EAST of EUCLID	WEST of EUCLID
7th	Tulip	Evergreen Elm *
8th	Evergreen Elm *	Tulip
9th	Tulip	Tulip
11th	Evergreen Elm *	Evergreen Elm *
13th	Liquidambar	Holly Oak
14th	Tulip	Tulip
15th	Liquidambar	Liquidambar
17th	Tulip	Tulip
18th	Liquidambar	Liquidambar
19th	Pittosporum R.	Virginia Live Oak ***
20th	Incense Cedar	Incense Cedar
21st	Tulip	Tulip
22nd	Evergreen Elm *	Evergreen Elm *
23rd	Tulip	Tulip
24th	Crape Myrtle	Crape Myrtle

* Ulmus parvifolia ('Brea' or 'Drake')
** Quercus lobata
*** Quercus virginiana

STREETS		
16th	East/San Antonio	Liquidambar
16th	West/San Antonio	Bronze Loquat
3rd	("A" st to Arrow Hwy)	Evergreen Elm *

See approved St. Tree List

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE
F.E.C.	4/17/75

TREE PLANTING

REVISIONS

J.C.H.	9-2-65	L.W.A.	5-23-68
W.A.H.	9-10-65	L.W.A.	8-13-70
W.A.H.	2-18-66	B.S.	1-31-74
L.W.A.	10-24-66	F.E.C.	4-17-75
L.O.K.	12-20-66	K.J.M.	10-14-75
L.W.A.	8-30-68	B.F.	1-19-76

APPROVED BY Fred C. Blanchard CITY ENGINEER

DRAWING NO. CU-P-6

ALBIZIA julibrissin. SILK TREE - Deciduous

ARCHONTOPHOENIX cunninghamiana (Seaforthia elegans). KING PALM. Evergreen

BAUHINIA variegata. PURPLE ORCHID TREE. Deciduous

BAUHINIA variegata 'Candida'. WHITE ORCHID TREE. Deciduous

BETULA pendula. EUROPEAN WHITE BIRCH. Deciduous

BRACHYCHITON acerifolia (Stercubas acerifolia). FLAME TREE, AUSTRALIAN FLAME TREE. Deciduous

BRACHYCHITON populneus (Sterculia diversifolia). BOTTLE TREE. Evergreen

CAESALPINIA gilliesii (Poinciana gilliesii). BIRD OF PARADISE BUSH. Deciduous

CALLISTEMON citrinus (C. lanceolatus). LEMON BOTTLEBRUSH. Evergreen

CALLISTEMON viminalis. WEEPING BOTTLEBRUSH. Evergreen

CASSIA leptophylla. GOLD MEDALLION TREE. Evergreen

CERCIDIUM floridum (C. torreyanum). BLUE PALO VERDE. Deciduous

CERCIS occidentalis. WESTERN REDBUD. Deciduous

CHIONANTHUS retusus. CHINESE FRINGE TREE. Deciduous

CHORISIA speciosa. FLOSS SILK TREE. Evergreen

CINNAMOMUM camphora. CAMPHOR TREE. Evergreen

CUPANIOPSIS anacardioides. CARROT WOOD, TUCKEROO. Evergreen

ERYTHRINA coralloides. NAKED CORAL TREE. Deciduous

EUCALYPTUS torquata. CORAL GUM. Evergreen

FICUS microcarpa nitida. INDIAN LAUREL FIG. Evergreen

GINKGO biloba. MAIDENHAIR TREE. Deciduous

GLEDITSIA triacanthos 'Sunburst'. HONEY LOCUST. Deciduous

HETEROMELES arbutifolia (Photinia arbutifolia). TOYON, CHRISTMAS BERRY, CALIFORNIA HOLLY. Evergreen

HYMENOSPORUM flavum. SWEETSHADE. Evergreen

JUNIPERUS scopulorum 'Blue Haven'. BLUE HEAVEN. Evergreen

KOELREUTERIA bipannata (K. integrifoliola). CHINESE FLAME TREE. Deciduous

KOELREUTERIA paniculata. GOLDENRAIN TREE. Deciduous

LAGERSTROEMIA indica. CRAPE MYRTLE. Deciduous

LIRIODENDRON tulipifera. TULIP TREE. Deciduous

MAGNOLIA grandiflora. SOUTHERN MAGNOLIA. BULL BAY. Evergreen

MAGNOLIA grandiflora 'Majestic Beauty'. MAGNOLIA. Evergreen

MAGNOLIA soulangiana. SAUCER MAGNOLIA (Often erroneously called TULIP TREE). Deciduous

MAGNOLIA soulangiana 'Alexandrina'. SAUCER MAGNOLIA. Deciduous

MALUS floribunda. JAPANESE FLOWERING CRABAPPLE. Deciduous

MELALEUCA quinquenervia (sold as M. leucadendra). CAJEPUT TREE. Evergreen

OLEA europaea. OLIVE. Evergreen

PICEA pungens 'Glauca'. COLORADO BLUE SPRUCE. Evergreen

PINUS canariensis. CANARY ISLAND PINE. Evergreen

PINUS eldarica. 'Mondell Pine'. CALABRIAN PINE. Evergreen

PINUS pinaster. CLUSTER PINE, FRENCH TURPENTINE PINE, MARITIME PINE. Evergreen

PINUS pinea. ITALIAN STONE PINE. Evergreen

PISTACIA chinensis. CHINESE PISTACHE. Deciduous

PITTOSPORUM rhombifolium. QUEENSLAND PITTOSPORUM. Evergreen

PITTOSPORUM undulatum. VICTORIAN BOX. Evergreen

PLATANUS acerifolia. (Often sold as P. orientalis.) LONDON PLANE TREE. Deciduous

PODOCARPUS gracilior. (Often sold as P. elongatus.) FERN PINE. Evergreen

PRUNUS cerasifera. CHERRY PLUM, MYROBALAN. Deciduous

PRUNUS cerasifera 'Krauter Vesuvius'. PURPLE LEAF PLUM. Deciduous

PRUNUS cerasifera 'Thundercloud'. PURPLE LEAF PLUM. Deciduous

PYRUS calleryana. ORNAMENTAL PEAR. Deciduous

QUERCUS ilex. HOLLY OAK, HOLM OAK. Evergreen

QUERCUS suber. CORK OAK. Evergreen

SAPIUM sebiferum. CHINESE TALLOW TREE. Deciduous

TABEBUIA avellanedae. (T.ipe). Deciduous

TABEBUIA chrysotricha. (sometimes sold as T. putcherrima.) GOLDEN TRUMPET TREE. Deciduous

ZELKOVA serrata. SAWLEAF ZELKOVA. Deciduous

Foothill Service Island Plant Material Recommendations

Recommended species are the result of evaluating each for their appearance/ maintenance factors; tolerance to chemicals and smog/heat; growth habit in our environment and traffic visibility.

1. Pittosporum tobira "Wheelerii", Dwarf Mock Orange.
2. Raphiolepis indica "Enchantress", Dwarf Pink India Hawthorn.
3. Lagerstroemia indica "Petites", Dwarf Crepe Myrtles.
4. Xylosma congestum "Compactum", Dwarf Xylosma.
5. Ilex vomitoria "Nana", Dwarf Yaupon Holly.

   or

   Ilex cornuta "Rotunda", Dwarf Chinese Holly.
6. Juniperus chinensis "Armstrongii", Armstrong Juniper.

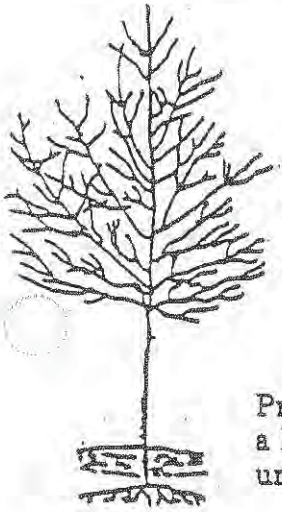
   (Armstrong Juniper can be used for good effect in special situations - i.e. individual wells on rock median island on Foothill Blvd. at Mountain Ave.)

7. Nandina domestica Compacta "Nana", Dwarf Heavenly Bamboo.
8. Leucophyllum texanum "Compacta", Texas Ranger Shrub.
9. Escallonia "Fradesi", Compact Escallonia.
10. Agapanthus africanus, Lily of the Nile.

PRUNING TREES

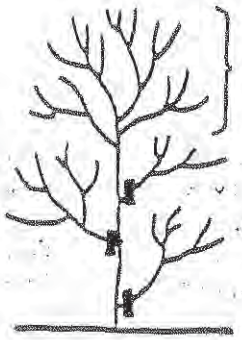
Remove crossing limbs, broken branches, and excessive growth next to the tree to admit sunlight and air circulation.

Make three saw cuts to prevent ripping the bark of the tree trunk. Start the first cut on the underside of the limb about one foot from the trunk or branch and saw through one third of the branch. Start the second cut on top of the branch, about 3 inches behind the bottom cut, sawing until the branch splits off. Saw off the stub flush with the trunk to allow the wound to heal.



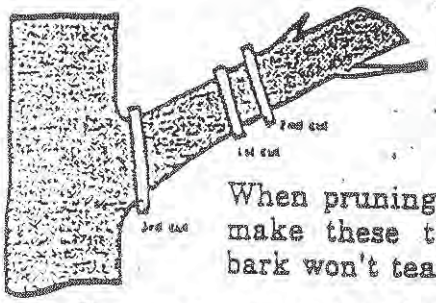
Lower branches on street trees should be removed to a height of 8 to 10 feet.

Prune this way to give tree a head you can walk or mow under.



Head or Crown

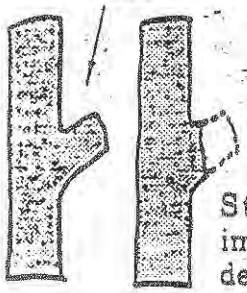
Remove side growth from trunk to encourage high, well formed head or crown.



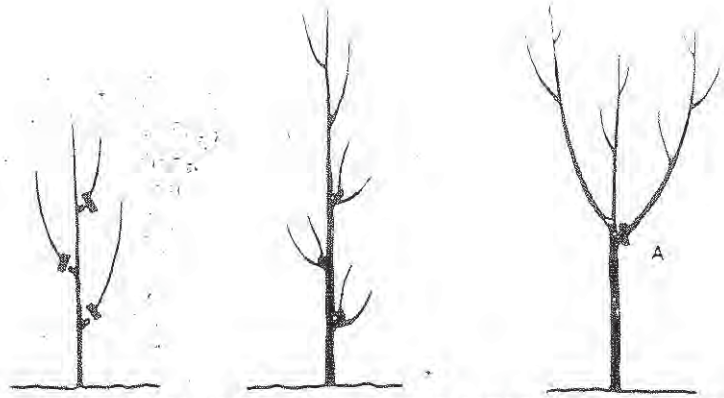
When pruning large limbs, make these three cuts so bark won't tear.

To prevent tearing bark, split in trunk, cut limb as shown.

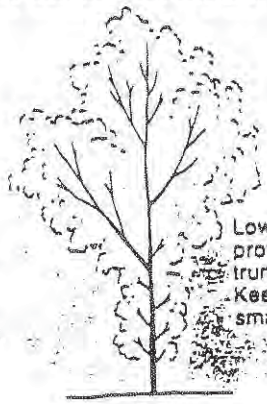
Don't Leave Stubs



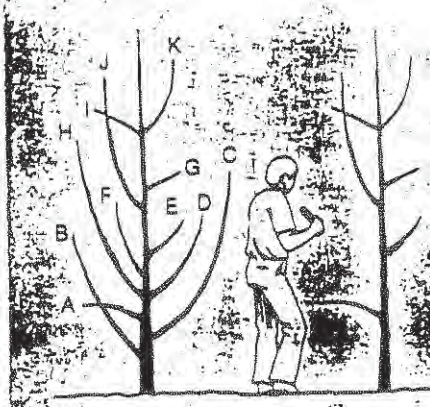
Stub looks ugly; more important, it can result in decay. Cut branch to trunk.



To keep the leader dominant, pinch back strong, competing laterals. The leader on the right has been choked out by strong growing laterals. The original leader and the less desirable lateral should be removed.



Low, temporary branches protect and nourish the trunks of young trees. Keep them relatively small by pruning.

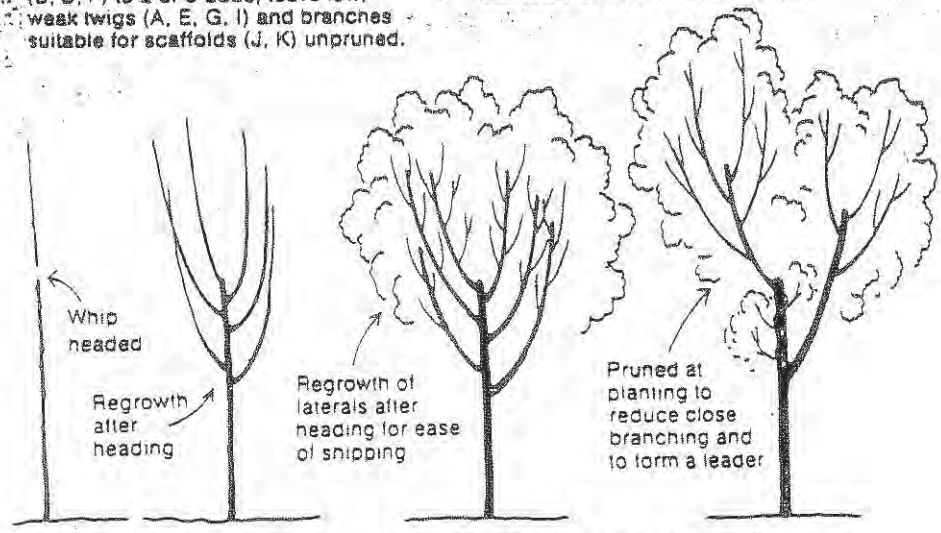


Selection of temporary branches: Thin out low, vigorous ones (C, H); head low limbs of moderate vigor (B, D, F) to 2 or 3 buds; leave low, weak twigs (A, E, G, I) and branches suitable for scaffolds (J, K) unpruned.

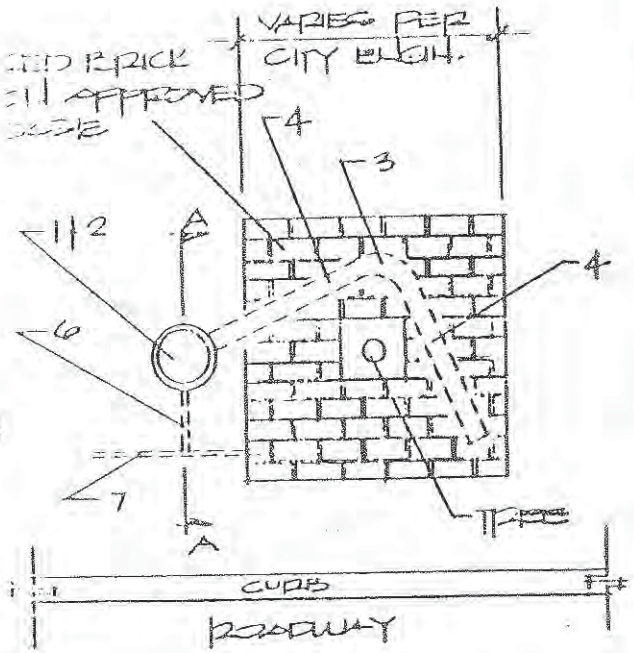
All branches on short, young trees are handled as temporary until the tree grows tall enough to have scaffolds at the desired heights.

Ortho "The World of Trees"

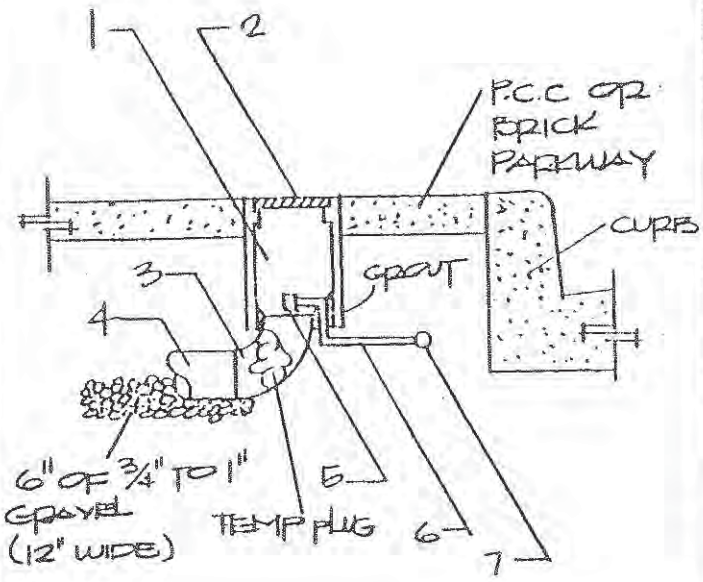
Chevron Chemi: Company 19-



Unfortunately many landscape trees are headed before you buy them. Such trees often need severe pruning to develop a framework high enough above the ground.



TREE WELL DETAIL



SECTION A-A

1. IRRIGATION BOX 7 7/8" x 12"
2. IRRIGATION BOX COVER.
3. GRATE BURS ELBOW 4" 90°
4. GRATE BURS PERFORATE PIPE 4"Φ, 4 LIN FT MIN. MAINTAIN 2° MIN. SLOPE
5. RAIN-O-MAT FLOOD HE. #302-B
6. 1/2"Φ PIPE
7. WATER SUPPLY (CITY WATER NOTE 1 BELOW)

MATERIALS.

PARKWAY TREATMENT PER THE DRAWING REQ'D OF THE FOLLOWING:

a) ALL SECONDARY FRONTAGE OR DOUBLE-FRONTAGE LOTS.

b) ALL USES SUBJECT TO CONDITIONAL USE PERMITS, EXCEPT WHERE A SPECIAL PARKWAY LANDSCAPING PLAN HAS BEEN APPROVED.

2. PARKWAY TREATMENT PER

INSTANCES:

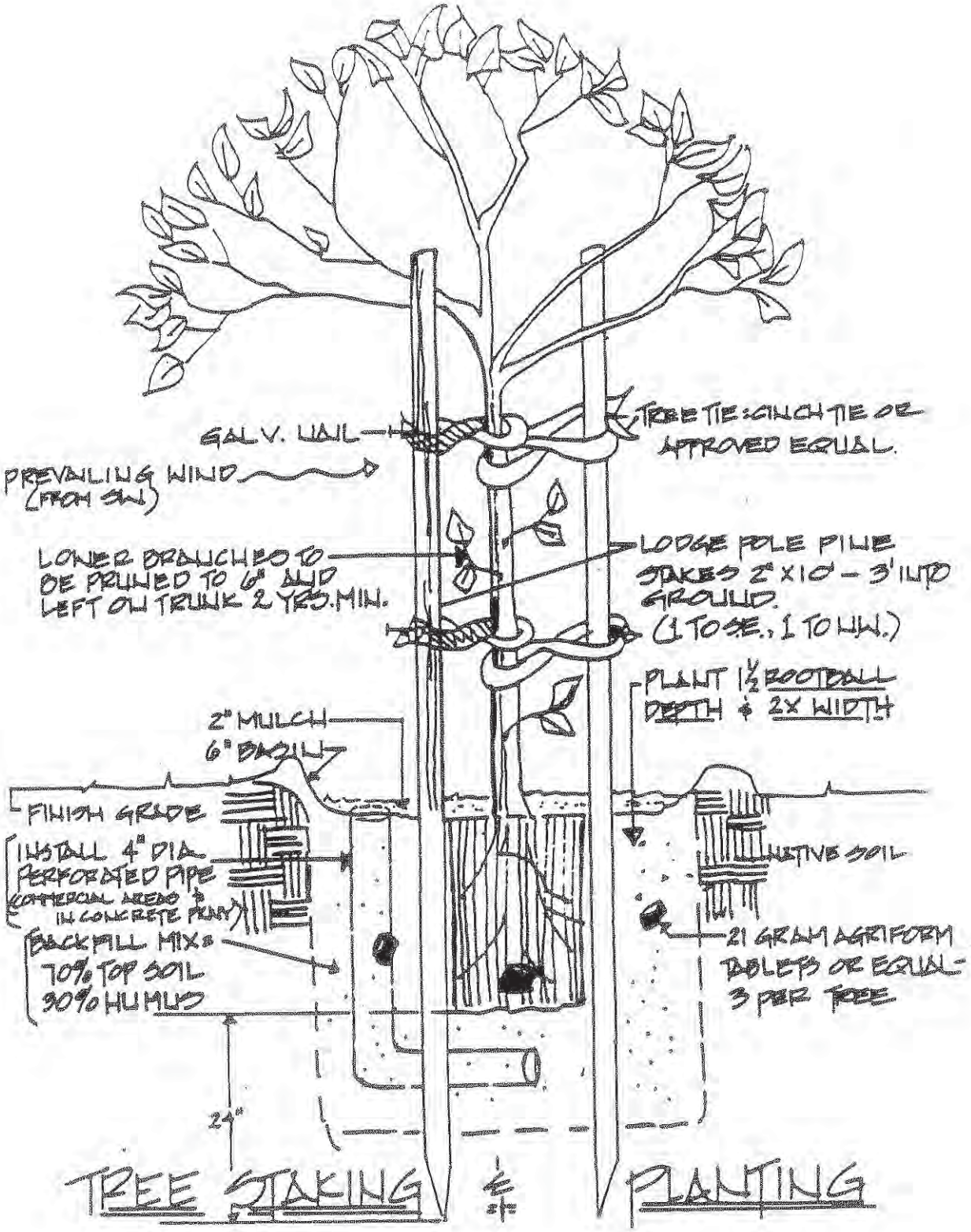
a) ALL INDUSTRIAL ZONES

b) ALL COMMERCIAL ZONES.

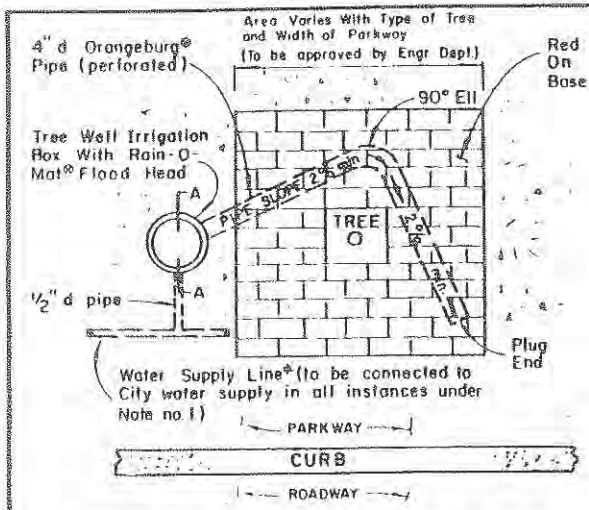
c) ALL MULTI-FAMILY RESIDENTIAL ZONES

d) SIDE YARDS IN SINGLE-FAMILY RESIDENTIAL ZONES

e) UNDER SPECIAL

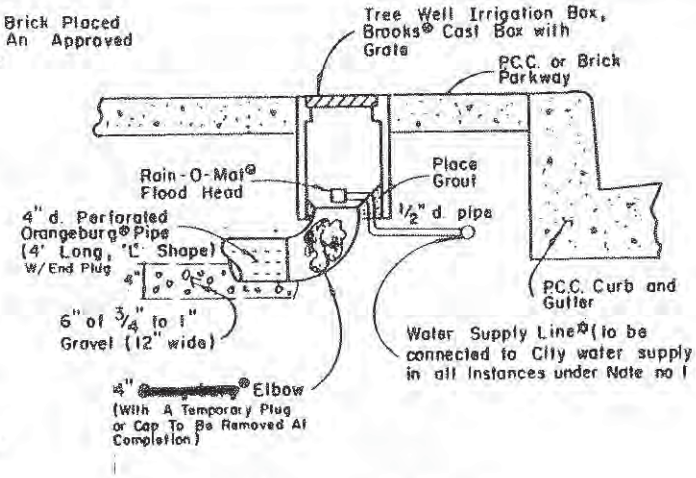


TREE STAKING & PLANTING



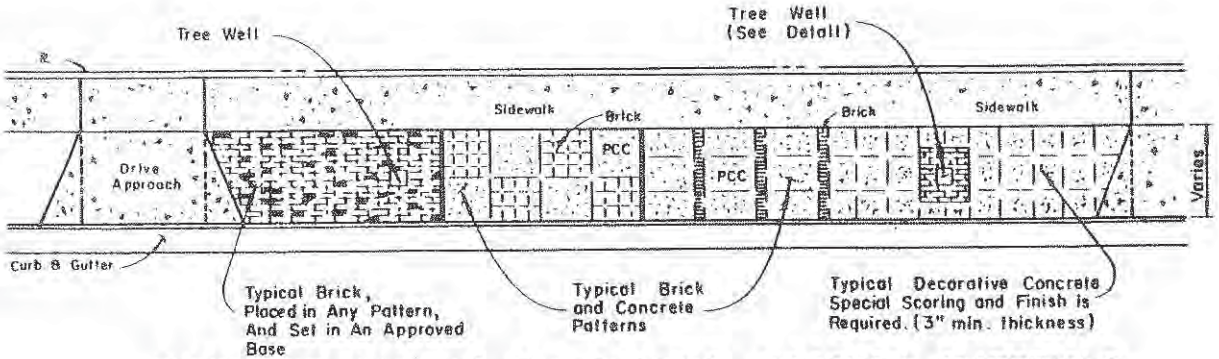
DETAIL FOR TREE WELLS

No Scale



SECTION A-A

No Scale



SUGGESTED STYLES® For PLACING MASONRY MATERIALS

®Other Styles and Materials As Approved by the City Engineer

DESCRIPTION OF TREE WELL MATERIALS®

BROOKS I-R 7 7/8" x 12" Box	- 1 Ea
BROOKS I-RDTG Cast Iron Cover	- 1 Ea
ORANGEBURG Elbow 4" dia., 90°	- 2 Ea
ORANGEBURG Perforated Pipe, 4" dia.	- 4 LF Min
RAIN-O-MAT Flood Head No. 302-B	- 1 Ea

NOTES

1. Parkway treatment per this Standard Drawing is REQUIRED of the following:
   (a) All secondary frontage or double-frontage lots.
   (b) All uses subject to Conditional Use Permits, except where a Special Parkway Landscaping Plan (which includes an automatic sprinkler system and lawn or other low growth plantings) has been approved
2. Parkway treatment* per this Standard Drawing is PERMITTED in the following instances:
   (a) All Industrial Zones
   (b) All Commercial Zones
   (c) All Multi-Family Residential Zones
   (d) Side yards in Single-Family Residential Zones.
   (e) Under Special Conditions Only (as approved by Engineering Dept.) for front yards in Single-Family Residential Zones.

   * Where this type of parkway treatment is used for any of the above listed "permitted locations" parkway tree irrigation shall be provided by one of the following:
   (1) Underground sprinkler system per detail this drawing, except not to be connected to the City water system.
   (2) Open tree wells (not covered by masonry materials) having a minimum area of 40 s.f. and an above ground water spigot at each tree well.

®3. All manufacturer's names and catalog numbers listed hereon are for descriptive purposes only and in each instance shall be deemed to be followed by "Or Equal As Approved by The Engineer".

*4. The water supply line shall include approved automatic control equipment; vacuum breaker; City meter. The size of the water supply line varies with the number of wells served - minimum size shall be 3/4" diameter pipe; all piping shall be Schedule 40 galvanized iron pipe with threaded joints.

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	PARKWAY TREATMENT with MASONRY MATERIALS (Required & Permitted Locations)
LWA	10-1-70	
Revisions By:	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING No. CU-P-7

1) Construction Permits for Work in Parkways CU-P-7

Capital Projects Engineer Hudson reported on an ongoing problem encountered in damage to parkway improvements incident to major projects of sidewalk or curb replacements. Citizens create, or have created, a number of parkway treatments which can be damaged during reconstruction of curbs or sidewalks. In some cases the repair of these improvements is much more expensive than the sidewalk or curb repair. To avoid major unexpected repair costs in the future, staff recommended two courses of action for Committee consideration:

a) When citizens obtain permits to install improvements in the public right-of-way (parkways), they be made aware that subsequent sidewalk, curb or other projects may damage those improvements, and that extraordinary cost of repair will normally not be assumed by the City.

b) When the City sets up a project for such repairs, and it is apparent that there may be substantial damage to installed work in the parkway, there will be discussion with the adjoining property owner as to the possibility of damage and who will bear the cost of repair -- prior to initiation of work. Some types of parkway improvements do not present a major cost to repair, others do and it is important to determine costs prior to commencing work.

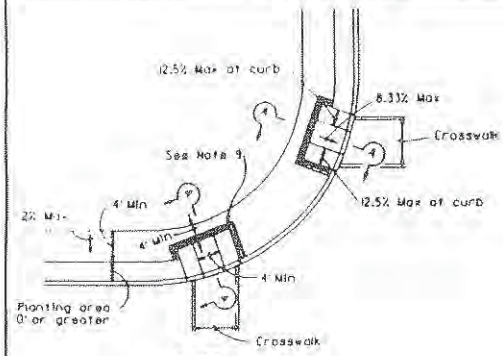
The Committee recommends that Council approve the concepts set forth above as a guide to staff for future work. SL 4/1/87

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS

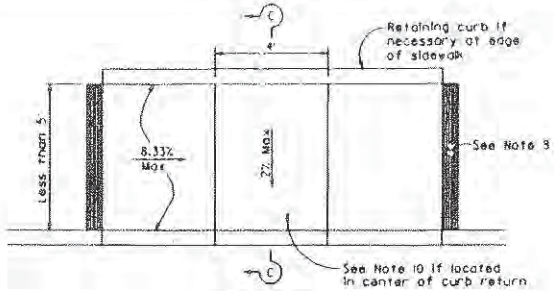
REGISTERED CIVIL ENGINEER

July 1, 1992
PLANS APPROVAL DATE

To accompany plans dated _____

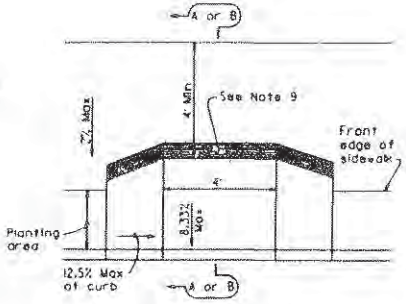


CASE A



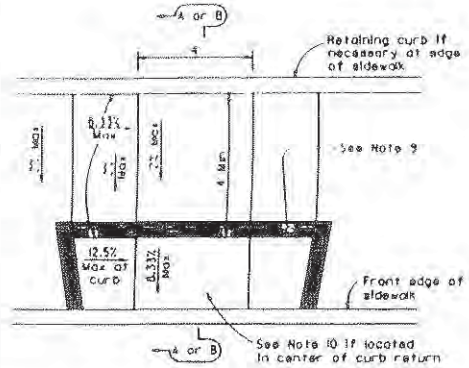
CASE C

Use when sidewalk is less than 5' wide

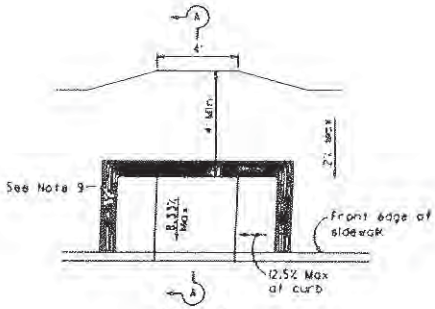


CASE F

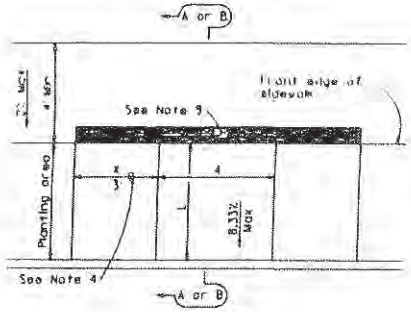
See Note 5



CASE B



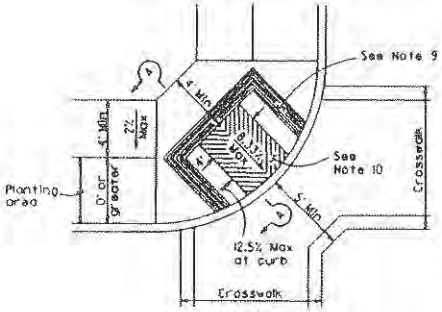
CASE D



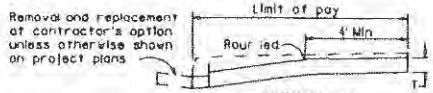
CASE G

See Note 5

SECTION A-A

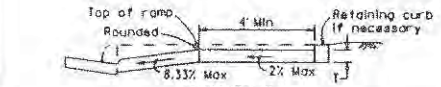


CASE E



DETAIL H

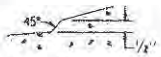
Existing curb and sidewalk



SECTION B-B

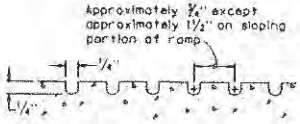
Depress entire sidewalk as required

SECTION C-C



LIP DETAIL

See Note 7



GROOVING DETAIL

NOTES

1. If distance from curb to back of sidewalk is too short to accommodate ramp and 4' platform as in Case A, the sidewalk may be depressed longitudinally as in Case B or C or may be widened as in Case D.
2. If sidewalk is less than 5' wide, the full width of the sidewalk shall be depressed as shown in Case C.
3. When ramp is located in center of curb return, crosswalk configuration must be similar to that shown on the plan to accommodate wheelchairs.
4. If planting area width is equal to or greater than ramp length (L), ramp side slope (X) distance = 3' (see Case G).
5. For Cases F and G, the longitudinal portion of the sidewalk may need to be depressed as shown in Case B.
6. If located on a curve the sides of the ramp need not be parallel, but the minimum width of the ramp shall be 4'.
7. The bottom of the ramp shall have a 1/2" lip at 45°.
8. Sidewalk and ramp thickness, T, shall be 3 1/2.
9. The ramp shall have a 12" wide border with 1/4" grooves approximately 3/4" on center. See grooving detail. The surface of ramp shall have a transverse broomed surface texture rougher than the surrounding sidewalk except when located in center of curb return.
10. When ramp is located in center of curb return, it shall be grooved in a herringbone pattern with 1/4" grooves approximately 1 1/2" on center. See grooving detail. Grooves shall be aligned parallel to crosswalk lines or parallel to the prolongation of curbs when there are no crosswalk lines.
11. Ramp side slope varies uniformly from a maximum of up to 12.5% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Cases C and G.
12. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated by others prior to, or in conjunction with, curb ramp construction.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURB RAMP DETAILS NO. 1

NO SCALE

NEW STANDARD PLAN NSP A88

STD. PLAN NSP A88

Drawing for Std Pl A21
(superseded by Pl A88)

NOTES

1 For approved tree list and planting details see Standard Drawing CU-P-6

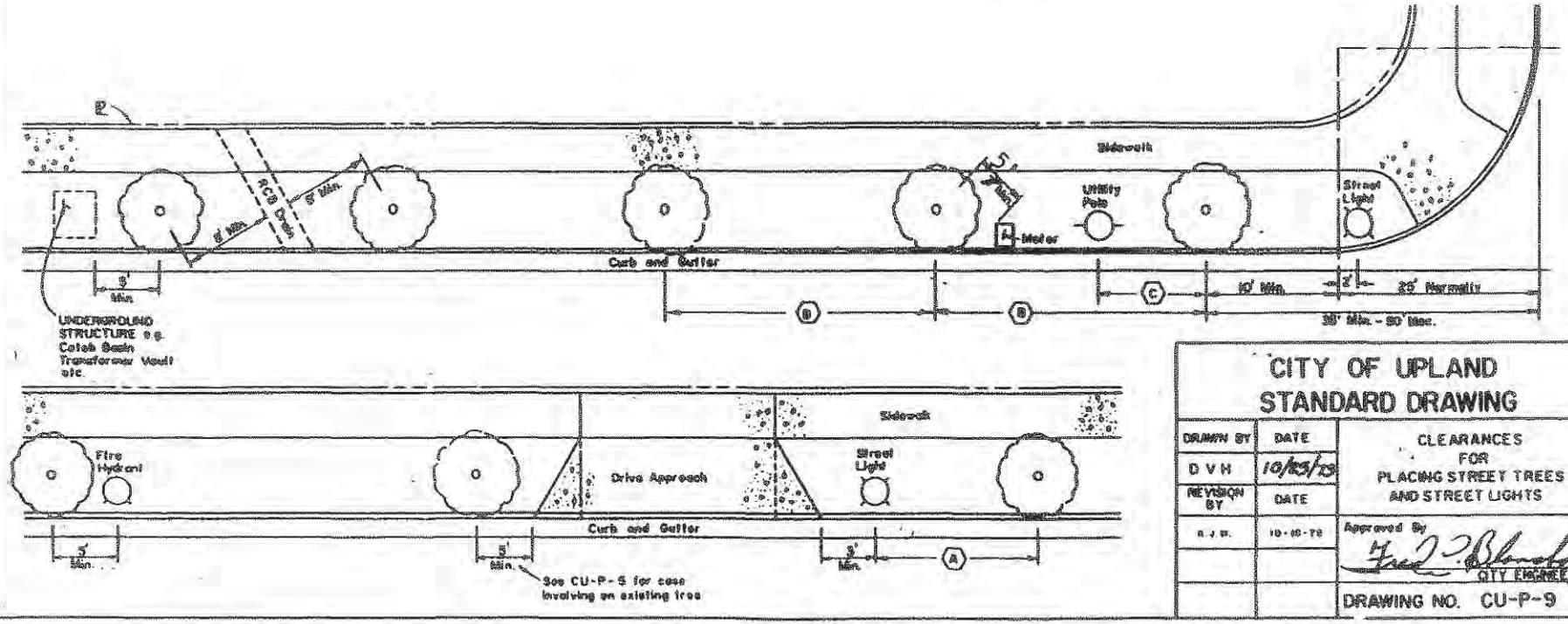
LEGEND

(A) * 10' Min. – for those trees listed under "Small Trees" on Standard Drawing CU-P-6
15' Min. – for all other trees

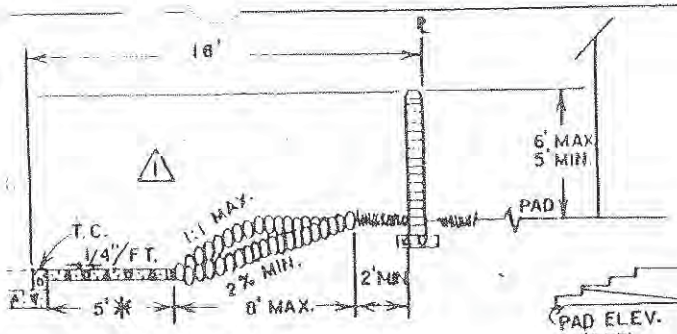
(B) Spacing in accordance with maximum and minimum dimensions shown on CU-P-8.

(C) * 5' Min. – for those trees listed under "Small Trees" on Standard Drawing CU-P-6
10' Min. – for all other trees

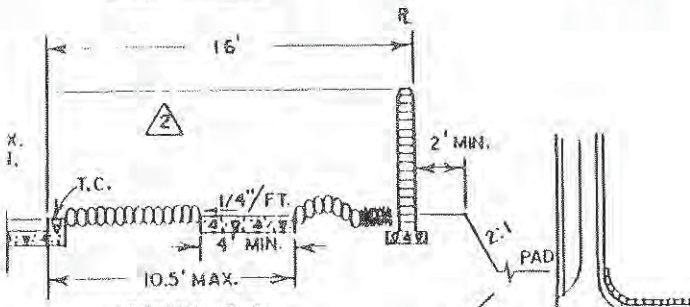
* The Min. for (A) and (C) shall be 1/2 (B) Max.



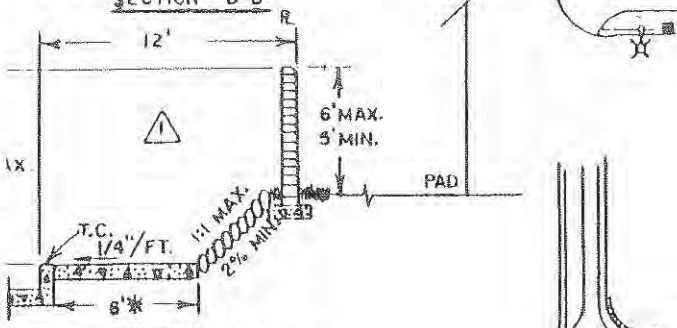
CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	CLEARANCES FOR PLACING STREET TREES AND STREET LIGHTS
D V H	10/23/73	
REVISION BY	DATE	
R. J. B.	10-10-78	Approved By Fred J. Blondel CITY ENGINEER
		DRAWING NO. CU-P-9



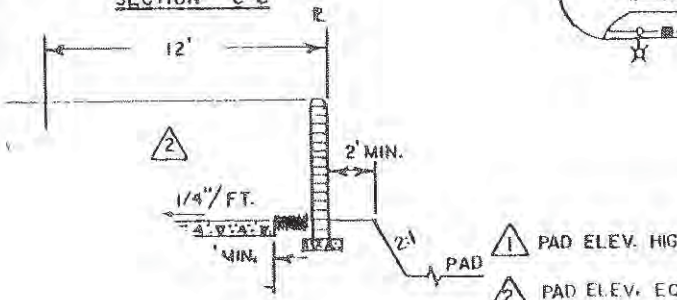
SECTION A-A

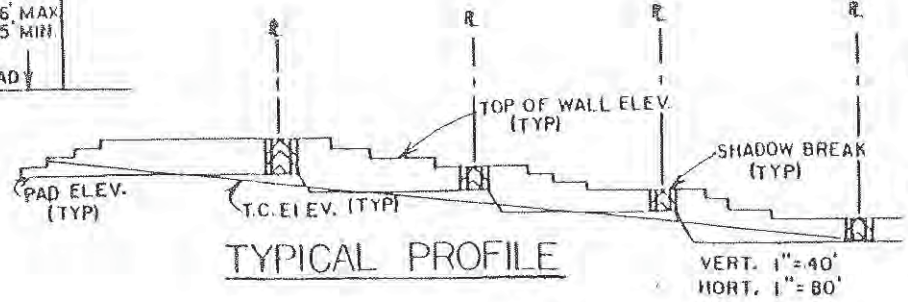


SECTION B-B

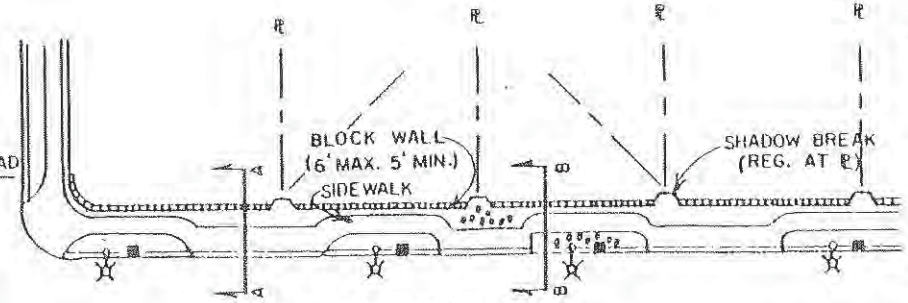


SECTION C-C



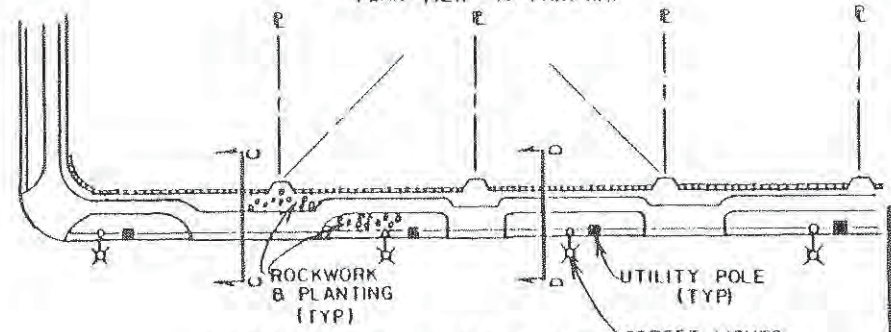


TYPICAL PROFILE



MOUNTAIN AVE.

PLAN VIEW 16' PARKWAY



SECONDARY HIGHWAYS

PLAN VIEW 12' PARKWAY

1 PAD ELEV. HIGHER THAN T.C.

2 PAD ELEV. EQUAL TO OR LOWER THAN T.C.

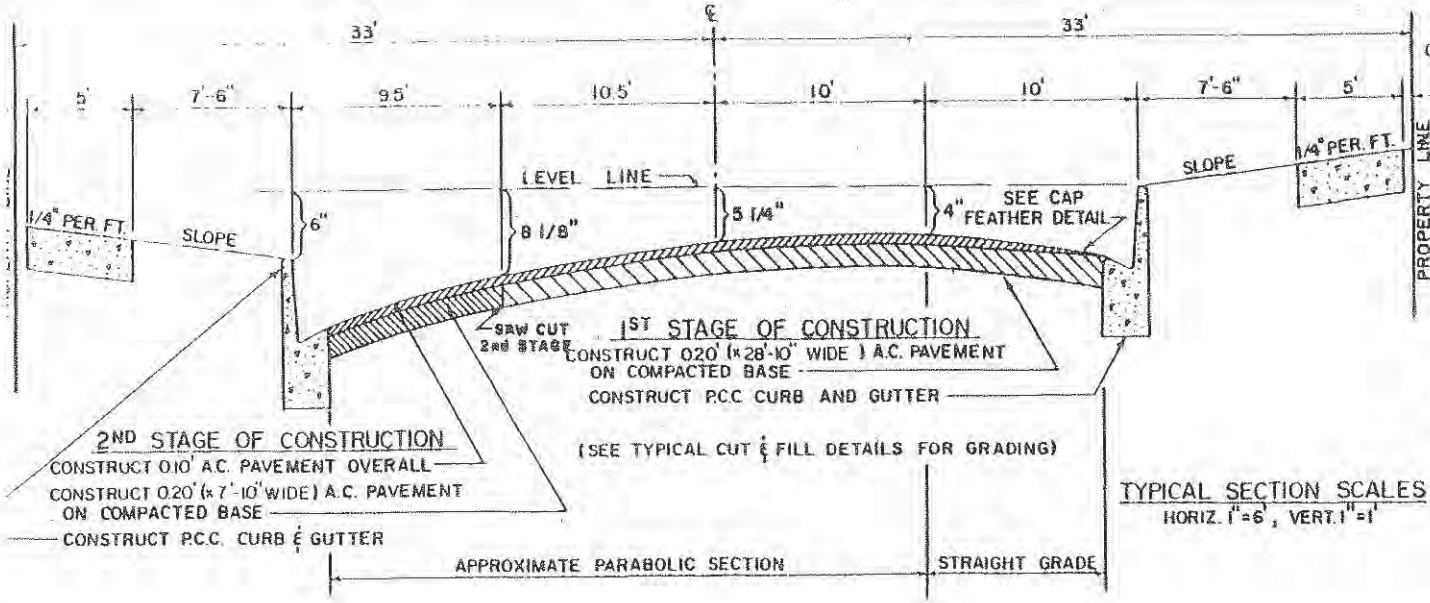
* { SIDEWALK AT CURB SHALL BE 1 FOOT WIDER THAN WHEN SIDEWALK IS AT NORMAL LOCATION. }

GENERAL NOTES

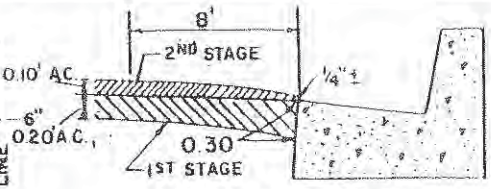
1. ALL ITEMS SHOWN ON THIS STANDARD DRAWING, SHALL APPEAR ON THE STREET IMPROVEMENT PLANS.
2. FOR PARKWAY ROCK DETAILS, SEE STANDARD PLANS, "MOUNTAIN AVENUE PARKWAY LANDSCAPING" DETAILS.
3. REFER TO STD. DWG. CU-E-1, FOR DETAILS OF REAR YARD EMBANKMENTS AT EXTERIOR LOT LINES, AND STD. DWG. CU-E-2 FOR DETAILS OF REAR YARD EXCAVATIONS AT EXTERIOR LOT LINES.
4. REFER TO PROJECT LANDSCAPE PLANS FOR ARCHITECTURAL TREATMENT OF WALLS, SHADOW BREAKS AND PLANTING DETAILS.
5. IRRIGATION SYSTEM IS REQUIRED. REFER TO STANDARD DRAWINGS CU-P-6 AND CU-P-7 AND PROJECT LANDSCAPING PLANS FOR DETAILS.
6. WALL HEIGHTS EXCEEDING MAXIMUMS SHOWN SHALL BE SUBJECT TO APPROVAL BY ADMINISTRATIVE COMMITTEE.
7. PAD ELEVATION IS FINISHED FLOOR ELEVATION MINUS 6".

CITY OF UPLAND
STANDARD DRAWING

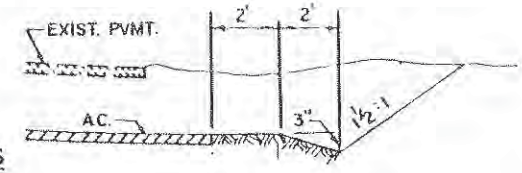
DRAWN BY	DATE	PARKWAY LANDSCAPING MOUNTAIN & AVENUE SECONDARY HIGHWAYS
FV		
		APPROVED BY [signature] 2-11-81
		DEPT. CITY ENGINEER
		DRAWING NO. CU-P-10



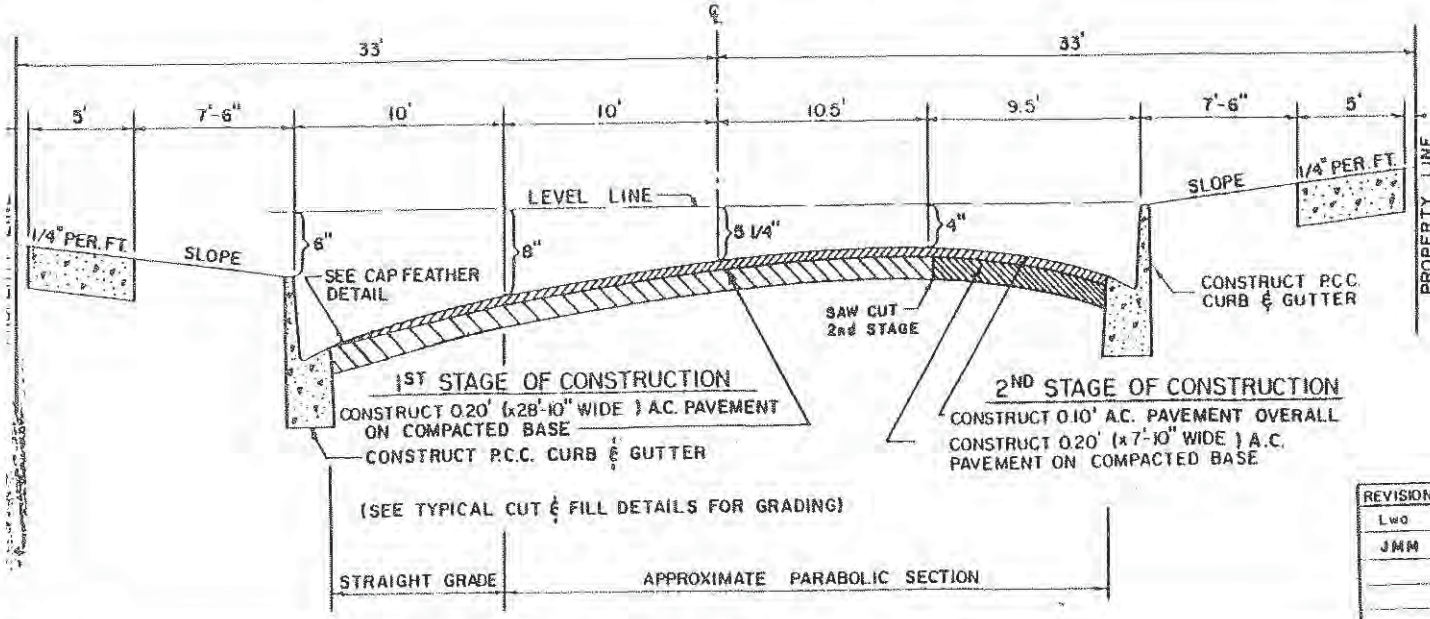
TYPICAL SECTION SCALES
HORIZ. 1" = 6', VERT. 1" = 1'

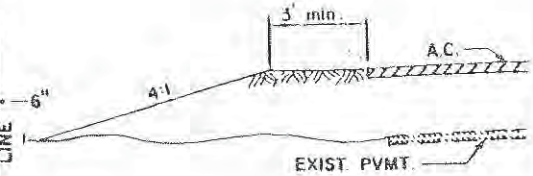


CAP FEATHER DETAIL
SCALES: HORIZ. 1" = 1.5', VERT. 1" = 1'



TYPICAL CUT DETAIL
SCALE: 1" = 2'





TYPICAL FILL DETAIL
SCALE: 1" = 2'

TYPICAL SECTIONS FOR STAGE CONSTRUCTION OF SELECT SYSTEM STREETS

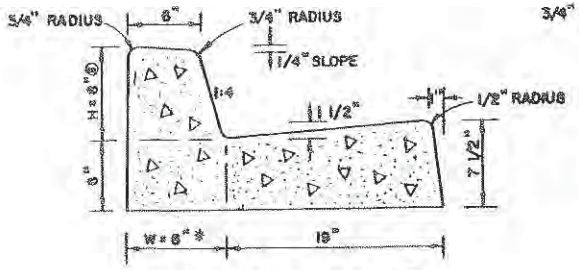
CITY OF UPLAND

REVISIONS	DATE
LWO	5-15-70
JMM	2-24-72

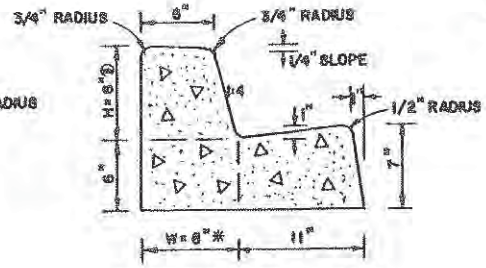
DRAWN BY: Phil Harris
CHECKED BY:
DATE: March 10, 1968
SCALE: As Shown
SHEET NO. 1 OF 1 SHEETS

APPROVED BY: Fred C. Blomfield
CITY ENGINEER R.C.E. 15035

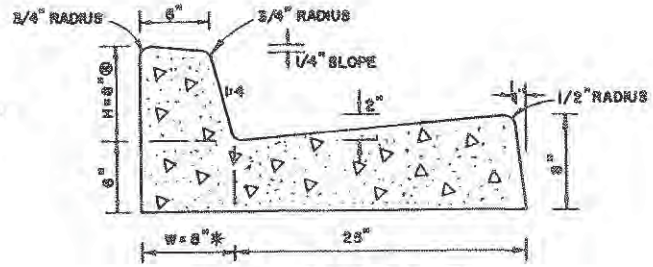
DRAWING NO. CU-R-1



COMBINATION CURB & GUTTER
TYPE "A"

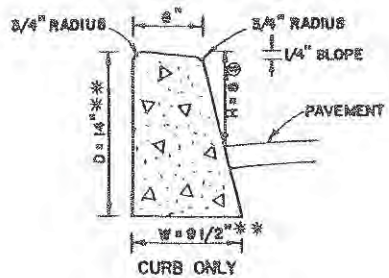


COMBINATION CURB & GUTTER
TYPE "B"



COMBINATION CURB & GUTTER
TYPE "C"

* DIMENSION SHOWN FOR "W" IS FOR STANDARD 8" CURB HEIGHT. WHEN PLANS CALL FOR OTHER THAN H=8", USE "W" FROM TABLE INCLUDED HEREON.



CURB ONLY
TYPE "D"

** DIMENSIONS SHOWN FOR "D" & "W" ARE FOR STANDARD 8" CURB HEIGHT. WHEN PLANS CALL FOR OTHER THAN H=8", USE "D" & "W" FROM TABLE INCLUDED HEREON.

**VARIABLE DIMENSIONS
CURB ONLY

HEIGHT	DEPTH	WIDTH
4"	10"	8 1/2"
5"	11"	8 3/4"
6"	12"	9"
7"	13"	9 1/4"
9"	15"	9 3/4"
10"	16"	10"
11"	18"	10 1/2"
12"	19"	10 3/4"
13"	20"	11"
14"	21"	11 1/4"

*VARIABLE DIMENSIONS
CURB & GUTTER

HEIGHT	WIDTH
6"	7 1/2"
7"	7 3/4"
9"	8 1/4"
10"	8 1/2"
11"	8 3/4"
12"	9"

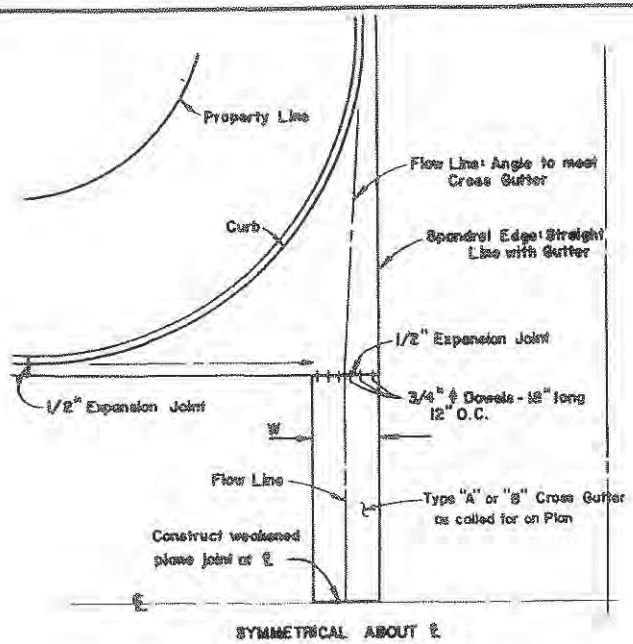
GENERAL NOTES

1. ALL CURBS AND GUTTERS ARE TO BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE PER CITY OF UPLAND STANDARD SPECIFICATIONS.
2. TYPE "A" CURB & GUTTER SHALL BE USED IN ALL INSTANCES EXCEPT AS NOTED HEREONBELOW.
3. TYPE "C" CURB & GUTTER SHALL BE USED WHENEVER THE FLOW LINE GRADIENT IS LESS THAN 0.60%.
4. TYPE "B" CURB & GUTTER, MODIFIED TYPE "A", MODIFIED TYPE "C", AND SPECIAL CURB AND GUTTER SECTIONS SHALL ONLY BE USED WHEN SPECIFICALLY CALLED FOR ON THE PLANS.

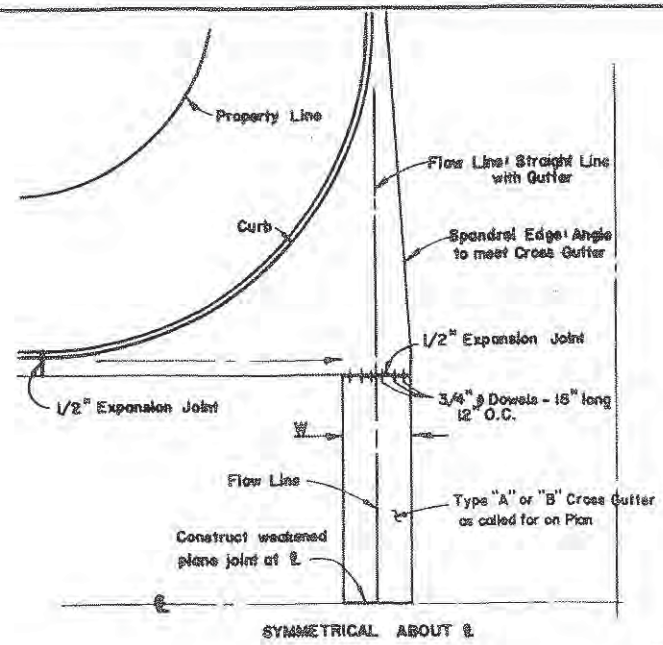
(@): STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	COMBINATION CURB & GUTTER AND CURB ONLY
w o h	6-23-64	
REVISION BY	DATE	
JMM	10-28-71	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NUMBER: CU-R-2

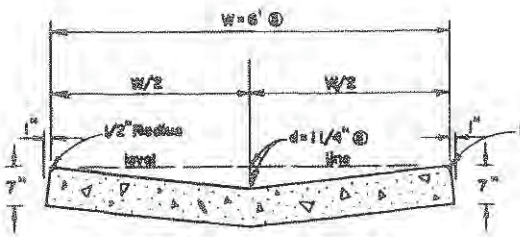


DETAIL "SE"



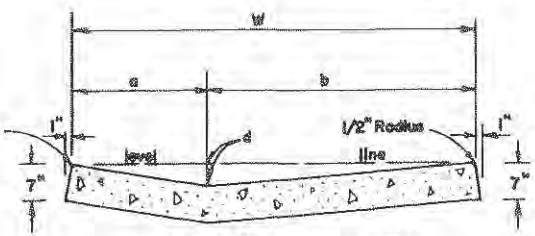
DETAIL "SG"

NOTE:
ALL CROSS GUTTERS TO BE CONSTRUCTED USING "8 SACK" CONCRETE UNLESS OTHERWISE NOTED ON THE PLAN OR APPROVED BY THE CITY ENGINEER.



TYPE "A" CROSS GUTTER

W	3'	5'	6'	7'	8'	9'
d	1"	1"	1 1/4"	1 1/4"	1 1/2"	1 1/2"



TYPE "B" CROSS GUTTER

W	4.5'	6'	7.5'	9'	10.5'
a	1.5'	2'	2.5'	3'	3.5'
b	3'	4'	5'	6'	7'
d	1"	1"	1 1/4"	1 1/2"	1 3/4"

® STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN

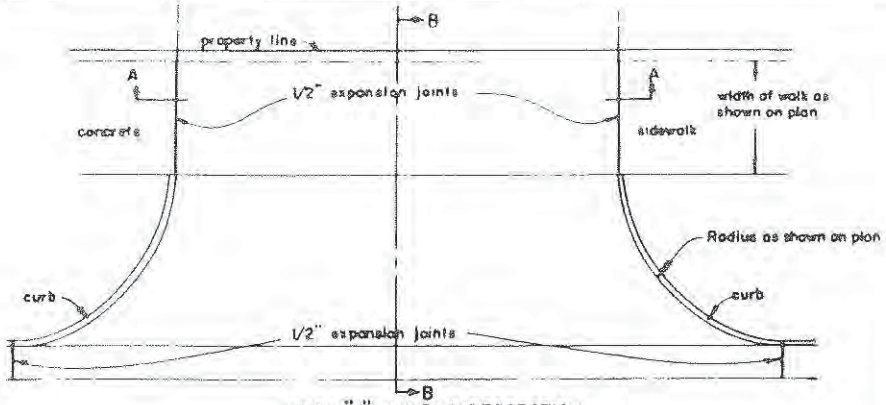
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE
w a h	7/1/65
REVISION BY	DATE
w a h	12-8-65
Lwa	7-8-69

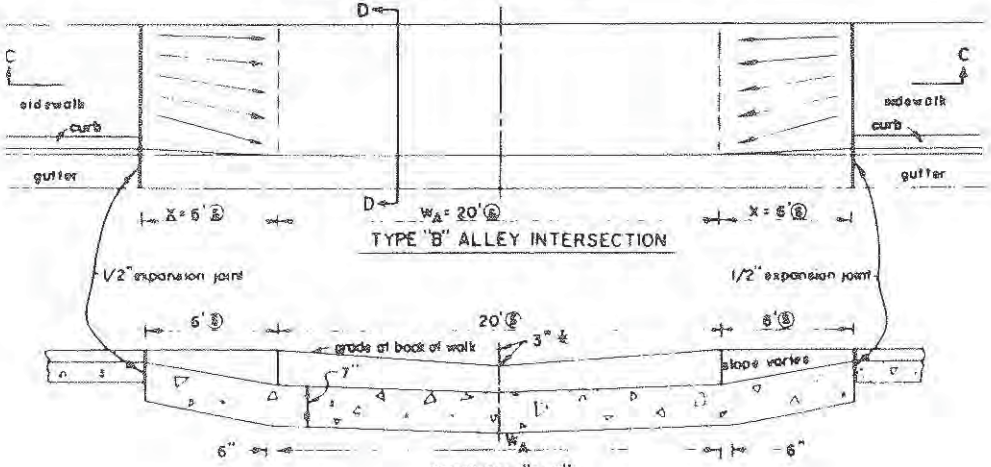
SPANDREL DETAILS AND CROSS GUTTERS

APPROVED BY Fred C. Blanchard
CITY ENGINEER

DRAWING NO. CU-R-3

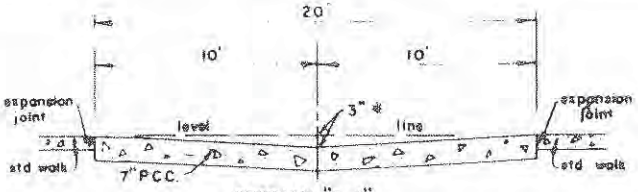


TYPE "A" ALLEY INTERSECTION

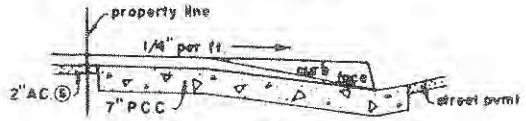


TYPE "B" ALLEY INTERSECTION

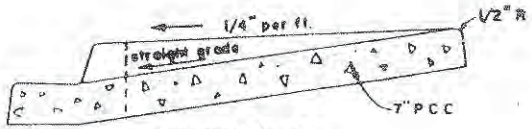
SECTION "C-C"



SECTION "A-A"



SECTION "B-B"

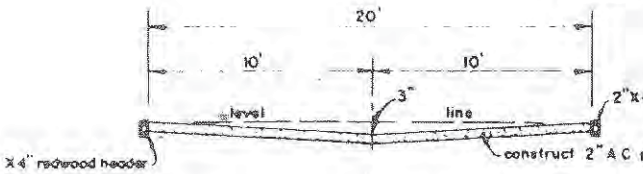


SECTION "D-D"

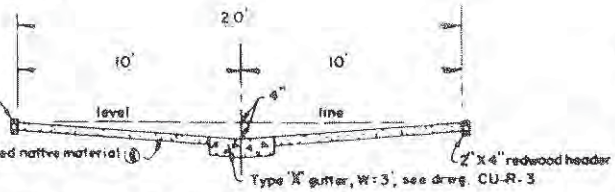
* 4" when alley has concrete gutter.

Ⓢ STANDARD UNLESS OTHERWISE NOTED ON PLAN

STANDARD ALLEY SECTIONS



TO BE USED WITH GRADES OF 0.60% OR GREATER

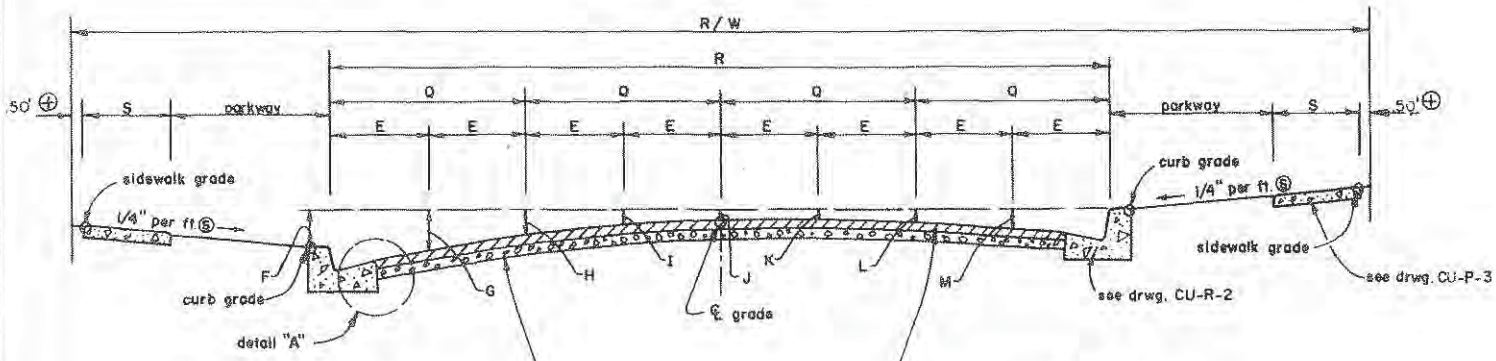


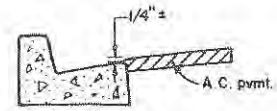
TO BE USED WITH GRADES OF LESS THAN 0.60%

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	ALLEY SECTIONS AND DETAILS
w a h	7/16/65	
REVISION BY	DATE	APPROVED BY
		CITY ENGINEER
		DRAWING NO CU-R-4

TYPICAL ROADWAY SECTION





DETAIL "A"

Aggregate Base Material may be substituted for asphaltic concrete in excess of 30' thickness. (minimum thickness = 40')

Asphaltic Concrete Surface:
Thickness dependent on base soil.
30' minimum thickness for Select System Streets.*
20' minimum thickness for all other streets.

⊕ variable dimension, normal distance = 50'

*30' minimum for Select System Streets may be developed thru Stage Construction as indicated on drwg. CU-R-1.

GENERAL NOTES

1. Dimensions "G" thru "M" as given hereon are for 8" curb heights, and should be adjusted for other curb heights.
2. Minimum sidewalk width for business districts = 6'

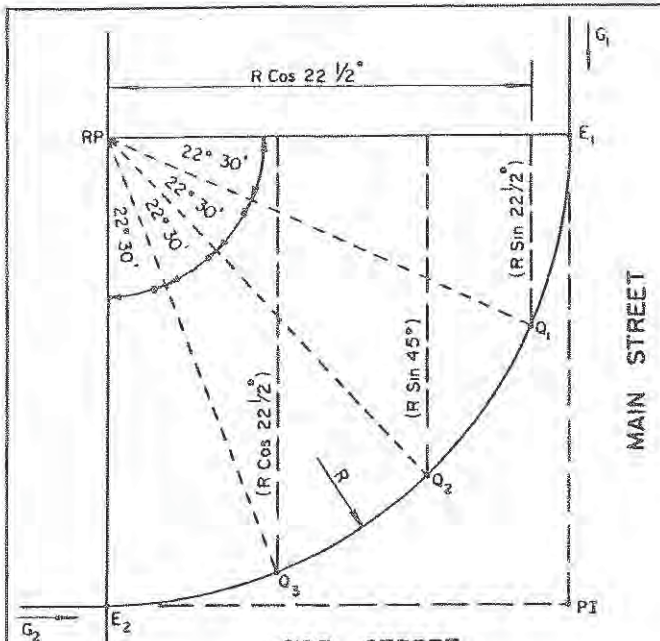
NORMAL DIMENSIONS FOR TYPICAL ROADWAY SECTIONS

R	S (min)	R/W	Q	E	F	G	H	I	J	K	L	M
36'	4'	60' min	9'	4.5'	0"	—	3 1/2"	—	2"	—	3 1/2"	—
					3"	—	6"	—	3 1/2"	2 3/4"	3 1/2"	—
					6"	—	8"	—	5 1/4"	—	4"	—
40'	5'	66'	10'	5'	0"	—	3 1/2"	—	2"	—	3 1/2"	—
					3"	—	6"	—	3 1/2"	2 3/4"	3 1/2"	—
					6"	—	8"	—	5 1/4"	—	4"	—
52'	5'	80'	13'	6.5'	0"	—	2 1/2"	—	1/2"	—	2 1/2"	—
					3"	—	5 1/2"	—	3"	2"	3"	—
					6"	—	7 1/2"	—	3 1/2"	2"	3"	—
					9"	—	10"	—	5 1/2"	—	3 1/2"	—
64'	5'	88'	16'	8'	0"	4 1/2"	2 3/4"	1 1/4"	0"	1 1/4"	2 3/4"	4 1/2"
					3"	6 1/2"	3 3/4"	1 1/2"	0"	1 1/4"	2 3/4"	4 1/2"
					6"	9 1/2"	6 3/4"	4 1/2"	2 3/4"	1 1/2"	2 3/4"	4 1/2"
					9"	12 1/2"	9 3/4"	7 1/2"	5 3/4"	4 1/4"	3"	4 1/2"
72'	5'	100'	18'	9'	0"	4 1/2"	2 3/4"	1 1/4"	0"	1 1/4"	2 3/4"	4 1/2"
					3"	6 1/2"	3 3/4"	1 1/2"	0"	1 1/4"	2 3/4"	4 1/2"
					6"	9 1/2"	6 3/4"	4 1/2"	2 3/4"	1 1/2"	2 3/4"	4 1/2"
					9"	12 1/2"	9 3/4	7 1/2"	5 3/4"	4 1/4"	3"	4 1/2"
					12"	14 3/4"	11 1/4"	8 1/2"	6 1/4"	4 1/2	3"	4 1/2"

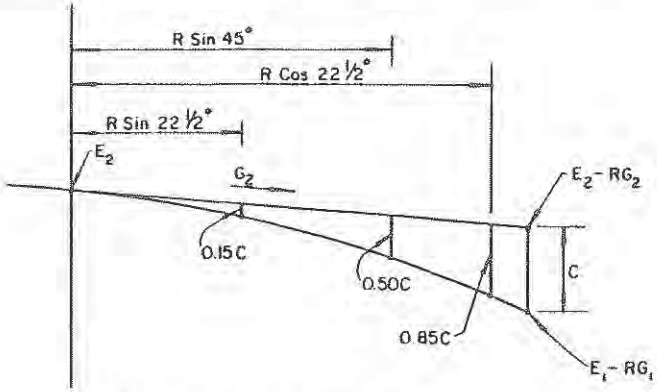
Ⓢ STANDARD UNLESS OTHERWISE NOTED ON PLAN

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	ROADWAY SECTION
w a h	7/22/65	
REVISIONS BY	DATE	
W. A. B.	5-26-71	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-R-5



COMPUTATIONS FOR QUARTER POINT GRADES
(CURB RETURNS WITH Δ BETWEEN 89° and 91°)



LEGEND & FORMULAE

$C = E_2 - E_1 + R(G_1 - G_2)$

$Q_1 = E_1 + C(1 - \cos^2 22\tfrac{1}{2}°) + R\left[G_2(1 - \cos 22\tfrac{1}{2}°) - G_1 \sin 22\tfrac{1}{2}°\right]$

$Q_2 = E_1 + C(1 - \sin^2 45°) + R\left[G_2(1 - \sin 45°) - G_1 \sin 45°\right]$

$Q_3 = E_1 + C(1 - \sin^2 22\tfrac{1}{2}°) + R\left[G_2(1 - \sin 22\tfrac{1}{2}°) - G_1 \cos 22\tfrac{1}{2}°\right]$

G = Rate of Grade

E = Elevation at Point Indicated (Ends of Return)

Q = Elevation at Point Indicated (Quarter Points)

NOTES:

(1) The method established hereon shall be used to compute both top of curb and flow line grades for all curb returns.

(2) MAIN STREET GRADES

The gradient of the "Main Street" shall be straight across the spandrel (A vertical curve will not be allowed).

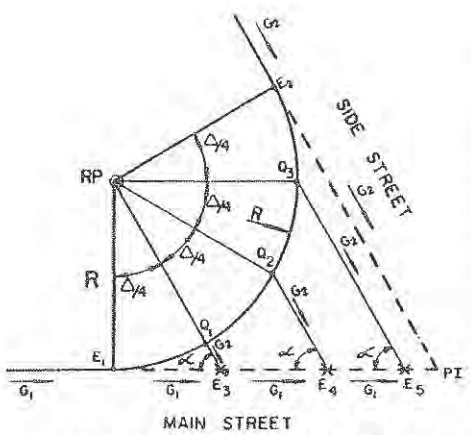
SIDE STREET GRADES

"G2" is the tangent grade of the side street at the end of the curb return.

A grade break will not be allowed at the end of the curb return. A reverse vertical curve (Opposite that of the curb return) will not be allowed at the end of the curb return.

The rate of change in grade for a side street vertical curve shall not exceed 8% per 100 feet.

(3) Curb return grade for returns other than 90° shall be established on a plane with the side street and main street gradients meeting at the return P.I.



DETAIL FOR RETURNS LESS THAN 89° MORE THAN 91°

LEGEND & FORMULAE

$E_1 - G_1T = E_2 - G_2T$

$\alpha = 180° - \Delta$

$E_3 = E_1 - G_1\left[R \sin \Delta/4 + R(1 - \cos \Delta/4) \cot \alpha\right]$

$E_4 = E_1 - G_1\left[R \sin \Delta/2 + R(1 - \cos \Delta/2) \cot \alpha\right]$

$E_5 = E_1 - G_1\left[R \sin 3/4\Delta + R(1 - \cos 3/4\Delta) \cot \alpha\right]$

$Q_1 = E_3 + G_2\left[R(1 - \cos \Delta/4) \div \sin \alpha\right]$

$Q_2 = E_4 + G_2\left[R(1 - \cos \Delta/2) \div \sin \alpha\right]$

$Q_3 = E_5 + G_2\left[R(1 - \cos 3/4\Delta) \div \sin \alpha\right]$

E & Q = Elevation of Points Indicated

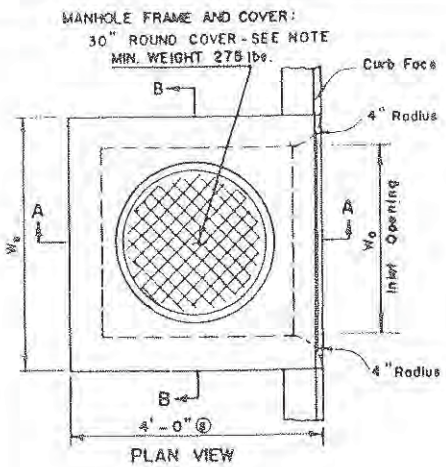
G = Rate of Grade

T = Tangent of Curb Return

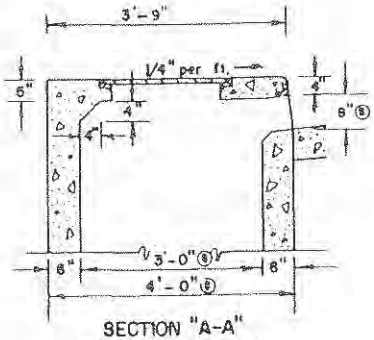
Maximum "C"	
R	C
15	0.13
20	0.24
25	0.37
30	0.54
35	0.70
40	0.80
45	0.90
50	1.00
60	1.20

CITY OF UPLAND
STANDARD DRAWING

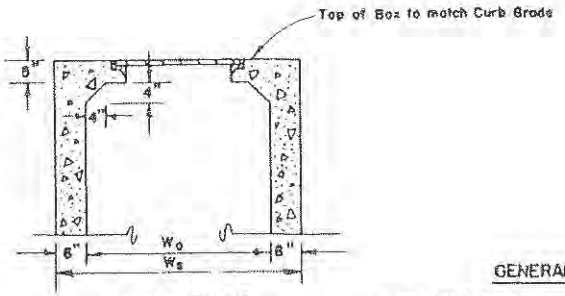
DRAWN BY	DATE	Required Method For Establishing Curb Return Grades
B.G.	3/21/74	
REVISION BY	DATE	
		APPROVED BY
		CITY ENGINEER
		DRAWING NO. CU-R-6



PLAN VIEW



SECTION "A-A"
(TOP OF INLET ONLY)



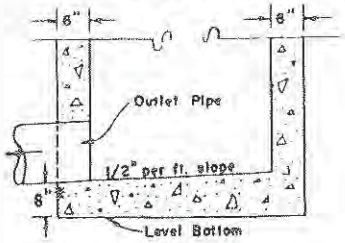
SECTION "B-B"
(TOP OF INLET ONLY)

GENERAL NOTES

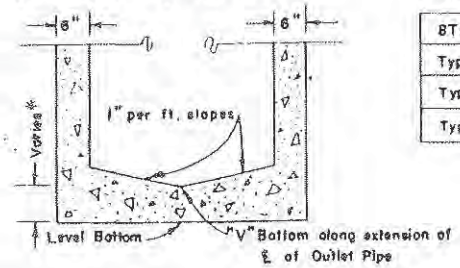
1. REFER TO CITY OF UPLAND STANDARD DRAWING CU-S-4 FOR REINFORCING STEEL AND ALL OTHER ADDITIONAL DETAILS.

2. MANHOLE FRAME & COVER EQUAL TO ALHAMBRA FOUNDRY A1136 - 30" CIRCULAR TELEPHONE TYPE WITH ALL TELEPHONE MARKINGS REMOVED, MINIMUM WEIGHT 250 LBS. OR EQUAL TO CITY OF LOS ANGELES STANDARD B2189 PARKWAY TYPE WITH LOCKING DEVICE.

TYPICAL DETAILS OF BOTTOM OF INLET STRUCTURES



SECTION OF BOTTOM
DRAWN THRU PIPE ℄



SECTION OF BOTTOM
DRAWN PERPENDICULAR TO PIPE ℄

WIDTH OF STRUCTURE (W_s)
WIDTH OF INLET OPENING (W_o)

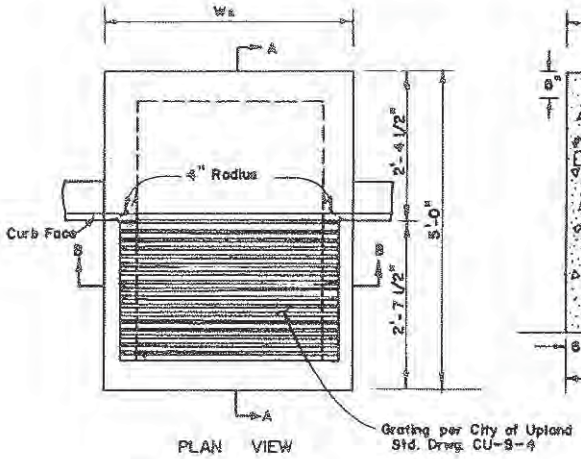
STRUCTURE	W_o	W_s
Type "A-1"	2'-11 3/8"	3'-11 3/8"
Type "A-2"	6'-4 3/4"	7'-4 3/4"
Type "A-3"	9'-10 1/8"	10'-10 1/8"

*MINIMUM BOTTOM THICKNESS = 6" AT CENTER OF PIPE OUTLET

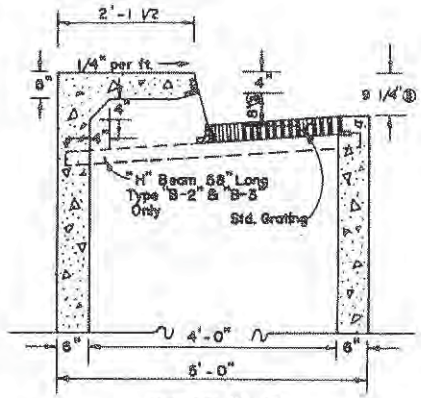
ⓢ STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN

CITY OF UPLAND
STANDARD DRAWING

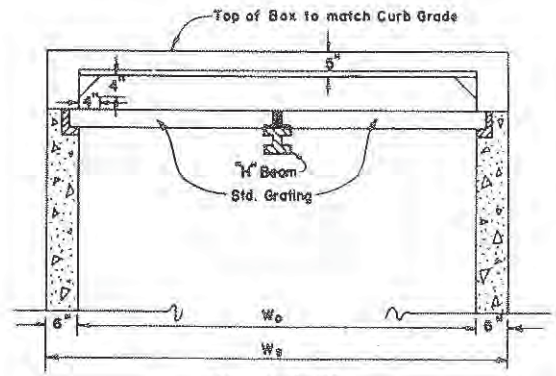
DRAWN BY	DATE	CURB INLETS
w o h	6-24-65	TYPES "A-1", "A-2" & "A-3"
REVISION BY	DATE	
L.G.K.	12-22-66	APPROVED BY
L.A.L.	10-12-77	Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-S-1



PLAN VIEW



SECTION "A-A"



SECTION "B-B"

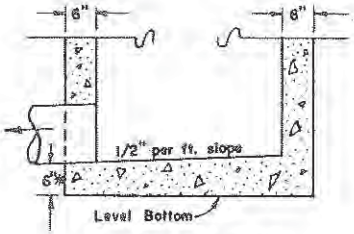
WIDTH OF STRUCTURE (W_s)
WIDTH OF INLET OPENING (W_o)

STRUCTURE	W_o	W_s	"H" BEAM
Type "B-1"	2'-11 3/8"	3'-11 3/8"	Not Required
Type "B-2"	6'-4 3/4"	7'-4 3/4"	1-5" WF 18.9#
Type "B-3"	9'-10 1/8"	10'-10 1/8	2-5" WF 18.9#

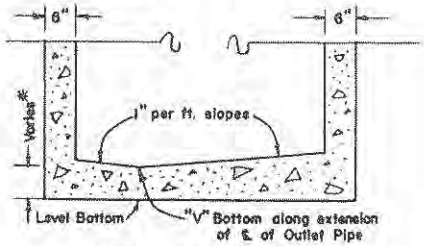
GENERAL NOTES

REFER TO CITY OF UPLAND STANDARD DRAWING CU-S-4 FOR REINFORCING STEEL, GRATINGS, AND ALL OTHER ADDITIONAL DETAILS.

TYPICAL DETAILS OF BOTTOM OF INLET STRUCTURES



SECTION OF BOTTOM DRAWN THRU PIPE ℄



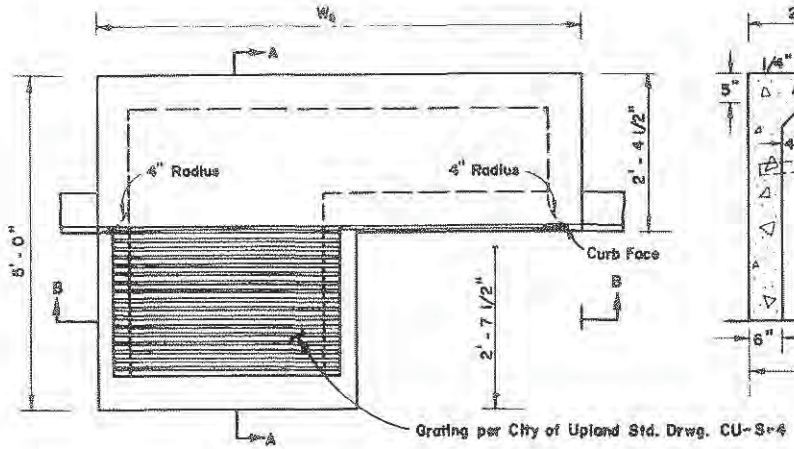
SECTION OF BOTTOM DRAWN PERPENDICULAR TO PIPE ℄

*Minimum bottom thickness = 6" at center of pipe outlet.

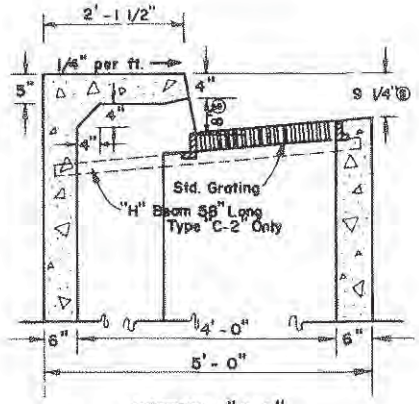
® STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

CITY OF UPLAND STANDARD DRAWING

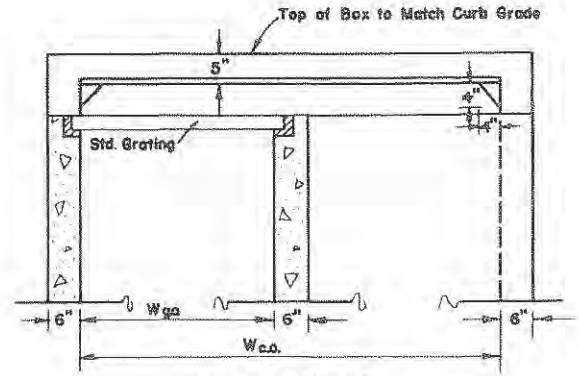
DRAWN BY	DATE	CURB INLETS TYPES:
w a h	6/29/65	"B-1", "B-2" & "B-3"
REVISION BY	DATE	APPROVED BY
w a h	11-26-65	Fred C. Blanchard
L.G.K.	12-21-66	CITY ENGINEER
		DRAWING NO. CU-S-2



PLAN VIEW



SECTION "A-A"



SECTION "B-B"

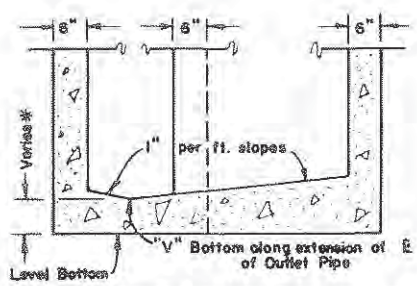
GENERAL NOTES

REFER TO CITY OF UPLAND STANDARD DRAWING CU-S-4 FOR REINFORCING STEEL, GRATINGS, AND ALL OTHER ADDITIONAL DETAILS.

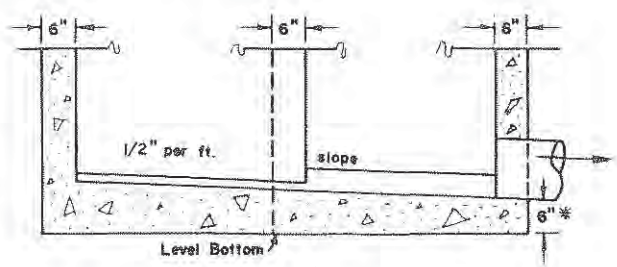
WIDTH OF STRUCTURE (W_s)
WIDTH OF GRATE OPENING ($W_{g.o.}$)
WIDTH OF CURB OPENING ($W_{c.o.}$)

STRUCTURE	W_s	$W_{g.o.}$	$W_{c.o.}$	"H" BEAM
Type "C-1"	7'-4 3/4"	2'-11 3/8"	6'-4 3/4"	Not Required
Type "C-2"	10'-10 1/8"	6'-4 3/4"	9'-10 1/8"	1-5" WF 18.9#

TYPICAL DETAILS OF BOTTOM OF INLET STRUCTURES



SECTION OF BOTTOM DRAWN THRU PIPE ℄



SECTION OF BOTTOM DRAWN PERPENDICULAR TO PIPE ℄

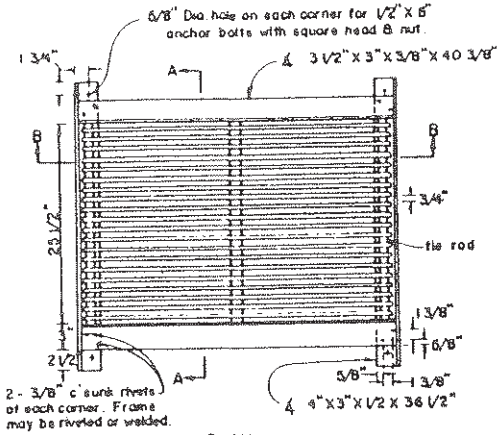
* Minimum bottom thickness = 6" at center of pipe outlet

® STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

CITY OF UPLAND STANDARD DRAWING

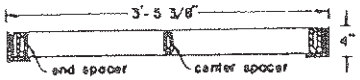
DRAWN BY	DATE	CURB INLETS
w a h	6/29/65	TYPES "C-1" & "C-2"
RIVISION BY	DATE	
w a h	11-26-65	APPROVED BY Fred C. Blanchard
L. G. K.	12-21-66	CITY ENGINEER
		DRAWING NO. CU-S-3

FRAME AND GRATING

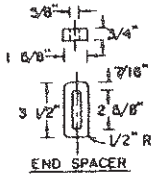


PLAN

SECTION "A-A"



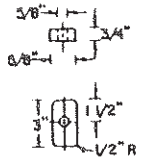
SECTION "B-B"



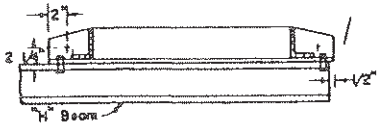
END SPACER

CENTER SUPPORT ASSEMBLY

PLAN



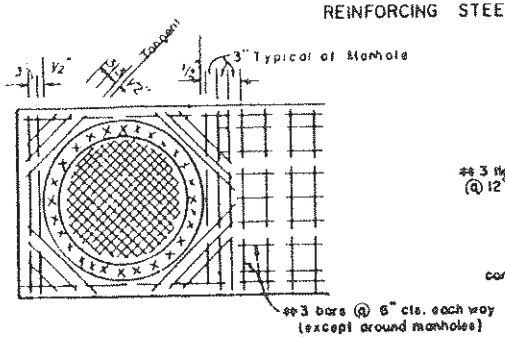
CENTER SPACER



ELEVATION

SECTION "C-C"

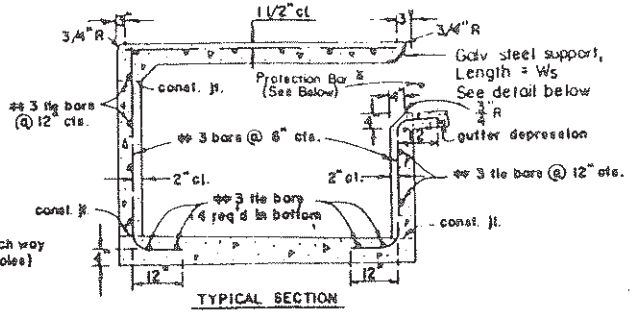
REINFORCING STEEL



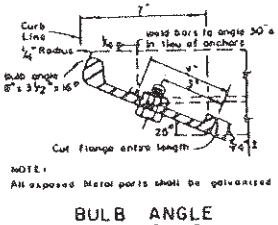
TYPICAL TOP SLAB REINFORCING
All Curb Inlets & Outlet Structures

TYPICAL SLAB SECTION AT MANHOLE

* #1 protection bar 4" from bottom of the depression
NOTE, a 2nd bar is required if top opening is over 6"

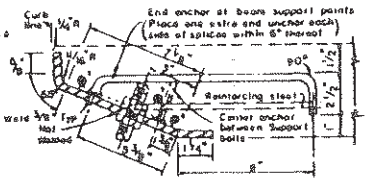


TYPICAL SECTION
All Curb Inlets & Outlet Structures



NOTE:
All exposed Metal parts shall be galvanized

BULB ANGLE
Alternate for Face Plate



NOTES:
(1) 3-#8 Bars at each beam plate, splice centered on joint
All exposed Metal parts shall be galvanized

FACE PLATE ANCHORAGE

GENERAL NOTES

REINFORCING STEEL

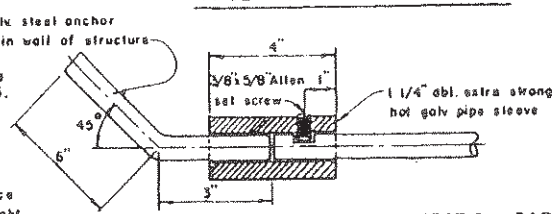
1. The details shown hereon apply to standard Curb Inlets and Outlets per City of Upland drwgs. no. CU-S-1, CU-S-2, CU-S-3 & CU-S-5.
2. All reinforcing steel, unless otherwise noted, shall be 3/8" Dia.

MANHOLE FRAME AND COVER

1. To be Parkway Type, min. weight 130 lbs, equal to the City of Los Angeles Standard No. B 218 9 with locking device OR Telephone Type with all markings removed, min. weight 250 lbs.. (ALHAMBRA FOUNDRY no. A1136 or equal.)

FRAME AND GRATE

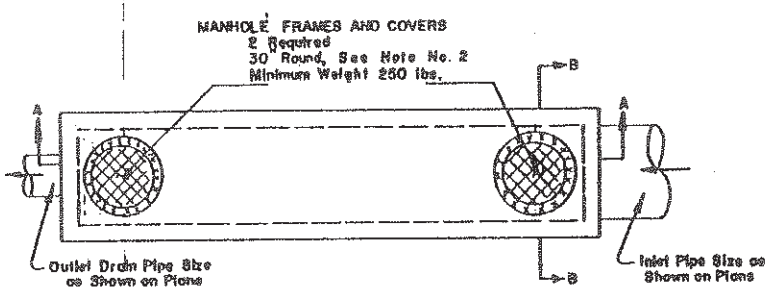
1. Center support assembly shall be used for multiple grating installations.
2. All exposed metal parts shall be galvanized. Welding, machining and drilling shall be done before galvanizing.
3. Bolt holes shall be 5/8" Dia. unless otherwise specified. Bolts shall be used to join two or more frames to "H" beam.
4. Tie rods shall be 1/2" Dia. X 25 3/8", threaded 3/4" on bolt ends. Use one 1/2" Dia. square head nut at each end.
5. Top of grating shall be flush with street surface on all corners.
6. All parts shall be of structural grade steel, except spacers, which shall be either cast iron or steel.



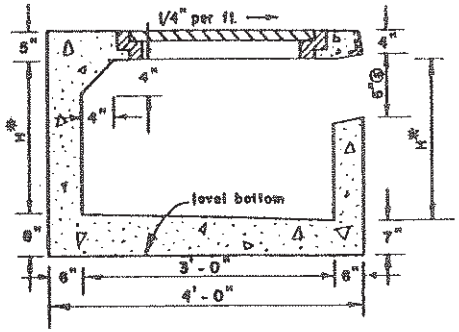
DETAIL OF REMOVABLE PROTECTION BAR
(TO BE USED IN ALL CASES Unless Otherwise Noted On The Plans)

CITY OF UPLAND STANDARD DRAWING

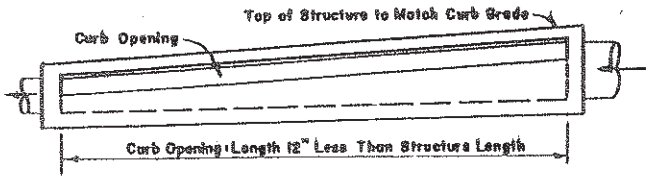
DRAWN BY	DATE	FRAME & GRATING & REINFORCING STEEL
w e h	7/9/85	
REVISIONS BY	DATE	APPROVED BY
L.H.H	10/24/66	Fred C. Blanford
L.G.K	12/21/66	CITY ENGINEER
L.W.G	5/20/70	
W.A.B	8/26/71	
L.A.L	2/28/77	DRAWING NO. CU-S-4



PLAN VIEW



SECTION "B-B"

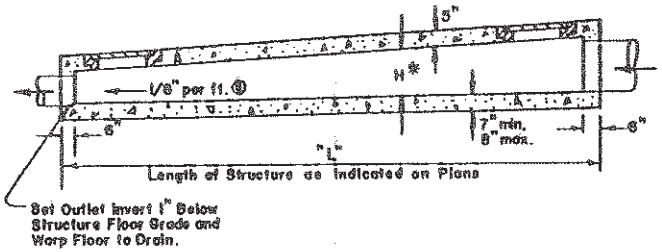


FRONT VIEW

*"H" IS VARIABLE DIMENSION. MAXIMUM "H" EQUALS INSIDE HEIGHT OF INLET PIPE PLUS 2", AT INLET END OF STRUCTURE.

GENERAL NOTES

1. REFER TO CITY OF UPLAND STANDARD DRAWING CU-S-4 FOR REINFORCING STEEL AND ALL OTHER ADDITIONAL DETAILS.
2. MANHOLE COVER & FRAME TO BE PARKWAY TYPE EQUAL TO CITY OF LOS ANGELES STANDARD B2169 WITH LOCKING DEVICE OR TELEPHONE TYPE, MINIMUM WEIGHT 250 LBS., WITH ALL MARKINGS REMOVED. (ALHAMBRA FOUNDRY NO. A1136 OR EQUAL.)



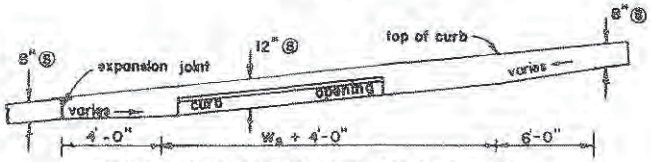
SECTION "A-A"

⊕ STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

CITY OF UPLAND STANDARD DRAWING

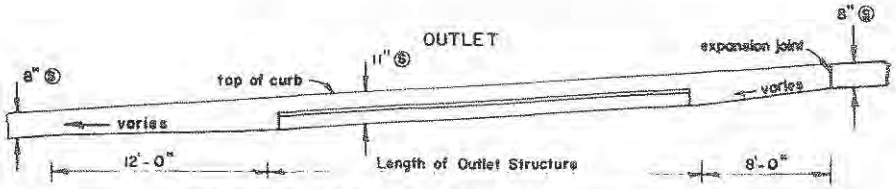
DRAWN BY	DATE	CURB OUTLET STRUCTURE
w e h	7/1/65	
REVISION BY	DATE	
L A L	10/18/77	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-S-5

INLETS

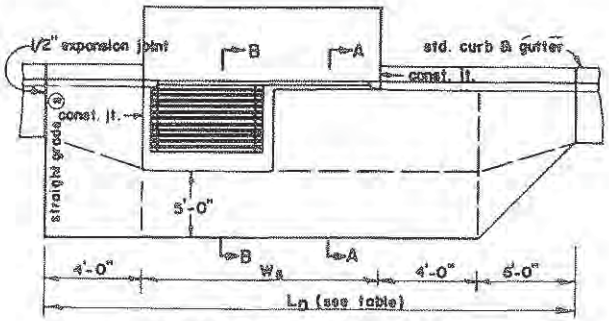


TYPICAL CURB ELEVATION VIEW FOR CURB INLETS

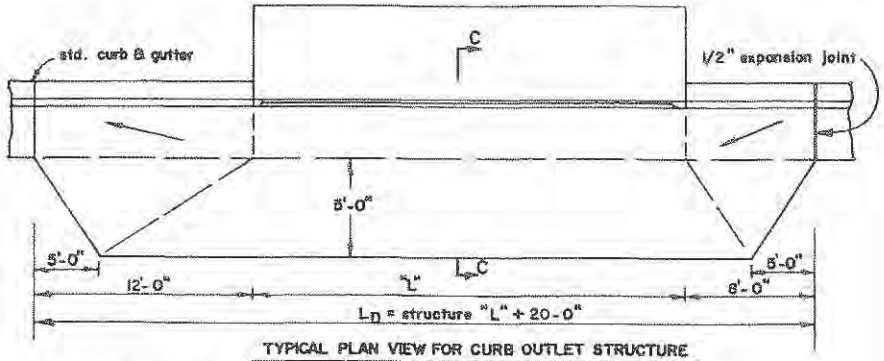
OUTLET



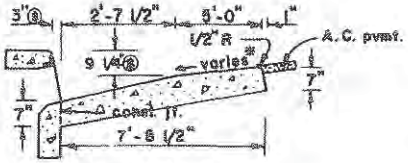
TYPICAL CURB ELEVATION VIEW FOR CURB OUTLET STRUCTURE



TYPICAL PLAN VIEW FOR CURB INLETS

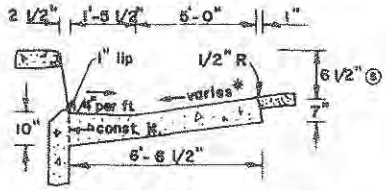


TYPICAL PLAN VIEW FOR CURB OUTLET STRUCTURE

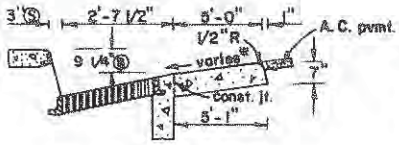


SECTION "A-A"

* Slope to meet pavement grade.



SECTION "C-C"



SECTION "B-B"

CURB INLET

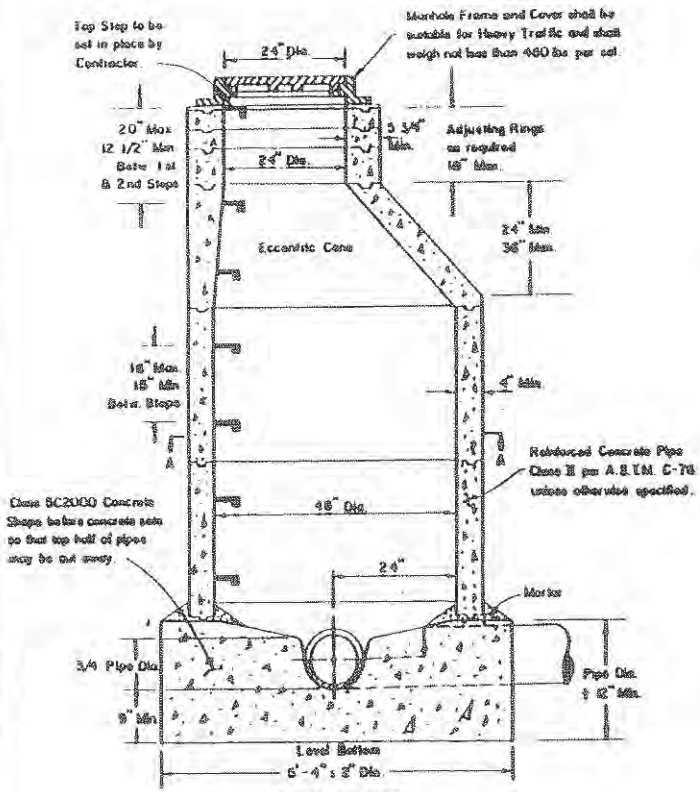
STRUCTURE	A-1 & B-1	A-2, B-2 & C-1	A-3, B-3 & C-2
L_D	17'-11 3/8"	21'-4 3/4"	24'-10 1/8"

Ⓢ STANDARD DIMENSION UNLESS OTHERWISE NOTED ON PLAN.

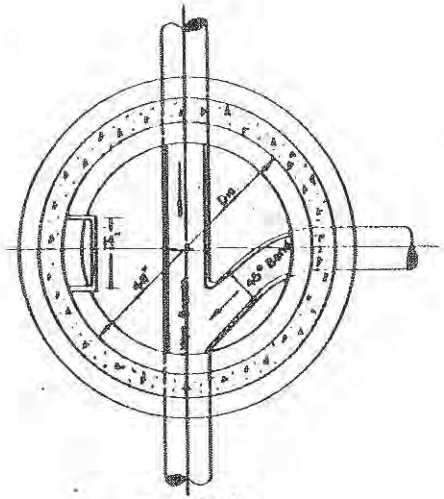
CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	STANDARD GUTTER DEPRESSIONS FOR CURB INLETS AND OUTLETS
w o h	7/12/65	
REVISION BY	DATE	
w o h	11-26-65	APPROVED BY
L.G.K.	12-21-66	Fred C. Blanchard, CITY ENGINEER
		DRAWING NO. CU-S-6

TYPE "A" MANHOLE

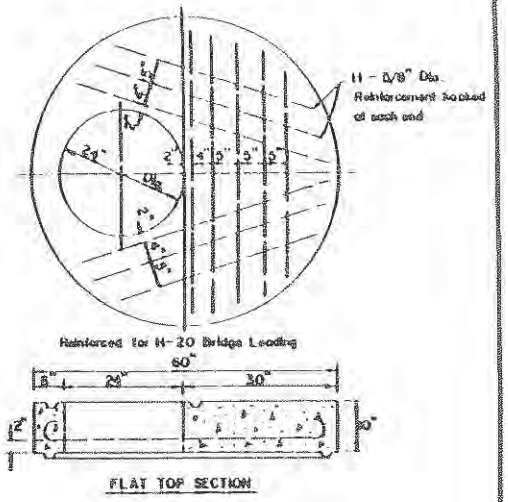


TYPICAL SECTION



SECTION "A-A"

TYPE "B" MANHOLE



FLAT TOP SECTION

NOTE:
Type "B" Manhole same as Type "A" Manhole except that Flat Top Section shall be used in place of Eccentric Cone Section & Manhole walls shall be St'd Precast Sections having 6"* minimum wall thickness.
(* Minimum reinforcement for Sections having 6" wall thickness shall be No. 4 wire hoops.)

GENERAL NOTES

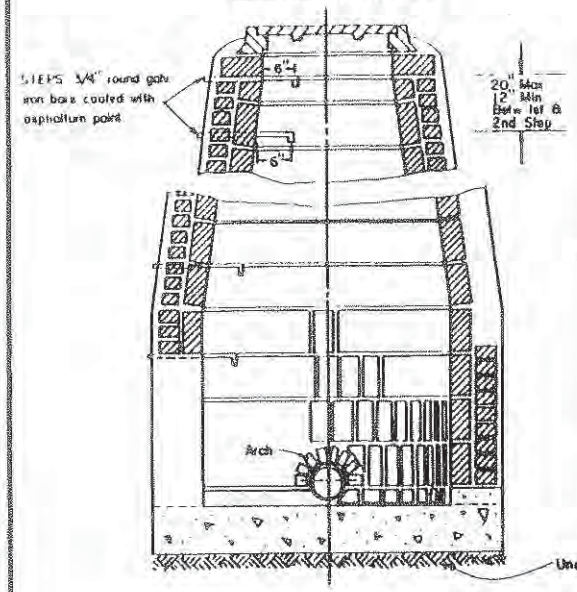
STANDARD MANHOLE—TYPE "A":
Type "A" Manholes shall be used in all cases, unless otherwise noted on the Plan or in the Specifications.

DROP MANHOLES:
Drop Manholes shall be constructed using a Tee Branch at top invert and a 90° Bend at the bottom invert. The entire Drop Section shall be encased in concrete, having a 6 inch minimum cover, from the base of the Manhole to the center of the upper pipe section.

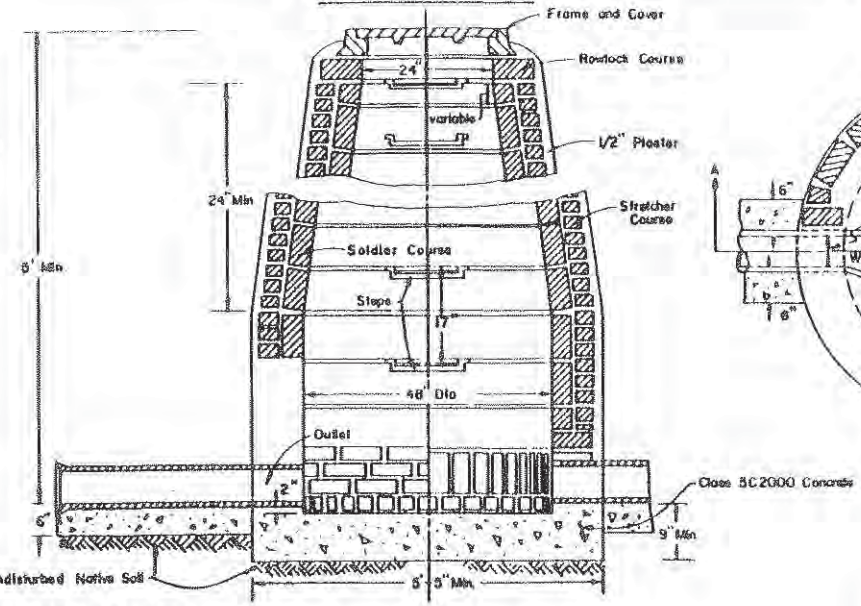
CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	PRECAST CONC. MANHOLES TYPE "A" & TYPE "B" FOR SANITARY SEWER SYSTEMS
w a k	10/21/55	
REVISION BY	DATE	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-Z-1

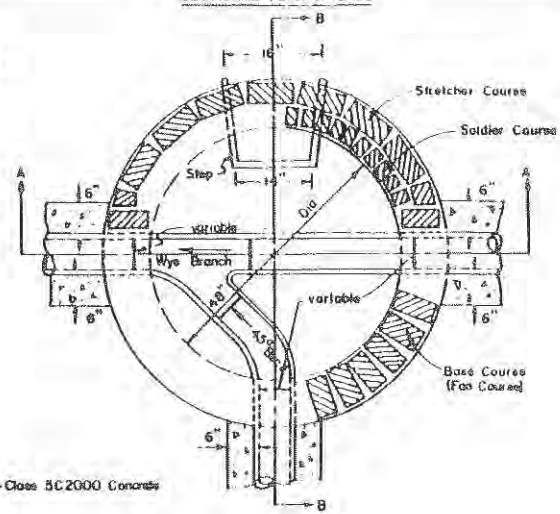
SECTIONAL ELEVATION "B-B"



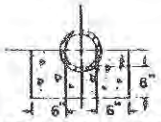
SECTIONAL ELEVATION "A-A"



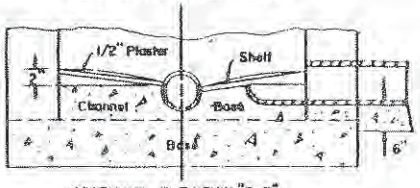
SECTIONAL PLAN OF BASE



TYPE "C" MANHOLE



CROSS SECTION OF CRADLE



SECTIONAL ELEVATION "B-B"
CHANNEL BASE

GENERAL NOTES

CONCRETE BASE:
During construction, all pipes shall be rigidly supported by brick piers one foot deep, located just outside the structure. Construct top of concrete base 2 inches below invert of lowest pipe. Fill space beneath pipe with mortar and shove from both sides with base course brick to form a water tight joint.

BASE OR FAN COURSE:
Lay brick flat on radial lines with tops to same level.

ARCHES:
Lay spalled brick on edge to form a true radial arch with full mortar joint around all pipe openings. Turn arch of two such courses over pipes 15 inches or more in diameter.

SOLDIER COURSES:
Lay inside brick on radial lines with first four courses vertical. Lay succeeding courses with a uniform batter to obtain an inside diameter of 24" at top of last or fractional soldier course. Use split brick to close soldier course.

STRETCHER COURSES:
Lay outside brick flat in a deep bed of mortar. Shove brick hard together against adjacent soldier course.

ROWLOCK COURSE:
Lay last course of brick on edge across soldier and stretcher courses, on radial lines.

STEPS:
Set lower step on top of third soldier course and notch brick above. Place upper step immediately below rowlock course and project 6 inches. Steps shall be spaced not more than 17 inches apart.

JOINTS:
Inside joints shall be neatly struck and pointed and shall not exceed 3/8 inch in thickness.

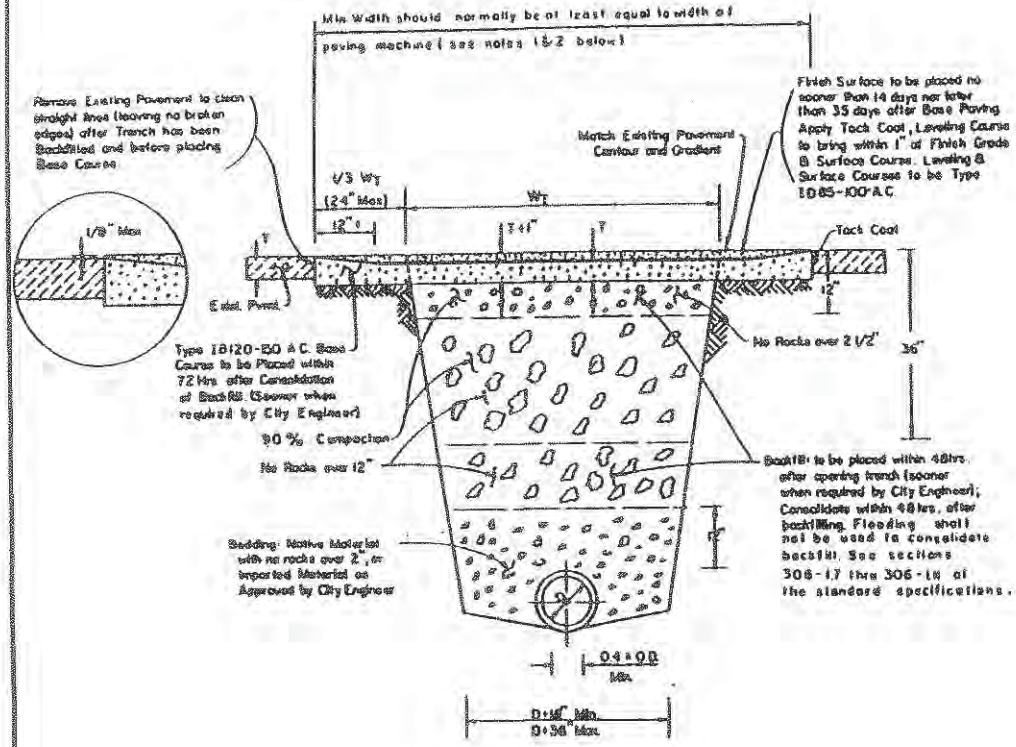
CHANNEL BASE:
The depth of channel in channel base shall be 3/4 of pipe diameter for pipes 15 inches or less, and shall equal the pipe diameter for pipes 18 inches or larger. For special channels in trap or gauging manholes see special plans.

CRADLE:
Cradle first length of pipe at all inlets and outlets with concrete per detail.

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	BRICK MANHOLE TYPE "C" FOR SANITARY SEWER SYSTEMS
w o h	10/21/65	
REVISION BY	DATE	APPROVED BY
		Fred C. Blanchard
		CITY ENGINEER
		DRAWING NO. CU-Z-2

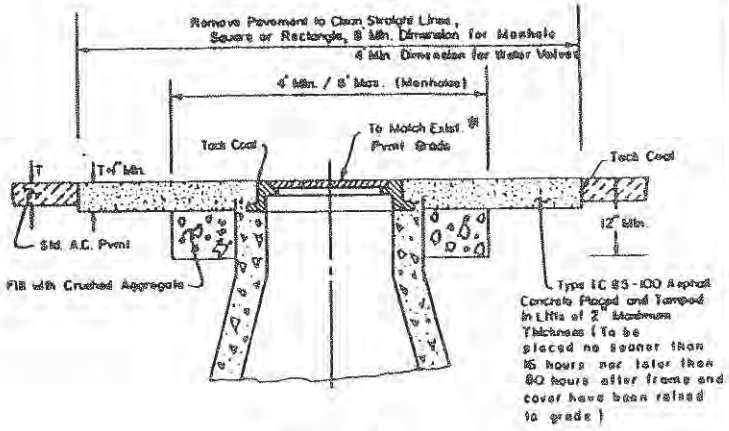
DETAIL FOR TRENCHING, BACKFILL & A.C. PAVEMENT REPAIR



GENERAL NOTES

1. Spreader Boxes may be employed for ditch paving jobs less than 500 lin. ft..
2. All Joints shall be vertical butt joints. Lap or feathered joints are not allowed.
3. Unless otherwise instructed by city Engineer, trench patch should be straight grade across width, and should not be crowned at center.

DETAIL FOR ADJUSTING MANHOLES & WATER VALVES TO GRADE



GENERAL NOTES

1. # Frame and Cover to be set 3" to 6" below Subgrade before A.C. Pavement is Placed.
2. Frame and Cover to be adjusted to Grade after A.C. Paving. Pavement Repairs to be made per this Detail after Raising to Grade.
3. Reset Top Step in Manhole of the time Frame and Cover are raised to Grade; add additional step when necessary to maintain proper spacing between Steps (see Dwgs. CU-Z-1 & CU-Z-2 for Correct Spacing of Steps).

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	TRENCHING, BACKFILLING, ADJUSTING TO GRADE AND ASSOCIATED PAVEMENT REPAIRS
w s h	10/28/65	
REVISION BY	DATE	
L.w.s	10-24-66	APPROVED BY
L.G.K.	12-22-66	Fred C. Blanchard, CITY ENGINEER
W A B	12-1-70	DRAWING NO CU-Z-3

1. Trench repair shall be per City Standard CU-Z-3 except as modified below. This drawing and these modifications shall be considered a part of the plans.

   a. Pavement removals for trench resurfacing shall be at right angles to or parallel with the centerline of the street. No curvilinear trench surfacing will be permitted.

   b. All pavement cuts for trench resurfacing shall be saw cut leaving a clean straight line.

   c. If the remainder pavement between the edge of the trench cut and gutter line (or pavement joint, previous trench cut, longitudinal crack, transverse crack, etc.) is less than four feet, that pavement shall be removed. Resurfacing shall be incorporated with trench resurfacing.

   d. If the remainder pavement between the edge of trench cut and gutter line is four feet or greater, the remainder pavement shall be ground down tapering from 1" at the gutter to 0" four feet out from gutter. Trench resurfacing shall include overlaying this ground pavement.

   e. Depending upon width of trench, location of trench, condition of pavement, number of lanes, traffic volumes and other factors, additional requirements are made. Such requirements may include lane resurfacing, half street resurfacing, whole street resurfacing, and slurry seals.

   f. Prior to saw cutting for trench resurfacing, removal limits shall be approved by City Inspector.

2. Sidewalk and curb and gutter repair shall be to the closest expansion joint.

3. A Street Closure Permit shall be obtained from the City at least 48 hours prior to the start of construction.

4. Compaction test required - 95%. (Note: This item may be revised to 90% by City).

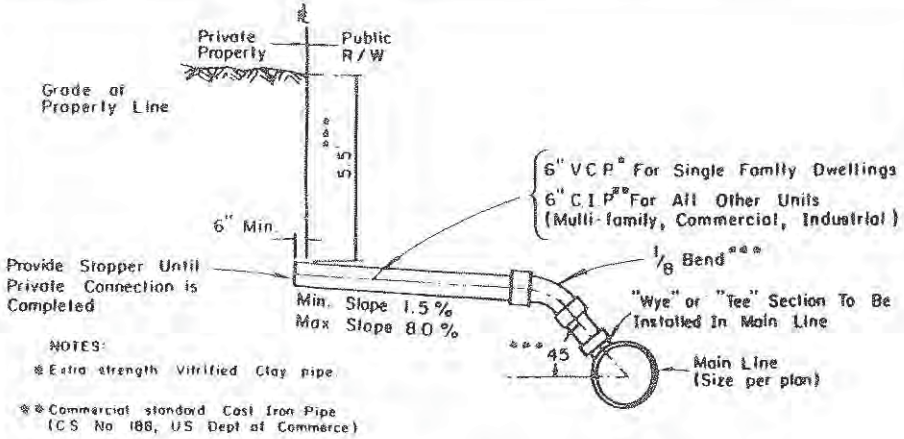
5. City of Upland Water Department Standard W6-23, which is attached, shall be considered part of this plan.

6. Centerline of trench, conduit or other utility installation shall not be closer than 5' from the edge of the gutter.

7. A preconstruction meeting shall be scheduled with the engineering department at least 10 days prior to start of construction unless otherwise directed by Engineering Department Public Works Director.

Call ~~Sharon Sharrett at 982-1352 ext. 222~~ BOB SCHNEEMAN 931-4146 if you have questions.

5/4/89



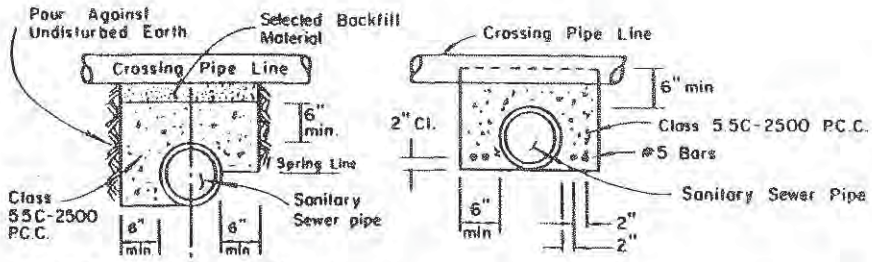
NOTES:

* Extra strength Vitrified Clay pipe

** Commercial standard Cast Iron Pipe (CS No 188, US Dept of Commerce)

*** Normal, unless otherwise noted on plan

SANITARY SEWER LATERAL LINE



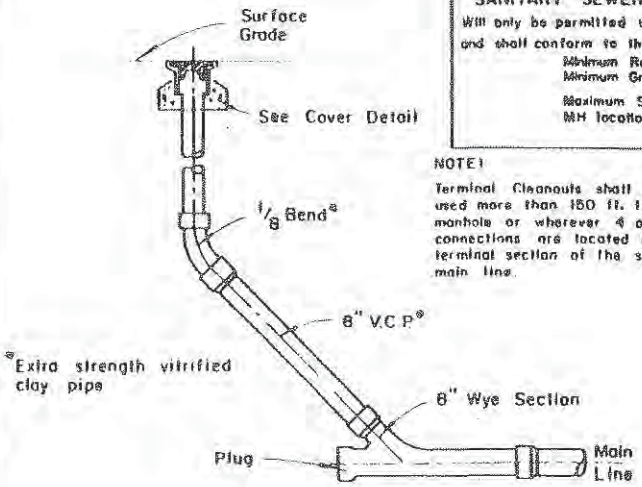
HALF SECTION — Use when sewer is being constructed

HALF SECTION — Use when sewer is existing

NOTE:
Minimum length for protection shall be 48" plus the diameter of the pipe crossing the sewer.

PROTECTION FOR SANITARY SEWERS

(Use When Clearance Between Sewer And Other Pipe Is 18" or Less)



*Extra strength vitrified clay pipe

SANITARY SEWER TERMINAL CLEANOUT

SANITARY SEWER ON HORIZONTAL CURVE

Will only be permitted when concentric with the street ℄, and shall conform to the following limiting requirements

Minimum Radius: 200 LF

Minimum Grade in % = $0.4 + \frac{80}{R}$

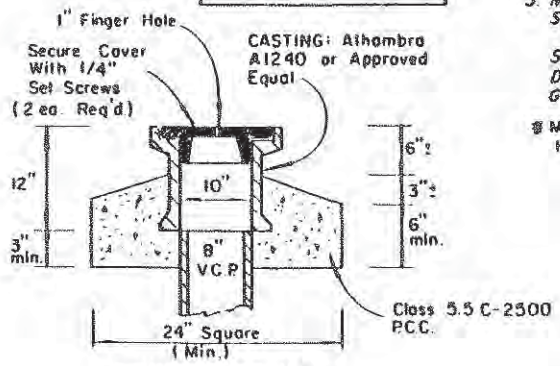
Maximum Spacing of staking 25 ft.

MH locations Req'd at both ends of curve with Max. spacing of 250 ft.

NOTE:
Terminal Cleanouts shall not be used more than 150 ft. from a manhole or wherever 4 or more connections are located on the terminal section of the sewer main line.

MAIN LINE GRADIENTS

DIA.	MIN. SLOPE	MAX. SLOPE
* 8"	0.40 %	8.0 %
10"	0.32	7.0
12"	0.24	5.0
15"	0.18	4.0
18"	0.14	3.0
21"	0.12	2.5
24"	0.10	2.0



COVER "DETAIL"

GENERAL NOTES:

1. The width of the trench at the top of the pipe shall not exceed 3 times the diameter of the sanitary sewer pipe.
2. Grade stakes shall be set every 25 feet to insure a true gradient.
3. Maximum spacing between manholes: $S_{max.} = 35\ (D + G^{1/2})$

S_{max} = Maxium spacing
D = Diameter in inches
G = Gradient in percent

* Minimum Slope Shall Be Increased For Dead End Lines Having A Limited Number Of Connections

CITY OF UPLAND STANDARD DRAWING

Drawn By	Date	SANITARY SEWER SYSTEMS
LWA	4-27-70	MAIN LINES
Revisions By	Date	LATERAL LINES
B.G.	12-12-73	TERMINAL CLEANOUTS
B.F	12-4-75	Approved By Fred C. Blanchard, City Engineer
		DRAWING NO. CU-Z-4

SAMPLE

DESIGN PROFESSIONAL'S STATEMENT
TEMPORARY DRAINAGE AND EROSION CONTROL

This drainage and erosion control plan was prepared under my direction. Berms, swales, sandbags and other temporary drainage facilities shown here are to be installed and maintained during the construction phase of the project.

In my opinion, adequate provisions have been made to provide drainage of surface water from the site without causing flooding or sedimentation problems on public rights-of-way or surrounding private property.

Firm Name

Signature

Title RCE#

Date

CITY ENGINEER'S STATEMENT
TEMPORARY DRAINAGE AND EROSION CONTROL

I hereby accept this temporary drainage and erosion control plan as meeting the prerequisites for issuance of permits and for record purposes.

This plan was prepared under the direction of a fully qualified professional who has stated that the implementation of the drainage devices shown hereon will alleviate potential flooding and erosion problems affecting public rights-of-way and surrounding private property during the construction stage of the project.

City Engineer RCE#

Date

TO APPEAR
ON PAGE 1
OF PLAN(S)

DESIGN PROFESSIONAL'S STATEMENT
(Parkway Landscaping and Irrigation)

This plan was prepared under my direction and is, in my professional opinion, in accordance with all applicable City of Upland standards, requirements and conditions of approval, and, to the best of my knowledge, with all applicable California State Laws and requirements. The irrigation system is designed according to generally accepted standards and, in my opinion, will provide adequate coverage with relatively low maintenance. The hardscape items (sidewalks, drive approaches, etc.) shown on this plan conform, to the best of my knowledge, to the civil engineering plans for this project. In the event of any descrepancies, the civil engineering plans are assumed to be correct.

The developer has arranged to have (firm name): _____
inspect, or direct the inspection of the construction of the public and private facilities shown on these plans, and to furnish the statements, reports, and "as built" plans required by Planning Department Directive No. 9.

I have received a copy of the approved street tree list. The trees selected for the public right-of-way have been selected from that list.

_____
Firm Name

_____
Name Title

_____
Date

STATEMENTS OF CITY OF UPLAND
(Parkway Landscaping and Irrigation)

I hereby accept this Plan as meeting the prerequisite for issuance of applicable permits and for record purposes. This Plan was prepared under the direction of a fully qualified professional who has stated that the Plan conforms with all applicable requirements of the City. The design, elevations, sizes, details and features of the landscaping and irrigation have not been reviewed by the City, except as they relate to the City Standards, conditions of approval, and backflow prevention devices.

_____
Water Utility Director Date

_____
City Engineer RCE# 15033 Date
EXP. 3-31-91

DESIGN PROFESSIONAL'S STATEMENT FOR ROUGH GRADING

On behalf of _____, I hereby state that I am an official representative of the firm and that as of _____ (date), the rough grading of _____ has been completed, under my supervision, and is in substantial conformance with the official Grading Plan filed with the City, except as otherwise revised in an acceptable manner and in accordance with all applicable City of Upland Grading Standards and Conditions of Approval concerning grading and Section 8110 of the Upland Municipal Code. In my opinion, adequate provisions have been made for the drainage of surface waters from each building site.

I agree that concurrent with the filing of this grading statement for the final unit of this development, if substantial changes have been made, I will file an "As Built" plan with the City for record purposes which will reflect all significant changes from the original plan and which will include a statement that all changes conform to City Grading Standards and Conditions of Approval concerning grading and Section 8110 of the Upland Municipal Code. The "As Built" plan will show conditions as they existed on the inspection date indicated on this statement and will not show subsequent changes made by individual lot owners.

Remarks: _____

_____

_____

_____

_____

_____
Firm Name

_____
Signature

_____
Title RCE #

_____
Date

DESIGN PROFESSIONAL'S STATEMENT FOR FINAL GRADING

On behalf of _____, I hereby state that I am an official representative of the firm and that as of _____ (date), the final grading of _____ has been completed, under my supervision, and is in substantial conformance with the official Grading Plan filed with the City, except as otherwise revised in an acceptable manner and in accordance with all applicable City of Upland Grading Standards and Conditions of Approval concerning grading and Section 8110 of the Upland Municipal Code. In my opinion, adequate provisions have been made for the drainage of surface waters from each building site.

I agree that concurrent with the filing of this grading statement for the final unit of this development, if substantial changes have been made, I will file an "As Built" plan with the City for record purposes which will reflect all significant changes from the original plan and which will include a statement that all changes conform to City Grading Standards and Conditions of Approval concerning grading and Section 8110 of the Upland Municipal Code. The "As Built" plan will show conditions as they existed on the inspection date indicated on this statement and will not show subsequent changes made by individual lot owners.

Remarks: _____

_____

_____

_____

_____

_____
Firm Name

_____
Signature

_____
Title RCE #

_____
Date

SAMPLE

To appear on page 1 of plan

DESIGN PROFESSIONAL'S STATEMENT

This grading plan was prepared under my direction and is in accordance with Section 8110 of the Upland Municipal Code. The site grading and related structural features as designed and shown hereon conform with all applicable details and provisions of Series CU-E of the Standard Drawings of the City of Upland, with Series ED-E of the Engineering Directives, and with any City of Upland Conditions of Approval concerning grading. In my opinion, adequate provisions have been made for the drainage of surface waters from each building site.

Firm Name

Signature

Title RCE#

Date

STATEMENT OF CITY ENGINEER

I hereby accept this Grading Plan as meeting the prerequisite for issuance of a Grading Permit and for record purposes. This Grading Plan was prepared under the direction of a fully qualified professional who has stated that the plan conforms with all applicable requirements of the City. The design, elevations, details and features of the on-site grading have not been reviewed by the City, except as they relate to public improvements within adjacent right of ways and easements.

City Engineer RCE#

Date

General Notes

1. The Land Surveyors Act, Section 8771 of the Business & Professions Code, and Sections 732.5, 1492.5, 1810.5 of the Streets & Highways Code require that survey monuments shall be protected and perpetuated.

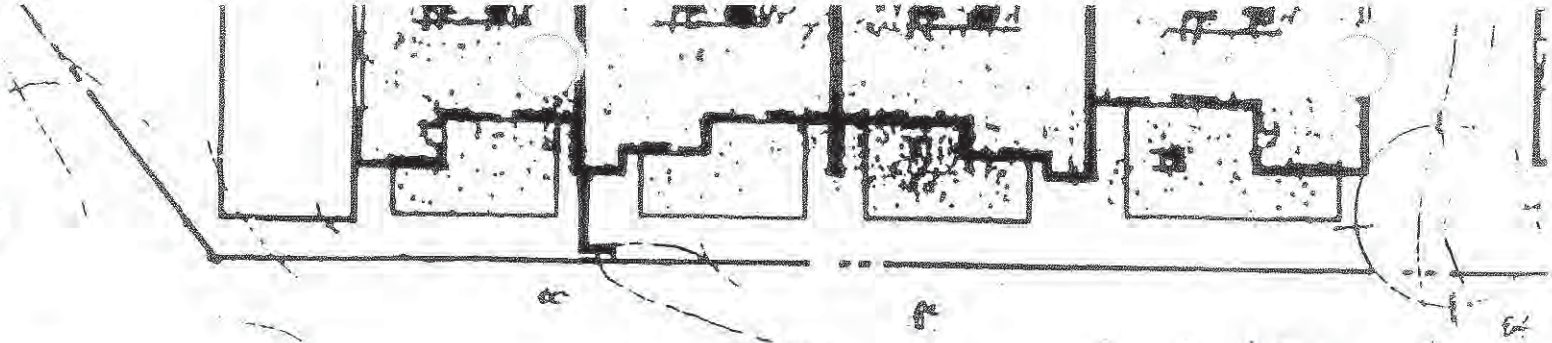
2. When monuments are near the path of construction, the monuments shall be located and referenced out by a Licensed Land Surveyor or Registered Civil Engineer (authorized to practice Land Surveying), prior to the time of construction.

3. Corner Records shall be filed with County Surveyor prior to the start of construction, for those survey points that exist as shown on recorded Tract Maps, Parcel Maps, Records of Surveys, Highway Maps or points that provide survey control. These Corner Records shall describe the monuments found as well as tie distances to reference points for the resetting of the survey monuments.

4. When the construction is completed, the monuments shall be set to the surface, or a survey monument box set at the monument or permanent witness monuments set to perpetuat the location. Corner Records are to be filed with the County Surveyor for the new monuments set.

5. Reconstruction and relocation of improvements or utilities on roads pursuant to Section 8771, is understood to mean grinding, asphalt overlays, chips seals, slurry seals or any other work that will cover or disturb the survey monuments.

Survey monuments that exist as shown on Recorded Maps, Highway Maps or points that provide survey control within the construction area, shall be located and referenced out by a Licensed Land Surveyor or Registered Civil Engineer (authorized to practice Land Surveying), and Corner Records shall be filed with the County Surveyor prior to the start of construction. These Corner Records shall describe the monuments found with tie distances to reference points for resetting of the survey monument . When construction is completed, monuments shall be set and Corner Records shall be filed with the County Surveyor showing the new monuments.



FILE

MW/
For your File
KL
2-23-83

DESIGN PROFESSIONAL'S STATEMENT
(ON SITE STREET LIGHTING)

THIS PLAN WAS PREPARED UNDER MY DIRECTION AND IS, IN MY PROFESSIONAL OPINION, IN ACCORDANCE WITH ALL APPLICABLE CITY OF UPLAND STANDARDS, REQUIREMENTS AND CONDITIONS OF APPROVAL, AND, TO THE BEST OF MY KNOWLEDGE, WITH ALL APPLICABLE CALIFORNIA STATE LAWS AND REQUIREMENTS. THE STREET LIGHTING SYSTEM IS DESIGNED ACCORDING TO GENERALLY ACCEPTED STANDARDS AND, TO THE BEST OF MY KNOWLEDGE, THIS SYSTEM HAS BEEN INSTALLED IN THE SAME LOCATIONS AND WITH THE SAME WATTAGES AS SHOWN ON THE PLAN.

THE DEVELOPER HAS ARRANGED TO HAVE WHITTAKER ELECTRIC COMPANY INSPECT, OR DIRECT THE INSPECTION OF THE CONSTRUCTION OF PUBLIC AND PRIVATE FACILITIES SHOWN ON THESE PLANS, AND TO FURNISH THE STATEMENTS, REPORTS AND "AS BUILT" PLANS REQUIRED BY THE CITY OF UPLAND ENGINEERING DEPARTMENT.

WHITTAKER ELECTRIC co.
CONTRACTING ENGINEERING
[illegible] SOUTH "J" ST., SAN BERNARDINO, CA. 92410

Gene Bealor
GENE BEALOR - VICE PRESIDENT

2-17-83
DATE

2.

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CITY OF UPLAND

WATER DIVISION

SPECIFICATIONS

FOR THE CONSTRUCTION OF

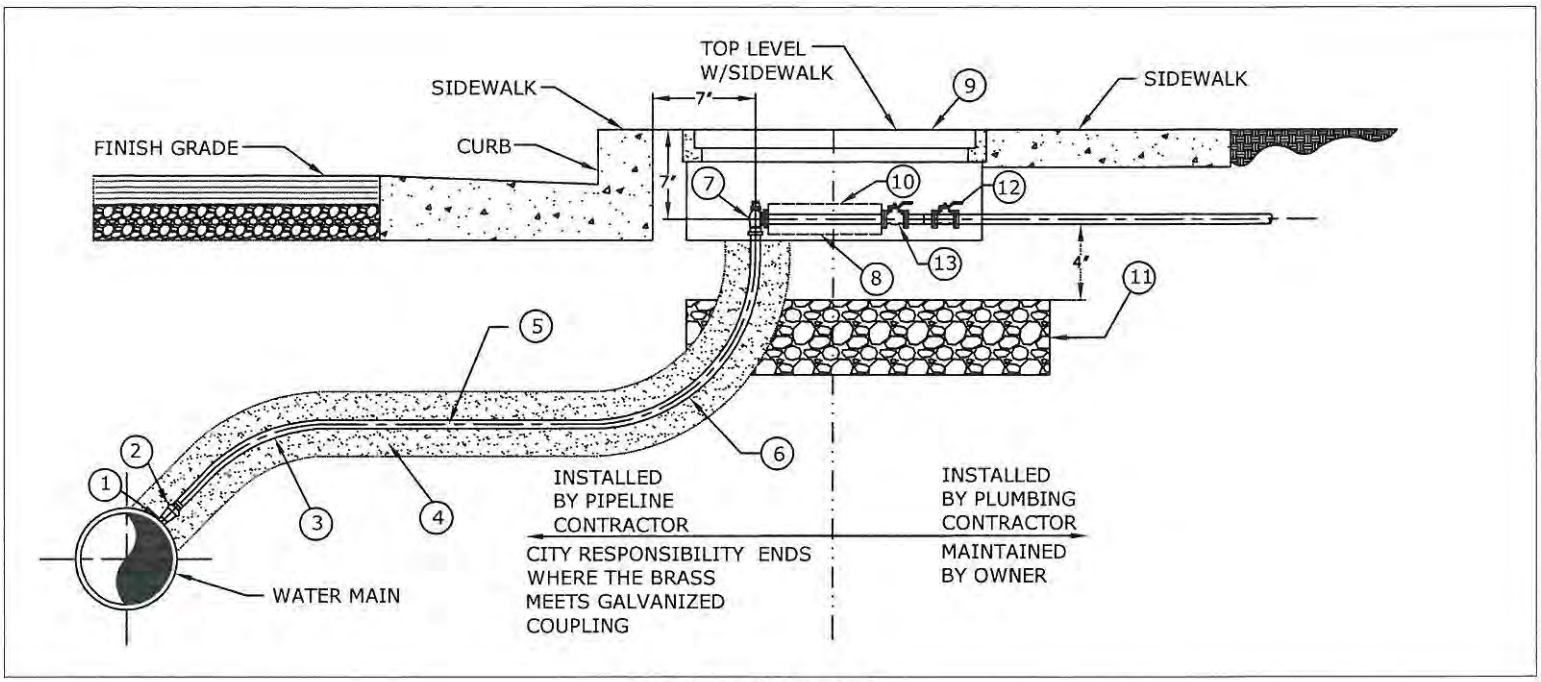
WATER MAINS AND APPURTENANCES

City of Upland Water Division
Index of Standard Drawings

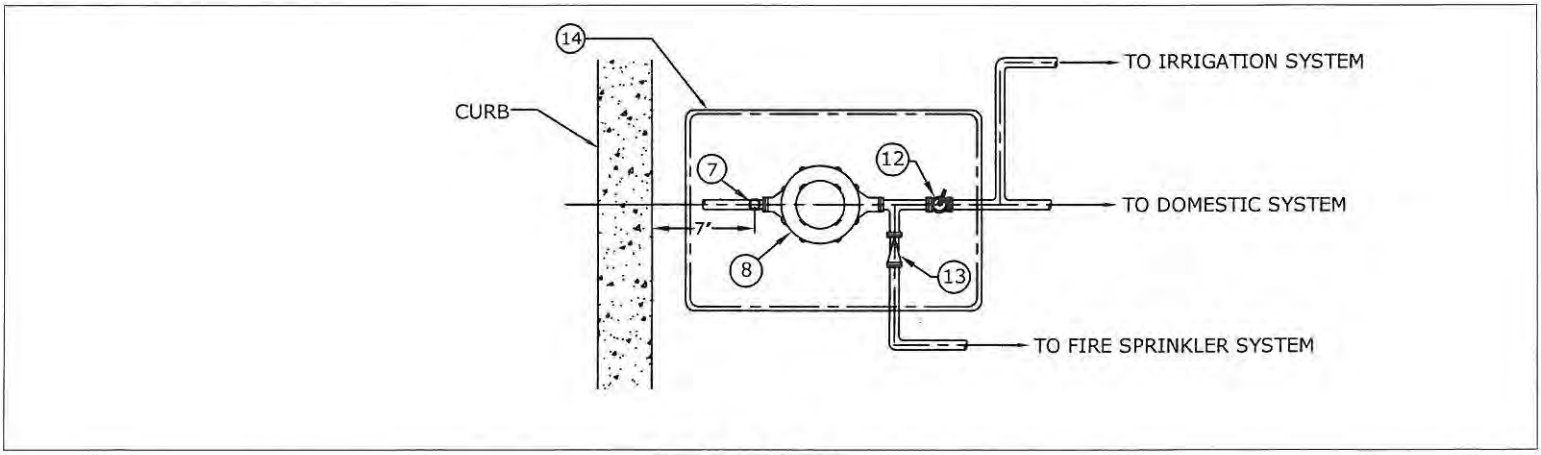
STD#	ISSUE DATE	TITLE/DESCRIPTION	LATEST APPROVAL DATE
		SERVICE DETAILS	
W.01A		1" Fire Service Detail for Single Family Residence	4/5/2011
W.01B		Notes for 1" Fire Service Detail for Single Family Residence	4/5/2011
W.02		Required Jumper Pipe and Meter Box Setting for 5/8" and 1" Meters	3/16/2009
W.03		2" and 1-1/2" Service Detail	3/16/2009
W.04		Required Jumper Pipe Setting for 1-1/2" and 2" Meters	3/16/2009
W.05		6" Fire Hydrant Installation	3/16/2009
W.06		Tapping Detail for 4" and Larger Contractor installed facilities	3/16/2009
W.07		Typical Gate Valve Installation	3/16/2009
W.08		Typical Butterfly Valve Installation	3/16/2009
W.09		Typical Valve Can Installation	3/16/2009
W.10		Details for 4"-16" Steel Pipe, Cut and Plug Existing Water Main	3/16/2009
W.11		4" through 16" Vertical off-set of Existing Steel Pipe	3/16/2009
W.12		Standard 6" Blow-off Detail	3/16/2009
W.13		Air-Vacuum and Air Release Valve Assembly	3/16/2009
W.14		Air Release Cover Assembly and Mounting Detail	3/16/2009
W.15		3" and Larger Domestic Service	3/16/2009

City of Upland Water Division
Index of Standard Drawings

STD#	ISSUE DATE	TITLE/DESCRIPTION	LATEST APPROVAL DATE
W.16		4" and Larger Aboveground Fire Service with Reduced Pressure Detector Check Assembly	3/16/2009
W.17		4" and Larger Aboveground Fire Service with Double Check Detector Check Assembly	3/16/2009
W.18		4" through 10" Double Check Detector Check Valve Assembly	3/16/2009
W.19		Typical Installation Reduced Pressure Principle Backflow Prevention Assembly	3/16/2009
W.20		Typical Installation of Double Check Valve Backflow Prevention Assembly	3/16/2009
W.21		Typical Pipe & Fire Hydrant Layout (Alignment)	3/16/2009
W.22		Blue Dot Pavement Markers and Fire Hydrant Marking	3/16/2009
W.23		Trench Bedding and Pavement Repair Detail	3/16/2009
W.24		Thrust Block Installation	3/16/2009
W.25		Pipe Zone	3/16/2009
W.26A		Easement Zone and Joint Trench Utilities	7/16/2009
W.26B		Easement Zone and Joint Trench Utilities	7/16/2009
1-10		Special and General Provisions	3/16/2009



PROFILE VIEW



PLAN VIEW

NOTE: SEE W.01B FOR NOTES

REVISION	DATE	UPLAND PUBLIC WORKS - WATER	DRAWING NUMBER
		1" FIRE SERVICE DETAIL FOR SINGLE FAMILY RESIDENCE.	UPW-WD
		APPROVED: _____ DATE: 4/5/11	W.01A
NOT TO SCALE			

WATER SERVICE INSTALLATION KIT
FOR DEVELOPER INSTALLED SERVICES

ITEM	QTY	DESCRIPTION
1	1 EA	TAP MAIN DIRECTLY USING UPW APPROVED TAPPING MACHINE OR DRILL CLEAN 1" DIA. HOLE IN MAIN AND USE HEAVY DUTY WELD COUPLING (I.P. THREADED, 3000#).
2	1 EA	1" BRASS CORPORATION STOP.
3	1 EA	ANGLE OF SERVICE INSTALLATION NOT TO EXCEED 45°.
4		IMPORTED SAND.
5		1" TYPE "K" SOFT COPPER.
6		1" 90 DEGREE BEND (18" MIN. RADIUS).
7	1 EA	1" ANGLE STOP.
8		1" JUMPER ASSEMBLY TO BE PROVIDED BY PUBLIC WORKS AND TO BE INSTALLED BY THE CONTRACTOR.

ITEM	QTY	DESCRIPTION
9		VAULT TO BE PROVIDED BY THE CITY OF UPLAND WATER DIV. AND INSTALLED BY THE DEVELOPER OR CONTRACTOR.
10	1 EA	CONTRACTOR OR DEVELOPER TO INSTALL A 1" BRASS BALL VALVE.
11		4" THICK $\frac{3}{4}$" CRUSHED ROCK.
12	1 EA	LOCKING BALL VALVE PROVIDED BY THE CITY.
13	1 EA	CHECK VALVE TO BE SUPPLIED BY CONTRACTOR.
14	1 EA	#65 METER BOX TO BE SUPPLIED BY THE CITY AND INSTALLED BY THE CONTRACTOR.

NOTE:

(A) SIDEWALK AND PAVEMENT TO BE INSTALLED ONLY AFTER SERVICE INSTALLATION IS COMPLETE AND APPROVED BY UPLAND WATER DIVISION.

(B) DIMENSIONS ARE TAKEN FROM TOP AND BACK OF CURB.

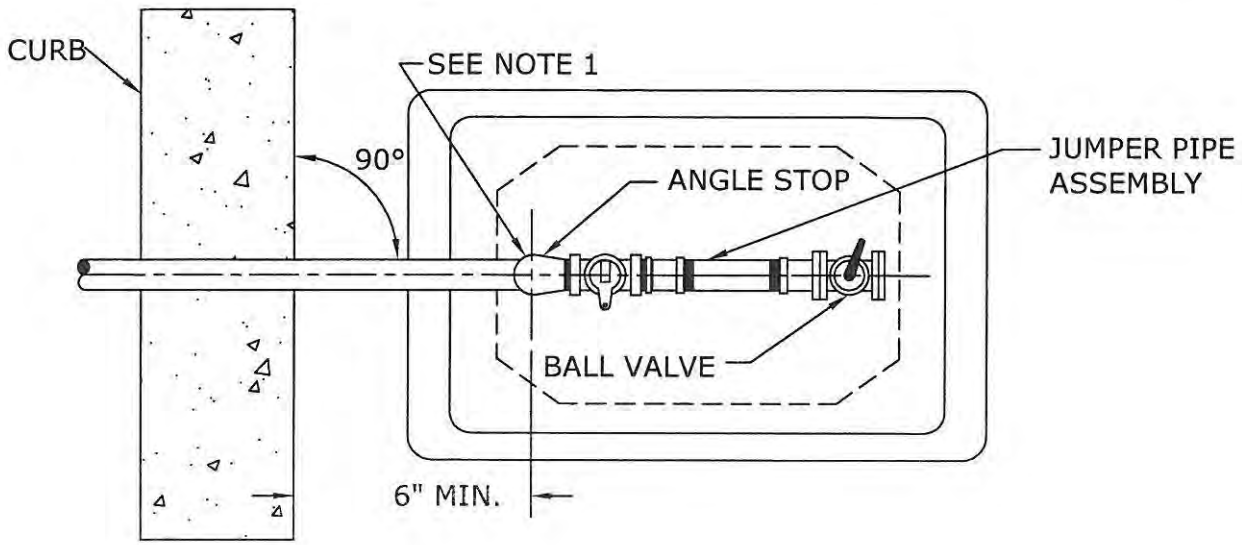
(C) WATER METERS SHALL BE INSTALLED IN PARKWAY AND SHALL HAVE A MINIMUM OF 7 FEET FROM TREES, UNLESS OTHERWISE APPROVED BY THE WATER DIVISION INSPECTOR.

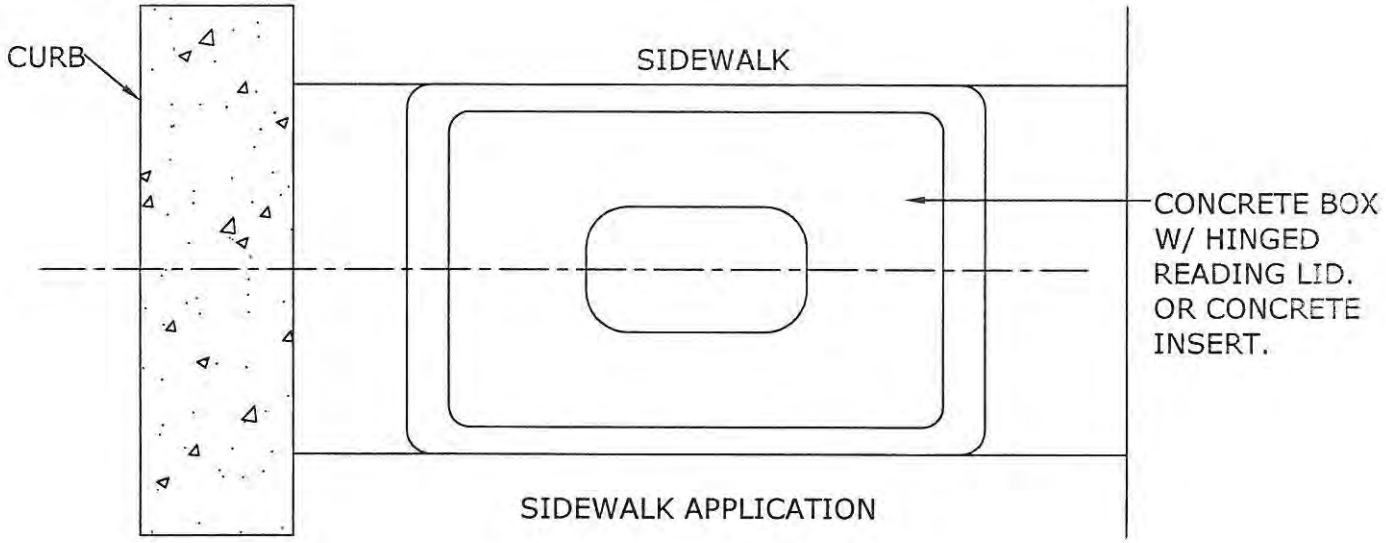
(D) METER TO BE INSTALLED WHEN INSTALLATION HAS MET THE APPROVAL BY THE CITY OF UPLAND WATER DIVISION.

(E) ALL FITTINGS/ PIPE FROM ANGLE STOP TO 1' BEYOND METER BOX SHALL BE NO LEAD BRASS.

(F) CONTRACTOR/OWNER SHALL BE RESPONSIBLE FOR ALL FIRE DEPARTMENT COORDINATION, INSPECTION AND APPROVAL REQUIREMENTS.

REVISION	DATE	UPLAND PUBLIC WORKS - WATER	DRAWING NUMBER
		NOTES FOR 1" FIRE SERVICE DETAIL FOR SINGLE FAMILY RESIDENCE.	UPW-WD
		APPROVED: Anthony M. Lo DATE: 4/5/11	W.01B
NOT TO SCALE			





NOTES:

A. JUMPER PIPE ASSEMBLY WILL BE SET PERPENDICULAR TO CURB.

B. PARKWAY TREES WILL BE PLACED A MINIMUM OF 7 FEET FROM WATER SERVICE.

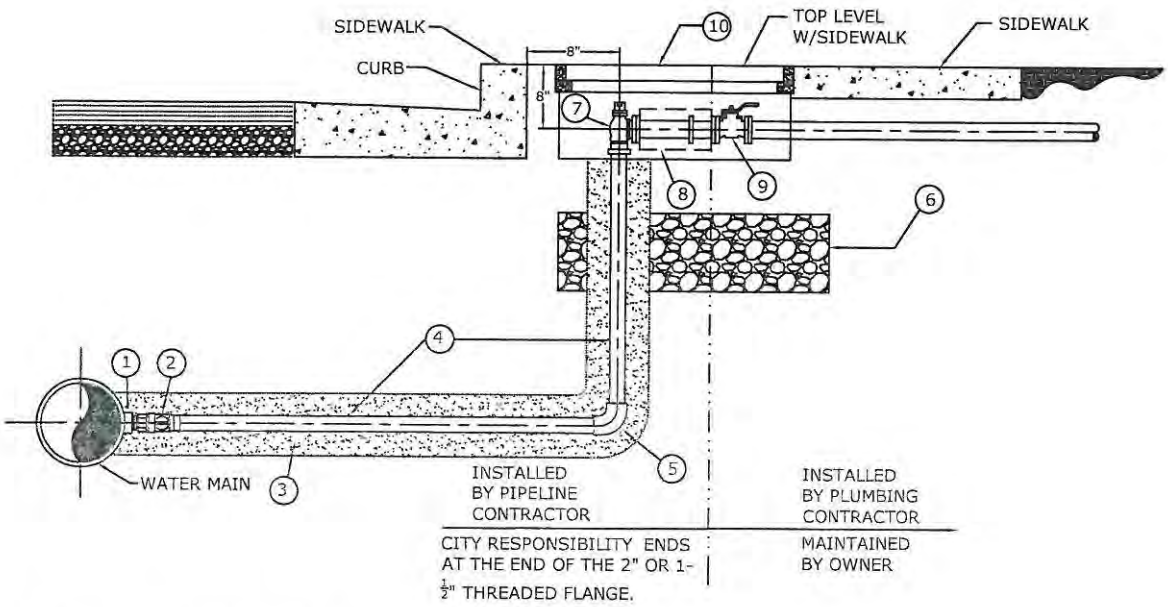
C. A PERMANENT "W" WILL BE MARKED ON THE FACE OF THE CURB AT EACH WATER SERVICE.

D. WHERE BACKFLOW PREVENTION DEVICES ARE REQUIRED ALL STEEL PIPE MUST BE INSTALLED TO THE INLET OF THE DEVICE WITH NO TEES OR BYPASS LINES.

E. BACKFLOW DEVICES SHALL BE INSTALLED ON PRIVATE PROPERTY BEHIND THE PUBLIC RIGHT OF WAY.

F. BOXES & JUMPER PIPE ASSEMBLIES WILL BE FURNISHED BY THE CITY AND INSTALLED BY THE DEVELOPER.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		REQUIRED JUMPER PIPE AND METER BOX SETTING FOR $\frac{5}{8}$" AND 1" METERS	UPW-WD W.02
NOT TO SCALE		APPROVED: Anthony M. Lo DATE: 3/16/09	



WATER SERVICE INSTALLATION KIT FOR DEVELOPER INSTALLED SERVICES

ITEM	QTY	DESCRIPTION
1	1 EA	TAP MAIN DIRECTLY USING UPW APPROVED TAPPING MACHINE. DRILL CLEAN 1-⅞" OR 1-⅜" DIA. HOLE IN MAIN AND USE HEAVY DUTY WELD COUPLING (I.P. THREADED, 3000#).
2	1 EA	2" OR 1-½" BRASS CORPORATION STOP TO SUIT LATERAL SIZE.
3		IMPORTED SAND.
4		2" OR 1-½" TYPE "K" SOFT COPPER.
5	1 EA	2" OR 1-½" 90 DEGREE SWEAT COPPER ELBOW W/ SILVER SOLDER.
6		4" THICK ¾" CRUSHED ROCK.
7	1 EA	2" OR 1-½" ANGLE STOP.
8	1 EA	2" OR 1-½" JUMPER ASSEMBLY TO BE PROVIDED BY THE CITY OF UPLAND WATER DIV. TO BE INSTALLED BY THE DEVELOPER OR CONTRACTOR.
9	1 EA	CONTRACTOR OR DEVELOPER TO INSTALL A 2" OR 1-½" BRASS BALL VALVE.
10		METER VAULT TO BE PROVIDED BY THE CITY OF UPLAND WATER DIV.

NOTE:

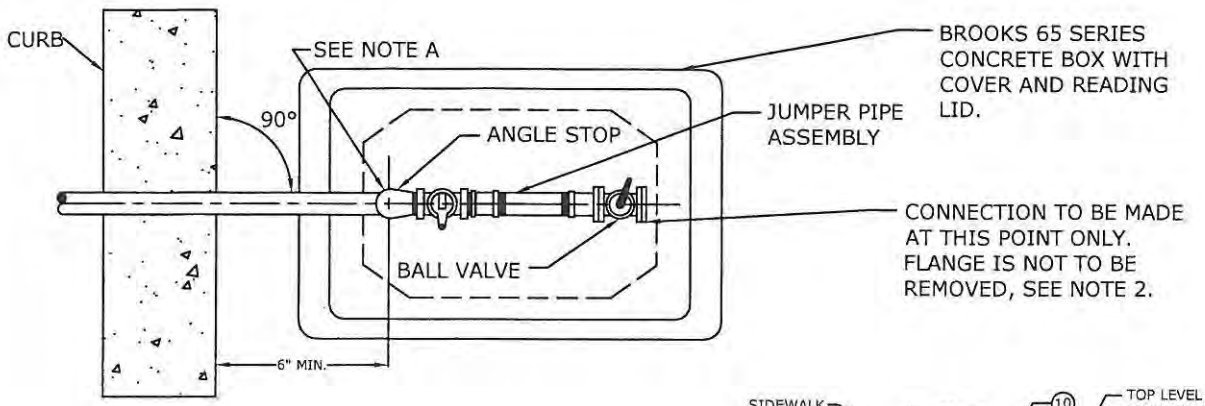
(A) SIDEWALK AND PAVEMENT TO BE INSTALLED ONLY AFTER SERVICE INSTALLATION IS COMPLETE AND APPROVED BY UPLAND WATER DIVISION.

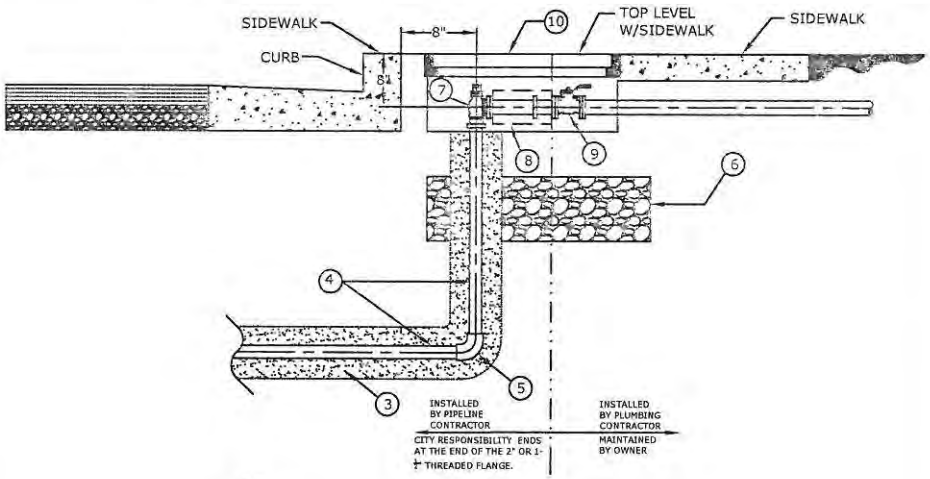
(B) DIMENSIONS ARE TAKEN FROM TOP AND BACK OF CURB.

(C) WATER METER SHALL BE INSTALLED IN PARKWAY AND SHALL HAVE A MINIMUM 7 FEET SEPARATION FROM TREES, UNLESS OTHERWISE APPROVED BY THE WATER DIVISION INSPECTOR.

(D) METER TO BE INSTALLED WHEN INSTALLATION HAS MET THE APPROVAL BY THE CITY OF UPLAND WATER DIVISION.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		2" AND 1-½" SERVICE DETAIL	UPW-WD W.03
NOT TO SCALE		APPROVED: Anthony M. Le DATE: 3/16/09	





WATER SERVICE INSTALLATION KIT FOR DEVELOPER INSTALLED SERVICES

ITEM	QTY	DESCRIPTION
3		IMPORTED SAND.
4		2" OR 1-½" TYPE "K" SOFT COPPER.
5	1 EA	2" OR 1-½" 90 DEGREE SWEAT COPPER ELBOW W/ SILVER SOLDER.
6		4" THICK ¾" CRUSHED ROCK.
7	1 EA	2" OR 1-½" ANGLE STOP.
8	1 EA	2" OR 1-½" JUMPER ASSEMBLY TO BE PROVIDED BY THE CITY OF UPLAND WATER DIV. TO BE INSTALLED BY THE DEVELOPER OR CONTRACTOR.
9	1 EA	CONTRACTOR OR DEVELOPER TO INSTALL A 2" OR 1-½" BRASS BALL VALVE.
10		METER VAULT TO BE PROVIDED BY THE CITY OF UPLAND WATER DIV.

NOTE:

A. JUMPER PIPE ASSEMBLY WILL BE SET PERPENDICULAR TO CURB.

B. PARKWAY TREES WILL BE PLACED A MINIMUM OF 7 FEET FROM WATER SERVICE UNLESS OTHERWISE APPROVED BY THE WATER DIVISION.

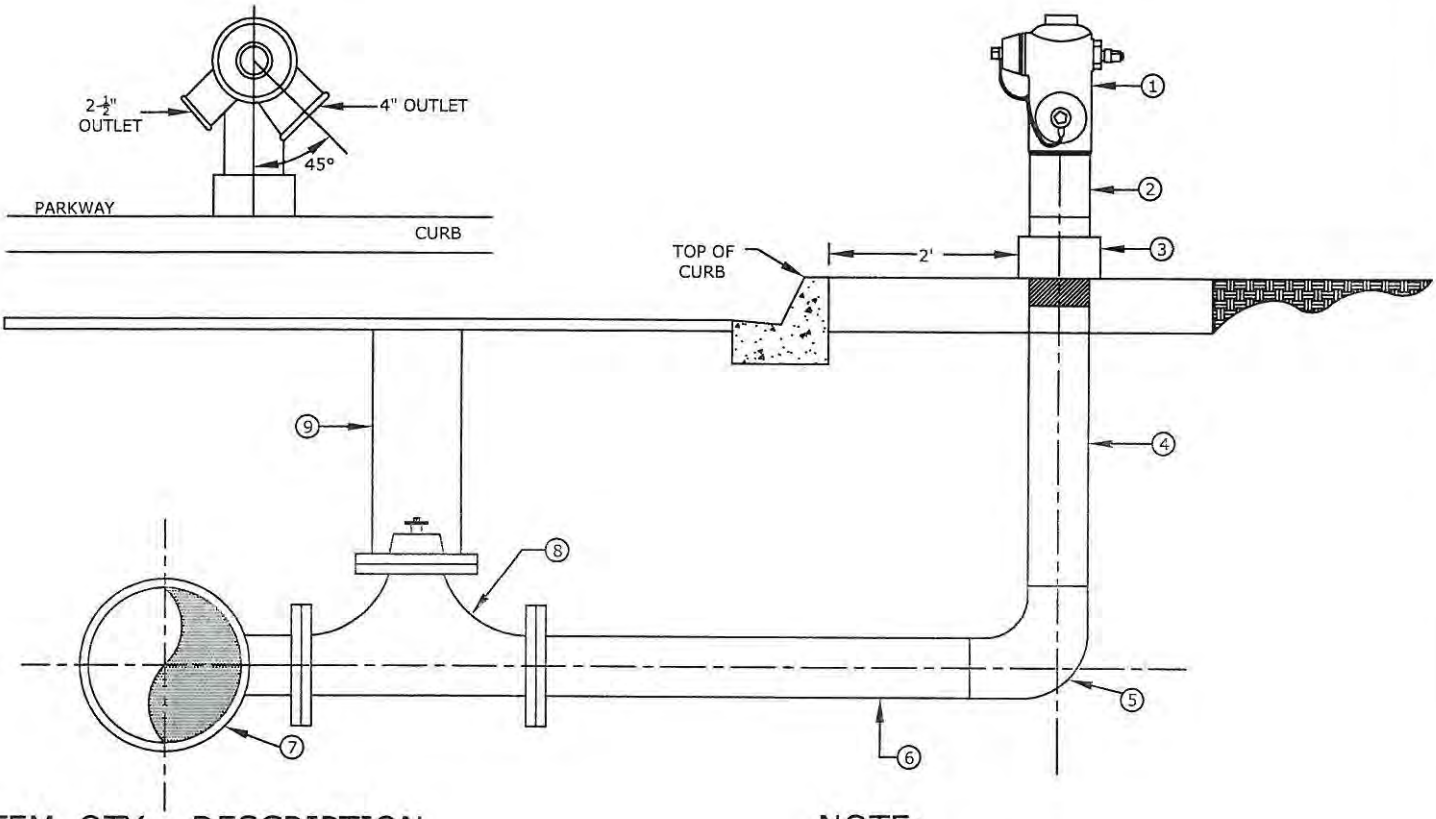
C. A PERMANENT "W" WILL BE MARKED ON THE FACE OF THE CURB AT EACH WATER SERVICE.

D. WHERE BACKFLOW PREVENTION DEVICES ARE REQUIRED, ALL STEEL PIPE MUST BE INSTALLED TO THE INLET OF THE DEVICE WITH NO TEES OR BYPASS LINES.

E. BACKFLOW DEVICES SHALL BE INSTALLED ON PRIVATE PROPERTY BEHIND THE PUBLIC RIGHT OF WAY.

F. BOXES & JUMPERS PIPE ASSEMBLIES WILL BE FURNISHED BY THE CITY AND INSTALLED BY THE DEVELOPER.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		REQUIRED JUMPER PIPE SETTING FOR 1-½" AND 2" METERS	UPW-WD
		APPROVED: Anthony M. Lo DATE: 3/16/09	W.04
NOT TO SCALE			



ITEM	QTY.	DESCRIPTION
1	1 EA	JAMES JONES J-3708 6" HEAD
2	1 EA	20"x6" TBE BLACK NIPPLE AWWA APPROVED
3	1 EA	6" BREAK AWAY COUPLING AWWA APPROVED
4	__ LF	CEMENT LINED AND MORTOR COATED PIPE WITH A T.O.E WELDED TO TOP OF RISER
5	1 EA	6" CML&C WELD 90° ELBOW
6	__ LF	CML&C PIPE
7	1 EA	USE WELD NOZZLE WITH DOUBLER OR TAPPING SLEEVE ON EXISTING MAIN.
8	1 EA	INSTALL PER CITY OF UPLAND WATER DIV. STD.-W.06
9	1 EA	INSTALL PER CITY OF UPLAND WATER DIV. STD.-W.09

NOTE:

A. ALL FITTINGS TO BE WELDED TO THE SATISFACTION OF THE UPW DIVISION

B. FIRE HYDRANT LATERAL IS TO BE HYDROSTATIC PRESSURE TESTED TO A MINIMUM OF 200 PSI FOR A 2 HR. PERIOD

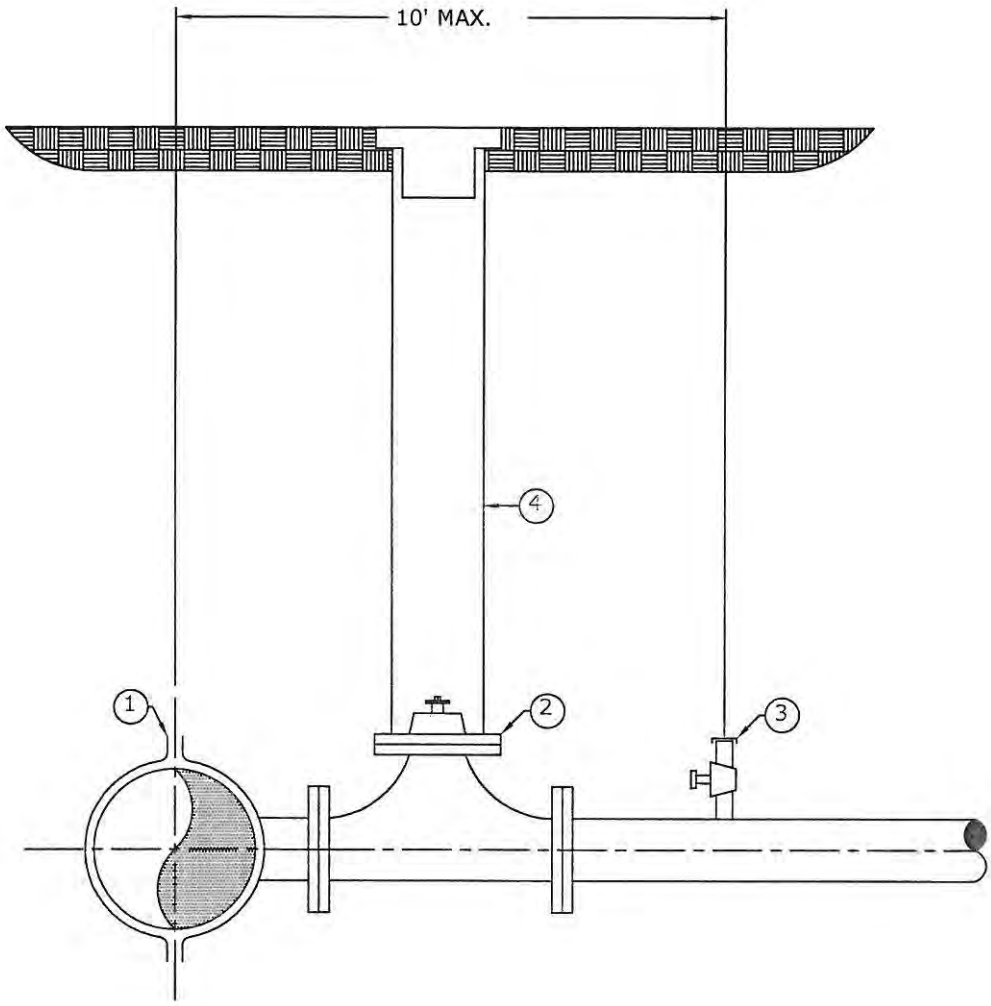
C. FIRE HYDRANT LATERAL TO BE DISINFECTED WITH CHLORINE. RESIDUAL MUST BE 50mgl. AFTER A 24 HR. CONTACT TIME

D. ANY EXPOSED METAL TO BE COVERED WITH CONCRETE OR 10mil. TAPE

E. ALL EXPOSED SURFACES TO BE PAINTED WITH 2 COATS OR RUST OLEUM GLOSS SUNBURST YELLOW #7747

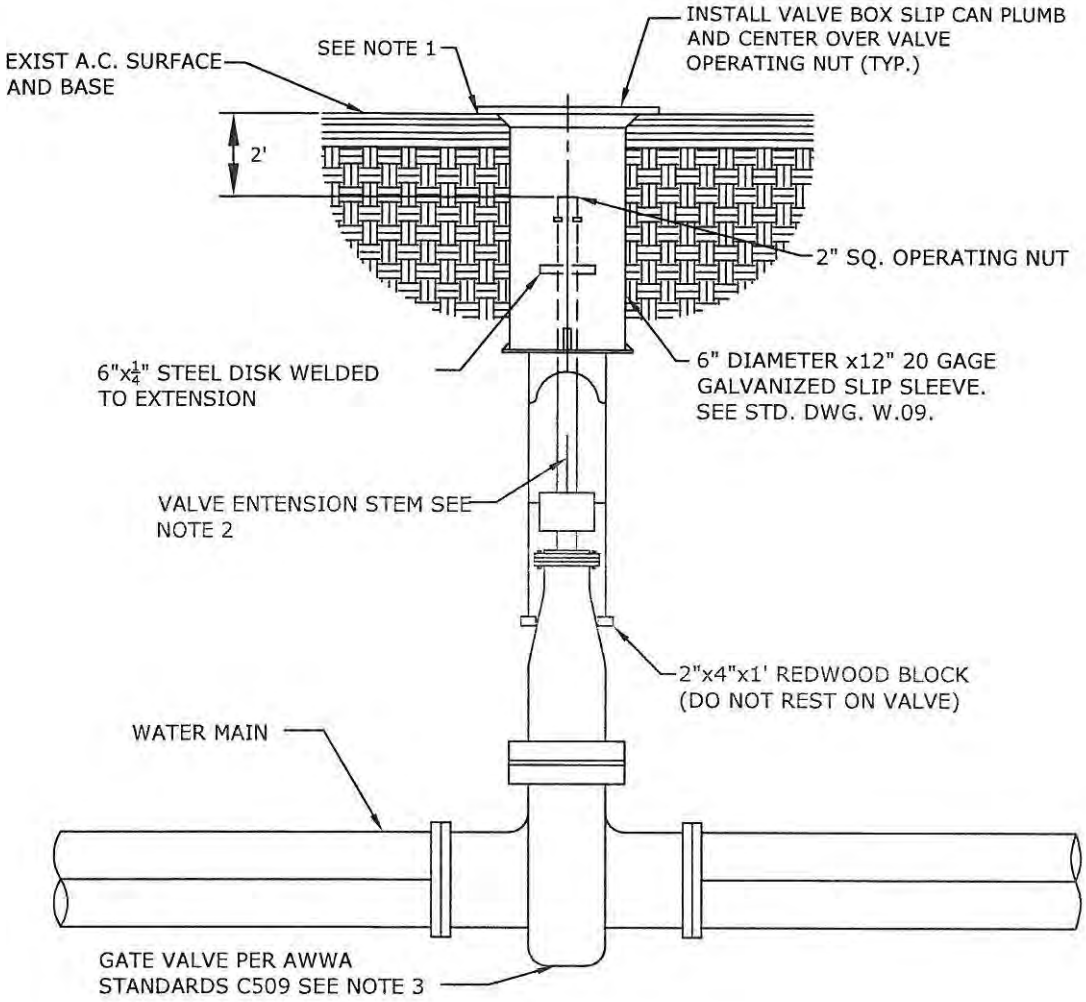
F. INSTALL BLUE DOT PAVEMENT MARKERS PER UPW STD.-W.22

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		6"FIRE HYDRANT INSTALLATION	UPW–WD W.05
NOT TO SCALE		APPROVED: Anthony M. Lee DATE: 3/16/09	



ITEM	QTY.	DESCRIPTION
1	1 EA.	___" EPOXY COATED TAPPING SADDLE (___" O.D. x " FLG) OR ___" FABRICATED TAPPING SADDLE (___" O.D. x___" FLG) OR ___" FABRICATED WELD NOZZLE WITH DOUBLERS (___" O.D. x___" FLG)
2	1 EA.	___" FLGXFLG GATE VALVE
3	1 EA.	1" CHLORINATION AND FLUSHING PORT (INSTALL WHEN LATERAL IS LONGER THAN 10')
4	1 EA.	INSTALL PER STD.-W.09

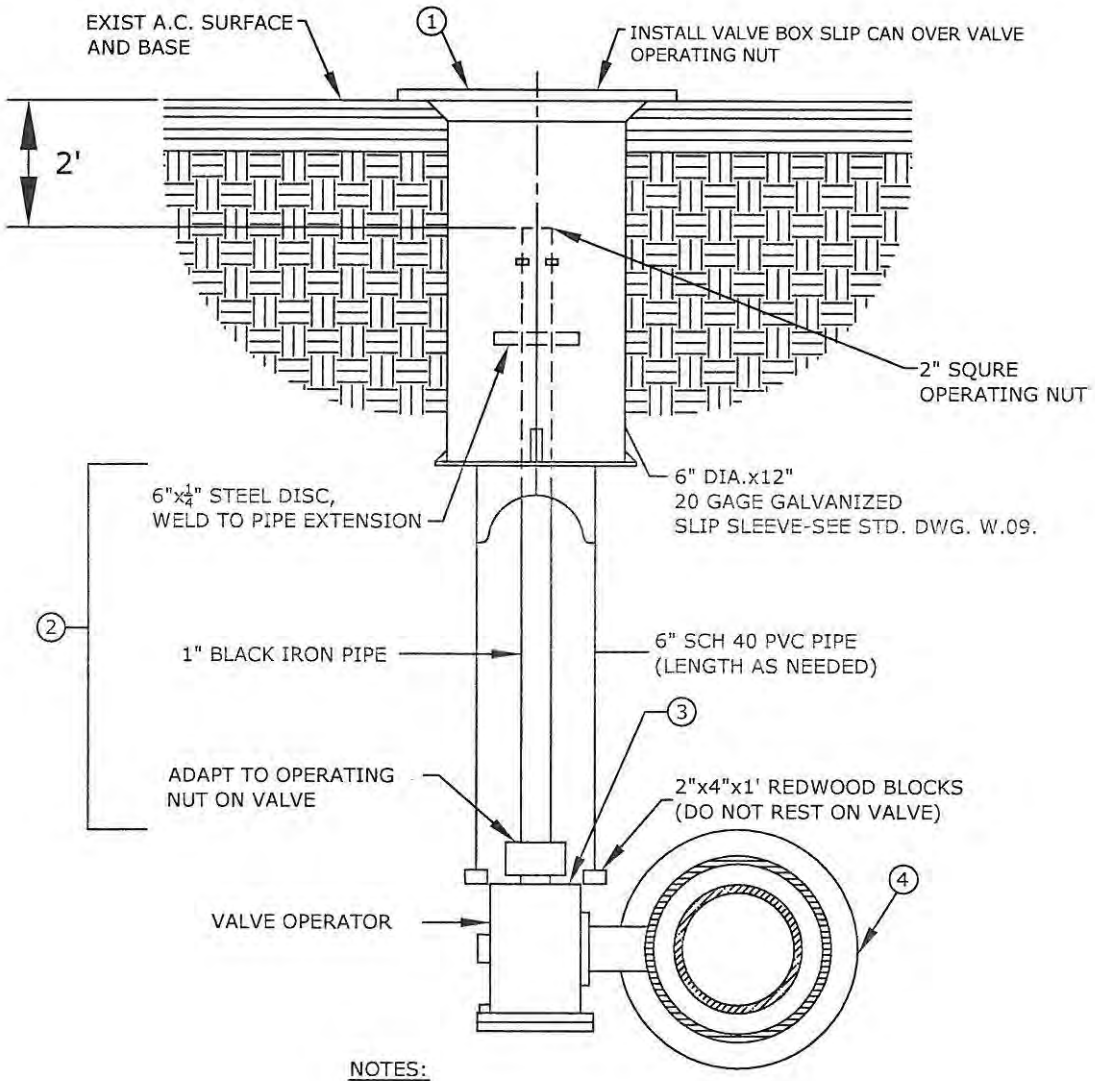
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TAPPING DETAIL FOR 4" AND LARGER CONTRACTOR INSTALLED FACILITIES	UPW-WD
		APPROVED: Anthony M. Le DATE: 3/16/09	W.06
NOT TO SCALE			



NOTES:

1. FINAL RIM ELEVATION TO BE ⅛" TO ¼" BELOW FINAL STREET GRADE.
2. A VALVE EXTENSION STEM SHALL BE PROVIDED WHERE THE OPERATING NUT DEPTH EXCEEDS FIVE (5) FEET AND SHALL BE 1" BLACK IRON PIPE.
3. GATE VALVE: PER AWWA STANDARD UPLAND WATER DIVISION APPROVED RESILIENT SEAT GATE VALVE, 200 PSI MINIMUM PRESSURE RATING, INTERNAL EPOXY COATED.

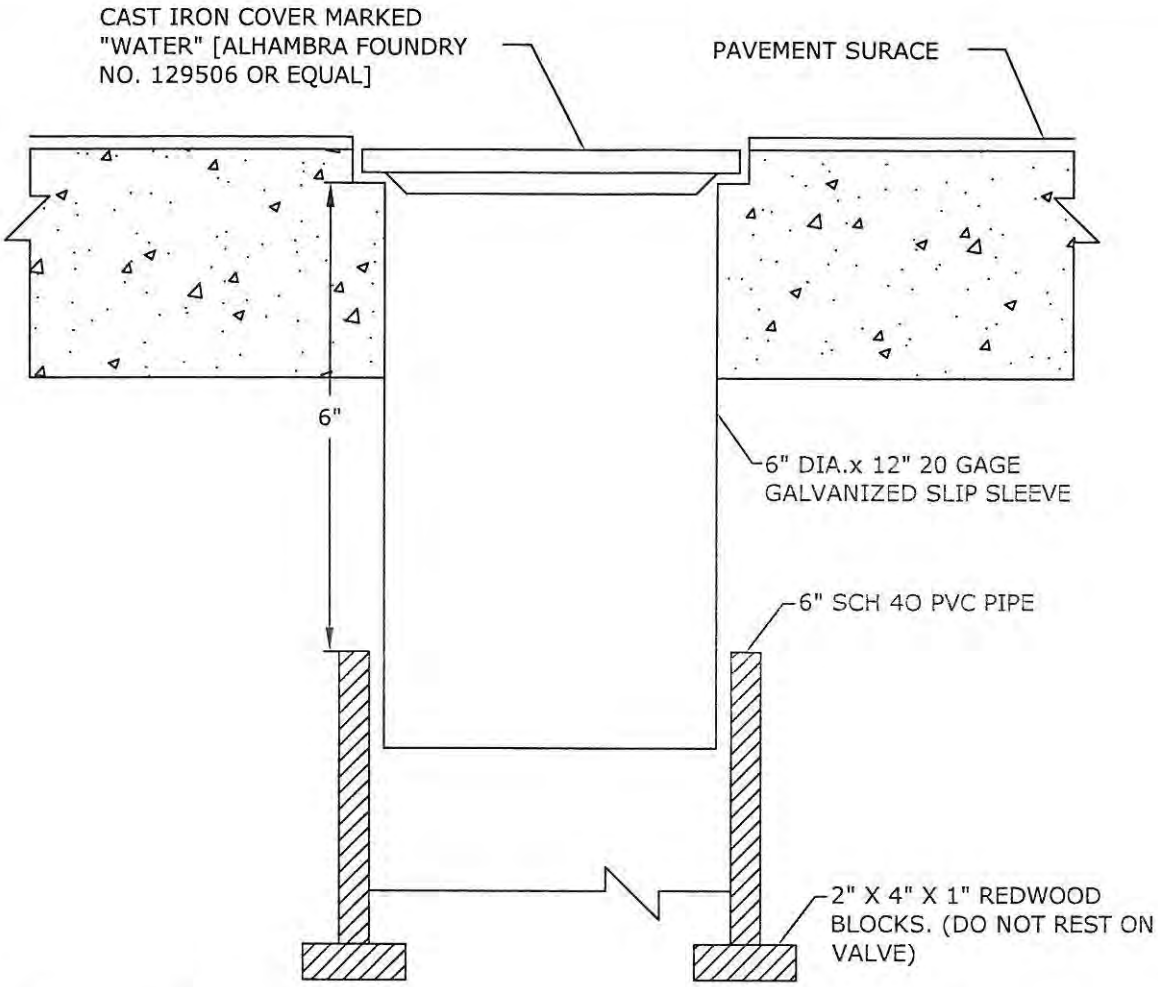
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL GATE VALVE INSTALLATION	UPW-WD
		APPROVED: Anthony M. C DATE: 3/16/09	W.07
NOT TO SCALE			



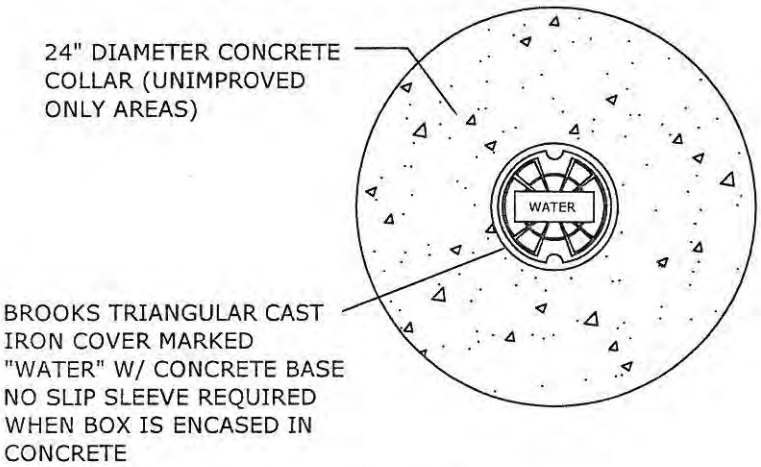
NOTES:

1. FINAL RIM ELEVATION TO BE ⅛" TO ¼" BELOW FINAL STREET GRADE.
2. A VALVE EXTENSION STEM SHALL BE PROVIDED WHERE THE OPERATING NUT DEPTH EXCEEDS FIVE (5) FEET AND SHALL BE 1" BLACK IRON PIPE.
3. BACKFILL VALVE WITH SAND UP TO PACKING.
4. VALVE SHALL BE A RUBBER SEATED BUTTERFLY VALVE FURNISHED WITH FLANGED ENDS, A CAST IRON BODY AND DISC, AND MOLDED RUBBER SEAT. THE INTERIOR SHALL BE CLASS 200 UNLESS OTHERWISE SPECIFIED AND SHALL CONFORM TO AWWA STD. C504.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL BUTTERFLY VALVE INSTALLATION	UPW-WD W.08
NOT TO SCALE		APPROVED: Anthony M. Le DATE: 3/16/09	



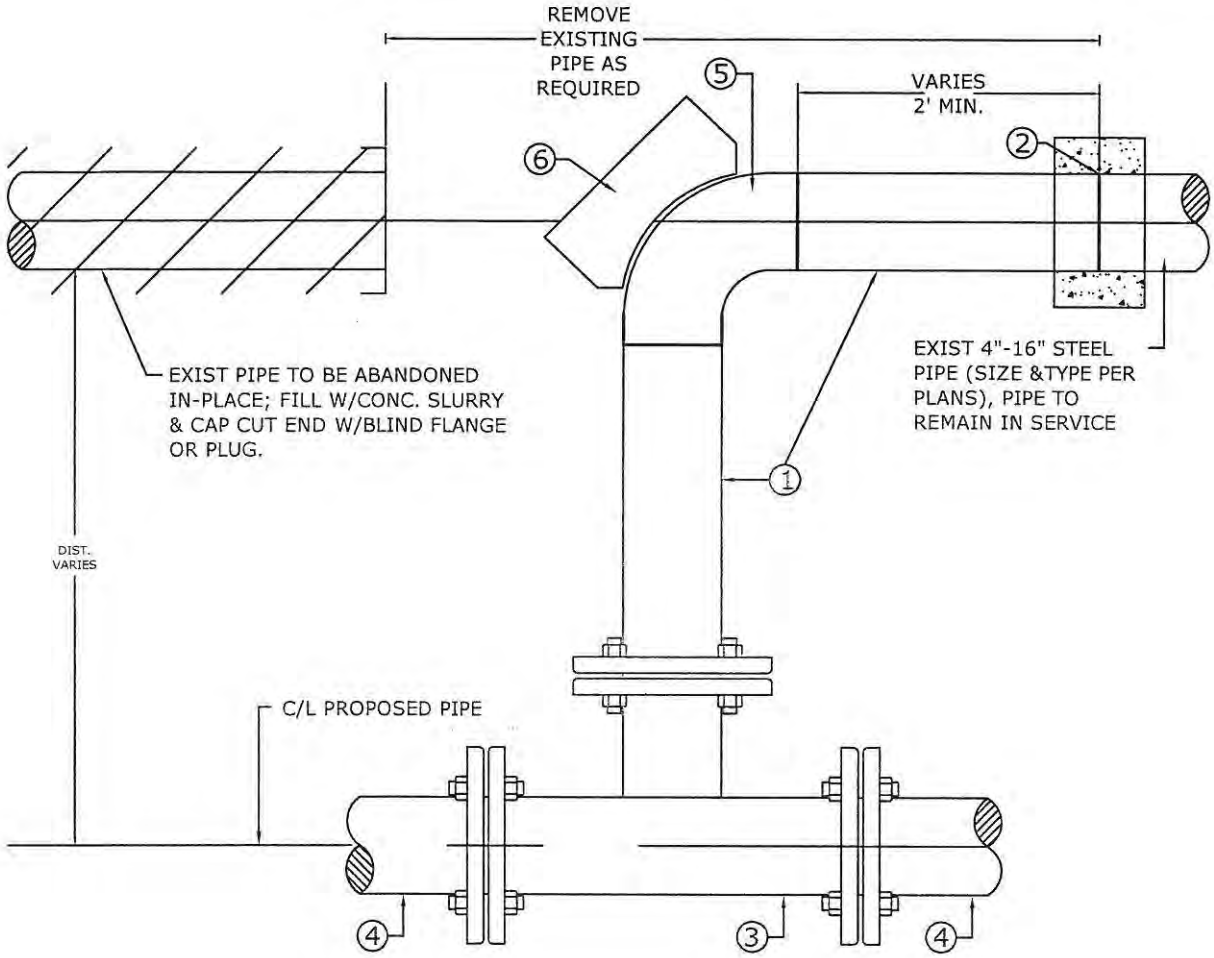
STANDARD VALVE



NOTES

1. INSTALL VALVE BOX OVER OPERATING NUT.
2. VALVE STEM EXTENSION SHALL EXTEND TO 2" BELOW PAVED SURFACE.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL VALVE CAN INSTALLATION	UPW-WD W.09
NOT TO SCALE		APPROVED: Anthony M. Lo	DATE: 3/16/09



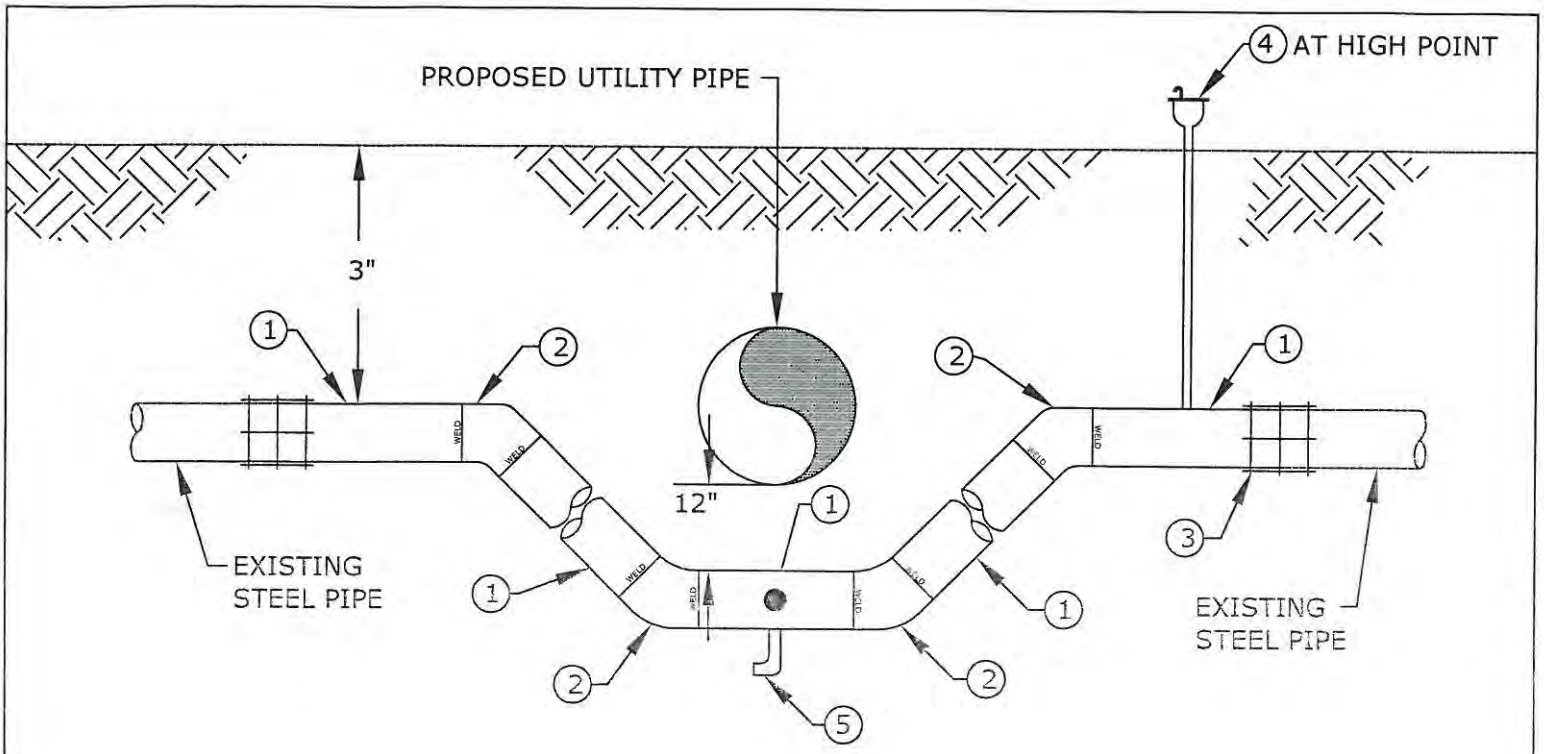
ITEM	QTY	DESCRIPTION
①		AS REQUIRED EXIST PIPE SIZE X REQUIRED LENGTH CML&C.
②	1 EA	EXISTING PIPE SIZE TO BE WELDED TO NEW PIPE OR INSTALL FLEXIBLE STEEL PIPE COUPLING.
③	1 EA	CEMENT LINE AND MORTAR COATED PRE FABRICATED TEE WITH WELD ON FLANGES. (SIZE VARIES)

ITEM	QTY	DESCRIPTION
④		AS REQUIRED PROPOSED PIPE MAIN SIZE X REQUIRED LENGTH CML&C.
⑤	1 EA.	EXIST PIPE SIZE X CML&C 90 DEGREE WELD ELBOW.
⑥	1 EA	THRUST BLOCK TO BE INSTALLED IF A FLEXIBLE COUPLING IS USED PER UPW STD. W.24.

NOTE:
ALL MATERIAL, CONSTRUCTION METHODS AND TESTING SHALL BE IN ACCORDANCE WITH UPW STANDARDS AND SPECIFICATIONS. A UPW INSPECTOR SHALL BE PRESENT AT ALL TIMES DURING CONSTRUCTION UNLESS OTHERWISE APPROVED BY UPW.

*CML&C: CEMENT MORTER LINED AND CEMENT COATED.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		DETAIL FOR 4"-16" STEEL PIPE, CUT AND PLUG EXISTING WATER MAIN	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.10
NOT TO SCALE			



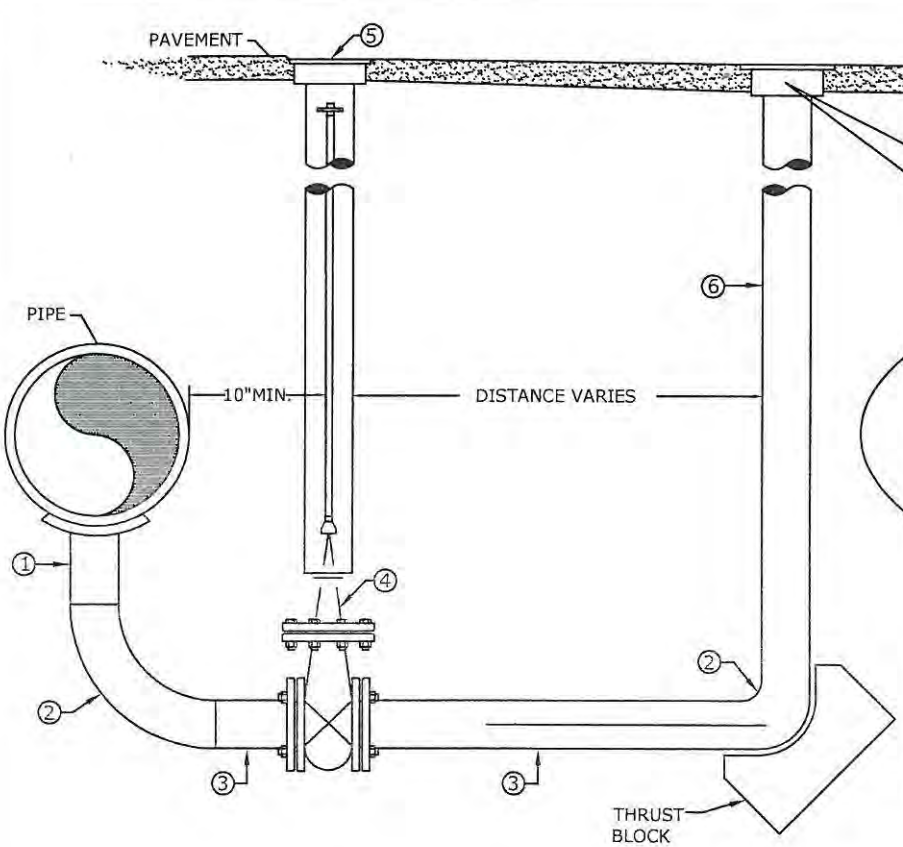
ITEM	QTY	DESCRIPTION
1	__LF	__" STEEL PIPE CML&C
2	4 EA.	__" 45° STEEL BEND CML&C
3	2 EA.	__" FLEX COUPLING WITH THRUST HARNESS (AS NEEDED) PER AWWA M-11, LATEST EDITION
4	1 EA.	__" COMBINATION AIR/ VACUUM VALVE PER STD. DWG.-W.13 AND W.14 UPW SHALL DETERMINE NECESSITY OF VALVE ON A CASE BY CASE BASIS.
5	1 EA.	MANUAL BLOW-OFF ASSEMBLY UPW STD. W.12. (SIZE TO BE HALF THAT OF THE WATER LINE OFF SET)

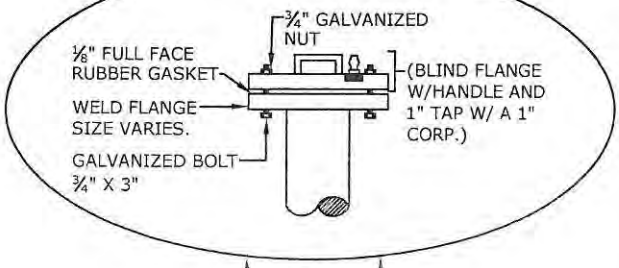
NOTE:

1. CONTRACTOR TO FIELD VERIFY EXISTING STEEL THICKNESS, COATING AND LINNING AND MATCH EXISTING.

2. ALL JOINTS TO BE WELDED.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		4" THROUGH 16" VERTICAL OFF-SET OF EXISTING STEEL PIPE	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.11
NOT TO SCALE			

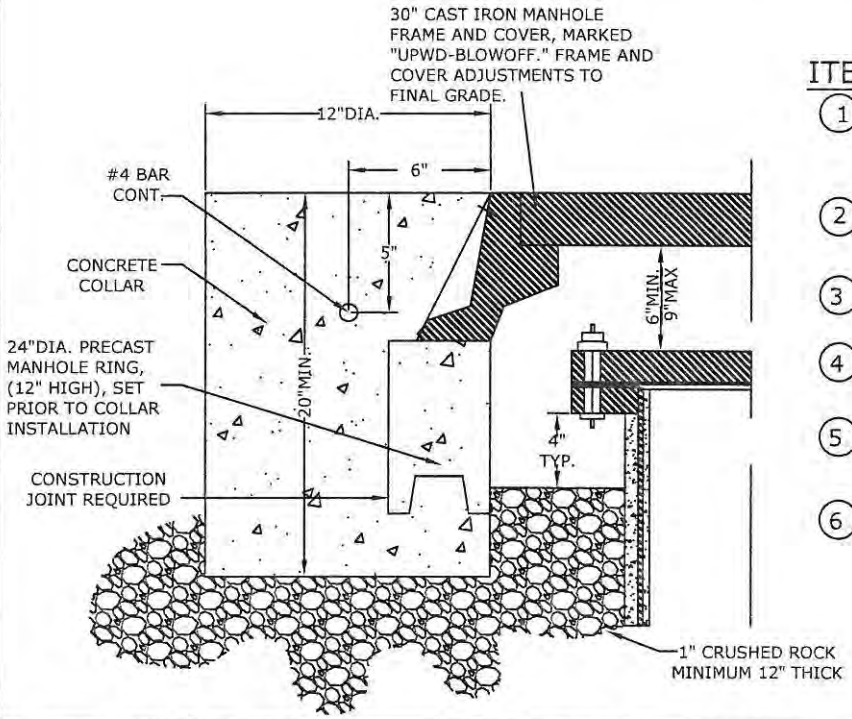




NOTE:

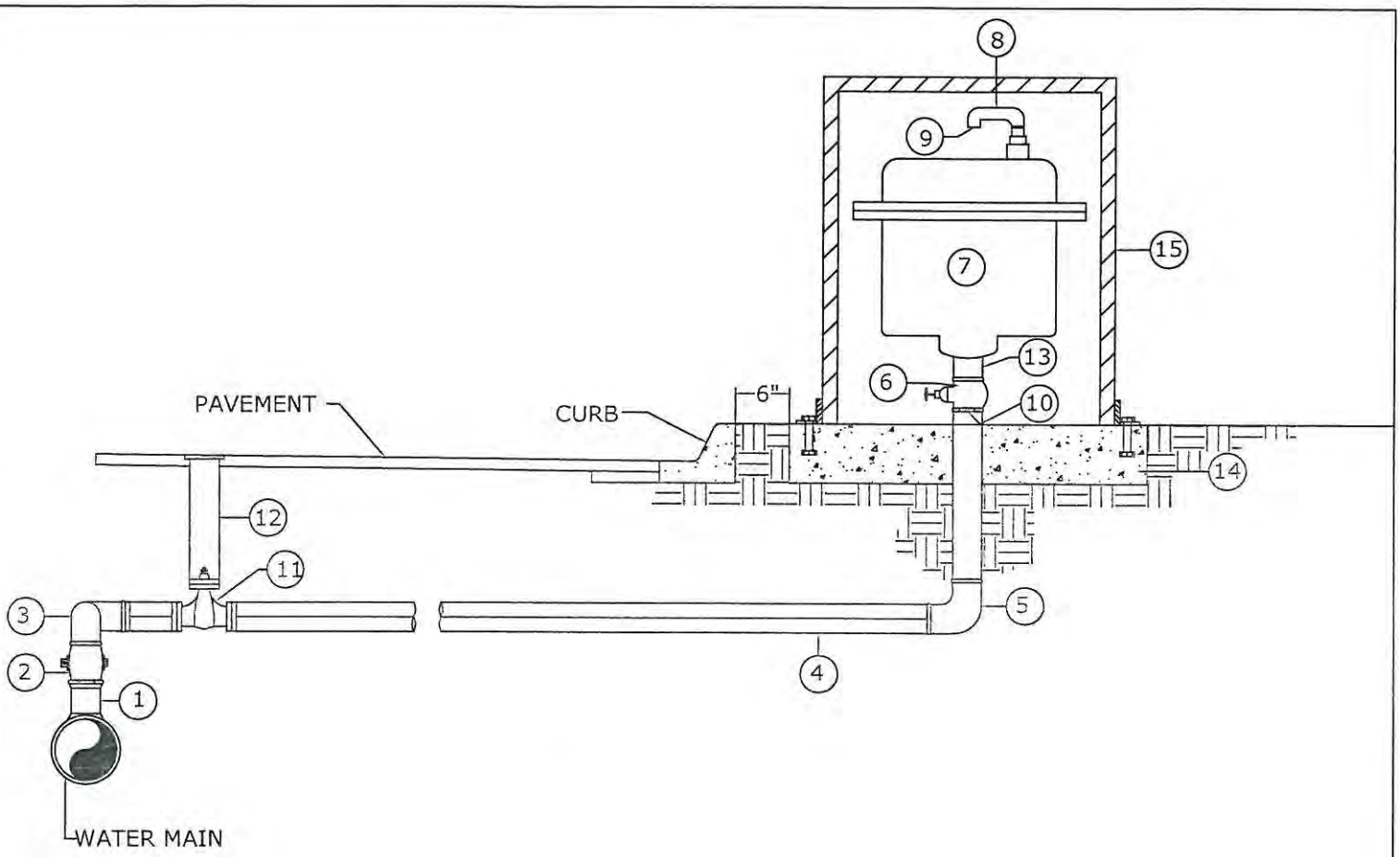
A) BOLT HEAD TO BE FULLY CIRCUMFERENCE WELDED TO UNDER SIDE OF WELDS FLANGE.

B) SIZE OF BOLTS SHOWN ARE TYPICAL TO 6" FLANGED OUTLET. 4" FLANGED OUTLETS WILL REQUIRE ⅝" X 2 ½" BOLTS W/ NUTS.



ITEM	QTY	DESCRIPTION
1	1 EA	USE WELD NOZZLE WITH DOUBLER OR TAPPING SLEEVE ON EXISTING MAIN
2	2 EA	6" CEMENT LINED AND MORTAR COATED WELD 90 DEGREE ELBOW
3	__LF	6" C.L.M.C. PIPE
4	1 EA	INSTALL PER UPW STD. #W.07
5	1 EA	INSTALL PER UPW STD. #W.09
6	__LF	6" C.L.M.C.

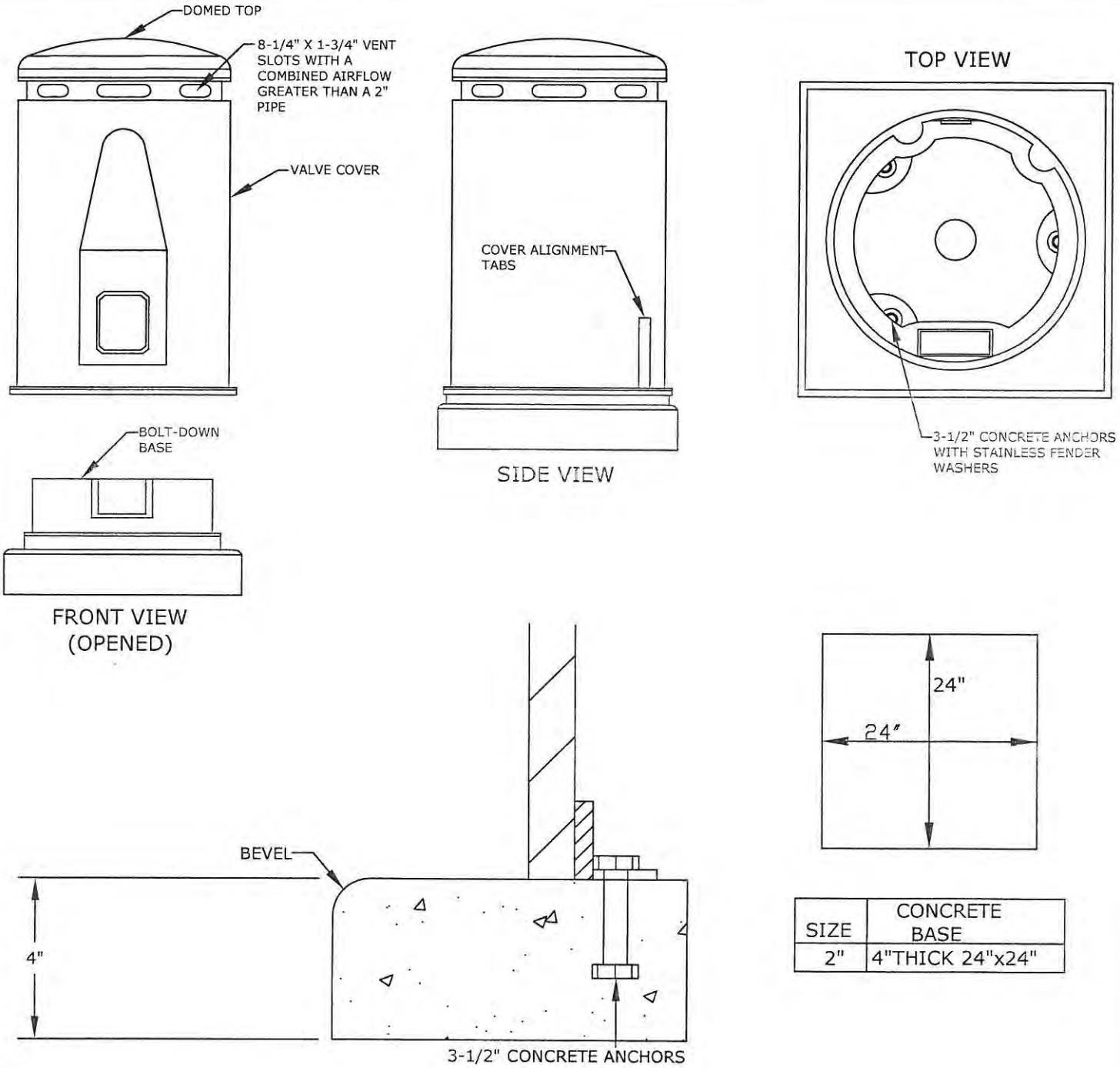
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		STANDARD 6" BLOW-OFF DETAIL	UPW-WD
			W.12
NOT TO SCALE		APPROVED: Anthony M. La DATE: 3/16/09	



ITEM	QTY	DESCRIPTION
①	1 EA	TAP MAIN DIRECTLY USING UPW APPROVED TAPPING MACHINE. DRILL CLEAN 1-$\frac{7}{8}$" OR 1-$\frac{3}{8}$" DIA. HOLE IN MAIN AND USE APPROVED SERVICE SADDLE OR 2" WELD ON COUPLING.
②	1 EA	2" BRASS CORPORATION STOP TO SUIT LATERAL SIZE.
③	1 EA	90 DEGREE ELBOW.
④	1 EA	2" TYPE 'K' SOFT COPPER PIPE.
⑤	1 EA	2" 90 DEGREE ELBOW
⑥	1 EA	2" OR 1" BRASS GATE VALVE A.W.W.A. APPROVED.
⑦	1 EA	2" OR 1" AIR RELEASE VALVE A.W.W.A. APPROVED.
⑧	2 EA	TYPE 'K' SOFT COPPER STRAIGHT ELBOW.
⑨	1 EA	SCREEN WITHIN ELBOW.
⑩	1 EA	2"x1" BELL REDUCER FOR 1" AIR RELEASE.
⑪	1 EA	2" THREADED RESILIENT WEDGE GATE VALVE A.W.W.A. APPROVED.
⑫	1 EA	INSTALL PER U.P.W. STD. DRAWNING-W.09
⑬	1 EA	2" OR 1" CLOSE NIPPLE.
⑭	1 EA	CONCRETE BASE REFER TO DRAWING-W.14
⑮	1 EA	AIR RELEASE VALVE COVER SEE U.P.W. STD. DRAWING-W.14 FOR DESIGN SPECIFICATIONS.

NOTE: ALL AIR RELEASE ASSEMBLY LATERALS SHALL BE 2" AND BUSHED DOWN TO 1" DEPENDING ON DESIGN SPECS.

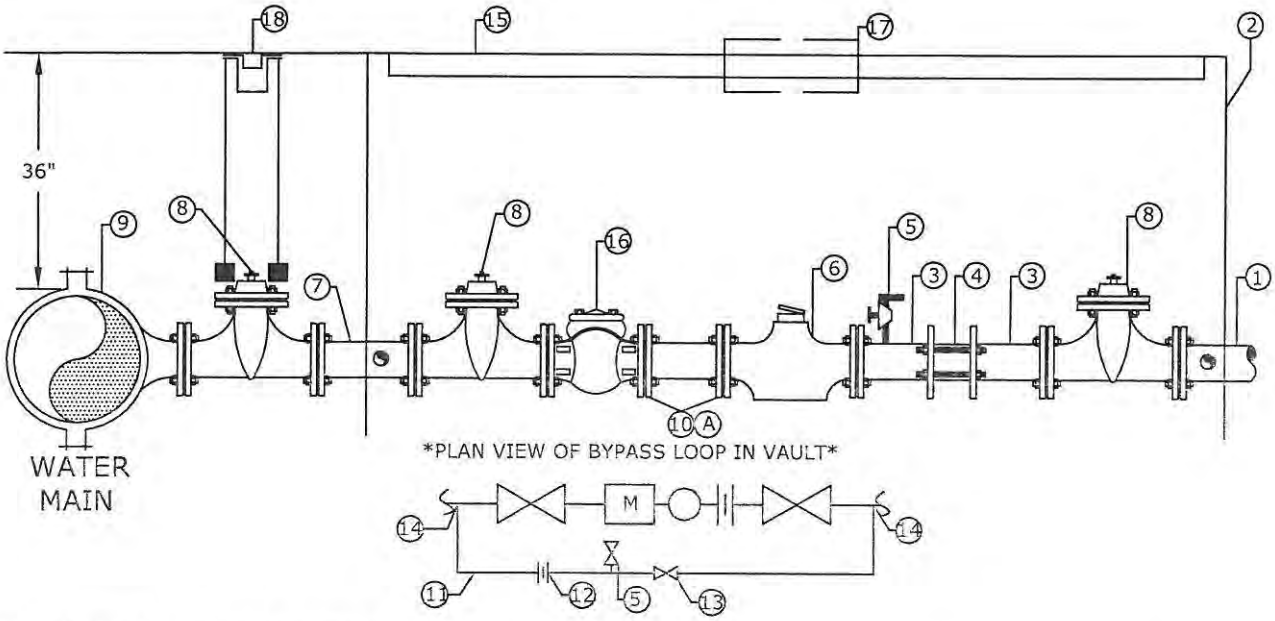
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		AIR-VACUUM & AIR RELEASE VALVE ASSEMBLY	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.13
NOT TO SCALE			



SIZE	CONCRETE BASE
2"	4"THICK 24"x24"

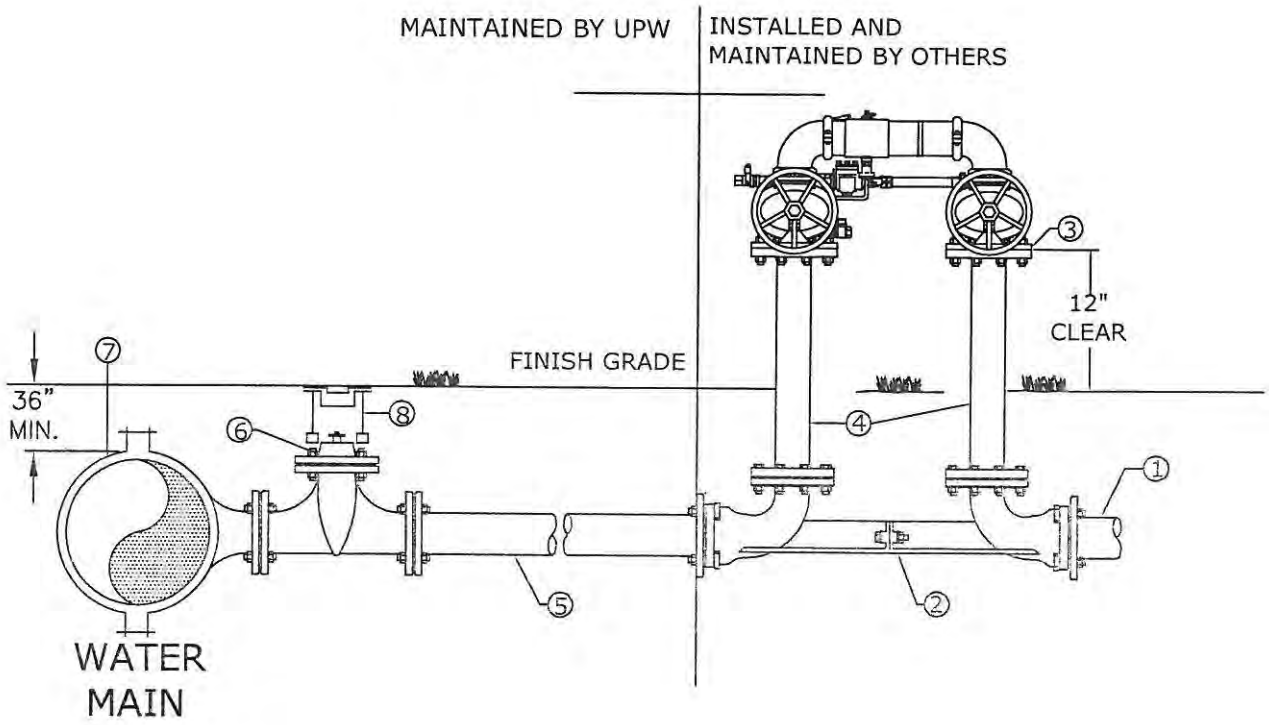
18" DIA. X 30" TALL VALVE ENCLOSURE. ENCLOSURE TO HAVE A BOLT DOWN BASE WITH REMOVABLE COVER. COVER & BASE TO BE MANUFACTURED FROM 3/16" WALL POLYETHYLENE WITH UV STABILIZERS. COVER SHALL LOCK TO BASE WITH AN INTEGRAL AUTO-LATCH AND PADLOCK HASP. COVER TO BE PIPELINE PRODUCTS' MODEL #VCAS-1830 OR APPROVED EQUAL.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		AIR RELEASE COVER ASSEMBLY & MOUNTING DETAIL	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.14
NOT TO SCALE			



ITEM	QTY.	DESCRIPTION
①	4 LF	__" STUB-OUT SERVICE CONNECTION MATERIAL SPECIFIED BY CUSTOMER
②	1 EA	PRE-CAST CONCRETE VAULT DIMENSION VARIES
③	2 EA	__" STANDARD STEEL PIPE WITH WELD ON FLANGE
④	1 EA	__" FLEX COUPLING FROM THE WATER DIVISION APPROVED LIST
⑤	1 EA	2" BRASS TEST PORT WITH WHEEL VALVE AND CAP
⑥	1 EA	__" WATER METER TO BE PROVIDED BY THE CITY, INSTALLED BY THE DEVELOPER OR CONTRACTOR
⑦	__ LF	__" CEMENT LINED & MORTAR COATED PIPE
⑧	3 EA	FLANGE RW GATE VALVE ASSEMBLY PER UPW STD.-W.07
⑨	1 EA	EPOXY COATED STAINLESS STEEL TAPPING SLEEVE, OR WELD NOZZLE WITH DOUBLER __" O.D. MAIN WITH __" SERVICE LATERAL
⑩		SPOOL LENGTH TO BE 5 TIMES THE DIAMETER OF THE METER, DEVELOPER OR CONTRACTOR TO PROVIDE AND INSTALL
⑪	1 EA	BYPASS LOOP-BRASS PIPE (U.S. MANUFACTURED) (SIZE TO BE HALF THAT OF THE SERVICE)
⑫	1 EA	__" BRASS-THREE PART UNION
⑬	1 EA	__" THREADED GATE VALVE
⑭	1 EA	__"x__" TAPPING SADDLE
⑮	1 EA	STEEL DOOR ACCESS HATCH
⑯	1 EA	__"x__" BRASS STRAINER PROVIDED BY CITY, INSTALLED BY THE DEVELOPER OR CONTRACTOR.
⑰		4" ACCESS HATCH TO READ METER
⑱	1 EA	VALVE BOX PER UPW STD.-W.09
Ⓐ	2 EA	WELD FLANGES

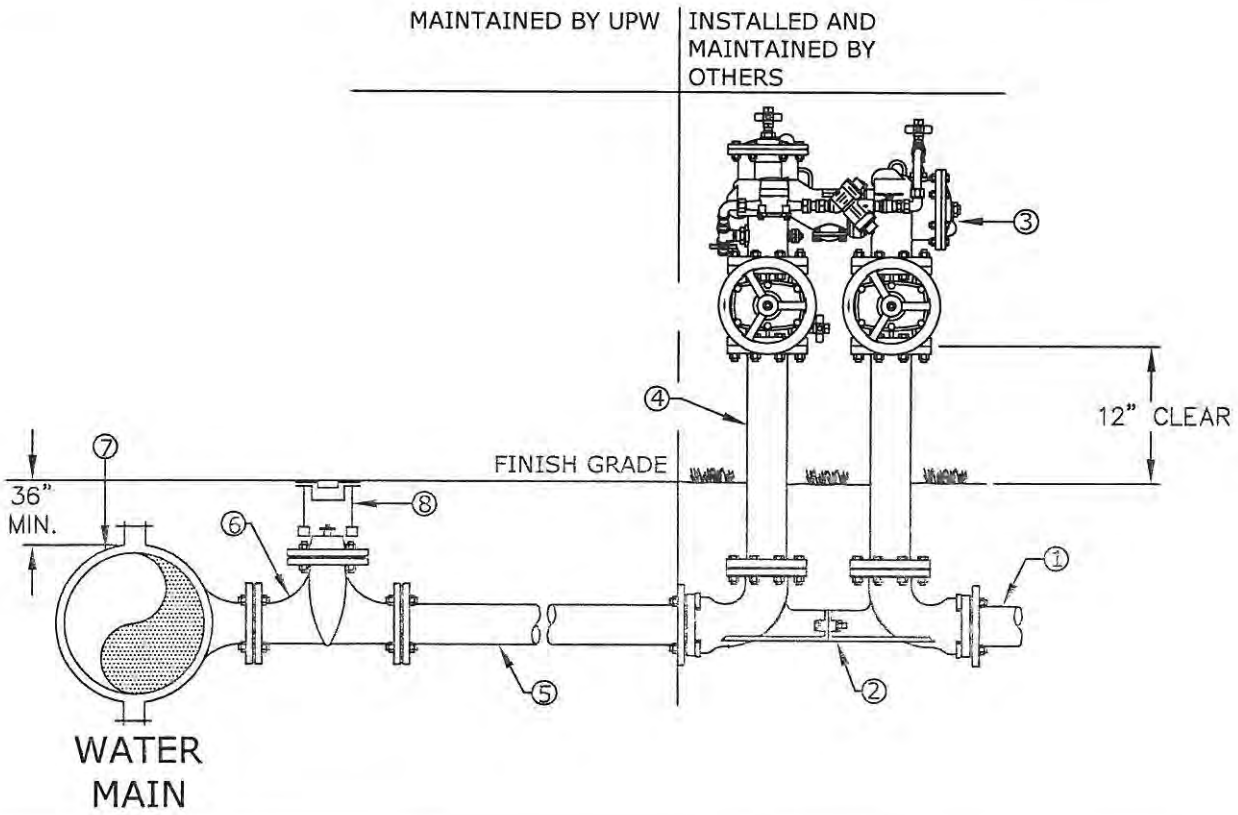
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		3" AND LARGER DOMESTIC SERVICE	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.15
NOT TO SCALE			



ITEM	QTY	DESCRIPTION
①	4 LF	STUB-OUT FOR SERVICE CONNECTION (MATERIAL SPECIFIED BY CUSTOMER)
②	1 EA	__" VALVE SETTER
③	1 EA	REDUCER PRESSURE DETECTOR CHECK ASSEMBLY (WATTS SERIES 957RPDA, OR APPROVED EQUAL.)
④	2 EA	__" SCH. 40 STEEL OR DUCTILE IRON PIPE SPOOLS.
⑤	__LF	__" CLMC PIPE SEE SPECIFICATIONS FOR BACKFILL REQUIREMENTS UPW STD.-W.23
⑥	1 EA	__" FLANGE GATE VALVE ASSY PER UPW STD.-W.6
⑦	1 EA	EPOXY COATED TAPPING SLEEVE, TAPPING SLEEVE, WELD NOZZEL WITH DOUBLER, OR TEE _"O.D. MAIN WITH _" SERVICE LATERAL
⑧	1 EA	INSTALL VALVE BOX PER UPW STD.-W.09

NOTE:
ONCE INSTALLATION IS COMPLETED DEVICE MUST BE TESTED BY A CERTIFIED TESTER OF SAN BERNARDINO COUNTY.

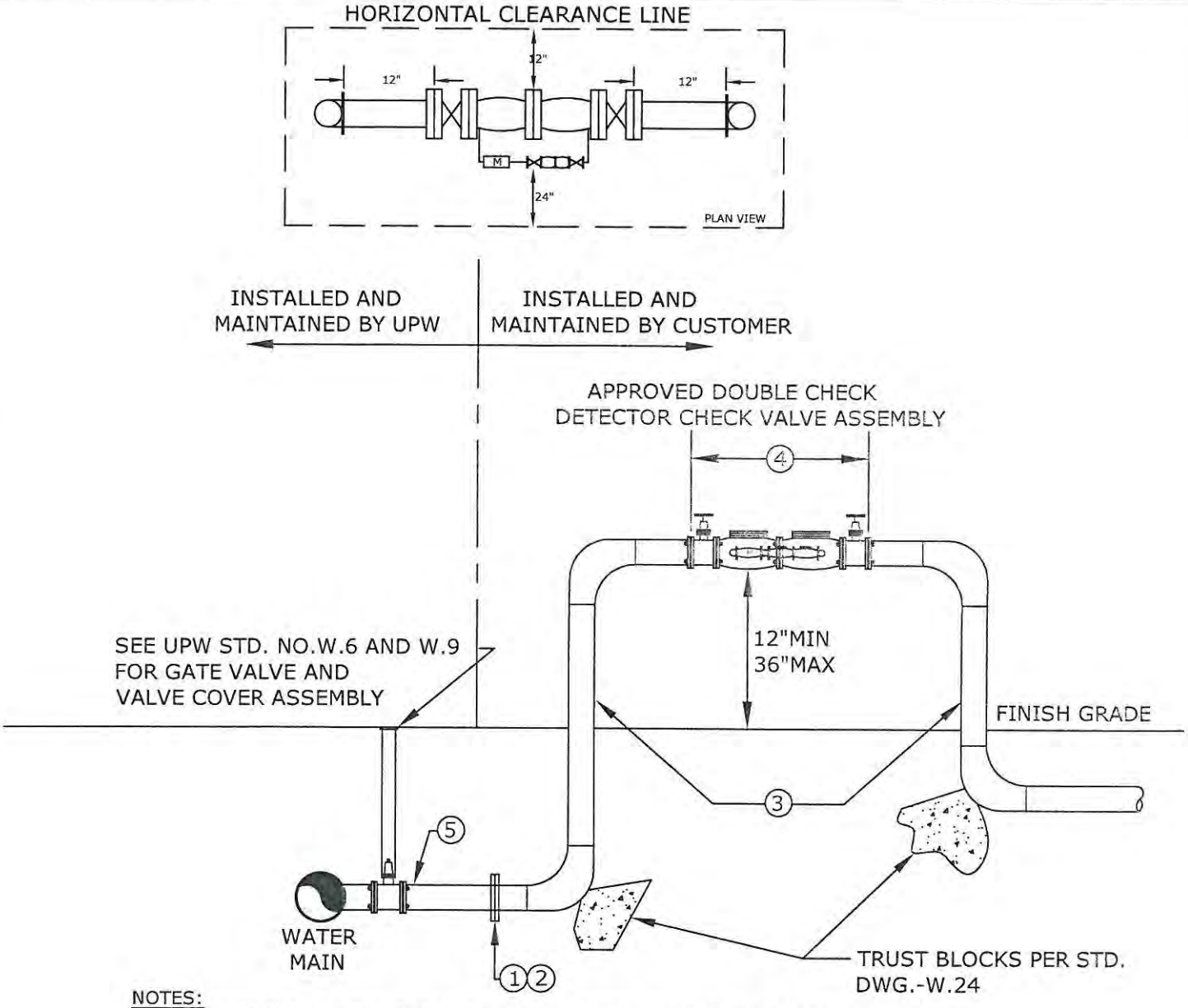
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		4" AND LARGER ABOVEGROUND FIRE SERVICE W/REDUCED PRESSURE DETECTOR CHECK ASSEMBLY	UPW-WD
NOT TO SCALE		APPROVED: Anthony M. Lo DATE: 3/16/09	W.16



ITEM	QTY	DESCRIPTION
①	4 LF	STUB-OUT FOR SERVICE CONNECTION (MATERIAL SPECIFIED BY CUSTOMER)
②	1 EA	__" VALVE SETTER
③	1 EA	__" DOUBLE CHECK DETECTOR ASSEMBLY (FEBCO 876/876V OR APPROVED EQUAL)
④	2 EA	__" SCH. 40 STEEL OR DUCTILE IRON PIPE SPOOLS.
⑤	1 LF	__" CLMC PIPE SEE SPECIFICATIONS FOR BACKFILL REQUIREMENTS UPW STD.-W.23
⑥	1 EA	__" FLANGE GATE VALVE ASSY PER UPW STD.-W.06
⑦	1 EA	EPOXY COATED TAPPING SLEEVE, TAPPING SLEEVE, WELD NOZZLE WITH DOUBLER, OR TEE _"O.D. MAIN WITH _" SERVICE LATERAL
⑧	1 EA	INSTALL VALVE BOX PER UPW STD.-W.09

NOTE:
ONCE INSTALLATION IS COMPLETED DEVICE MUST BE TESTED BY A CERTIFIED TESTER OF SAN BERNARDINO COUNTY.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		4" AND LARGER ABOVEGROUND FIRE SERVICE W/DOUBLER CHECK DETECTOR CHECK ASSEMBLY	UPW-WD
NOT TO SCALE		APPROVED: Anthony M. La DATE: 3/16/09	W.17



NOTES:

1 CITY WILL INSTALL BLIND FLANGE AT CONNECTION POINT. THE CITY'S WATER DEPARTMENT INSPECTOR TO BE PRESENT WHEN BLIND FLANGE IS REMOVED AND DETECTOR CHECK VALVE ASSEMBLY IS INSTALLED.

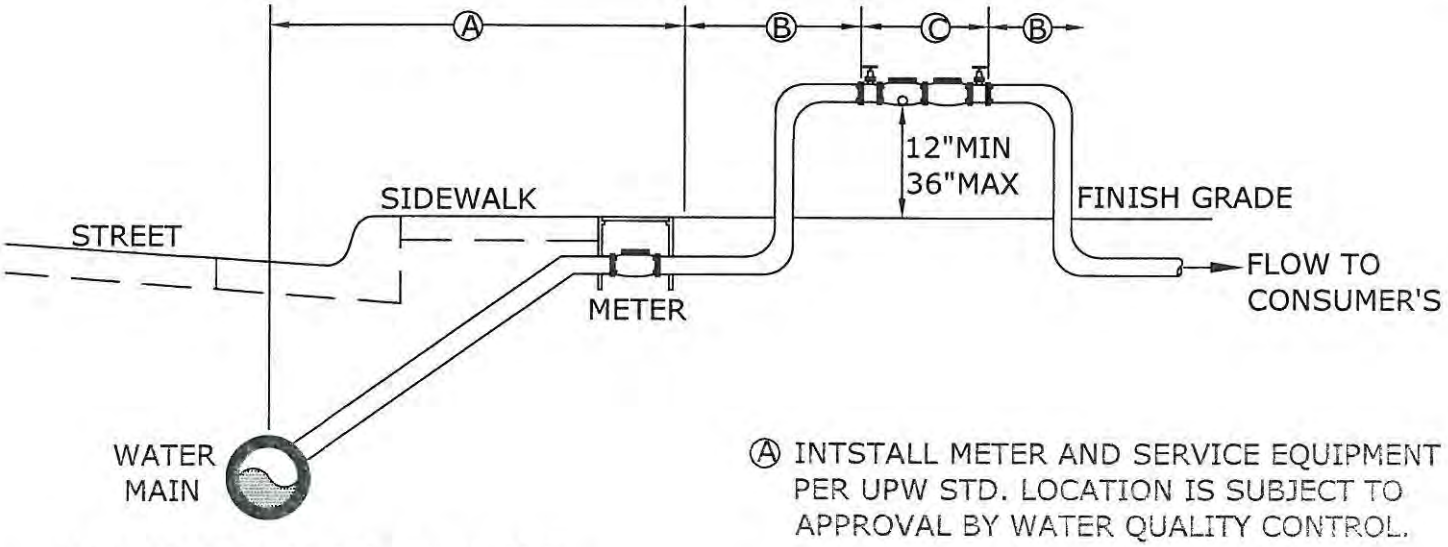
2 CUSTOMER TO SWAB CONNECTING FLANGE WITH 600 PPM CHLORINE SOLUTION WHEN MAKING CONNECTION.

3 CUSTOMER TO PAINT ALL ABOVE GRADE PIPING AND DETECTOR ASSY.

4 THE DETECTOR ASSY. SHALL BE INSPECTED AND TESTED IMMEDIATELY AFTER INSTALLATION.

5 ALL UPW INSTALLED WATER LINES SHALL BE CLMC PIPE. FOR 10" DETECTOR ASSEMBLY INSTALL 12" LATERAL AND PIPING.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		4" THROUGH 10" DOUBLE CHECK DETECTOR CHECK VALVE ASSEMBLY	UPW-WD
NOT TO SCALE		APPROVED: Anthony M. Lo DATE: 3/16/09	W.18

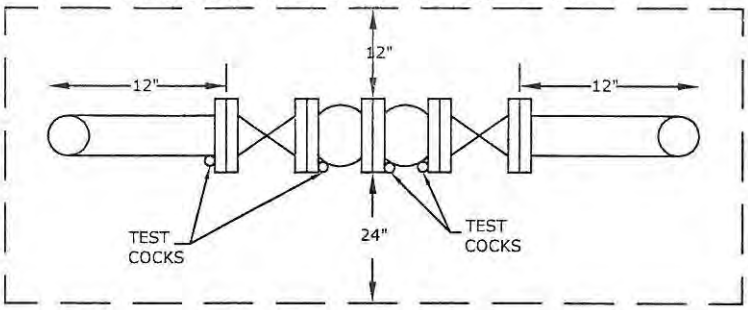


Ⓐ INTSTALL METER AND SERVICE EQUIPMENT PER UPW STD. LOCATION IS SUBJECT TO APPROVAL BY WATER QUALITY CONTROL.

Ⓑ INSTALLED AND MAINTAINED BY CONSUMER PER CITY OF UPLAND WATER DIVISION.

Ⓒ APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY WITH RESILIENT SEATED SHUT-OFF VALVES.

HORIZONTAL CLEARANCE LINE



NOTES:

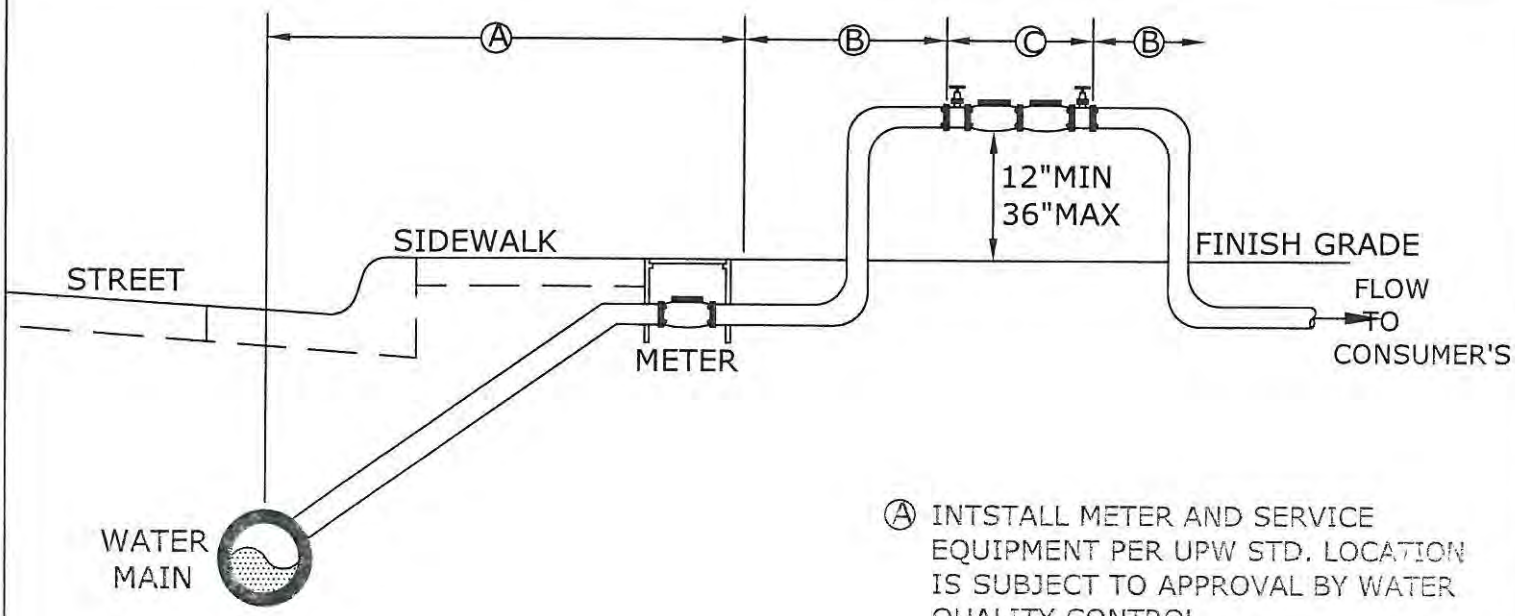
1. THE ASSEMBLY MUST BE INSPECTED AND APPROVED BY UPW IMMEDIATELY AFTER INSTALLATION. THE ASSEMBLY MUST BE TESTED BY A CERTIFIED BACKFLOW TESTER OF SAN BERNARDINO COUNTY.

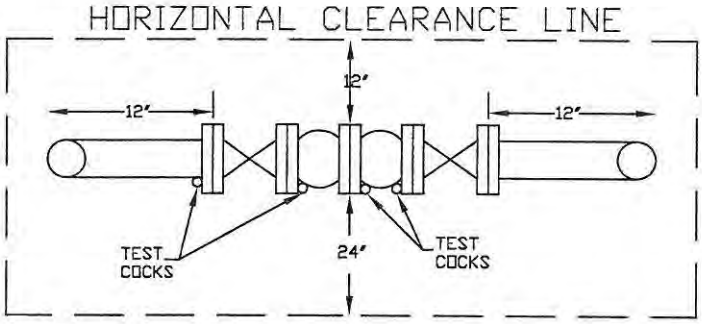
2. NO CONNECTIONS OR TEES ARE PERMITTED BETWEEN THE METER AND BACKFLOW PREVENTER. STRAINERS WILL BE REVIEWED ON AN INDIVIDUAL BASIS.

3. PRIOR TO INSTALLATION OF THE ASSEMBLY, THE WATER SERVICE SHALL BE FLUSHED.

4. A MANIFOLD CONNECTION WITH DUPLEX UNITS SHOULD BE INSTALLED IF AN UNINTERRUPTED SUPPLY OF WATER IS NECESSARY.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL INSTALLATION REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY	UPW-WD
NOT TO SCALE		APPROVED: Anthony M. [illegible] DATE: 3/16/09	W.19





Ⓐ INTSTALL METER AND SERVICE EQUIPMENT PER UPW STD. LOCATION IS SUBJECT TO APPROVAL BY WATER QUALITY CONTROL.

Ⓑ INSTALLED AND MAINTAINED BY CONSUMER PER CITY OF UPLAND WATER DIVISION.

Ⓒ APPROVED DOUBLE CHECK ASSEMBLY WITH RESILIENT SEATED SHUT-OFF VALVES.

NOTES:

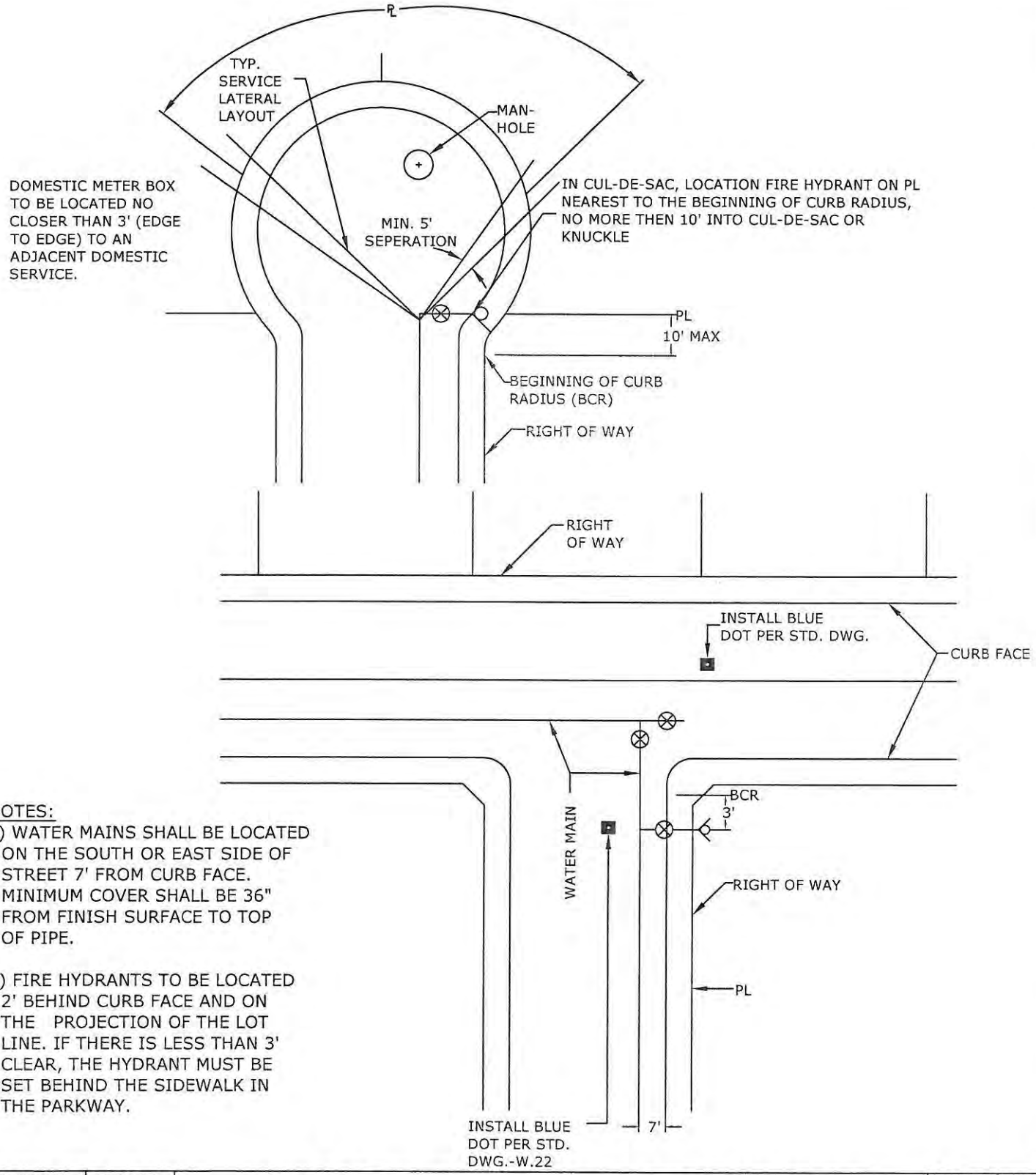
1. THE ASSEMBLY MUST BE INSPECTED AND APPROVED BY UPW IMMEDIATELY AFTER INSTALLATION. THE ASSEMBLY MUST BE TESTED BY A CERTIFIED BACKFLOW TESTER OF SAN BERNARDINO COUNTY.

2. NO CONNECTIONS OR TEES ARE PERMITTED BETWEEN THE METER AND BACKFLOW PREVENTER. STRAINERS WILL BE REVIEWED ON AN INDIVIDUAL BASIS.

3. PRIOR TO INSTALLATION OF THE ASSEMBLY, THE WATER SERVICE SHALL BE FLUSHED.

4. A MANIFOLD CONNECTION WITH DUPLEX UNITS SHOULD BE INSTALLED IF AN UNINTERRUPTED SUPPLY OF WATER IS NECESSARY.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL INSTALLATION OF DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.20
NOT TO SCALE			



NOTES:

1) WATER MAINS SHALL BE LOCATED ON THE SOUTH OR EAST SIDE OF STREET 7' FROM CURB FACE. MINIMUM COVER SHALL BE 36" FROM FINISH SURFACE TO TOP OF PIPE.

2) FIRE HYDRANTS TO BE LOCATED 2' BEHIND CURB FACE AND ON THE PROJECTION OF THE LOT LINE. IF THERE IS LESS THAN 3' CLEAR, THE HYDRANT MUST BE SET BEHIND THE SIDEWALK IN THE PARKWAY.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TYPICAL PIPE & FIRE HYDRANT LAYOUT (ALIGNMENT)	UPW-WD
		APPROVED: Anthony M. Lo DATE: 3/16/09	W.21
NOT TO SCALE			

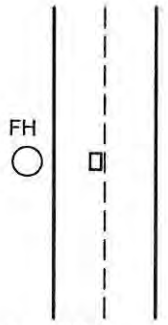


FIGURE 1
TWO LANE STREET

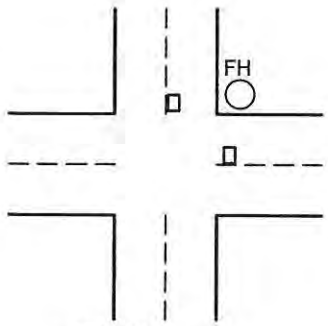


FIGURE 3
INTERSECTION

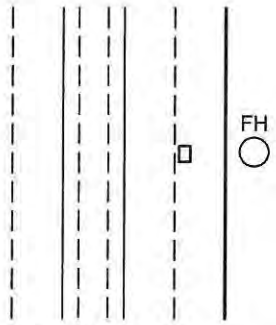


FIGURE 5
MULTI-LANE STREET
WITH TURN LANE

LEGEND

- REFLECTORIZED BLUE DOT PAVEMENT MARKER
- FH ○ FIRE HYDRANT
- - - - LANE DIVIDER LINE
- —— NO TURNS DIVIDER LINE
- —— CURB LINE

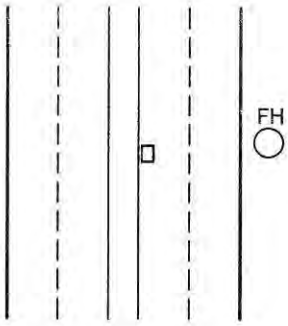


FIGURE 2
MULTI-LANE STREET

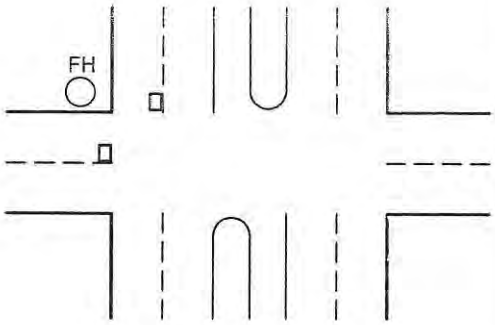


FIGURE 4
FOUR-LANE WITH TURN
LANE AT INTERSECTION

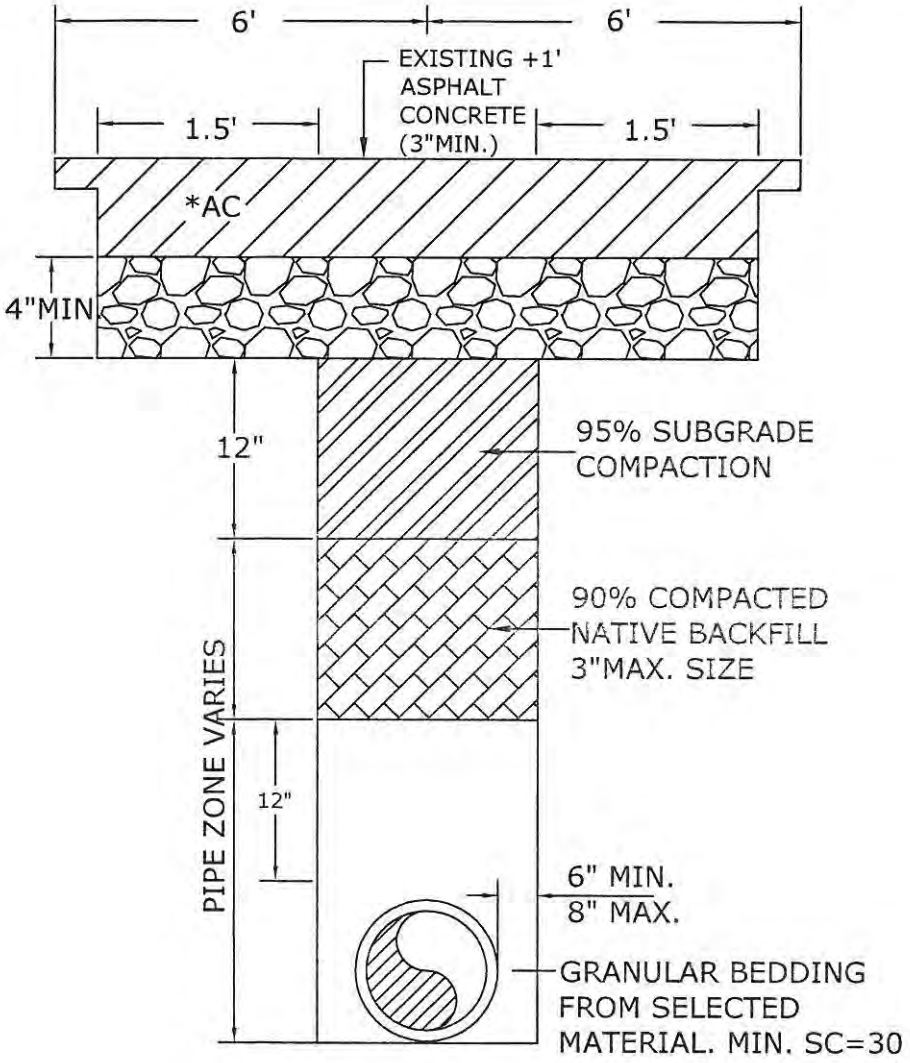
A. TWO-WAY STREETS AND ROADS: MARKERS SHOULD BE PLACED SIX INCHES FROM EDGE OF PAINTED CENTERLINE ON THE SIDE NEAREST THE FIRE HYDRANT. IF THE STREET HAD NO CENTERLINE, THE MARKER SHOULD BE PLACED SIX INCHES FROM THE APPROXIMATE CENTER ON THE ROADWAY ON THE SIDE NEAREST THE HYDRANT (SEE FIGURE 1 THROUGH 3)

B. STREETS WITH LEFT TURN LANE AT THE INTERSECTION: MARKERS SHOULD BE PLACED SIX INCHES FROM THE EDGE OF THE PAINTED WHITE LINE ON THE SIDE NEAREST THE HYDRANT (SEE FIRGURE 4)

C. STREETS WITH CONTINUOUS TWO-WAY LEFT TURN LANE: MARKERS SHOULD BE PLACED SIX INCHES FROM THE EDGE OF THE PAINTED YELLOW BARRIER LINE ON THE SIDE NEAREST THE FIRE HYDRANT (SEE FIGURE5)

D. CUL-DE-SAC: MARKER SHOULD BE 6" FROM THE CENTER OF THE CUL-DE-SAC CURB RADIUS ON THE SIDE NEAREST THE FIRE HYDRANT.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		BLUE DOT PAVEMENT MARKERS AND FIRE HYDRANT MARKING	UPW-WD
			W.22
NOT TO SCALE		APPROVED: Anthony M. Lo DATE: 3/16/09	



NOTES:

1. TRENCH WIDTH BE CONTROLLED TO TOP OF PIPE ZONE.

2. ALL PAVEMENT SECTION FLOATERS THAT ARE 4 FEET OR LESS SHALL BE REMOVED AND REPLACED WITH THRENCH REPAIR.

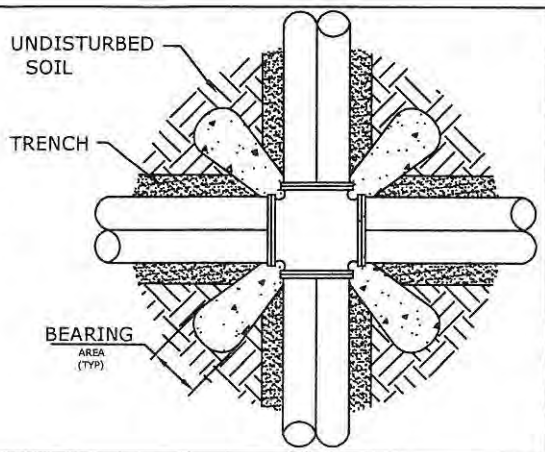
3. FINISH SURFACE PAVEMENT REQUIREMENT SHALL BE DETERMINED BY CITY ENGINEER

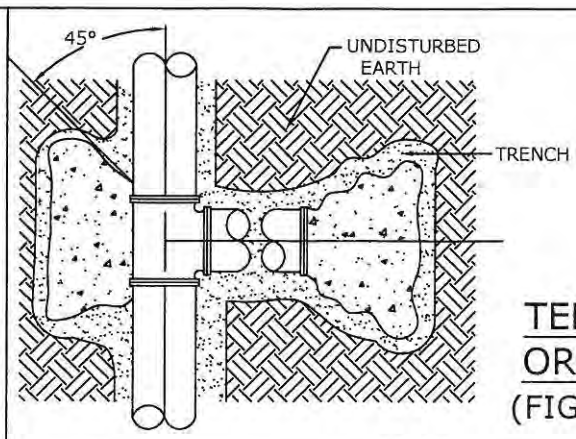
4. TRENCH DEPTHS OF GREATER THAN 5 FEET SHALL HAVE ADEQUATE SHORING.

5. COMPACTION SHALL BE 90% IN ALL ZONES UNLESS OTHER WISE SPECIFIED. TRENCH STABILITY SHALL CONFORM TO CAL-OSHA REQUIREMENTS.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		TRENCH BEDDING AND PAVEMENT REPAIR DETAIL	UPW-WD
		APPROVED: Anthony M. La DATE: 3/16/09	W.23
NOT TO SCALE			

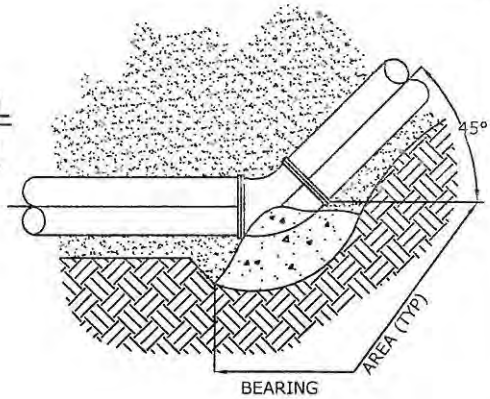
CROSS
(FIGURE 1)

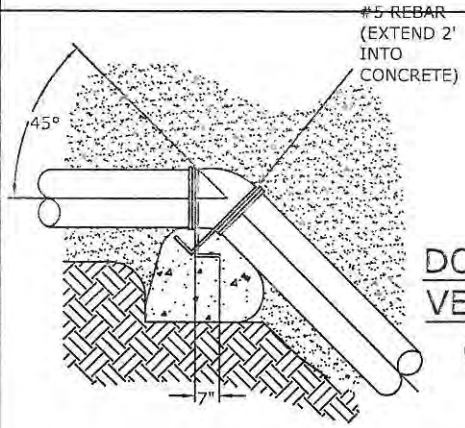




TEE, PLUG OR CAP
(FIGURE 2)

HORIZONTAL OR UPWARD VERTICAL BEND
(FIGURE 3)





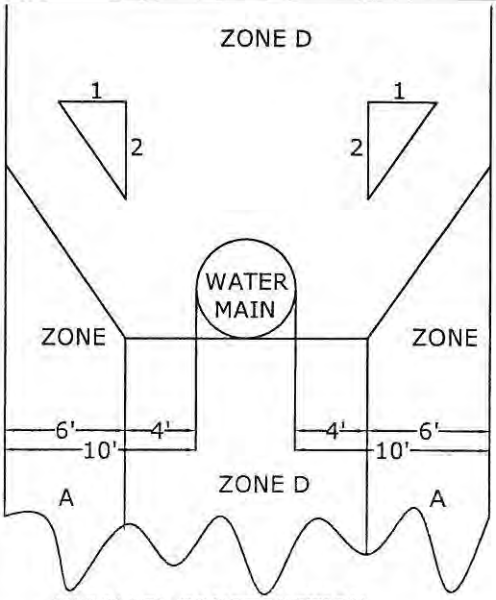
DOWNWARD VERTICAL BEND
(FIGURE 4)

GENERAL NOTES:
ALL CONCRETE SHALL BE 3000 PSI MINIMUM. 28 DAYS COMPRESSIVE STRENGHT. CONCRETE IS TO BE PLACED AGAINST INDISTURBED EARTH. TABLE BELOW DENOTES MINIMUM BEARING AREA OR VOLUME OF TRUST BLOCK. SPECIAL DESIGN CALCULATIONS ARE TO BE SUBMITTED TO UPW FOR APPROVAL IF ALLOWABLE SOIL BEARING CAPACITY IS LESS THAN 3000 PSF. ALL VERTICAL SURFACES NOT BEARING AGAINST UNDISTURBED EARTH SHALL BE FORMED. ALL THRUST BLOCKS SHALL BE PLACED IN THE PRESENCE OF AN UPW INSPECTOR.

	BEARING AREA SQ. FT.						CONC/CU YDS		
PIPE I.D.	FIGURE	FIGURE	FIGURE 3,				FIGURE 4,		
	1	2	90*	45*	22-1/2*	11-1/4*	45*	22-1/2*	11-1/4*
4"	2	2	2	2	1	1	1	0.5	0.5
6"	2	3	4	2	1	1	1.5	1.0	0.5
8"	3	5	7	4	2	1	3.0	1.5	1.0
10"	4	8	11	6	3	2	4.0	2.5	1.5
12"	6	11	15	8	4	2	6.0	3.0	1.5
16"	10	20	28	15	8	4	10.5	6.0	3.0
18"	13	25	35	19	10	5	13.5	7.5	3.5
20"	16	31	44	24	12	6	16.0	9.0	4.5
24"	22	44	63	34	17	9	23.5	12.5	6.5

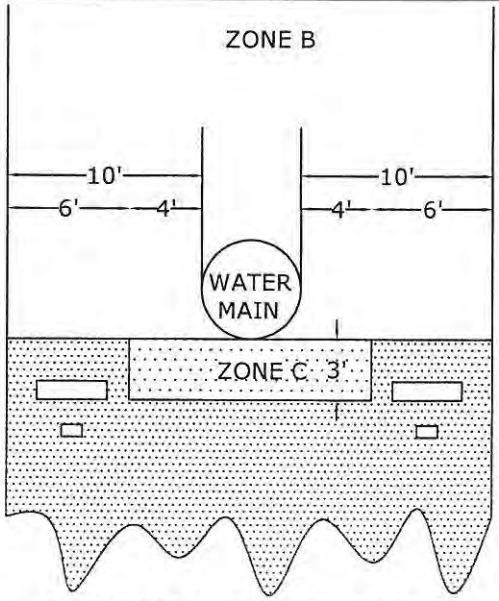
NOTE:
USE OF THRUST BLOCKS REQUIRES PRIOR DEPARTMENT APPROVAL AND WILL BE EVALUATED ON A CASE BY CASE BASIS.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		THRUST BLOCK INSTALLATION	UPW-WD
		APPROVED: Anthony M. Lo DATE: 3/16/09	W.24
NOT TO SCALE			



PARALLEL CONSTRUCTION

IF A MAIN LINE SEWER CANNOT BE LOCATED TEN OR MORE FEET FROM A PRESSURE WATER MAIN AND MUST BE LOCATED WITHIN ANY OF THE ABOVE INSICATED ZONES, SPECIAL CONSTRUCTION WILL BE REQUIRED AS SHOWN BELOW.



PERPENDICULAR COSTRUCTION

IF A MAIN LINE SEWER MUST CROSS A PRESSURE WATER MAIN WITHIN ANY OF THE ABOVE INDICATED ZONES, OR IS A HOUSE LATERAL MUST CROSS IN ZONE B, SPECIAL CONSTRUCTION WILL BE REQUIRED AS SHOWN BELOW.

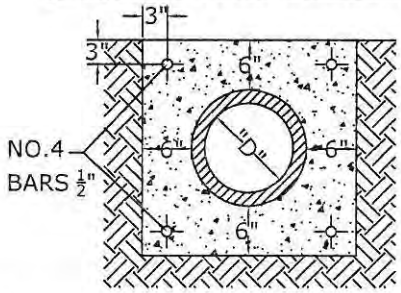
ZONE	SEWER CONSTRUCTION REQUIREMENTS
A	V.C.P. WITH COMPRESSION JOINTS
B OR C	C.I.P. (CLASS 150) APPROVED MECHANICAL JOINTS, OR C.V.P. WITH SPECIAL CONCRETE ENCASEMENT PER (S-23 CASE IV), OR V.C.P. GROUTED IN CONTINOUS STEEL CASING.
D	DO NOT LOCATED ANY PARALLEL SEWER IN THIS AREA WITHOUT HEALTH DEPARTMENT APPROVAL CALL MA 0-2980

FORCE MAINS:

PARALLEL CONSTRUCTION NOT PERMITTED IN ANY ZONE.

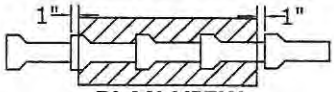
PERENDICULAR CONSTRUCTION IN ANY ZONE REQUIRES C.I.P. (CLASS 150) WITH APPROVED MECHANICAL JOINTS, OR ASBESTOS CEMENT PIPE WITH SPECIAL CONCRETE ENCASEMENT PER IV.

CASE IV-SPECIAL ENCASEMENT



GENERAL NOTES:

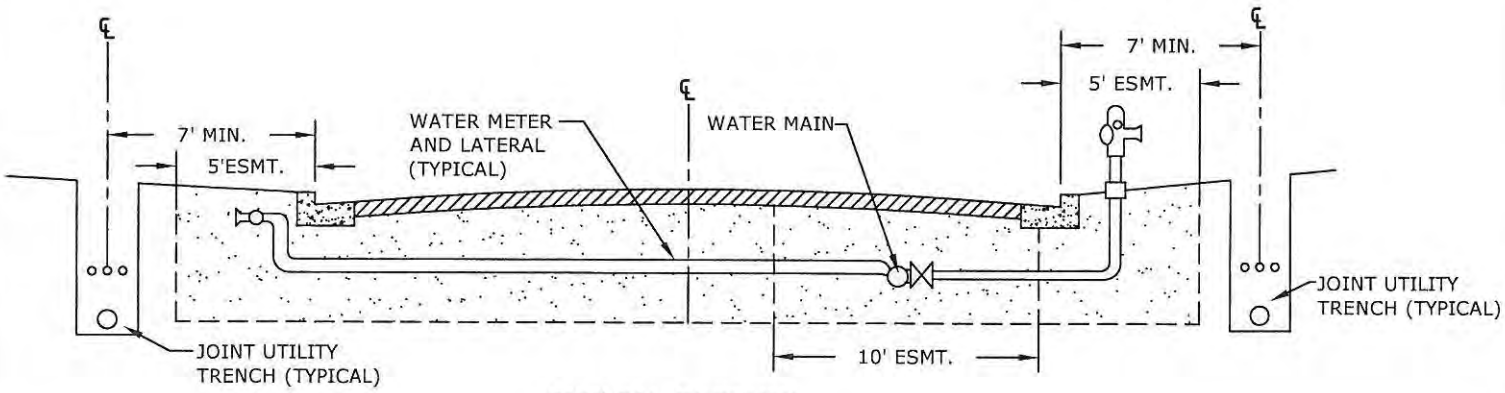
1. EXTEND BOTH ENDS OF ENCASEMENT TO A POINT ONE INCH SHORT OF FIRST PIPE JOINT BEYOND LOCATIONS SPICIFIED ON PLAN.



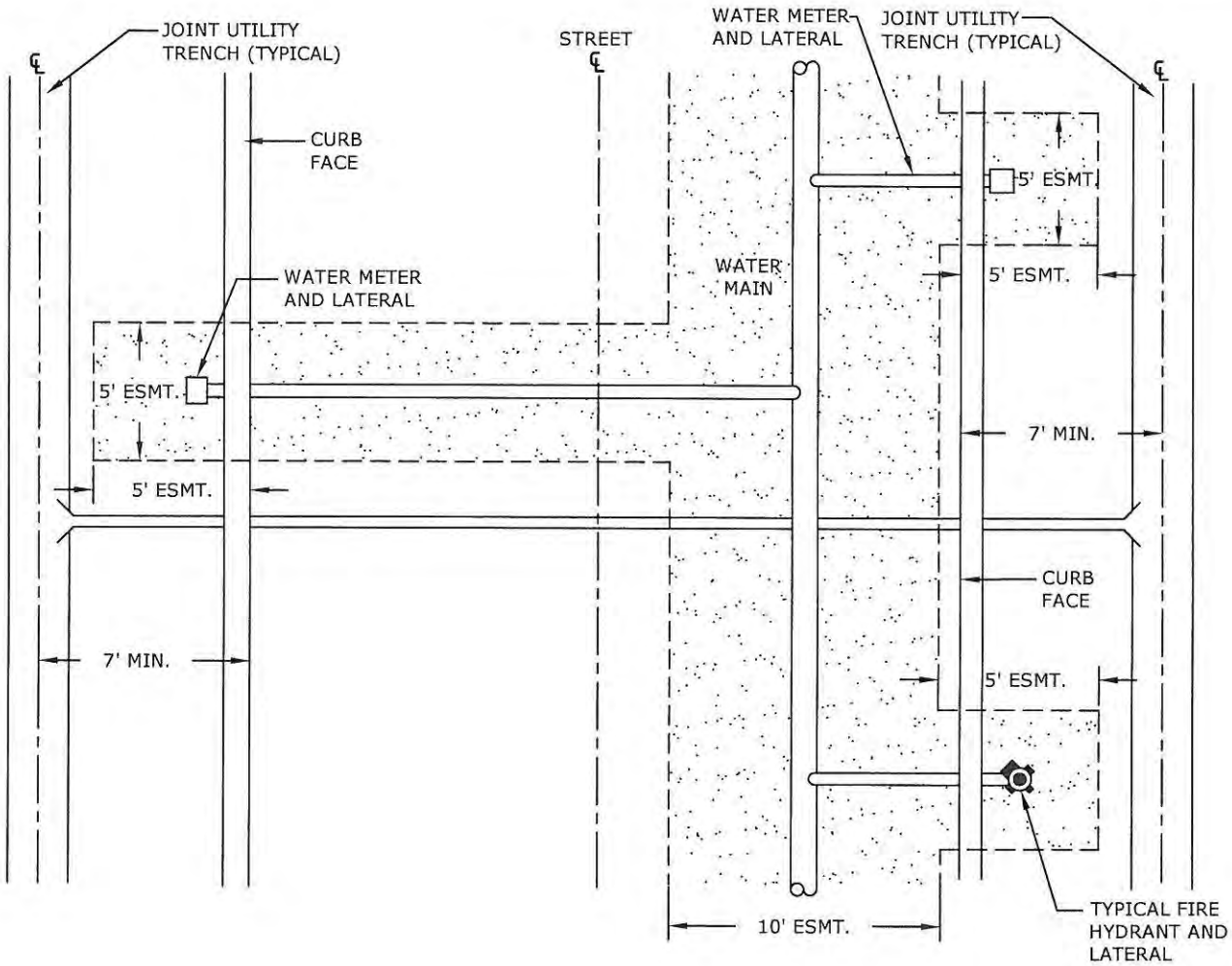
PLAN VIEW

2. APPLY FORM OIL, THIN PLASTIC SHEET, OR OTHER ACCEPTABLE MATERIAL TO PIPE, TO PREVENT BOND BETWEEN PIPE AND CONCRETE.
3. USE CLASS 5C2500 CONCRETE FOR ALL CASES.

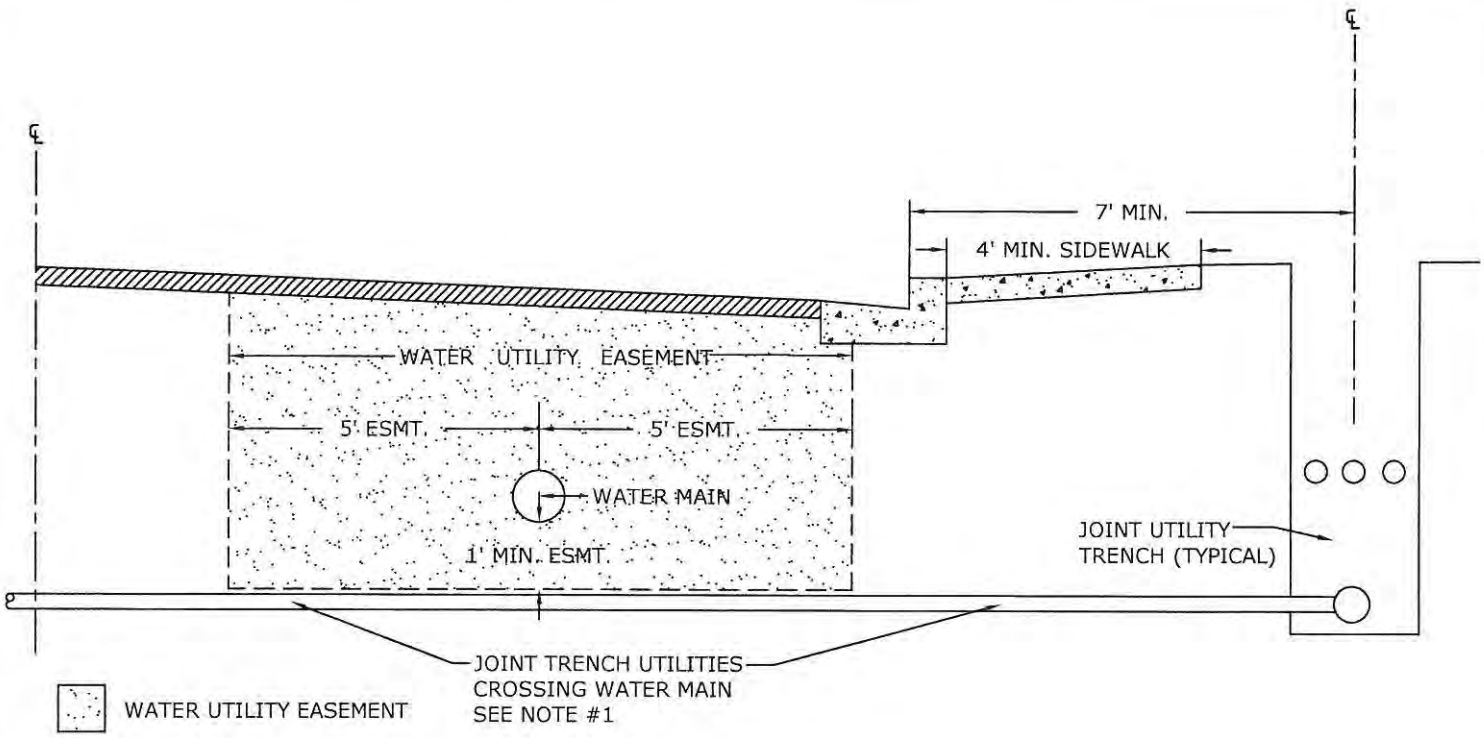
REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		PIPE ZONE	UPW-WD
			W.25
NOT TO SCALE		APPROVED: Anthony M. Lee DATE: 3/16/09	



TYPICAL SECTION



REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		EASEMENT ZONE AND JOINT TRENCH UTILITIES	UPW-WD
		APPROVED: _____ DATE: 7/16/09	W.26A
NOT TO SCALE			



NOTES:

1. ALL UTILITIES* CROSSING A WATER MAIN OR LATERAL SHALL HAVE A MINIMUM SEPARATION OF 12 INCHES FROM THE BOTTOM OF THE WATER FACILITY TO THE TOP OF THE SHALLOWEST CONDUIT.

2. SPECIAL CONSTRUCTION SHALL BE REQUIRED AT EACH UTILITY CROSSING A WATER FACILITY IF THE REQUIREMENTS CANNOT BE MET.

3. SPECIAL CONSTRUCTION MAY INCLUDE A 12 INCH SEPARATION FROM THE WATER FACILITIES AND A CONCRETE EASEMENT AROUND ALL CONDUITS WITHIN THE EASEMENT ZONE, AS NECESSARY.

4. THE WATER DEPARTMENT SHALL BE NOTIFIED WHEN SUCH CROSSINGS ARE TO BE MADE. UTILITY CROSSINGS OF WATER FACILITIES REQUIRE INSPECTION BY THE WATER DEPARTMENT.

* UTILITIES DO NOT INCLUDE SEWER FACILITIES.
SEE WATER AND SEWER SPECIFICATIONS.

REVISION	DATE	UPLAND PUBLIC WATER DIVISION	DRAWING NUMBER
		EASEMENT ZONE AND JOINT TRENCH UTILITIES	UPW-WD
		APPROVED: [signature] DATE: 7/16/09	W.26B
NOT TO SCALE			

SPECIAL PROVISIONS
CONSTRUCTION MATERIALS

GENERAL: All material furnished shall be new and of recent manufacture and shall be completely suitable for the purpose intended. All materials shall be provided as specified, unless prior determination is obtained from the Assistant Public Works Director, or an approved equal.

PIPE: Small steel pipe 2 inches in diameter and smaller unless otherwise shown, shall be galvanized and conform to the requirements of the "Specifications for Black and Hot-Dipped Zinc-Coated (galvanized) Welded and Seamless Steel Pipe for Ordinary Uses" (ASTM Designation A120), and shall be standard weight unless otherwise shown. Fittings shall be of galvanized malleable iron, unless otherwise shown. All pipe bigger than 2 inches shall be Cement Mortar Lined & Cement Coated 10 gauge steel cylinder, bell and spigot ends with rubber gaskets A.W.W.A approved.

FIRE HYDRANTS: The Fire Hydrant Assemblies shall be Class 200 constructed as shown in Standard Drawing W.05 and in the locations shown on the construction drawings.

FLEXIBLE STEEL PIPE COUPLINGS: Flexible steel pipe couplings shall be Smith- Blair, Inc. Type 400 Series Steel Couplings or approved equal.

FLANGED COUPLING ADAPTERS: Flanged Coupling Adapters shall be Smith-Blair, Inc. Type 900 Series Flanged Coupling Adapters or approved equal.

SADDLES: Saddles shall be Smith-Blair, Inc. Type 900 Series or approved equal.

FLANGES: Materials, dimensions and drilling of flanges for pipe and fittings shall be in accordance with A.W.W.A designation C207-94 D ring Flanges. All flanges shall be attached to the pipe with the bolt holes straddling the vertical axis of the pipe.

GASKETS FOR FLANGED JOINTS: Flanged joints shall be provided with 1/16 inch thick full face rubber gaskets or approved equal.

MANHOLE FRAMES AND COVERS: Manhole frames and covers shall be Alhambra Foundry Co. No. A-1170 with 24-inch clear opening or approved equal. The manhole cover shall be plainly marked "WATER".

VALVES SLEEVES AND CAPS: Sleeves constructed of 6-inch P.V.C. Schedule 40 and galvanized slip sleeve shall provide access from the street or ground surface to the gate valve as shown on Standard Drawing No. W.09. The valve sleeve shall be cut and positioned so as to provide proper clearance between the lower end of the sleeve and the valve housing. The valve sleeve within the paved roadway shall be capped by means of a 6-inch cast iron pavement cap. The pavement cap shall be plainly marked "WATER".

PRE-CAST VAULTS: Pre-Cast Concrete Vaults shall be Jenson Pre-Cast Manufacture, size and dimensions will vary.

VALVES-GENERAL:

(A) The Contractor shall furnish and install all valves shown. All valves shall be new and of recent manufacture and A.W.W.A. approved.

(B) The flanges of valves may be either raised or plain faced. Flanges of all valves shall be faced and drilled to 125-pound American Standard Dimensions.

(C) Each valve body shall be tested under a test pressure equal to twice its design water working pressure.

(D) The Contractor shall furnish to the Engineer prior to purchase, sufficient literature, catalog data and drawings to assure that the valves proposed to be furnished meet all requirements of these specifications.

AIR-VACUUM AND AIR RELEASE VALVES: Air vacuum and air release valves shall be of the sizes shown and shall have screwed ends. Bodies shall be of high strength cast iron, and the float, seat, and all moving parts shall be constructed of Type 18-8 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Air – Vacuum and Air Release Valves shall be designed for a working pressure of 200 PSI.

SMALL VALVES: Valves 2inch and smaller, unless otherwise shown, shall be all bronze with screwed ends designed for a water working pressure of 200 psi and be A.W.W.A.

SERVICE LATERAL VALVES: Service lateral valves and piping shall be provided where shown on the drawings. The service lateral assemblies shall be constructed as shown on Standard Drawing W.01 and W.03

BUTTERFLY VALVES: Butterfly Valves shall conform to the "Standard Specifications for Gate Valves for Ordinary Water Service" (A.W.W.A. C-504-94). The valves shall be designed for the specified Class and shall be furnished complete with manual operator and worm gear reducer totally enclosed in a gear case, unless specified otherwise on the drawings. On North and South Water Mains the operating nut shall be installed on the west side of the Water Main and on the East and West Water Mains the operating nut shall be installed on the north side of the main.

RESILIENT WEDGE GATE VALVES: Resilient Wedge Gate Valves shall be encapsulated solid wedge with sealing mechanism in accordance with A.W.W.A. C-509 or C-515.The valve body shall be cast iron or ductile iron. Gate valves shall be of the non-rising stem type with "O" rings. When both "O" rings are located above the thrust collar the bearing area shall be fusion-bonded epoxy coated and contain a thermoplastic washer to reduce friction.

PLUG VALVES: Lubricated Plug Valves shall be pressure lubricated tapered plug type or approved equal. The valve bodies and plugs shall be constructed of cast iron and shall have smooth finished water passages. The lubrication system shall be designed to provide for application of the lubricant through a

check protected passage in the valve stem. Provision shall be made by ducts and grooves to insure the maintenance of a film of lubricant between all contact surfaces of moving parts. Suitable gaskets and packing shall be provided to insure that the valve is water tight at all times and to prevent escape of water or lubricant. The valves shall operate smoothly and easily after lubrication. All valves shall be packed with the proper lubricant. Valves shall have flanged ends and all valves shall open with counterclockwise turn.14 inch valves and larger shall be of the straightway short pattern type and shall be designed for and equipped with worm gearing and side hand wheel. 14 inch and larger lubricated Plug Valves shall be Nordstrom Figure 4149, 4149-1/2, 4149-1/4, ANSI Class 150 or approved equal. Lubricated Plug Valves 12 inches or smaller in diameter shall be Nordstrom Figure 1949, 1949-1/2 ANSI Class 150 or approved equal.

PRESSURE RELIEF VALVES: Pressure Relief Valves shall be of the modified globe type operated by an automatically controlled diaphragm. The valve shall be designed to automatically maintain a predetermined maximum line pressure by opening and discharging to atmosphere. The valve shall be designed for fast opening and slow closing to prevent surges. Valve Discs shall be non metallic and renewable. Valve seats shall be bronze and replaceable. All shafts and stems shall be constructed of corrosion resistant metal. The diaphragm shall be constructed of reinforced synthetic rubber. The valves shall be Cla-Val Company's Pressure Relief Valve Model 50-01 and 650-01 or approved equal.

PUMP CONTROL VALVES: Pump Control Valves shall be of the modified globe type operated by an automatically controlled diaphragm. The valves shall be designed to eliminate booster pump starting and stopping pressure surges by automatically opening at controlled rate after the pump starts and automatically closing at controlled rate before the pump stops. In the event of a power failure the valve shall close quickly at the moment flow stops. Valve discs shall be non metallic and renewable. Valve seats shall be bronze and shall be replaceable. All shafts and stems shall be constructed of corrosion resistant metal. The diaphragm shall be constructed of reinforced synthetic rubber. Included with each valve shall be all solenoids, micro switches, strainers and other accessories necessary to the complete operation of the valves. All electrical equipment shall be designed for all weather outdoor service, and shall operate on 480 volts A.C. The valve shall be Cla-Val Company's Booster Pump Control Valve 60 Series or approved equal.

SPECIAL PROVISIONS
CONSTRUCTION METHODS

LAYING AND JOINTING CEMENT LINED AND MORTAR COATED PIPE

(A) **LAYING**: Trenches shall be in a reasonably dry condition when the pipe is laid. Necessary facilities shall be provided for lowering and properly placing the pipe sections in the trench without damage. All handling of piping shall be done with fabric type slings which will not damage the coating of the pipe section. The slings shall bear uniformly against the pipe. When not being handled, all pipe shall be supported on timber cradles, sand bags or mounds of earth. The pipe shall be laid carefully to the lines and grades given and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for jointing, the bedding for the pipe shall be checked for firmness and uniformity of surface.

(B) **JOINTING**: The rubber gasket joint shall be made by properly lubricating with a suitable vegetable compound soap, the endless rubber ring gasket before it is placed in the groove at the spigot end. The gasket shall be stretched over the spigot end of the pipe and carefully seated in the groove. The gasket shall not be twisted, rolled, cut, crimped or otherwise injured or forced out of position during the closure of the joints. A feeler gauge shall be used to check the position of the rubber gasket after the joint has been telescoped. For Pipe 20 inches and larger 6" diameter hand holes shall be installed on opposite sides of the pipe where any offsets or angles are installed. Hand Holes shall be 6" Black Weld on Couplings. After pipe is mortared, 6" Galvanized Plugs shall be installed and properly cemented over to the satisfaction of the Water Utility Inspector For pipe 20 inches and smaller the spigot end of the pipe shall be daubed with mortar containing 1 part lumnite cement to not more than 3 parts of sand, then inserted into the bell and forced to the bottom of the bell. Excess mortar on the inside shall be swabbed out. After the pipe has been laid, but before backfill has been completed, the outside annular space between pipe sections shall be completely filled with grout. The grout shall be poured in such a manner that all exposed portions of the metal joint shall be completely protected with cement mortar. Grout used on the outside of the joints shall be a mixture of 1 part of cement to 3 parts of sand, and shall be sufficiently fluid to permit it to be poured into the joint space. The outside mortar joints shall be properly formed by use of heavy duty diapers as manufactured by the Mar-Mac Manufacturing Co., McBee, South Carolina, or approved equal.

(C) **FIELD WELDING**: At all changes in direction and elsewhere as called for on the drawings, the bell end shall be circumferentially welded to the spigot end of the adjoining pipe. The weld shall be continuous and ample bell holes shall be dug to permit proper welding. The field welds between the bell and spigot ends shall be made in 2 or more passes so as to build up a fillet weld having a minimum thickness of ¼ inch. Prior to welding those joints designated for welding, the joints shall be made up in accordance with (B) above, except that at the Contractor's option the rubber gasket may be omitted. Such joints shall be inspected and approved by the City of Upland Water Utility Inspector before the coating is placed around the outside of the joint.

(D) **CLOSURE PIECES**: Where butt straps or closure pieces are used, the exterior of the closure pieces shall be given a coating at least equal to that on the pipe, or may be given a protective

coating in accordance with the requirements of (B) above. Where butt straps or closure pieces are used, the interior of the closure pieces shall be given a lining of mortar containing 1 part lumnite cement to not more than 3 parts of sand. The completed hand lining shall provide a smooth transition surface across the closure piece.

CONNECTIONS TO EXISTING FACILITIES: The contractor shall make all the connections to existing pipelines as shown and all connections, 8 inches and smaller shall be made by Hot Tap method unless otherwise approved by the Water Utility Inspector. Dry connections to existing facilities shall be made at times which will cause the least inconvenience to the water consumer, and shall be planned in such a manner that the duration of any shutdown will be kept to a minimum. The Contractor shall notify the Water Utility Inspector at least 3 days in advance of the date on which he proposes to begin to make connection to the existing facilities. It is the Contractors responsibility to give any Residences or Businesses affected by the shutdown a 24 hour written notice. The Date, duration of the shutdown and a brief description of the work being done shall be written on the notice. Notices will be provided by the City of Upland Water Division. When a connection to an existing main is made, about 2 ounces of Calcium Hypochlorite shall be placed in the pipe at each point where the existing main is cut. All new pipe and fittings at such connections shall be swabbed internally with an approved chlorine solution. All connections shall be made in the presence of the Water Utility Inspector. After the mew main is complete, it shall be sterilized and tested, before the valve, between the new main and old main is opened.

INSTALLATION OF VALVES: All buried valves shall have the operating nuts in a vertical position except as otherwise noted and the valve sleeves shall be centered over the operating nuts and shall be set plumb. Valves shall be provided with a stem extension where the depth to operator exceeds 5 feet from finished grade. Clearance must be provided between the vane seal of butterfly valves when in the full open position and the adjacent connections. This may require chamfering of the pipe mortar lining and/or other measures. Reducing flanges may not be connected to butterfly valves.

DISINFECTING PIPELINES

(A) **GENERAL**: Disinfection shall be accomplished by chlorination. Chlorine residuals must be tested and found satisfactory, before the lines are tested for leakage.

(B) **CHLORINATION PROCESS**: Chlorine Tablets or Powdered Chlorine shall be applied to each section of pipe as the pipe is installed. Chlorine gas injection may also be used. The amount of chlorine applied shall provide a minimum of 50 milligrams per liter after 24 hours in a water chlorine solution. The pipe ends shall have valves or sealed at the end of each work day, until the pipe system is complete.

Newly constructed Water Mains connecting to existing facilities shall have a Steel Test Plate installed between the valve and the new section of water pipe that was installed. 1 inch Chlorination Ports shall be installed at each point of connection, on the downstream side of the newly constructed Water Main as shown on UPW-WD W.06. The Contractor may proceed with the chlorination process and Hydrostatic Test once the above mentioned has been inspected by the Water Utility Inspector. The new main and laterals shall be loaded slowly, so that all internal piping is exposed to the chlorine water solution. A schedule of loading procedures shall be supplied to the Water Division or Inspector.

It shall be the responsibility of the Contractor of Developer to supply water to the newly installed water main for Disinfection and Hydrostatic purposes. The Contractor of Developer will take special precautions to ensure that no highly chlorinated water backpressures into the existing Domestic Distribution System. The use of A.W.W.A. approved Backflow Devices are to be used when the Contractor is drawing water from an existing source of water (Fire Hydrants or Service Laterals) to fill the new main with water. If for any reason the contractor or Developer is unable to get water to the new main, then special provisions will be made and coordinated with the Water Division. All valves shall remain closed tight, until results of the bacteria testing processes are confirmed to show a Negative Bacteria count for each sample taken. If the sample(s) show a positive count, the Disinfection process, and Bacteria Analysis shall be repeated.

(C) **RETENTION PERIOD**: Chlorinated water shall be retained in the pipeline long enough to destroy all non-spore forming bacteria. This period shall be at least 24 hours. After the chlorine treated water has been retained for the required time the chlorine residual at the pipe extremities, and at other representative points shall be at least 50 milligrams per liter. The pipeline shall be thoroughly flushed of all chlorinated water.

(D) **BACTERIA ANALYSIS**: The Contractor or Developer shall employ the services of a Certified Laboratory to collect water samples for bacterial analysis. No samples shall be taken by the Developer or Contractor and then transported to the Laboratory for analysis. The number of samples and locations of the samples for Bacterial Analysis shall be determined by the Water Division or Inspector.

(E) **REMOVALE OF HIGHLY CHLORINATED WATER:** At no time shall the Contractor or Developer discharge any highly chlorinated water into the Storm Drain. High solutions of chlorinated water shall be dumped into the City's Sewer System or spread onto a vacant field or lot where there is no possibility of the water contaminating the Storm Drain. Special precautions shall be made when discharging the chlorinated water into the Sewer Line. Backflow prevention devices will be used to prevent cross-contamination from the Sewer Line.

(F) **CHARGING SYSTEM FOR SERVICE**: The Test Plates shall be removed, Chlorination Ports plugged and the connecting valve(s) shall be fully opened to Provide the maximum flow required. All Fire Hydrant valves shall be fully opened.

FIELD APPLICATION OF PROTECTIVE COATING: Except as otherwise shown all buried valves, flanged joints, buried steel piping in the Fire Hydrant assemblies and other buried items which are not galvanized or mortar coated shall be thoroughly cleaned and given 2 coats of Carboline, Bit mastic 50 Black 0900, Batch # 0D8255Y or approved equal. The dry film thickness shall be at least 1/8 inch over all surfaces. The coating shall be applied strictly in accordance with the manufacturer's recommendations.

TESTING PIPELINES

(A) **GENERAL**: The Contractor shall furnish all equipment, labor and material, exclusive of water, for testing and disinfecting the pipelines. Water used for testing and disinfecting will be furnished by the Agency but the Contractor shall provide the necessary means to deliver water from the nearest available connection to the points of use. All tests of pressure piping shall be made in the presence of the Water Utility Inspector. All pipelines and piping shall be thoroughly flushed out with water prior to testing.

(B) **TESTING**: The Contractor shall test the pipeline either in sections or as a unit before any resurfacing is done, provided however, that resurfacing at intersections may be done prior to testing. The pipeline shall not be tested before the mortar lining and coating on the entire pipe lengths in the line have attained an age of 14 days. The test shall be made by closing valves when available or by placing temporary bulk heads in the pipe and filling the line slowly with water. Care shall be used to see that all air vents are open during the filling. After the line or section thereof has been completely filled, it shall be allowed to stand under a slight pressure for a sufficient length of time to allow the mortar lining to absorb what water it will and to allow the escape of air from any air pockets. Steel Test Plates shall be installed to UPW-WD, W.06 before the Hydrostatic Test is performed. During this period, the bulkheads, valves, and connections shall be examined for leaks. If any are found they shall be stopped, or in case of leakage through valves in the main line or through bulkheads, provisions shall be made for measuring such leakage during the test. The test shall consist of holding the test pressure on each section of the line between valves or bulkheads for a period of 2 hours. The test pressure at the lowest point in the line, or in the section of line being tested, shall be 200 psi. The water necessary to maintain this pressure shall be measured through a meter or by other means satisfactory to the Water Utility Inspector. The leakage shall be considered the amount of water entering the pipeline during the test, less the measured leakage through valves and bulkheads. This leakage shall not exceed 25 gallons per inch of diameter per mile per 24 hours. Any noticeable leaks shall be stopped and any defective pipe shall be replaced with new sections.

SPECIAL PROVISIONS
CONSTRUCTION METHODS
SEWER & WATER SPECIFICATIONS

All water lines installed in the City of Upland, and within the boundaries of the City's influence shall be installed in accordance with the State Health Department's guidelines, and meet all City of Upland Water Division Specifications for all sewer main, sewer laterals crossings and separations.

(1) Horizontal Separation for Water and Sewer Mains. Water mains shall be installed at least:

A. Ten feet horizontally from and 1 foot higher than sanitary sewers located parallel to the main,

B. One foot higher than sanitary sewers crossing the main,

C. and ten feet, and preferably 25 feet, horizontally from sewage leach fields, cesspools, seepage pits and septic tanks.

Special distances specified in 1 shall be measured from the nearest edges of the facilities.

(2) Where the requirements cannot be met due to topography, inadequate right-of-way or Easements or conflicts with other specifications, lesser separation is permissible if:

A. The water main and the sewer are located as far apart as feasible within the Conditions listed above.

B. The water main and the sewer are not installed within the same trench.

C. The water main is appropriately constructed to prevent contamination of the water in the main by sewer leakage.

(3) Vertical Separation for Water and Sewer Mains

A. Where a water main line crosses a sewer main line, there shall be a 3 foot separation between the two lines.

B. Where the vertical separation between a water main and a sewer main is more than 2 feet, but less than 3 feet, the sewer line shall be Cast Iron, and if a water main joint is within 10 feet of the Cast Iron, the water main joint shall be welded solid.

C. Where the vertical separation between a water main and a sewer main is more than 1 foot, but less than 2 feet, the sewer line shall be incased with Cast Iron or cement with ½ inch rebar.

D. Under No circumstances shall a water main be installed under a sewer main line, and no water main shall be installed in the same ditch line with a sewer main.

(4) Vertical Separation for Water Mains and Sewer Laterals

A. The vertical separation between a water main and sewer laterals shall meet the same requirements as the vertical separation between the water main and sewer main lines.

(5) Vertical and Horizontal Separation for Water Services and Sewer Laterals

A. A water service lateral shall be installed at least 3 feet away from a sewer lateral unless the terrain does not permit then it is up to the Inspector on the job site to determine the closest separation that is to be allowed on the laterals. The water lateral will not be allowed to be installed in the same ditch line with sewer lateral, under no circumstances.

GENERAL PROVISIONS

SPECIFICATIONS: All materials supplied and all work performed shall be in accordance with the Standard Specifications For Public Works Construction, as adopted by the City of Upland, except as otherwise specified in these General Provisions, the Special provisions, on the Construction Drawings or on the Standard Drawings. Copies of the Specifications for the Construction of Water Mains and Appurtenances and current supplements may be purchased at the office of the City Engineer, Water Division Office or online at www.upland.ca.us.

ORDINANCES: Connections to the City mains for water service to parcels of land may not be made until the requirements of Ordinance 615, relating to the payment of a water connection fee, and the requirements of Ordinance 643, relating to the sale of water stock to the City, have been satisfied.

PERMITS AND FEES: All applicable City of Upland construction permits and inspection fees including a Fire Hydrant use permit fee, or deposit for Fire Hydrant Meter will be required prior to commencing with the construction of the water facilities.

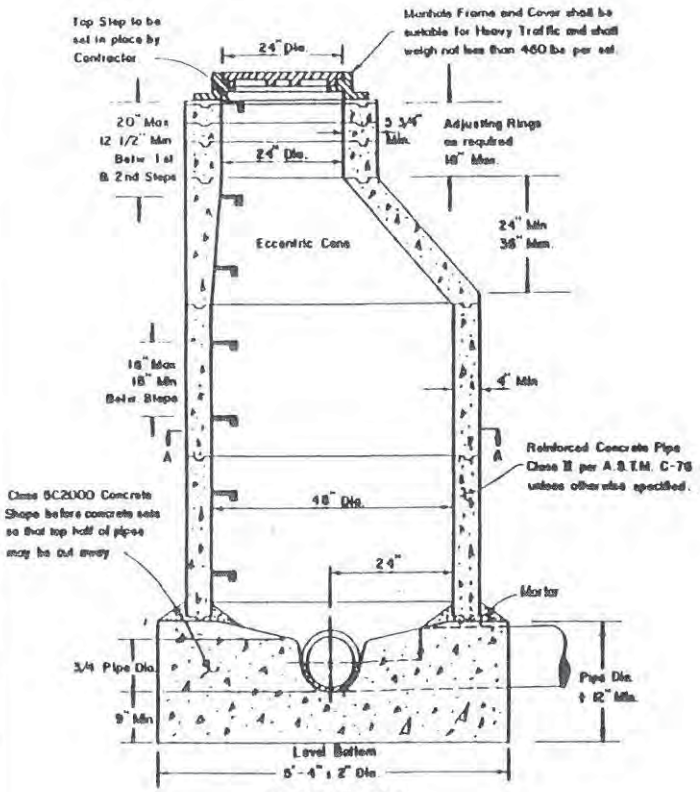
CONSTUCTION DRAWINGS: All drawings of the water systems facilities proposed to be constructed must be submitted to the Engineering Division, and routed to the Water Division, for approval, and are not valid until signed and approved, by the Design Engineer, the Fire Department, the Assistant P.W. Director of Utilities the Engineering Division and the Public Works Director. Drawings must show the profile view, with elevations proposed, as well as the plan view of the system. The scale of the plan view shall be 1"= 40'. The scale of the profile view shall be 1"= 40' horizontal and 1"= 4' vertical. The drawing sheet size shall be 24"x 36" unless approved otherwise by the Engineer. Electronic plan and profile sheets are available from the Development Service section of the Engineering Division.

STANDARD DRAWING: Copies of the Standard Drawings applicable to water mains and appurtenant works may be obtained from Development Services, Engineering Division or found on the City's web site.

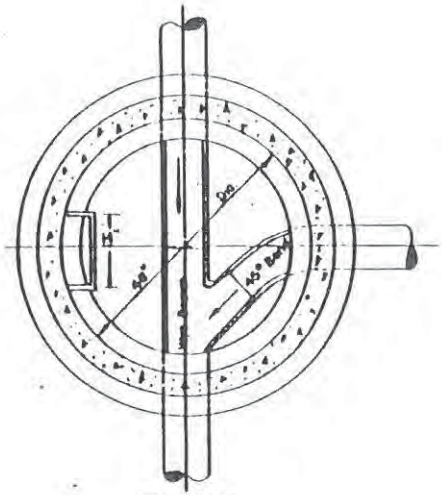
EASEMENTS: All water system facilities located on private property and which is to be part of the public water system must be constructed in easements deeded to the City of Upland. A fully dimensioned drawing showing the proposed easements as well as a legal description of the easements must be furnished to the City of Upland for recording. In addition, a small size (approximately 11.5"x 15") reproducible drawing of the proposed easements, with dimensions shown, will be required for use as an exhibit to supplement the other easement documents.

MAIN EASEMENT WIDTH: Water Main Easement Widths shall be a minimum of 15 ft. for water pipe buried at 36 inches. Water Pipe buried deeper or less than 36 inches, easement widths shall be determined by the Design Engineer and approved by the City of Upland Deputy Director of Utilities.

TYPE "A" MANHOLE

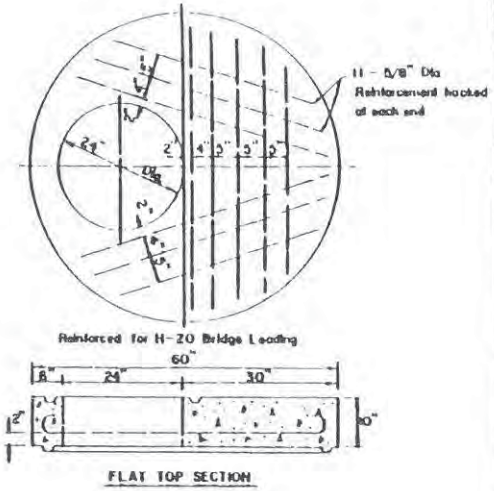


TYPICAL SECTION



SECTION "A-A"

TYPE "B" MANHOLE



FLAT TOP SECTION

NOTE:

Type "B" Manhole same as Type "A" Manhole except that Flat Top Section shall be used in place of Eccentric Cone Section & Manhole walls shall be St'd Precast Sections having 6" * minimum wall thickness (* Minimum reinforcement for Sections having 6" wall thickness shall be No. 4 wire hoops.)

GENERAL NOTES

STANDARD MANHOLE – TYPE "A":

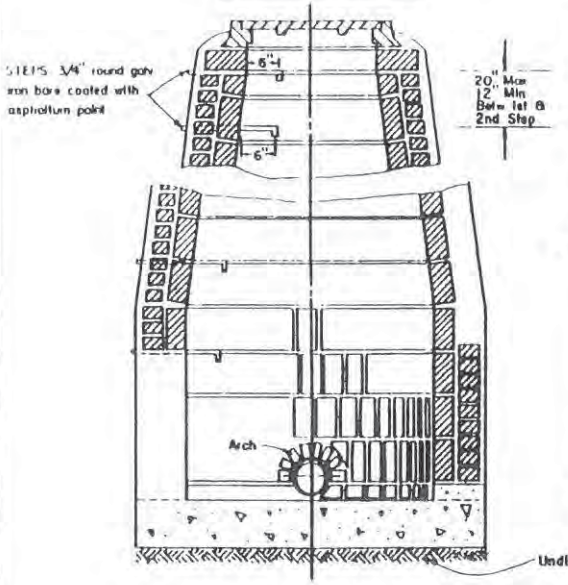
Type "A" Manholes shall be used in all cases, unless otherwise noted on the Plan or in the Specifications.

DROP MANHOLES:

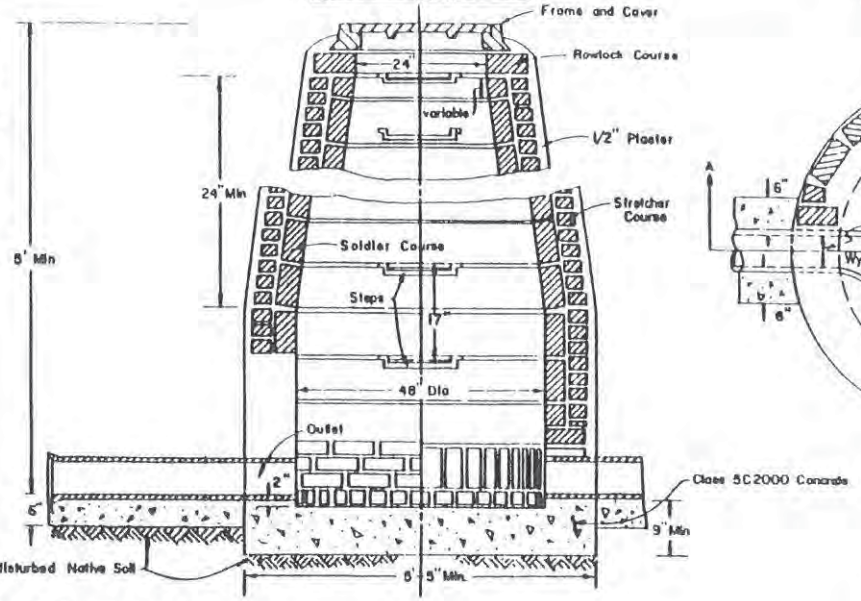
Drop Manholes shall be constructed using a Tee Branch at top invert and a 90° Bend at the bottom invert. The entire Drop Section shall be encased in concrete, having a 6 inch minimum cover, from the base of the Manhole to the center of the upper pipe section.

CITY OF UPLAND STANDARD DRAWING		
DRAWN BY	DATE	PRECAST CONC. MANHOLES TYPE "A" & TYPE "B" FOR SANITARY SEWER SYSTEMS
w a h	10/21/66	
REVISION BY	DATE	
		APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-Z-1

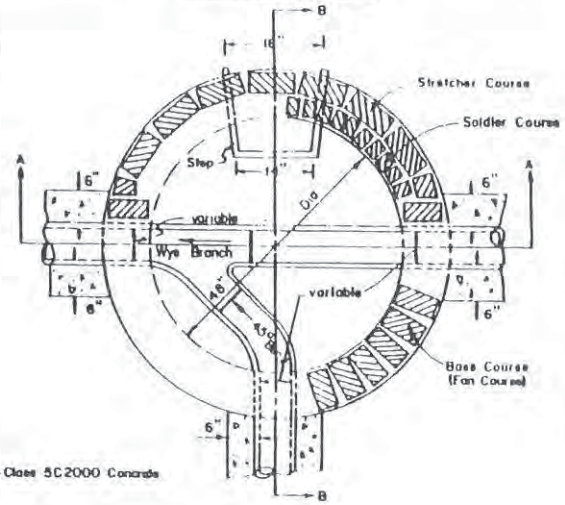
SECTIONAL ELEVATION "B-B"



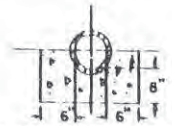
SECTIONAL ELEVATION "A-A"



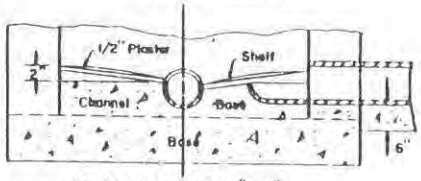
SECTIONAL PLAN OF BASE



TYPE "C" MANHOLE



CROSS SECTION OF CRADLE



SECTIONAL ELEVATION "B-B"
CHANNEL BASE

GENERAL NOTES

CONCRETE BASE:

During construction, all pipes shall be rigidly supported by brick piers one foot deep, located just outside the structure. Construct top of concrete base 2 inches below invert of lowest pipe. Fill space beneath pipe with mortar and shove from both sides with base course brick to form a water tight joint.

BASE OR FAN COURSE:

Lay brick flat on radial lines with tops to same level.

ARCHES:

Lay spalled brick on edge to form a true radial arch with full mortar joint around all pipe openings. Turn arch of two such courses over pipes 15 inches or more in diameter.

SOLDIER COURSES:

Lay inside brick on radial lines with first four courses vertical. Lay succeeding courses with a uniform batter to obtain an inside diameter of 24" at top of last or fractional soldier course. Use split brick to close soldier course.

STRETCHER COURSES:

Lay outside brick flat in a deep bed of mortar. Shove brick hard together against adjacent soldier course.

ROWLOCK COURSE:

Lay last course of brick on edge across soldier and stretcher courses, on radial lines.

STEPS:

Set lower step on top of third soldier course and notch brick above. Place upper step immediately below rowlock course and project 6 inches. Steps shall be spaced not more than 17 inches apart.

JOINTS:

Inside joints shall be neatly stuck and pointed and shall not exceed 3/8 inch in thickness.

CHANNEL BASE:

The depth of channel in channel base shall be 3/4 of pipe diameter for pipes 15 inches or less, and shall equal the pipe diameter for pipes 18 inches or larger. For special channels in trap or gouging manholes see special plans.

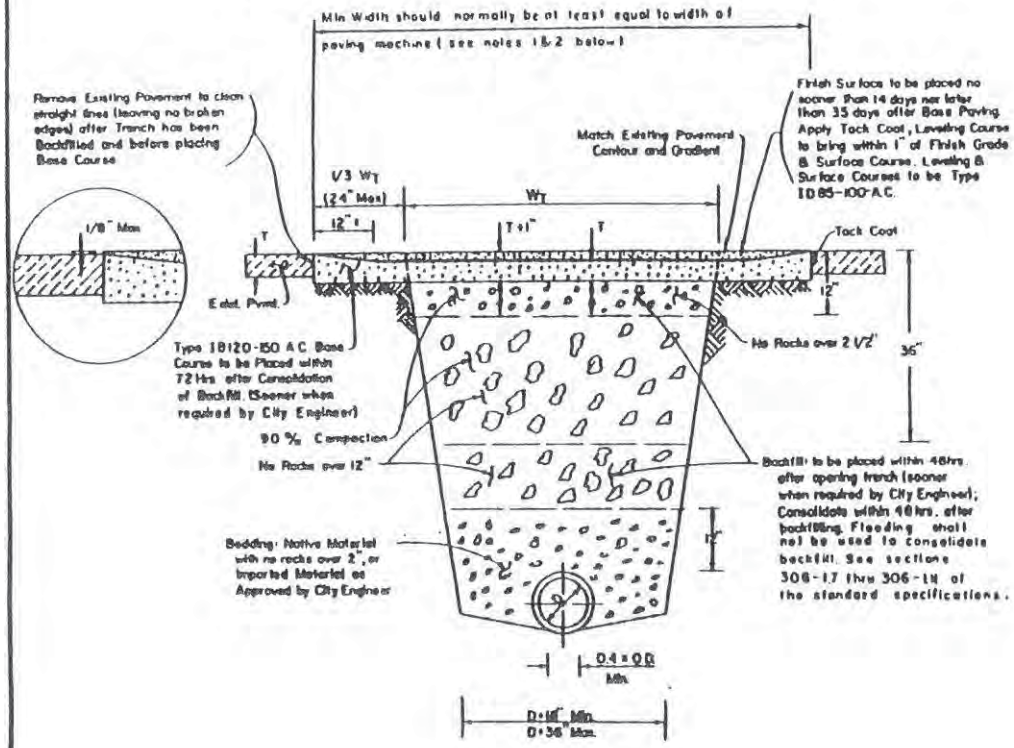
CRADLE:

Cradle first length of pipe at all inlets and outlets with concrete per detail.

CITY OF UPLAND
STANDARD DRAWING

DRAWN BY	DATE	BRICK MANHOLE TYPE "C" FOR SANITARY SEWER SYSTEMS
w o h	10/21/65	
REVISION BY	DATE	APPROVED BY Fred C. Blanchard CITY ENGINEER
		DRAWING NO. CU-Z-2

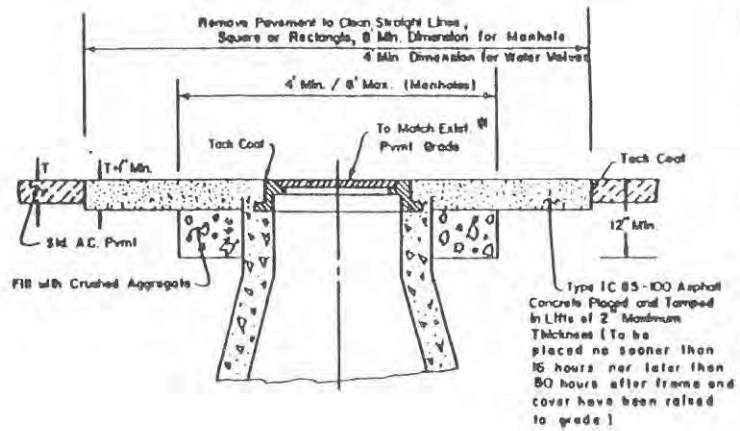
DETAIL FOR TRENCHING, BACKFILL & A.C. PAVEMENT REPAIR



GENERAL NOTES

1. Spreader Boxes may be employed for ditch paving jobs less than 500 lin. ft..
2. All Joints shall be vertical butt joints. Lap or feathered joints are not allowed.
3. Unless otherwise instructed by city Engineer, trench patch should be straight grade across width, and should not be crowned at center.

DETAIL FOR ADJUSTING MANHOLES & WATER VALVES TO GRADE

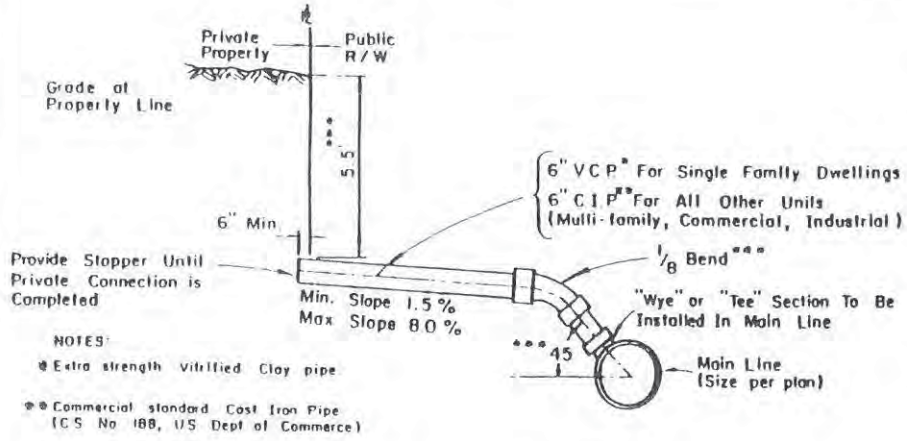


GENERAL NOTES

1. # Frame and Cover to be set 3" to 6" below Subgrade before A.C. Pavement is Placed.
2. Frame and Cover to be adjusted to Grade after A.C. Paving. Pavement Repairs to be made per this Detail after Raising to Grade.
3. Reset Top Step in Manhole at the time Frame and Cover are raised to Grade; add additional step when necessary to maintain proper spacing between Steps (see Drwgs. CU-Z-1 & CU-Z-2 for Correct Spacing of Steps).

CITY OF UPLAND STANDARD DRAWING

DRAWN BY	DATE	TRENCHING, BACKFILLING, ADJUSTING TO GRADE AND ASSOCIATED PAVEMENT REPAIRS
w e h	10/28/65	
REVISION BY	DATE	
L.W.E.	10-24-66	APPROVED BY
L.G.K.	12-22-66	Fred C. Blanchard, CITY ENGINEER
W.A.B.	12-1-70	DRAWING NO CU-Z-3



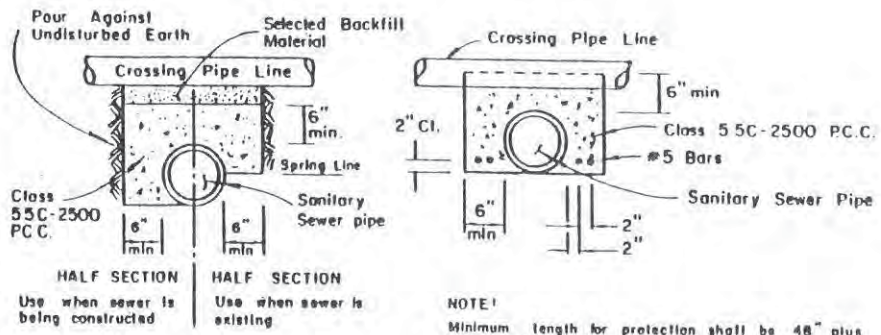
NOTES:

* Extra strength vitrified Clay pipe

** Commercial standard Cast Iron Pipe (C.S. No. 188, U.S. Dept. of Commerce)

*** Normal, unless otherwise noted on plan

SANITARY SEWER LATERAL LINE

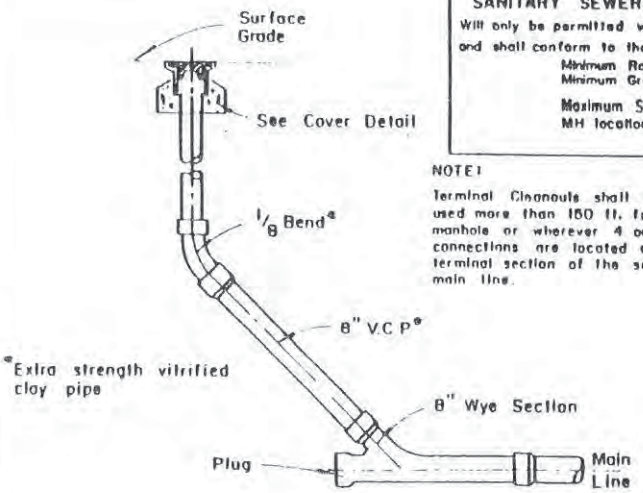


NOTE:

Minimum length for protection shall be 48" plus the diameter of the pipe crossing the sewer

PROTECTION FOR SANITARY SEWERS

(Use When Clearance Between Sewer And Other Pipe Is 18" or Less)



SANITARY SEWER TERMINAL CLEANOUT

SANITARY SEWER ON HORIZONTAL CURVE

Will only be permitted when concentric with the street ℄, and shall conform to the following limiting requirements

Minimum Radius: 200 LF

Minimum Grade in % = $.04 + \frac{80}{R}$

Maximum Spacing of staking 25 ft.

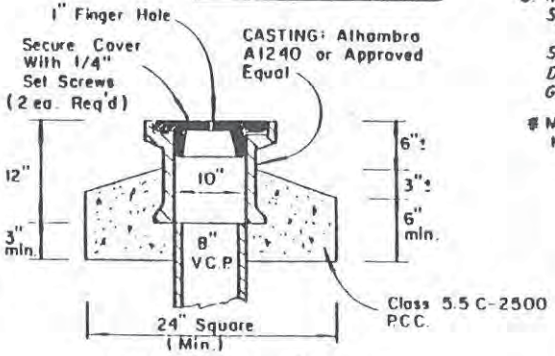
MH locations Req'd at both ends of curve with Max. spacing of 250 ft.

NOTE:

Terminal Cleanouts shall not be used more than 150 ft. from a manhole or wherever 4 or more connections are located on the terminal section of the sewer main line.

MAIN LINE GRADIENTS

DIA	MIN. SLOPE	MAX. SLOPE
# 8"	0.40 %	8.0 %
10"	0.32	7.0
12"	0.24	5.0
15"	0.18	4.0
18"	0.14	3.0
21"	0.12	2.5
24"	0.10	2.0



COVER "DETAIL"

GENERAL NOTES:

1. The width of the trench at the top of the pipe shall not exceed 3 times the diameter of the sanitary sewer pipe.
2. Grade stakes shall be set every 25 feet to insure a true gradient.
3. Maximum spacing between manholes: $S_{max.} = 35\ (D + G^{1/2})$

S_{max} = Maxium spacing
D = Diameter in inches
G = Gradient in percent

\# Minimum Slope Shall Be Increased For Dead End Lines Having A Limited Number Of Connections

CITY OF UPLAND STANDARD DRAWING

Drawn By	Date	SANITARY SEWER SYSTEMS
LWA	4-27-70	MAIN LINES
Revisions By	Date	LATERAL LINES
B.G.	12-12-73	TERMINAL CLEANOUTS
B.F.	12-4-75	Approved By Fred C. Blanchard, City Engineer
		DRAWING NO. CU-Z-4

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Public Works Department
Telephone (909) 931-4235
Facsimile (909) 931-4321
Date of Revision: May 4, 2015

Land Development Booklet

General Information
of
Fees - Cost Estimates -
Improvement Plan Checklist
and
Construction General Notes

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Section 1.0

Public Works Fee Summary

Effective April 9, 2015

Plan Check and Miscellaneous Fees

Plan Check fees are on a per sheet basis unless otherwise indicated by a minimum fee. Depending on the complexity of the plan or document, in addition to the minimum fee, hourly rates and additional costs are applicable. In the case of the Erosion Control, if the plans are included in the precise grading plan, then the grading plan check fee is used.

Map Checking Fee

Final Tract or Parcel Map	$1,800.00 first two sheets plus $50.00 per lot

Public and Private Improvement Plan Check Fees

Street Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Sewer Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Water Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Storm Drain Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Other Improvement Plans	$1,800.00 first two sheets plus $800.00 each additional sheet

Grading Plan Check Fee

Rough Grading Plans- Residential	$1,500.00 first two sheets plus $300.00 each additional sheet
Rough Grading Plans-Commercial/Industrial	$1,500.00 first two sheets plus $300.00 each additional sheet
Precise Grading Plans-Residential	$1,800.00 first two sheets plus $300.00 each additional sheet
Precise Grading Plans-Commercial/Industrial	$1,800.00 first two sheets plus $300.00 each additional sheet

Erosion Control & Other Improvement Plan Check Fees

On-site Utility Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Demolition Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Horizontal Control Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Erosion Control Plans	$1,800.00 first two sheets plus $800.00 each additional sheet
Traffic Control Plans	$1,800.00 first two sheets plus $800.00 each additional sheet

Landscape Plan Check Fee

Public Landscape Plans	$950.00 (minimum fee plus hourly rate)
Private Landscape Plans	$950.00 (minimum fee plus hourly rate) plus $25.00 per lot

As-Built Plans, Revisions, and Over 3rd Review

As-Built Plans	$630.00 (minimum fee plus hourly rate)
Revisions	$1,000.00 (minimum fee plus hourly rate)
Over 3rd Review	Billable hourly rate for each reviewer

Reports, Agreements, and Covenants

Hydrology Reports	$875.00 (minimum fee plus hourly rate)
Soils Report	$885.00 (minimum fee plus hourly rate)
CC&R's	$940.00 (minimum fee plus hourly rate, plus additional costs)
Bond Agreements	$900.00 (minimum fee plus hourly rate)
Bond Calculation Review	$500.00 (minimum fee plus hourly rate)
Declaration of Covenant for Parkway Landscape	$600.00 (minimum fee plus hourly rate)
Encroachment License Agreement	$1,200.00 (minimum fee plus hourly rate)
Traffic Studies	$1,400.00 (minimum fee plus hourly rate, plus additional costs)
Miscellaneous Agreements	$900.00 (minimum fee plus hourly rate)
Reimbursement Agreements	$1,600.00 (each)
Outside City Utility Service Agreement	$1,600.00 (each, 15% additional outside agency and/or consultant costs)

Miscellaneous Plan Check Fees

Miscellaneous Technical Document Plan Check Fees

Lot Line Adjustment	$1,100.00 first two sheets plus $50.00 per lot and/or parcel
Lot Merger	$1,100.00 first two sheets plus $50.00 per lot and/or parcel
Certificate of Correction	$700.00 (minimum fee plus hourly rate)
Irrevocable Offers of Dedication	$700.00 (minimum fee plus hourly rate)
Dedications (Easement Deeds & Grant Deeds)	$700.00 (minimum fee plus hourly rate)
Quit Claim Deeds	$700.00 (minimum fee plus hourly rate)
Legal Descriptions	Pass through fee of actual costs
WQMP	$1,600.00 (minimum fee plus hourly rate)
SWPPP	$725.00 (minimum fee plus hourly rate)
Waste Management Plan	
Remodel < 1,000 sf	$150.00 (minimum fee)
Remodel > 1,000 sf	$250.00 (minimum fee
New Construction 1,000-3,000 sf	$275.00 (minimum fee
New Construction > 3,000 sf	$350.00 (minimum fee
New Construction Commercial & Industrial	$500.00 (per 1,000 sf)
Miscellaneous Reports, Studies & Technical Documents	$850.00 (minimum fee plus hourly rate)

Research

Engineering Record Research Request	$120 Deposit, plus actual cost based on time spent at $60.00 per hour
Utility Research Request	$120 Deposit, plus actual cost based on time spent at $60.00 per hour

Hourly Rate for Engineering and Land Development Review

Plan Check	$ Billable hourly rate for each Reviewer, consultant fees, pass through fees, attorney's fees or other additional costs.

Miscellaneous Plan Check Fees

Permits Fees

Construction Permit plan check not required	$130.00 each plus hourly inspection rate: $137.00/hour (the inspection deposit is determined by Public Works)
Construction Permit plan check required	$250.00 each plus hourly inspection rate: $137.00/hour (the inspection deposit is determined by Public Works)
Clear and Grub Permit	$130.00 each plus hourly inspection rate: $137.00/hour (the inspection deposit is determined by Public Works)
Temporary Lane Closure Permits	
Partial Closure	$130 each Permit
Full Closure	$375 each Permit (per advanced approval only)
Traffic Control	
Construction Truck Access Plan	No Fee

Incidental Fees

CD (to transfer research data)	$25.00 each
Copies	$0.25 per page (11x17 largest size available)

Additional Plan Checks

Plan check fees quoted above cover three (3) plan check reviews for the minimum fee. Additional fees are based on the billable hourly rate of each reviewer, time and material for additional plan check reviews.

The plan check time required for a project depends on the workload of the plan checkers and the complexity of the project. An approximate plan check time will be given, if requested, at the time of submittal of the plans.

Section 2.0

Public and Private Improvement Plan Information

2.1 Plan Check Submittal Application

Date:_____ Project Number:_____

Project Address (when applicable):_____

Engineer:_____ Developer:_____

Address_____ Address:_____

_____ _____

Contact:_____ Contact:_____

Phone:_____ Phone:_____

Email:_____ Email:_____

1. Submit to Public Works this application filled out along with the number of sets of plans and related items as shown in the table below. Items not relevant to the project submittal may be omitted (i.e. Final Map and related items, if no map is involved). Check the "**TOTAL SUBMITTED**" column for items submitted. When in doubt, include the item.
2. All plan submittals shall be on 24" x 36" bond paper, stapled and folded to 8½ X 11 using the City's Standard Title Block. Ultimately, final plans shall be submitted for signature on Mylar (0.4 ml).The City will not accept original plans on Sepia, Sepia Mylar, Vellum, Xerox Mylar, or stick-on applications.
3. Plan Check submittals must be complete. The Planning Division Approval Letter **MUST** be included to complete your submittal. Partial and/or Incomplete packages will not be accepted for plan check. You will be notified of incomplete submittals.

Total Needed	Total Submitted	Submittal Items
4		Approval Letter / Approval Resolution/Conditions of Approval - Required for first plan check
4		Site Plan
4		Rough or Precise Grading Plans (including Erosion Control Plan)
4		Parcel/Tract Map
2		Preliminary Title Report, not over 30 days old (also required for legal descriptions)
2		Record documents referred to in the title report
2		Map Traverse Calculations and Closures
2		Approved Tentative Map
1		Pertinent reference materials (i.e. deeds, recorded maps, etc.)
4		CC& R's
		Public and Private Improvement Plans
4		Street
4		Water
3		Sewer
3		Storm Drain
3		Other
4		Related Grading Plans
2		Referenced Water and Sewer Plans
2		Cross Section (when widening existing streets)
2		Reference Street Plans, minimum 300 feet off-site
2		Signing and Striping Plans
2		Traffic Signal Plans with special provisions
2		Hydrology/Hydraulic Study
3		Off-Site / On-Site Landscape Plans
4		Legal Descriptions for Easement Deeds, Dedications, etc. with Exhibits and Title Report
2		Traffic Study
2		Soils Report
2		WQMP and SWPPP and copy of NOI (where applicable)
		Other items not listed (add additional sheet if necessary)

Phased Development Submittals:

In cases where a master tentative tract map is divided into sub-tracts or phases, each sub-tract or phase shall be submitted as its own, separate set of complete plans. It should be complete on its own merit. Combining of improvement plans for sub-tracts or phases is not allowed, except for grading plans.

Subsequent Plan Checks:

For each subsequent plan check, the last set of redlined plans and the requested number of revised sets required by the plan checker shall be submitted. If these items are missing, your submittal will be returned, un-checked, until all required items are submitted.

Plan Content:

Enclosed are improvement plan checklists that are to be used as a guide in the preparation of your plans for both public and private improvements (street, sewer, water, stormdrain, etc). Should you have any questions, please feel free to contact Public Works.

2.2 Submission of Improvement Plans for Final Review and Approval

When there are no more comments and the plan check process is complete, the plan checker will ask the design engineer to submit the following:

1. The last set of the plan checker's redlined plans,
2. Original Mylar's of all plans wet-signed and stamped by the Civil Engineer,
3. One bond copy of all the originals, and
4. Additional plan check fees (if required) by fee calculation.
5. Fully executed subdivision agreement with performance, engineer's cost estimate and payment bonds
6. Copy of Final Map.

Note:
Original mylars will be routed (by Public Works) to several City divisions for signatures of approval. **Please allow at least one week to obtain the required approval signatures.** Permits will be issued when all approvals have been obtained, the developer and/or engineer has supplied five (5) signed copies of all plans to the City, the contractor has met all permit requirements, and the inspection deposit and permit fee has been received.

2.3 Revisions to Approved Improvement Plans and As-Built Plans

Revisions:

Revisions may be made to City-approved improvement plans, as follows:

Proposed revisions shall be drawn in red on a bond copy of the original plan. The redlined print and minimum plan check fee of $1,000.00, are submitted to Public Works for review. The revision plan check is also subject to additional fees for the billable hourly of each reviewer, consultant costs and other applicable fees.

Upon approval of the revision(s), the engineer may check out the original plans.

After the original is revised, the engineer shall submit the revised original, the redline print and a bond copy of the revised original to Public Works for final approval.

If the engineer revising the plan is not the original design engineer, he/she shall draw a new signature block on the plan and wet-sign and seal the plan for the revisions that have been made. In all cases, the revision shall be noted in the revision block of the plans and the location of the revision shall be clearly shown on the plan.

As-Built Plans:

As-built plans shall be submitted and approved prior to filing a Notice of Completion for any project. As-built revisions shall be made on the original, signed plans per the procedures above.

2.4

CITY OF UPLAND
PUBLIC WORKS DEPARTMENT
LAND DEVELOPMENT & TRANSPORTATION DIVISION

COST ESTIMATE SUMMARY SHEET
Public Improvements

BOND AMOUNT CALCULATION

Developer: _____

Project: _____

Location: _____

Item Description	Estimated Cost
1 . Street Improvements	$ -
2 . Sewer Improvements	$ -
3 . Water Improvements	$ -
4 . Drainage Improvements	$ -
5 . Traffic Improvements	$ -
6 . Miscellaneous	$ -
Grand Total	$ -
20% Contingency	$ -
Bond Amount	$ -
Faithful Performance (100%)	$ -
Labor and Materials (50%)	$ -
Final Monuments (Cash Deposit required for monuments)	$ -

Estimated By: _____

RCE#: _____

Date: _____

Bond amounts will be calculated by the Developer's Engineer and reviewed by the Public Works Department. Inspection fee deposits shall be paid prior to issuance of permit.

2.5

Preliminary Cost Estimate Form for Street Improvements

Developer: _____

Project: _____

Location: _____

Street Items	Quantity	Unit	Price	Amount
Roadway Excavation				$ -
1. Projects with Grading Plan area X 0.50' (hinge point to hinge point) (_____ SF)		CY	$ 15.00	$ -
2. Projects without Grading Plan road area and side slopes to daylight. Cut (C) = Fill (f) =				$ -
(a) Excavate & Fill		CY (c or f)	$ 4.00	$ -
(b) Excavate & Export		CY (c -f)	$ 1.10	$ -
PCC Curb and Gutter 6"		LF	$ 14.00	$ -
PCC Curb and Gutter 8"		LF	$ 16.00	$ -
PCC Sidewalk		SF	$ 7.00	$ -
PCC Cross Gutter/Spandrel		SF	$ 10.00	$ -
PCC Curb Only 6"		LF	$ 10.00	$ -
PCC Curb Only 8"		LF	$ 12.00	$ -
Rolled Curb		LF	$ 15.00	$ -
PCC Pavement		SF	$ 10.00	$ -
Ribbon/Alley Gutter		LF	$ 15.00	$ -
Wheelchair Ramp (ADA Compliant)		EA	$ 2,000.00	$ -
Drive or Alley Approach		SF	$ 10.00	$ -
Asphalt Concrete (144 lbs/ft^3)		TON	$ 95.00	$ -
AC Patch-Trench (Match Existing)		SF	$ 5.00	$ -
Grind & AC Overlay @ 0.50 inch		SF	$ 4.00	$ -
Aggregate Base CL II		CY	$ 55.00	$ -
AC Berm		LF	$ 14.00	$ -
Street Lights Underground + Trench (Standard Marbelite)		EA	$ 6,000.00	$ -
Street Lights Underground + Trench (Decorative)		EA	$ 7,000.00	$ -
Install Barricades		LF	$ 110.00	$ -
Remove Barricades		LF	$ 10.00	$ -
Remove AC Pavement		SF	$ 2.00	$ -
Remove PCC Curb		LF	$ 10.00	$ -
Adjust Sewer Manhole to grade		EA	$ 500.00	$ -
Adjust Water Valve to grade		EA	$ 300.00	$ -
Sawcut		LF	$ 2.00	$ -
Decorative Concrete		SF	$ 12.00	$ -
Underwalk Drain		EA	$ 1,800.00	$ -
Parkway Trees		EA	$ 350.00	$ -
Parkway Landscape and Irrigation		SF	$ 0.79	$ -
Install Chain Link Fence		LF	$ 16.00	$ -
Irrigation Backflow Prevention Assembly (w/ enclosure)				$ -
Relocate Power Pole		EA	$ 10,000.00	$ -
			Total for Street Improvements	$ -

By: _____

Street Drawing Number(s): _____

2.6

Preliminary Cost Estimate Form for Sewer Improvements

Developer: _____

Project: _____

Location: _____

Sewer Items	Quantity	Unit	Price	Amount
Sewer Manholes (48-inch Diameter)		EA	$ 4,500.00	$ -
Sewer Drop manholes (48-inch Diameter)		EA	$ 5,500.00	$ -
Sewer Cleanouts		EA	$ 1,000.00	$ -
6-inch VCP Sewer Laterals		LF	$ 60.00	$ -
8-inch VCP Sewer Mainline		LF	$ 85.00	$ -
10-inch VCP Sewer		LF	$ 110.00	$ -
12-inch VCP Sewer		LF	$ 120.00	$ -
Concrete Encasement 8-inch		LF	$ 15.00	$ -
Concrete Encasement 10-inch		LF	$ 18.00	$ -
Concrete Encasement 12-inch		LF	$ 20.00	$ -
8-inch CIP Mainline		LF	$ 150.00	$ -
Adjust Cleanout to Grade		EA	$ 300.00	$ -
Adjust Manhole to Grade		EA	$ 600.00	$ -
Remove Manhole		EA	$ 2,000.00	$ -
Connect to Existing Manhole and Rechannel		EA	$ 1,800.00	$ -
Backflow Device		EA	$ 800.00	$ -
8-inch x 4-inch Sewer Wye		EA	$ 600.00	$ -
Grease Interceptor		EA	$ 7,500.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Sewer Improvements	$ -

By: _____

Sewer Drawing Number(s): _____

2.7

Preliminary Cost Estimate Form for Water Improvements

Developer: _____

Project: _____

Location: _____

Water Items	Quantity	Unit	Price	Amount
6-inch Water main		LF	$ 65.00	$ -
6-inch Valve		EA	$ 1,300.00	$ -
8-inch Water main		LF	$ 80.00	$ -
8-inch Valve		EA	$ 1,500.00	$ -
6-inch Fire Hydrant Assembly		EA	$ 5,800.00	$ -
12-inch Valve		EA	$ 3,700.00	$ -
Upgrade 4-inch Fire Hydrant Assembly to 6-inch		EA	$ 5,000.00	$ -
Relocate 6-inch Fire Hydrant Assembly		EA	$ 2,400.00	$ -
2-inch Water Service		EA	$ 3,000.00	$ -
1 1/2-inch Water Service		EA	$ 2,300.00	$ -
1-inch Water Service		EA	$ 1,800.00	$ -
2-inch Air Vacuum Release Valve		EA	$ 3,500.00	$ -
Blind Flange		EA	$ 600.00	$ -
Relocate Existing Water meter		EA	$ 600.00	$ -
6-inch Fire Service		LF	$ 55.00	$ -
Backflow Device		EA	$ 2,800.00	$ -
8-inch Fire Service with Vault and Valve		EA	$ 7,000.00	$ -
6-inch Fire Service with Vault and Valve		EA	$ 6,000.00	$ -
4-inch Fire Service with Vault and Valve		EA	$ 5,000.00	$ -
4-inch Modified Blow-Off Assembly		EA	$ 2,700.00	$ -
Blow Off Assembly		EA	$ 2,700.00	$ -
Recycled Water Line, Irrigation		LF		$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Water Improvements	$ -

By: _____

Water Drawing Number(s): _____

2.8

Preliminary Cost Estimate Form for Storm Drain Improvements

Developer: _____

Project: _____

Location: _____

Storm Drain Items	Quantity	Unit	Price	Amount
18-inch RCP		LF	$ 125.00	$ -
24-inch RCP		LF	$ 145.00	$ -
30-inch RCP		LF	$ 155.00	$ -
36-inch RCP		LF	$ 190.00	$ -
42-inch RCP		LF	$ 215.00	$ -
48-inch RCP		LF	$ 240.00	$ -
54-inch RCP		LF	$ 275.00	$ -
60-inch RCP		LF	$ 320.00	$ -
72-inch RCP		EA	$ 375.00	$ -
8-inch HDPE		LF	$ 40.00	$ -
12-inch HDPE		LF	$ 45.00	$ -
Standard Manhole		EA	$ 4,500.00	$ -
Junction Structure (with manhole)		EA	$ 3,600.00	$ -
Junction Structure (without manhole)		LF	$ 2,500.00	$ -
4' Wide Catch Basin and Local Depression		EA	$ 5,000.00	$ -
7' Wide Catch Basin and Local Depression		EA	$ 6,000.00	$ -
10' Wide Catch Basin and Local Depression		EA	$ 7,000.00	$ -
14' Wide Catch Basin and Local Depression		EA	$ 8,500.00	$ -
21' Wide Catch Basin and Local Depression		EA	$ 9,500.00	$ -
Concrete Collar		EA	$ 1,500.00	$ -
Clean Out		EA	$ 1,500.00	$ -
Curb Inlet/Outlet		EA	$ 2,500.00	$ -
Bio-Swale		LF	$ 8.80	$ -
12"x12" Box Inlet		EA	$ 1,000.00	$ -
18"x18" or 24"x24" Box Inlet		EA	$ 1,500.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Drainage Improvements	$ -

By: _____

Storm Drain Drawing Number(s): _____

2.9 Preliminary Cost Estimate Form for Traffic Improvements

Developer: _____

Project: _____

Location: _____

Traffic Improvements	Quantity	Unit	Price	Amount
4" Painted Broken Stripes		LF	$ 2.00	$ -
4" Painted Double Solid Stripes		LF	$ 0.50	$ -
6" Painted Bike Lane Stripes		LF	$ 0.70	$ -
Painted One-Way, No Passing		LF	$ 0.40	$ -
Painted Two-Way, Left Turn Lane		LF	$ 0.90	$ -
Painted Pavement Markings		SF	$ 3.00	$ -
8" Thermoplastic Channelizing Line		LF	$ 2.00	$ -
12" Thermoplastic Crosswalk & Limit Line		LF	$ 3.00	$ -
Thermoplastic Pavement Markings		SF	$ 4.00	$ -
Street Name Sign & Post		EA	$ 300.00	$ -
Stop Sign & Post		EA	$ 300.00	$ -
Road Sign on existing pole/post (One Post)		EA	$ 200.00	$ -
Road Sign on existing pole/post (Two Post)		EA	$ 300.00	$ -
Street Sign (Mast Arm Hanger Method)		EA	$ 500.00	$ -
Remove Painted Stripes & Pavement Markings		SF	$ 3.00	$ -
Remove Thermoplastic Stripes & Pavement Markings		SF	$ 5.00	$ -
Traffic Signal & Lighting - New Installation		LS	$ 300,000.00	$ -
Traffic Signal & Lighting - Modification		LS	$ 200,000.00	$ -
Type E - 6' Round Signal Loops		EA	$ 600.00	$ -
Type D - 6' Square Loops with bike detection zone		EA	$ 800.00	$ -
Install Pull Box (#5)		EA	$ 500.00	$ -
Install Pull Box (#6)		EA	$ 700.00	$ -
Install Pull Box (#6E)		EA	$ 800.00	$ -
2" Conduit		LF	$ 25.00	$ -
3" Conduit		LF	$ 30.00	$ -
3" PVC Conduit (for Fiber Optic Cable only)		LF	$ 30.00	$ -
24 Single Mode Fiber Optic Cable		LF	$ 4.00	$ -
12 Pair Interconnect Cable		LF	$ 5.00	$ -
Bike Loops		EA	$ 300.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Traffic Improvements	$ -

By: _____

Drawing Number(s): _____

2.10 Preliminary Cost Estimate Form for Miscellaneous Improvements and Final Monuments

Developer: _____

Project: _____

Location: _____

Miscellaneous Items	Quantity	Unit	Price	Amount
			Sub-total for Miscellaneous Improvements	

By; _____

Miscellaneous Drawing Number(s): _____

Final Monument Items	Quantity	Unit	Price	Amount
			Sub-total for Final Monuments	

By: _____

Final Map Number(s): _____

2.11 Street Improvement Plan Check List (Public & Private)

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

Please note that street improvement plans and profiles are required for public and private street improvements.

I. Title Sheet

1. Vicinity Map with project location and north arrow
2. General Notes (list all improvement plans used as a reference in preparation of those plans in the general notes)
3. Construction Notes with quantity estimate
4. Index Map with Street Names (show flows around tract if necessary)
5. Legend of symbols and abbreviations
6. City of Upland bench mark, basis of bearings
7. Name, address, and telephone numbers of the developer/owner, civil engineer, and soils engineer
8. Project and Plan Numbers in the lower right corner of the plan
9. City-approved title/signature block (tract or parcel #, CUP, SP, etc.)
10. Civil Engineer's seal and signature
11. Underground Alert Notice
12. Private Engineer's note
13. "Survey Monument" and "Contractor's Responsibility for Safety" notes
14. Typical section(s) for all adjacent streets
15. Review Conditions of Approval and complete all requirements.
16. Confirm that plan check fees have been paid prior to permit issuance.
17. Declaration of Engineer of Record

II. Plan Sheets

1. Review Conditions of Approval for requirements.
2. North arrow (pointing to the top or to the right of the sheet)
3. Stationing shall increase to the north or east and conform to any previous/referenced plans.
4. Provide station equations and street names at intersections.
5. Street names shown on all streets, show street name signs with construction note (CU-G-2, 3 and 4)
6. Station and elevation at EC's, BC's, ECR's, BCR's, beginning and end of improvements, parkway drains, catch basins, etc.
7. Scale bar on all sheets 4 inch
8. Show bearings on all streets and cross-streets, radial bearing on centerline of all catch basins, etc. along a curve (CU-D-4). Curve or line table may be used.
9. Lot lines, lot numbers, and lot frontage dimensions
10. Show City limit lines, if applicable.
11. Curb return data (delta, radius, tangent, length); grade of intersecting street
12. Centerline curve data, and short and long side of curbed section
13. Label curb types, cross gutters, and all structures.
14. Note connections to existing improvements.
15. Transitions (length and stations) shall be minimum 2:1 for widening traffic and 10:1 for merging traffic on low speed roads. For roads with speed greater than 35 mph, tapers shall be per Caltrans standards. Major streets may require larger tapers, Type "L" markers 10 feet on center along taper (CU-G-1)
16. Show improvements to be constructed with solid lines. Existing or future improvements with dashed lines and proper label. Reference adjacent developments
17. Provide construction notes applicable to each sheet.
18. Obtain and show any required easements. Letters of permission are required for any grading and/or drainage beyond the project boundary.

Street Improvement Check List (Public & Private) (Continued)

19. Show existing and/or proposed ROW and topography a minimum of 100 feet beyond proposed improvements.
20. Show driveways and driveway widths.
21. Provide intersection site distances.
22. Confirm utility crossings.
23. Provide match lines and identical points on consecutive sheets. Provide reference to other sheets.
24. Minimum 200-foot centerline radius on residential streets, unless prior approval obtained
25. Curb returns shall be 35-foot radius at secondary or major streets, all others shall be 25-foot radius.
26. Provide wheel chair ramps at all curb returns
27. Provide ADA compliant right-of-way and improvement widths.
28. Show all existing above-ground and underground facilities with a note as to their disposition (pipelines, trees, power poles, etc.).
29. Provide details of all improvements, if not City-standard.
30. Show limits for each curb transition.
31. Use splash curbs on all downhill side of curb returns or drive approaches along major water carrying streets. Use 12” high splash curb when the curb is 10” or greater and 18” when curb is less than 10” high.
32. Show limits of new paving, old paving, overlay and removal. Use appropriate shading to delineate areas (CU-D-1). Select streets are to be built by staged construction (CU-R-1).
33. Right-of-way adjacent sidewalk is standard. If curb-adjacent sidewalk exists within block, continue sidewalk to street intersection and transition through return back to right-of-way adjacent sidewalk. Sidewalk shall be 6 feet wide in business districts (CU-P-7, CU-R-5, and CU-P-3).
34. Provide detail and direction of flow with arrows of cross gutter and aprons (CU-D-3, CU-R-3).
35. Provide flow line elevations on all BCRs, ECR’s and on the flow line of cross gutters (CU-D-3, CU-R-6).
36. If cross gutter has upstream drainage area greater than 1,000 feet in length, provide 10-foot wide cross gutter. Otherwise it shall be 6-foot width. Show width type on plans (CU-R-3)
37. No mid-block cross gutters or cross gutter across major through streets
38. On match-up paving situations, minimum cross slopes are to be 1% for driving lanes, 3-4% for shoulders, maximum is 2% driving lane & 6% shoulders. Cross slopes to be computed from lip of gutter; bird baths shall be eliminated.
39. Show the location, length, elevations & cross section of any Asphalt Berm to be constructed.
40. Show any required traffic striping or any striping that will need to be replaced due to construction.
41. Show location, size & variety of all existing street trees. Show all proposed street tree(s), variety & quantity on each street. Tree varieties for select streets are shown on CU-P-6. For streets not listed or new streets, the tree variety may be obtained from the Public Works Department. Street tree spacing is 40 feet ± depending on tree type.
42. Saw cut EP to straight line on match-in paving situations, or remove redwood headers.
43. Barricade required at temporary dead end streets or sidewalks.
44. Show any required “raised traffic marker” spacing diagram.
45. 2” x 4” redwood headers required at edges of paving that are not adjacent to gutters or existing paving, except for the 2:1 and 10:1 tapers.
46. All removals of paving or overlays within existing traveled way shall be per standard (CU-Z-3).
47. No driveways allowed on the south side of the street opposite a “T” intersection
48. Block walls connected with back-up lot treatment will be placed at the top of any slopes adjacent to the street. Wall details (other than standard garden walls) are required. Maximum wall height shall be 6 feet.
49. Verify that no proposed drive approaches cover any existing or proposed sewer or water laterals. All drive approaches shall be shown and noted (CU-P-4, CU-P-5).
50. At entrances to a PRD from major streets, provide a median on the private street for efficient traffic flow.
51. A slope letter is required if the cut or fill at end or side of a street adjacent to the subdivision boundary exceeds one-foot (2:1 slope maximum).
52. Alley approaches with a center gutter requires an under sidewalk drain. Show flowline elevations on plan (CU-R-4, CU-P-3).
53. Check grading plan for interior streets on all PRD.
54. Check subdivision boundaries for problems such as blocked drainage from or discharging to adjacent lands or conflicts between existing and proposed improvements.

Street Improvement Check List (Public & Private) (Continued)

55. Check for ponding on streets or at cross gutters.
56. Show irrigation facilities. Note areas where irrigation lines may be affected
57. Show locations of proposed fire hydrants and water valves, and manholes to be adjusted to grade.
58. Show the existing streetlights in the area on both sides of the street & the distance from the project limit. Submit this information to the Traffic Engineer to determine if any new lights are required.
59. A minimum of a 12' paved access is required to all public facilities. Access shall be clear of all obstructions including roof overhang
60. ¾" plywood false bottoms to be placed in all sewer manholes within the construction area
61. Provide trap at first manhole downstream of proposed improvements.
62. If applicable, check for designated Handicapped Route through the project.

III. Profile

1. Scale (horizontal and vertical). Show datum elevations at both ends of sheet.
2. Profile or centerline of existing and perimeter streets and existing ground line shall be dashed.
3. Provide stationing at bottom of profile.
4. Provide names and stationing of intersecting streets.
5. Label and show stations and elevations at the beginning and end of all curb returns, vertical curves, transition sections, grade breaks, and beginning and end of improvements.
6. Indicate lengths of curb returns and lengths of horizontal curves. Show to true scale. ¼ delta points to be shown on all returns with elevations; show intersecting street grade %
7. Minimum fall around curb returns shall be 0.4%. Show profile going into & out of return. Check shoulders around returns for excessive slope (maximum 6%). Check elevations using an approved method.
8. Use straight grade for cross gutters (CU-R-6). Maximum 2.5% coming into cross gutter. PI for vertical curve minimum of 50' back from flow line of cross gutter. On streets where the grade is 5% or greater, a grade of 4.5% into cross gutter is acceptable.
9. If curbs are variable height, show TC and FL elevations, flow line profile with grade
10. Label all grade lines and profiles. Also show size of curb face (CU-D-5).
11. Profile of existing centerline or elevations at least every 50 feet.
12. Show profile of existing EP with elevations at least every 50 feet.
13. Show profile of existing ground at property line.
14. Check that all slopes are shown correctly compared to elevations given.
15. Show connection with or future design to existing improvements, along with existing elevations. Show grade on existing improvements.
16. Extend profiles 300' beyond end of improvements necessary to justify proposed grades
17. Show profile of finished centerline & top of curbs (solid line), show grades (0.4% minimum) (CU-D-5)
18. Show profile of ¼ crown if necessary. Show grade.
19. Grade of major & secondary streets should not exceed 8%, residential streets should not exceed 16%.
20. Check elevations shown in profile against those shown in plan view.
21. Check difference between T.C. and centerline against what typical section shows.
22. Use vertical curves for all grade breaks in excess of 0.6% (CU-D-5). Avoid non-symmetrical vertical curves.
23. Show true length and true grade of horizontal curves.
24. Show tangent grades for vertical curves, reverse or compound vertical curves.
25. Show P.I. elevations for vertical curves (CU-D-5).
26. Elevations every 50' (or fractional part thereof) on vertical curves.
27. On "grade to drain" situations, check for sufficient elevations and stations to allow grading to be done (critical where grading is to be done in flat areas).
28. Check through streets for drivability.
29. Show transitions between different curb heights and types.
30. If future curb is to go over channel, etc., check to see there will be adequate clearance between bottom of deck and top of channel.
31. Design speeds: residential streets 25 mph, secondary streets 35 mph, major streets 45 mph.

Street Improvement Check List (Public & Private) (Continued)

32. Show structures to scale (catch basins, etc.). Note critical flow line elevations (CU-D-5).
33. Show any existing or proposed underground facilities that may conflict or enter into the design and construction of the proposed improvements.
34. Show existing or proposed flows coming into or out of new improvements.
35. Show H.G.L. to nearest 0.1' in profile. Show "Q" in streets into catch basins and into storm drain system and designate Q10, Q50, etc. State any flow-by at catch basins.
36. Catch basin water surface elevations shall be 6" below gutter flow line.
37. For knuckle or street curve widening, the widened portion shall drain to the gutter flow line at a minimum slope of 2%.

IV. Drainage and Miscellaneous

1. Submit drainage calculations, including hydrology maps for pre- and post-developed conditions.
2. Check to see if new street section will carry same flow as the existing street section (critical where there is an existing ditch running along street) without diverting flow across centerline
3. N=0.20 on residential streets (with driveways, parked cars, etc), N=0.15 on major streets (no driveways, little or no parking, etc)
4. Check drainage structures for capacity. Minimum velocity at two feet per second for all underground drainage facilities. Hydraulic calculations submitted by Registered Engineer shall include catch basin sizing calculation(s).
5. Note size, length & "D" strength or gauge for drainage pipe. Any CMP shall be asphalt coated & lined.
6. Sump catch basins shall be designed for a 50-year storm, underground storm drain systems designed for a 10-year storm & open channel designed for 100-year storm events. Sump conditions require a secondary overland overflow to prevent flooding of property should catch basin or storm drain become blocked.
7. Carry 10-year storm between curbs and 100-year storm between right-of-way lines.
8. Grate catch basins will be bicycle proof.
9. No cross gutters where there are existing storm drains to tie into.
10. No under sidewalk drains where there are existing storm drains to tie into.
11. Is a letter required for the Department of Real Estate about any possible flooding of lots on tract?
12. Are any block walls, ditches, etc. needed along tract boundary to prevent flooding (overland, from ditches or large water carrying streets)?
13. Does proposed drainage system fit into City's master storm drain plan?
14. Check for need of cutoff walls, energy dissipators, etc. at the outlets & headwall or aprons at inlets.
15. Storm drain easements (12-foot minimum width) shall not be centered on property lines. Storm drains shall not be located on property lines.
16. Manholes are required at angle points in storm drains and located in convenient area for access.
17. If the irrigation line is not steel & it is to remain in service, it shall be encased in concrete if the line has less than 30" of groundcover. If a line is relocated, it will be replaced with steel irrigation pipe in any traffic areas. Abandoned lines are to be removed or crushed in place.
18. Show disposition for stand pipes or weir boxes. Note those that are to be removed or reconstructed. Show details of any re-construction.

2.12 Street Light Criteria

In most cases, Southern California Edison (SCE) Company owns the street lights. The developer is responsible for plotting street lights on the street improvement plans using the criteria below. The City will approve the location of the street lights during the plan checking process.

I. Guidelines

1. The engineer shall plot all existing street lights, within 300-feet of the project limits, on the street improvement plans.
2. The engineer shall plot all proposed street lights on the street improvement plans
3. All streetlights must be called out with the appropriate construction note. The construction note shall contain information regarding the bulb specifications, pole type, pole height, and length of mast arm. A sample note is shown below.
4. Street lights shall be placed a minimum of 15-feet from all trees.
5. The developer/engineer must submit the approved street light locations to SCE (in a timely manner) to prepare the Lighting Plans. All fees and material costs shall be paid per SCE requirements.
6. Once the appropriate permits have been issued, the contractor shall install the conduit per the approved City street plans and SCE plans.
7. SCE will install cables through the conduit and connect the streetlights
8. The City Inspector will approve the installation of the lights and conduit
9. The City Engineering Division will request SCE to energize the streetlights

II. Streetlight Spacing Criteria

Streetlights will be staggered on each side of the street using the below criteria.

Street Type Width from CF to CF	**Light Spacing (In feet)**	**Light Pole Specifications**	**Light Specifications**	
			Lumens	**Watts**
Residential Street 36-ft	125’ to 130’ 150’ to 160’	Standard Concrete Pole	4,000 5,800	50 w 70 w
Collector Street 40 ft to 44ft	140’ to 150’	Standard Concrete Pole	5,800	70 w
Secondary Highways 64’ to 68’	90’ to 100’	Standard Concrete Pole	9,500	100 w
Major Highways 68’ and above	100’ to 125’	Standard Concrete Pole	16,000	150 w
Foothill Boulevard Euclid Avenue**	135’ to 150’	Ameron Corsican pole, pole color code 32, globe to be 12% white	Twin King 118	150 w

III. Miscellaneous

Foothill Boulevard, portions of Euclid Avenue: All new lights installed on Foothill Boulevard and portions of Euclid Avenue, will be decorative nostalgic lights. A sample construction note for a Foothill Boulevard light is as follows: “Install Twin King 118, 150 watt LED luminaries on Ameron Corsican Pole; globe will be 12% white, pole color code 32.”

Sample street light construction note for standard SCE lights: “Install xx watt LED Street Light on x’ mast arm of Standard Concrete Pole”.

Upland Town Center: Please contact City Staff.

2.13 Storm Drain Improvement Plan Check List (Public & Private)

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

I. Title Sheet

1. Vicinity map with project location and north arrow
2. General notes (list all improvement plans used as a reference in preparation of those plans in the general notes)
3. Construction notes / quantity estimate
4. Index Map
5. Legend of symbols & abbreviations
6. City of Upland Benchmark and basis of bearing
7. Name / address / phone number of owner, developer, civil engineer and soils engineer
8. Project and plan number in lower right hand corner
9. City approved title/signature block (Tract or Parcel No., CUP, SP, etc.)
10. Civil Engineer's signature & seal on each sheet
11. Underground Service Alert notice
12. Private Engineer's note
13. "Survey Monument" note and "Contractor's Responsibility of Safety" note
14. Review conditions of approval and complete all requirements.
15. Check that all plan check fees have been paid prior to permit issuance.
16. Declaration of Engineer of record.

II. Plan Sheet

1. Scale. Show horizontal scale near north arrow.
2. North arrow (pointing to the top or to the right of the sheet)
3. Necessary easements (width varies depending on depth and diameter)
4. Show existing improvements and dimensions with dashed lines, along with plan reference.
5. Show existing pipelines, irrigation lines, or structures, power poles, or trees, etc., in right-of-way and include note as to their disposition if encroaching. Show existing underground structures that may conflict with, or enter into, the design of proposed improvements.
6. Show improvements to be constructed with solid lines. Note connections to existing improvements.
7. Show improvement details if not City-standard.
8. Stationing to conform with established stationing on any previous plans. Stationing to be south to north or west to east.
9. Lateral should be 45º or less entering mains (90º O.K. for smaller diameter)
10. Centerline station for catch basin, show width, depth and velocity
11. Check historical drainage patterns.
12. Show stations at even 100' intervals
13. Construction notes
14. Lot lines, lot numbers and frontage dimensions
15. Cross check plan & profile stations and elevations
16. Curve data
17. Stations and lengths
18. Stations at EC and BC, and at beginning and end of improvements.
19. Utility crossings
20. Bearings of all street centerlines, intersecting streets, laterals and mains. Radial bearings on centerline of all catch basins, etc., on a curve. Use table of curve and lines
21. Street ROW widths
22. Check clearance of all parallel utilities
23. Check rip rap requirements
24. Check headwalls
25. Junction structure required for diameter greater than or equal to 36", if less than 36", full junction structure not required

Storm Drain Improvement Checklist (Public & Private) (Continued)

26. Minimum cover 30” without special permission
27. Check street capacities
28. Check catch basin sizes
29. A minimum of 12’ paved access shall be required to all public facilities. Access shall be clear of obstructions (including roof overhang)
30. Provide 4 inch bar scale

III. Profile

1. Scale, both horizontal and vertical.
2. Show datum elevations at both ends of sheet.
3. Existing ground shall be dashed line and labeled accordingly.
4. Profile of finish surface at centerline of storm drain. Existing surface for open channels.
5. Manhole rim elevations
6. Utility crossings with top or bottom of pipe elevations depending on location of crossing
7. For pipes, show size, length and “D” strength for each section.
8. Show HGL to the nearest 0.1’ plotted and labeled accordingly.
9. Show connection with or future design to existing improvements, along with existing elevations. Show grade on existing improvements.
10. Check minimum grade on storm drain pipe (0.5% minimum preferred, may allow flatter slope under certain conditions)
11. Station / elevation at beginning and end of all structures
12. Show stationing at bottom of profile at heavy lines.
13. Hydraulic data - Q100, V for each pipe section
14. Station of centerline on manhole
15. Match lines with station, elevation and sheet reference
16. Names and stationing of intersecting streets
17. Maximum manhole spacing (varies depending on pipe size)
18. Collar required for change in slope greater than 10%.
19. Check plan stations with profile stations
20. Show structures to scale (catch basins, junction structures, etc.). Note critical flow line elevations.
21. Stationing of centerline on all streets
22. Profile all laterals.
23. Velocity greater than or equal to 20 fps, special cover pipe is required using f’c = 4,000 psi concrete
24. Maximum velocity is equal to 45 fps using f’c = 5,000 psi concrete
25. Maximum water surface in catch basin shall be 6” below inlet FL elevation.
26. No decrease in pipe size downstream without prior approval.
27. Vn/Vc should be less than .9 or greater than 1.2
28. Safety ledge required in manholes deeper than 20 feet.
29. Show flow line of local depression at catch basins.

IV. Miscellaneous - Engineering Directive ED-S-1

Street Drainage Criteria

1. N/S streets: Q25 in curbs, Q100 in R.O.W.
2. E/W streets: Q50 in curbs, Q100 in R.O.W.
3. E/W streets with drainage areas greater than 80 acres & a slope less than 1% shall have a level street section.
4. For all arterial (and selected collector) streets, a minimum 10” curb face is required.

Storm Drain Pipe Criteria

1. Public drainage pipes shall be Reinforced Concrete Pipe (R.C.P.). HDPE pipe requires approval from the Public Works Director.

Storm Drain Pipe Criteria (continued)

2. N/S street minimum pipe capacity shall equal Q10 from the tributary area. Combined street and pipe capacity shall contain Q25 in curbs and Q100 in R.O.W.
3. E/W street minimum pipe capacity shall equal Q25 from tributary area. Combined street and pipe capacity shall contain Q50 in curbs and Q100 in R.O.W.
4. Minimum pipe size is 15” diameter and 11” x 18” arc pipe
5. Curb inlet openings shall be 1½ times the area required by the storm drain incremental capacity. Exceptions may be granted for tributary areas greater than 200 acres.
6. If street grade is greater than 2%, angled or skewed, openings (not parallel) to the roadway are preferred.

Sump Condition

1. Minimum pipe capacity sized for Q25. Area of inlet opening shall be two times the area required for the Q25 capacity.
2. A Q100 overland flow conveyance is required. Pad elevations shall be one foot above Q100 high water mark.

2.14 Sewer Improvement Plan Check List (Public & Private)

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

I. Title Sheet

1. Vicinity map with project location and north arrow
2. General notes (also, list all the improvement plans used as reference in preparation of those plans in the general notes)
3. Construction notes with quantity estimate
4. Index map
5. Legend of symbols and abbreviations
6. City of Upland benchmark and basis of bearing
7. Name/address/phone # of developer/owner, civil engineer and soils engineer
8. Project number and plan number in lower, right corner of plan
9. City approved title/signature block (tract or parcel number, CUP, SP, etc.)
10. Civil engineer's seal and signature
11. Underground alert notice
12. Private engineer's note
13. "Survey Monument" note and "Contractor's Responsibility of Safety" note
14. Review conditions of approval and complete all requirements
15. Check that plan check fees have been paid prior to permit issuance
16. Declaration of Engineer of record

II. Plan Sheet

1. Horizontal (1": 40') and verticals (1":4') minimum scales in plan and profiles sections
2. Bearings of all street centerlines shown
3. Stationing to conform with stationing on any existing plans on file
4. Identical stationing and elevations on consecutive sheets
5. Stationing of structures and BC and EC of all curves
6. Stations at beginning and end of improvements
7. North arrow shall be shown pointing up to the right
8. Show existing topography
9. All plan sheets to have house lateral location (design station and as-built station)
10. Show all water laterals
11. Show all existing pipelines, irrigation lines, structures, power poles, trees, fire hydrants, etc. in right-of-way or immediately adjacent to right-of-way
12. All existing and proposed utilities must be shown, labeled and dimensioned
13. Show existing, proposed and future right-of-way and improvement widths. Should conform to street improvement plan
14. Lot lines, frontage distances and lot #'s same as record map. Label property and map boundary lines
15. Show existing improvements and dimensions with dashed lines
16. All drawing references must be noted on plan
17. Show details of all improvements if not City standards. For all standard improvements, show standard drawing number. Check standard drawings for those dimensions shown on plans
18. Show all manholes to be adjusted to grade
19. Construction notes shown and numbers checked against indicated improvements
20. Street names shown
21. If connecting to an existing sewer , show flow line elev.'s and distance to the nearest manholes (both directions)
22. If sewer is in an easement, show location of easement (do not center on lot lines)
23. Location of new sewer to be at centerline for new streets. Pipe shall be V.C.P. pipe
24. Stationing shall be along true length of sewer , beginning at centerline of lowest manhole and increasing upstream
25. All sewer mains shall be vitrified clay type or C.I.P.

Sewer Improvement Checklist (Public & Private) (Continued)

26. Minimum separation between sewer and water lines shall conform to City standards and State Health Code
27. Minimum 8” public sewers.
28. Laterals are to be extended to the property line and stationed. The minimum slope is 2% with a minimum cover of 4 feet
29. No laterals to be connected to manhole, unless approved by the Public Works Director
30. No laterals directly opposite each other, minimum lateral separation shall be 2 feet
31. For all lateral installations, a cleanout shall be installed at grade level, on private property, just behind the city R.O.W.
32. Manhole or cleanout required at end of all sewers (including temporary terminus)
33. Maximum manhole spacing shall be 350’
34. Maximum distance between manholes and cleanouts shall be 150’ with no more than 3 connections
35. Sewers to be constructed to project boundaries within the public right-of-way
36. Sewer laterals to conform with City standards
37. Show detail for re-channelizing bottom of existing manholes where required
38. No vertical curves in sewer, grade breaks only at manholes
39. Where a sewer lateral is the same size as the sewer main , it shall be connected with a manhole
40. Under no circumstances will any sewer be allowed to pass under any buildings or under driveways without prior approval of the Public Works Director
41. Water mains are to be located 6’ west of east curb face for north/south streets and 6’ north of the south curb face for east west streets
42. Show city limit lines
43. Public sewer pipe to be C.I.P. or V.C.P.
44. Check if backflow device is required (needed if next upstream manhole has a rim elevation greater than the finished floor elevation of the building)
45. A minimum of 12’ paved access shall be required to all sewer manholes. Access shall be clear of obstructions (including roof overhang)
46. ¾” plywood false bottoms to be placed in all sewer manholes within the construction area
47. Provide trap at first manhole downstream of proposed improvements.
48. For tracts, show sewer and water as-built table. This table should show the proposed lateral stations and a column for the as-built locations, and a column to reflect when a sewer backflow valve is required. Backflow device is required when downstream manhole elevation is higher than pad elevation.
49. Provide 4 inch bar scale

III. Profile

1. Scale both horizontal and vertical
2. Show 100’ stationing at bottom of profile
3. Names and centerline stationing of intersecting streets
4. Label and show connection to existing sewer, existing elevation and grade. Denote existing elevation and grade with parenthesis. A note to verify elevation of existing sewer flow line prior to construction
5. Label all profiles
6. Profile of finished centerline surface
7. Sewer grade correctly shown
8. Label and show sta.'s and elev.'s at end of sewer, at crossings, rim and inverts of manholes and cleanouts
9. Show size and material of sewer main
10. Show location and bottom or top elevations of all crossings, parallel pipes or structures that might enter into the design of the sewer
11. Do elevations in profile and plan section match?
12. Are profiles and elevations the same on each sheet or section of match lines?
13. Minimum depth to top of sewer is 6’; minimum pipe cover is 5’
14. Compare design to existing plans. Reference on drawing if they exist.
15. 0.2 foot drop between flow line of inlet and outlet at manholes. Flow line of side inlets shall be 0.3 feet higher than outlet
16. Check sewer profile and grade (Minimum grade 8” = 0.40%, maximum grade = 8%)

Sewer Improvement Checklist (Public & Private) (Continued)

17. Design Requirements: sanitary sewers 12” diameter and smaller are normally designed to run half-full (50%) at peak flow. Larger sewers are designed to run 75% full at peak flow
18. Velocity not to exceed 10 ft/s

2.15 Water Improvement Plan Check List (Public & Private)

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

I. Title Sheet

1. Vicinity Map/North Arrow
2. General notes, list all improvement plans used as a reference in preparation of those plans in the general notes
3. Construction notes with quantity estimate
4. Index Map
5. Legend of symbols and abbreviations
6. City of Upland bench mark and basis of bearing
7. Name/address/phone # of developer/owner and civil engineer
8. Project number and plan number in lower, right corner of plan
9. City approved title/signature block (tract or parcel number, CUP, SP, etc.)
10. Civil engineer's seal and signature
11. Underground alert notice
12. Private engineer's note
13. "Survey Monument" note and "Contractor's Responsibility for Safety" note
14. Review conditions of approval and complete all requirements
15. Check that plan check fees have been paid prior to permit issuance
16. Declaration of Engineer of record.

II. Plan Sheet

1. Topo shall be shown per City standard
2. Street names shown
3. Stationing to conform to stationing on any existing plans on file. New stationing shall increase west to east or south to north
4. Identical stationing on consecutive sheets
5. Stationing of all street centerlines
6. Station at beginning and at end of improvements and at center of driveways, fire hydrants, blow-offs, services and main line valves
7. North arrow shall be shown pointing up to the right. No exceptions, unless approved by Public Works Director
8. All driveways, sewer mains and laterals must be shown
9. Water easements shown correctly. Water easements shall be located on one lot only.
10. If any area shown is located in the County, it must be labeled. Show City limit lines
11. Existing pipelines, irrigation lines, structures, power poles, or trees, etc., in right-of-way or immediately adjacent to right-of-way must be shown
12. All existing and proposed utilities must be shown, labeled and dimensioned
13. Show existing, proposed and future right-of-way and improvement widths. Should conform to street improvement plan
14. Lot lines, frontage distances and lot numbers same as record map. Label property and map boundary lines
15. Show existing improvements with dashed lines. Proposed improvements with solid lines
16. All drawing references must be noted on plan
17. Show details of all improvements if not City standard. For all standard improvements, show standard drawing number. Check standard drawings for those dimensions to be shown on plans
18. Show existing fire hydrants in vicinity on both sides of the street. Water Division to check locations & size of new fire hydrants. Maximum spacing for fire hydrants is 300’ (measured radially). Fire hydrants to be located at a property line where possible.
19. Construction notes shown and numbers checked against indicated improvements
20. All fittings should be labeled and called out
21. Blow-offs required at all dead ends, including temporary dead ends, per City Standards unless system terminates at a fire hydrant
22. Check for minimum separation requirements with all underground utilities per City Std. W.25 and Health Dept. requirements (including proposed sewer, recycled water lines and storm drain lines).

Water Improvement Checklist (Public & Private) (Continued)

23. Check for low or high points in system (including temporary dead ends) which may require air relief valves (for high points), relocation of fire hydrant, or blow-off valve (for low points)
24. "Hot Taps" shall indicate installation and size of tapping valve and tapping sleeve (welded nipple and flange in case of steel mains)
25. Note for restoration of existing pavement
26. Where shut down of existing main is required, add to general notes, “All shut down of existing water mains to be done by and coordinated with the City Water Division. Contractors shall notify all affected water users 72 hours in advance of shutdown”
27. Water mains to be CML&C steel pipe
28. Proposed location of all laterals shall be checked for conflicts with other facilities (i.e. trees, light poles, sewer laterals, driveways, etc.)
29. Water Division to approve the type, size and location of all mainline pipes, valves and laterals (maximum valve spacing is 500’)
30. A minimum of 12’ paved access shall be required to all public facilities. Access shall be clear of obstructions (including roof overhang)
31. False bottoms to be placed in all sewer manholes located within the construction area.
32. A trap is to be placed in the next downstream sewer manhole from the construction area to trap any construction debris from the site
33. For all industrial or commercial projects, install a new (or upgrade an existing) R. P. backflow device per City Standard W.19.
34. For tracts, show a sewer and water as-built table. This table should show the proposed lateral stations and a column for the as-built locations and a column to reflect when a sewer backflow valve is required.

III. Profile (when required)

1. Scale, both horizontal and vertical
2. Show 100' stationing at bottom of profile
3. Names and centerline stationing of intersecting streets
4. Label and show connection to existing water, existing elevation and grade. Denote existing elevation and grade with parenthesis
5. Label all profiles
6. Profile of finished centerline surface
7. Water grade correctly shown
8. Label and show stations and elevations at end of water , at crossings and grade breaks
9. Show size and material of water main
10. Show location and bottom or top elevations of all crossings, parallel pipes or structures that might enter into the design of the water main
11. Check that elevations in profile and plan section match
12. Check that profiles and elevations are the same on each sheet or section of match lines
13. Check minimum depth of top water line per City Standard CU-D-7
14. Compare design to existing plans and reference plan numbers on drawing

Section 3.0

Private Improvement
Fee Information

3.1

CITY OF UPLAND
PUBLIC WORKS DEPARTMENT
LAND DEVELOPMENT & TRANSPORTATION DIVISION

COST ESTIMATE SUMMARY SHEET
Private Improvements

Developer: _____

Project: _____

Location: _____

	Item Description	Estimated Cost
1 .	On-Site Improvements	$ -
2 .	Sewer Improvements	$ -
3 .	Water Improvements	$ -
4 .	Drainage Improvements	$ -
5 .	Traffic Improvements	$ -
6 .	Miscellaneous	$ -
	Sub Total	$ -
	20% Contingency	$ -
	Total Amount	$ -

Estimated By: _____

RCE#: _____

Date: _____

Bonds are not required for private improvements. These calculations are required to determine the Inspection Fee Deposit only. The Developer's Engineer will calculate the estimated cost. The Inspection Fee Deposit must be paid before permits are issued.

3.2

Preliminary Cost Estimate Form for Private On-Site Improvements

Developer: _____

Project: _____

Location: _____

Street Items	Quantity	Unit	Price	Amount
Roadway Excavation				$ -
1. Projects with Grading Plan area X 0.50' (hinge point to hinge point) (_____ SF)		CY	$ 12.00	$ -
2. Projects without Grading Plan road area and side slopes to daylight. Cut (C) = Fill (f) =				$ -
(a) Excavate & Fill		CY (c or f)	$ 3.00	$ -
(b) Excavate & Export		CY (c -f)	$ 1.00	$ -
PCC Curb and Gutter 6"		LF	$ 11.00	$ -
PCC Curb and Gutter 8"		LF	$ 13.00	$ -
PCC Sidewalk		SF	$ 6.00	$ -
PCC Cross Gutter/Spandrel		SF	$ 8.00	$ -
PCC Curb Only 6"		LF	$ 8.00	$ -
PCC Curb Only 8"		LF	$ 10.00	$ -
Rolled Curb		LF	$ 12.00	$ -
PCC Pavement		SF	$ 8.00	$ -
Ribbon/Alley Gutter		LF	$ 12.00	$ -
Wheelchair Ramp (ADA Compliant)		EA	$ 1,600.00	$ -
Drive or Alley Approach		SF	$ 8.00	$ -
Asphalt Concrete (144 lbs/ft^3)		TON	$ 76.00	$ -
AC Patch-Trench (Match Existing)		SF	$ 4.00	$ -
Grind & AC Overlay @ 0.50 inch		SF	$ 3.00	$ -
Aggregate Base CL II		CY	$ 44.00	$ -
AC Berm		LF	$ 11.00	$ -
Street Lights Underground + Trench (Standard Marbelite)		EA	$ 4,800.00	$ -
Street Lights Underground + Trench (Decorative)		EA	$ 5,600.00	$ -
Install Barricades		LF	$ 88.00	$ -
Remove Barricades		LF	$ 8.00	$ -
Remove AC Pavement		SF	$ 2.00	$ -
Remove PCC Curb		LF	$ 8.00	$ -
Adjust Sewer Manhole to grade		EA	$ 400.00	$ -
Adjust Water Valve to grade		EA	$ 240.00	$ -
Sawcut		LF	$ 2.00	$ -
Decorative Concrete		SF	$ 10.00	$ -
Underwalk Drain		EA	$ 1,440.00	$ -
Parkway Trees		EA	$ 280.00	$ -
Parkway Landscape and Irrigation		SF	$ 1.00	$ -
Install Chain Link Fence		LF	$ 13.00	$ -
Irrigation Backflow Prevention Assembly (w/ enclosure)			$ -	$ -
Relocate Power Pole		EA	$ 8,000.00	$ -
			Total for On-Site Improvements	$ -

By: _____

On-Site Drawing Number(s): _____

3.3

Preliminary Cost Estimate Form for Private Sewer Improvements

Developer: _____

Project: _____

Location: _____

Sewer Items	Quantity	Unit	Price	Amount
Sewer Manholes (48-inch Diameter)		EA	$ 3,600.00	$ -
Sewer Drop manholes (48-inch Diameter)		EA	$ 4,400.00	$ -
Sewer Cleanouts		EA	$ 800.00	$ -
6-inch VCP Sewer Laterals		LF	$ 48.00	$ -
8-inch VCP Sewer Mainline		LF	$ 68.00	$ -
10-inch VCP Sewer		LF	$ 88.00	$ -
12-inch VCP Sewer		LF	$ 96.00	$ -
Concrete Encasement 8-inch		LF	$ 12.00	$ -
Concrete Encasement 10-inch		LF	$ 14.00	$ -
Concrete Encasement 12-inch		LF	$ 16.00	$ -
8-inch CIP Mainline		LF	$ 120.00	$ -
Adjust Cleanout to Grade		EA	$ 240.00	$ -
Adjust Manhole to Grade		EA	$ 480.00	$ -
Remove Manhole		EA	$ 1,600.00	$ -
Connect to Existing Manhole and Rechannel		EA	$ 1,440.00	$ -
Backflow Device		EA	$ 640.00	$ -
8-inch x 4-inch Sewer Wye		EA	$ 480.00	$ -
Grease Interceptor		EA	$ 6,000.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Private Sewer Improvements	$ -

By: _____

Sewer Drawing Number(s): _____

3.4

Preliminary Cost Estimate Form for Private Water Improvements

Developer: _____

Project: _____

Location: _____

Water Items	Quantity	Unit	Price	Amount
6-inch Water main		LF	$ 52.00	$ -
6-inch Valve		EA	$ 1,040.00	$ -
8-inch Water main		LF	$ 64.00	$ -
8-inch Valve		EA	$ 1,200.00	$ -
6-inch Fire Hydrant Assembly		EA	$ 4,640.00	$ -
12-inch Valve		EA	$ 2,960.00	$ -
Upgrade 4-inch Fire Hydrant Assembly to 6-inch		EA	$ 4,000.00	$ -
Relocate 6-inch Fire Hydrant Assembly		EA	$ 1,920.00	$ -
2-inch Water Service		EA	$ 2,400.00	$ -
1 1/2-inch Water Service		EA	$ 1,840.00	$ -
1-inch Water Service		EA	$ 1,440.00	$ -
2-inch Air Vacuum Release Valve		EA	$ 2,800.00	$ -
Blind Flange		EA	$ 480.00	$ -
Relocate Existing Water meter		EA	$ 480.00	$ -
6-inch Fire Service		LF	$ 44.00	$ -
Backflow Device		EA	$ 2,240.00	$ -
8-inch Fire Service with Vault and Valve		EA	$ 5,600.00	$ -
6-inch Fire Service with Vault and Valve		EA	$ 4,800.00	$ -
4-inch Fire Service with Vault and Valve		EA	$ 4,000.00	$ -
4-inch Modified Blow-Off Assembly		EA	$ 2,160.00	$ -
Blow Off Assembly		EA	$ 2,160.00	$ -
Recycled Water Line, Irrigation		LF		$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Private Water Improvements	$ -

By: _____

Water Drawing Number(s): _____

3.5

Preliminary Cost Estimate Form for Private Storm Drain Improvements

Developer: _____

Project: _____

Location: _____

Storm Drain Items	Quantity	Unit	Price	Amount
18-inch RCP		LF	$ 100.00	$ -
24-inch RCP		LF	$ 116.00	$ -
30-inch RCP		LF	$ 124.00	$ -
36-inch RCP		LF	$ 152.00	$ -
42-inch RCP		LF	$ 172.00	$ -
48-inch RCP		LF	$ 192.00	$ -
54-inch RCP		LF	$ 220.00	$ -
60-inch RCP		LF	$ 256.00	$ -
72-inch RCP		LF	$ 375.00	$ -
8-inch HDPE		LF	$ 32.00	$ -
12-inch HDPE		LF	$ 36.00	$ -
Standard Manhole		EA	$ 3,600.00	$ -
Junction Structure (with manhole)		EA	$ 2,880.00	$ -
Junction Structure (without manhole)		LF	$ 2,000.00	$ -
4' Wide Catch Basin and Local Depression		EA	$ 4,000.00	$ -
7' Wide Catch Basin and Local Depression		EA	$ 4,800.00	$ -
10' Wide Catch Basin and Local Depression		EA	$ 5,600.00	$ -
14' Wide Catch Basin and Local Depression		EA	$ 6,800.00	$ -
21' Wide Catch Basin and Local Depression		EA	$ 7,600.00	$ -
Concrete Collar		EA	$ 1,200.00	$ -
Clean Out		EA	$ 1,200.00	$ -
Curb Inlet/Outlet		EA	$ 2,000.00	$ -
Bio-Swale		LF	$ 7.00	$ -
12"x12" Box Inlet		EA	$ 800.00	$ -
18"x18" or 24"x24" Box Inlet		EA	$ 1,200.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Private Drainage Improvements	$ -

By: _____

Storm Drain Drawing Number(s): _____

3.6

Preliminary Cost Estimate Form for Private Traffic Improvements

Developer: _____

Project: _____

Location: _____

Traffic Improvements	Quantity	Unit	Price	Amount
4" Painted Broken Stripes		LF	$ 1.60	$ -
4" Painted Double Solid Stripes		LF	$ 0.40	$ -
6" Painted Bike Lane Stripes		LF	$ 0.60	$ -
Painted One-Way, No Passing		LF	$ 0.30	$ -
Painted Two-Way, Left Turn Lane		LF	$ 0.70	$ -
Painted Pavement Markings		SF	$ 2.40	$ -
8" Thermoplastic Channelizing Line		LF	$ 1.60	$ -
12" Thermoplastic Crosswalk & Limit Line		LF	$ 2.40	$ -
Thermoplastic Pavement Markings		SF	$ 3.20	$ -
Street Name Sign & Post		EA	$ 240.00	$ -
Stop Sign & Post		EA	$ 240.00	$ -
Road Sign on existing pole/post (One Post)		EA	$ 160.00	$ -
Road Sign on existing pole/post (Two Post)		EA	$ 240.00	$ -
Street Sign (Mast Arm Hanger Method)		EA	$ 400.00	$ -
Remove Painted Stripes & Pavement Markings		SF	$ 2.40	$ -
Remove Thermoplastic Stripes & Pavement Markings		SF	$ 4.00	$ -
Traffic Signal & Lighting - New Installation		LS	$ 240,000.00	$ -
Traffic Signal & Lighting - Modification		LS	$ 160,000.00	$ -
Type E - 6' Round Signal Loops		EA	$ 480.00	$ -
Type D - 6' Square Loops with bike detection zone		EA	$ 640.00	$ -
Install Pull Box (#5)		EA	$ 400.00	$ -
Install Pull Box (#6)		EA	$ 560.00	$ -
Install Pull Box (#6E)		EA	$ 640.00	$ -
2" Conduit		LF	$ 20.00	$ -
3" Conduit		LF	$ 24.00	$ -
3" PVC Conduit (for Fiber Optic Cable only)		LF	$ 24.00	$ -
24 Single Mode Fiber Optic Cable		LF	$ 3.20	$ -
12 Pair Interconnect Cable		LF	$ 4.00	$ -
Bike Loops		EA	$ 240.00	$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Total for Traffic Improvements	$ -

By: _____

Drawing Number(s): _____

3.7 Preliminary Cost Estimate Form for Private Miscellaneous Improvements

Developer: _____

Project: _____

Location: _____

Miscellaneous Items	Quantity	Unit	Price	Amount
			Sub-total for Miscellaneous Improvements	

By; _____

Miscellaneous Drawing Number(s): _____

Section 4.0

Grading Plan
And
Fee Information

4.1 Grading Plan Check List

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

I. Title Sheet

1. Vicinity Map/North Arrow
2. General notes, list all improvement plans used as a reference in preparation of those plans in the general notes
3. Construction notes and Quantity Estimate
4. Index Map
5. Legend of symbols and abbreviations
6. City of Upland Bench Mark and basis of bearing
7. The name, address, and telephone number of developer/owner, civil engineer, and soils engineer
8. Project number and plan number in lower, right corner of plan
9. City approved title & signature block
10. Civil Engineer's seal & signature
11. Underground alert notice
12. Private Engineer's note
13. "Survey Monument" note and "Contractor's Responsibility for Safety" note
14. Estimated start and completion date
15. Design professional's statement
16. City Engineer's statement
17. Earthwork quantities
18. Description of property (address, APN, legal description)
19. Note: all grading shall be performed in accordance with the City of Upland's CU-E series Standard Drawings and ED-E of the Engineering Directives
20. All grading projects, regardless of size or time of year will require an Erosion Control Plan to prevent sediment from entering storm drain or water bodies; cross cut lot drainage not allowed
21. Review conditions of approval and complete all requirements
22. Check that all plan check fees have been paid prior to permit issuance
23. Submit WQMP
24. Provide WDID Number
25. Declaration of Engineer of Record
26. Comply with latest California Building Code (CBC)
27. Submit copy of approved tentative map and/or site plan
28. Submit copy of final map
29.
30.

II. Plan Sheet

1. North arrow/scale (minimum scale 1"=40')
2. Project boundary with dimensions
3. Lot lines and numbers with dimensions
4. All adjacent property lines
5. Existing contours and details of terrain. Extend existing contours at least 50' beyond the limits of the site
6. Plot location of all existing structures, buildings, walls, fences, trees, curb & gutters, driveways and sidewalks, etc. to within 30' of site
7. Plot and label all easements within the project site; easement must be on one lot only
8. Plot all underground facilities (existing & proposed)
9. Show pad and finish floor elevations of all existing and proposed buildings
10. Detailed plans of all surface and subsurface drainage devices
11. Show proposed drainage devices and swales; employ Low Impact Development (LID) and use BMPs
12. Show proposed curb, gutter, sidewalks, parking, planter areas, etc. Check that site matches approved site plan
13. Check all edge conditions for offsite grading and cross lot drainage. Request appropriate grading and drainage permission letters

Grading Check List (Continued)

14. 2:1 maximum slope allowed
15. Where needed, show stations and elevations along streets (stationing to conform to street stationing)
16. Construction notes
17. Details of non-standard drainage devices, etc.
18. Cross-section details where needed (especially along property lines)
19. Proposed contours
20. Dimension of street widths, existing utilities, proposed structures, buildings, parking lots, walls, drainage facilities, etc.
21. No drainage water allowed over public sidewalk in commercial sites. Give size and location of parkway drains
22. Onsite drainage over A.C. shall have a 1% minimum slope. Concrete gutters and V-ditches shall be a minimum of 6” thick, with a minimum slope (0.5% minimum)
23. All parkways to have a ¼” per foot slope
24. Show flowline grades for all drainage swales and devices
25. Show existing elevations at each lot corner
26. Retaining walls per separate permit must be submitted with grading plans. Only At-Risk grading permit will be issued until retaining walls are approved.
27. Change of grade along project property lines shall not exceed one foot without installation of retaining walls or slope letters (6” along existing fences)
28. Show sewer, water, fire, connections to proposed buildings
29. Give appropriate pavement section. Minimum 2” A.C. over native
30. Minimum grade for earth swale is 1%, check for erosion problems when slope exceeds 5% (CBC Section 1804)
31. The sides of common swales between houses shall be a minimum of 5% and maximum of 20% grade
32. Flowlines of swales for rear yard of residences shall be a minimum of 10 feet from the house (side yard has a 3’ minimum). A minimum depth of 3” below pad is required at the H.P. of the swale
33. Check for 18” landings in all planters adjacent to parking stalls (CU-L-5)
34. Check that each new or upgraded multi-family development has one trash enclosure for every 8 housing units
35. A multi-family recycling program shall be required as follows: 80 sq. ft. of space shall be allocated for every 8 housing units and an additional 5 sq. ft. for each unit above the 8 units
36. Check that a minimum of one trash enclosure is proposed for all industrial/commercial sites
37. Check that all industrial/commercial sites provide 100-square feet for every 10,000-square feet of building space, with an additional 5-square feet for each 1,000-square feet above the 10,000-square feet for recycling activities
38. Check driveway slopes to ensure fire access and drivability
39. Check turning radii for fire truck accessibility (min. inside r = 20’, min. outside r = 45’)
40. False bottoms to be placed in all sewer manholes located within the construction area.
41. A trap is to be placed in the next downstream sewer manhole from the construction area to trap any construction debris from the site
42. A minimum 12 foot paved access is required to access all public facilities
43. Show grease interceptor, plumbed separately from the domestic waste pipe, when required.
44. Check the designated handicapped access route for pedestrian traffic through site (must meet ADA standards).

4.2 Grading Plan Statements

The following statements shall be placed on all grading plans:

Design Professional's Statement

This grading plan was prepared under my direction and is in accordance with California Building Code (latest edition) and Chapter 15.52 of the Upland Municipal Code. The site grading and all applicable details conform to the provisions of Series CU-E of the Standard Drawings of the City of Upland, with Series ED-E of the Engineering Directives, and with any City of Upland Conditions of Approval concerning grading. In my opinion, adequate provisions have been made for the drainage of surface waters from each building site.

_____
Firm Name

_____
Signature

_____
Title RCE#

_____
Date

Statement of City Engineer

By my approval I hereby accept this grading plan and temporary erosion control plan as meeting the prerequisite for issuance of a grading permit and for record purposes. This grading plan and the temporary erosion control plan was prepared under the direction of a fully qualified professional who has stated that the plan conforms with all applicable requirements of the City. The design, elevations, details and features of the onsite grading have not been reviewed by the City, except as they relate to public improvements within adjacent right of ways and easements.

4.3 Erosion Control Plan Check List

Project No. _____ Plan No. _____ Checked by: _____

Plan Check Deposit: _____ Receipt Number: _____ Date: _____

I. Title Sheet

1. Vicinity Map/north arrow
2. General Erosion Control notes
3. Construction notes
4. Index map
5. Legend of symbols and abbreviations
6. Name/address/phone # of developer/owner, civil engineer, and soils engineer
7. Project number and plan number in lower, right corner of plan
8. City approved title/signature block (tract or parcel #, CUP, SP, etc.)
9. Civil engineer's seal and signature
10. Estimated start and completion date
11. “Design Professional’s Statement” for Erosion Control
12. “City Engineer’s Statement” for Erosion Control
13. Description of Property (address, APN, legal description)
14. Check that all plan check fees have been paid.
15. Provide 24-Hour contact person’s name and number
16. Provide WDID Number

II. Plan Sheet

1. North arrow/scale (minimum scale 1”=40’)
2. Project boundary with dimensions
3. Use Filter Fabric Gravel Bags
4. Temporary desilting details

4.4 Erosion Control Details

PENDING

4.5 Erosion Control Plan Statements

The following statements shall be placed on all erosion control plans:

Design Professional's Statement
Temporary Drainage and Erosion Control

This drainage and erosion control plan was prepared under my direction. Berms, swales, sandbags, and other temporary drainage facilities shown here are to be installed and maintained during the construction phase of the project. In my opinion, adequate provisions have been made to provide drainage of surface water from the site without causing flooding or sedimentation problems on public rights-of-way or surrounding private property.

_____
Firm Name

_____
Signature

_____
Title RCE#

_____
Date

Section 5.0

Tract and Parcel Maps

5.1 Submission of Tract and Parcel Maps For Plan Check

For review of final Tract or Parcel Maps, please submit the following:

4 sets	TRACT/PARCEL MAP (bond)
2 copies	TITLE REPORT (prepared within the last 90 days)
2 sets	RECORD DOCUMENTS (referenced in Schedule B of Title Report)
1 set	RECORD MAPS (as referenced on new final map)
1 copy	APPROVED TENTATIVE MAP
2 copies	FINAL APPROVED CONDITIONS OF APPROVAL
2 sets	CLOSURE CALCULATIONS
1 each	MAP REVIEW FEE (See section 1.0)

Rechecks

The last set of the map checker's redline prints of the map and two (2) sets of revised prints shall be submitted for subsequent map checks.

Final Review and Approval

When map checking is completed, the following is required for processing through City Council.

City Council meets the second (2nd) and fourth (4th) Monday of each month. The following items must be submitted (in final form) before noon on the Tuesday preceding the Council meeting.

1. An original of the map and one set of mylar prints shall be submitted, in final form, complete with all signatures.
2. Subdivision agreements shall be completed on the City of Upland forms, with all signatures.
3. Subdivision bonds shall be submitted. The form provided by the bonding company is acceptable.
4. All other documents required by the conditions of approval that must record with the final map (i.e. Landscape Maintenance Agreements, CC&R's, Aviation/Noise Easements, Reciprocal Parking agreements, etc.).
5. All outstanding fees must be paid in full.

5.2 Tract Map and Parcel Map Check List

Project No. _____ Map No. _____ Checked by: _____

Map Check Deposit: _____ Receipt Number: _____ Date: _____

Map Number _____ Expiration Date _____

Subdivider _____ Surveyor/Engineer _____

Other Identify _____

Check Print Number _____ Lots _____

Approved _____

I. Title Sheet

Please make comments on the face of the attached check print and return to this office. Any new additions or corrections other than those marked in red by our offices shall be labeled, underlined or in some manner made highly distinguishable along with calculations, if deemed necessary, for our office to check.

I. Authority

1. Subdivision Map Act
2. Land Surveyors Act
3. City Standards and Ordinance

II. Certificates

1. Acknowledgment
2. Acceptance
3. Auditor
4. Board of Supervisors
5. City Engineer
6. Owner
7. Records Square 3¼ x 3¼ inches
8. Signature Omissions
9. Surveyor or Engineer
10. Other: _____

III. Map Notes

Basis of Bearing:
1. Labeled on Map
2. Two monuments on the same line and shown on a recorded or filed map
3. Solar or stellar observation
4. California coordinate system (must include the zone and at least two stations)
5. Minor subdivisions number

Symbols and Abbreviations:
1. Closed circles or squares for found monuments
2. Open circles or squares for set monuments. Must include type, size, length, RCE or LS number
3. Define abbreviations

Tract Map and Parcel Map Checklist (Continued)

Surveyors Notes:

1. Where block walls may be installed at property lines, call out monumentation note to reflect both types (i.e. “all rear lot corners to be set with 1” iron pipe, 18” long, tagged LS _____, Flush. In the event the position of the rear lot corner falls on the wall, a lead and LS___ tag will be set on the face of the block wall to indicate the direction of the side lot lines).
2. Curb monumentation note: Set nail and tag LS _____ in the top of the curb at the prolongation of side lot lines for front corners.

IV. Mathematical Accuracy

1. Closure Unacceptable
2. Not Checked
3. Bearings Missing or Incorrect
4. Distance Missing or Incorrect
5. Center Line will now reconcile with right-of-way
6. Sum of parts equals the total distance
7. Curve Data
8. Radial Bearings
9. Acreage to hundredths (final maps with lots 1 acre and larger)

V. Survey Procedures

1. Additional Survey Information required
2. Chain of Title, deed interpretation incorrect, Deed Reference
3. Disagrees with Record Data
4. Monuments to County Standard
5. Proportion Incorrect
6. Sectional Breakdown Incorrect
7. Label Fractional Section Corners
8. Record measurements in parenthesis when a material discrepancy exists or beneficial to map interpretation
9. Reference for all found monuments or statement of acceptance if used as control monuments
10. Ties to adjacent tract lines, street C/L or section lines

VI. Map Body

1. Map Size, 18” x 26”, with 1” blank border on all sides
2. Map orientation, title and map body to read from bottom or right side of sheet when north arrow points away from reader
3. Map Subtitle Description
4. North Arrow and Scale
5. Sheets Numbered
6. Index Map (500 scale)
7. Current Title Report
8. Legibility of Map Data
9. Remove Advertising
10. City, County or State boundaries shown
11. Conforms to approved tentative map and conditions of approval
12. Data on soil test report delineated
13. Dedication shown and labeled
14. Delineate boundary of original parcel with a line three (3) times wider than all other lines
15. Delineate B.S.L.
16. Detail required for clarity
17. Delineate easements of record
18. Lot and parcel numbering
19. Midpoint of curve or P.I. monument
20. Non-access or non-vehicular access PUE or Private Road Easement

Tract Map and Parcel Map Checklist (Continued)

21. Recording Information
22. Reference to adjacent maps of record, shown with dashed lines and recording data
23. Remainder Parcel
24. Reserve Parcel
25. (S.B.C.F.C.D.E.) and private D.E.'s
26. Sewer Easements
27. Show adjacent Streets
28. Spelling
29. Street C/L dashed
30. Street names and widths to City Standards
31. Tie point numbers shown
32. Water Line Easement
33. Other: _____
34. Other: _____

VII. Final Subdivision Map Check

1. Cash Staking Deposit for Deferred Monumentation $ _____
2. Sufficient Processing deposit prior to recordation
3. Tie Sheets
4. Prints to Planning Department
5. Prints to Zoning
6. Prints to Building & Safety
7. Prints to Street Addresses
8. Prints to Fire Warden
9. Control boundary monuments shall be set and are subject to inspection before recordation of final maps. All monuments to be set before recordation of Parcel Maps.

Comments:

_____

_____

_____

_____

By: _____ Date: _____

☐ Please submit _____ corrected copies with redlined print and this checklist.

☐ Please submit original signed maps with one corrected copy.

5.3 Final Map Certificates

OWNERS STATEMENT:

WE HEREBY STATE I/WE ARE ALL AND THE ONLY PARTIES HAVING ANY RECORD TITLE INTEREST IN THE LAND SUBDIVIDED AS SHOWN ON THIS MAP AND I/WE CONSENT TO THE PREPARATION AND RECORDATION OF THIS PARCEL MAP.

(LIST ANY OFFERS OF DEDICATION OR SPECIAL CONDITIONS)
(INCLUDE ALL OWNERS)

DATED: _____ _____
NAME

(IF APPLICABLE)
BANK NAME
d/b/a (FILL IN CORPORATION NAME) AS BENEFICIARY UNDER TRUST DEED RECORDED
(FILL IN MONTH DATE YEAR), AS INSTRUMENT NUMBER (FILL IN DOCUMENT #) OR

BY:_____

NAME: _____

TITLE: _____

SURVEYOR'S STATEMENT:

THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF _____, ON _____. I HEREBY STATE THAT THIS PARCEL MAP SUBSTANTIALLY CONFORMS TO THE APPROVED OR CONDITIONALLY APPROVED TENTATIVE MAP, IF ANY.

DATED: _____ _____
NAME LS/RCE NUMBER

CITY ENGINEERS STATEMENT:

I HEREBY CERTIFY THAT I HAVE EXAMINED THE ANNEXED MAP AND THAT THE SUBDIVISION SHOWN THEREON IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP AND ANY APPROVED ALTERATIONS THEREOF AND THAT ALL PROVISIONS OF THE SUBDIVISION MAP ACT AND CITY OF UPLAND MUNICIPAL CODE HAVE BEEN COMPLIED WITH.

DATED: _____ _____
ROSEMARY HOERNING
DIRECTOR OF PUBLIC WORKS
CITY OF UPLAND, CALIFORNIA
R.C.E. NO. 44766

I AM SATISFIED THAT THIS MAP IS TECHNICALLY CORRECT.

DATED: _____ _____
MICHAEL P. THORNTON
L.S. 6867

Final Map Certificates (Continued)

ADD NOTICE: A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THIS DOCUMENT.

NOTARY ACKNOWLEDGEMENT **(MUST COMPLY WITH LATEST STATE OF CALIFORNIA APPROVED NOTARY ACKNOWLEDGEMENT STATEMENT/LANGUAGE)**

STATE OF CALIFORNIA)
COUNTY OF _____) SS

ON, _____ BEFORE ME, _____ PERSONALLY APPEARED, PERSONALLY KNOWN TO ME (OR PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE) TO BE THE PERSONS WHOSE NAMES ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT THEY EXECUTED THE SAME IN THEIR AUTHORIZED CAPACITIES, AND THAT BY THEIR SIGNATURES ON, THE INSTRUMENT THE PERSONS, OR THE ENTITY UPON BEHALF OF WHICH THE PERSONS ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY THAT UNDER THE PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

_____ _____
SIGNATURE OF NOTARY DATE COMMISSION EXPIRES

_____ _____
NAME OF NOTARY PRINCIPAL COUNTY OF BUSINESS

COMMISSION NO._____

CITY PLANNING COMMISSION CERTIFICATE:

I HEREBY CERTIFY THAT THE SUBDIVISION SHOWN ON THE ANNEXED MAP IS IN ACCORDANCE WITH THE TENTATIVE MAP REVIEWED AT A MEETING OF THE PLANNING COMMISSION OF THE CITY OF UPLAND, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, HELD ON THE _____ DAY OF _____ _____, 20____.

DATED: _____ _____
JEFF ZWACK
SECRETARY OF PLANNING COMMISSION
CITY OF UPLAND, CALIFORNIA

CITY CLERKS CERTIFICATE

I HEREBY CERTIFY THAT THE CITY COUNCIL OF THE CITY OF UPLAND BY A MOTION DULY SECONDED AND PASSED, APPROVED THE ATTACHED MAP ON THE _____ DAY OF _____, 20____ AND FOUND THIS MAP TO BE CONSISTENT WITH APPLICABLE GENERAL OR SPECIFIC PLANS OF THE CITY OF UPLAND.

(PROVIDE ALL EXCEPTIONS)

DATED: _____ _____
JEANNETTE VAGNOZZI
CITY CLERK, CITY OF UPLAND, CALIFORNIA

Final Map Certificates (Continued)

AUDITOR'S CERTIFICATE

I HEREBY STATE THAT ACCORDING TO THE RECORDS OF THIS OFFICE, AS OF THIS DATE, THERE ARE NO LIENS AGAINST THE REAL PROPERTY SHOWN UPON THE ANNEXED MAP FOR UNPAID STATE, COUNTY, MUNICIPAL, OR LOCAL TAXES OR SPECIAL ASSESSMENTS COLLECTED AS TAXES, EXCEPT TAXES OR SPECIAL ASSESSMENTS NOT YET PAYABLE, ESTIMATED TO BE $ _____.

DATED: _____

_____
(INSERT NAME OF COUNTY AUDITOR), COUNTY AUDITOR
COUNTY OF SAN BERNARDINO CALIFORNIA

BY: _____, DEPUTY

BOARD OF SUPERVISOR'S CERTIFICATE

I HEREBY STATE THAT A BOND IN THE SUM OF $ _____ HAS BEEN EXECUTED AND FILED WITH THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, CONDITIONED UPON THE PAYMENT OF ALL TAXES, STATE, COUNTY, MUNICIPAL, OR LOCAL, AND ALL SPECIAL ASSESSMENTS, COLLECTED AS TAXES WHICH AT THE TIME OF FILING OF THE ANNEXED MAP WITH THE COUNTY RECORDER, ARE A LIEN AGAINST SAID PROPERTY, BUT NOT YET PAYABLE, AND THAT THE SUBDIVIDER HAS FILED WITH ME A CERTIFICATE BY THE PROPER OFFICER, GIVING HIS ESTIMATE OF THE AMOUNT OF SAID TAXES AND ASSESSMENTS, AND SAID BOND IS HEREBY ACCEPTED.

DATED: _____

_____
(INSERT NAME OF CLERK)
CLERK OF THE BOARD OF SUPERVISORS
OF THE COUNTY OF SAN BERNARDINO

BY: _____,DEPUTY

Section 6.0

General Notes

6.1 NOTES FOR TITLE SHEET (To be placed on the title sheet of all plans)

SURVEY MONUMENT NOTE

SURVEY MONUMENTS THAT EXIST AS SHOWN ON RECORDED MAPS, HIGHWAY MAPS, OR POINTS THAT PROVIDE SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED BY A LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER (AUTHORIZED TO PRACTICE LAND SURVEYING). BEFORE THE START OF CONSTRUCTION, CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR. THESE CORNER RECORDS SHALL DESCRIBE THE MONUMENTS FOUND WITH TIE DISTANCES TO REFERENCE POINTS FOR THE RESETTING OF A SURVEY MONUMENT. WHEN CONSTRUCTION IS COMPLETED, MONUMENTS SHALL BE SET AND CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR SHOWING THE NEW MONUMENTS.

CONTRACTOR'S RESPONSIBILITY FOR SAFETY

IN SUBMITTING A BID FOR THIS WORK, THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER AND THE CITY OF UPLAND AND ITS AGENTS OR REPRESENTATIVES HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER, THE ENGINEER, OR THE CITY OF UPLAND AND ITS AGENTS OR REPRESENTATIVES.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT THE EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR AND WITH "CONSTRUCTION SAFETY ORDERS." THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR OR SUBCONTRACTOR'S COMPLIANCE WITH SAID REGULATION AND ORDERS.

ENGINEERS NOTICE TO CONTRACTOR

THE EXISTENCE AND APPROXIMATE LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES OR STRUCTURES EXCEPT AS SHOWN ON THESE PLANS. THE ENGINEER NEITHER ASSUMES ANY LIABILITY AS TO THE EXACT LOCATION OF SAID LINES NOR FOR UTILITIES OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK ON EXCAVATION TO DETERMINE EXACT LOCATION OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREON, AND FOR ANY DAMAGE OR PROTECTION OF THESE LINES.

THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT (U.S.A.), PHONE NUMBER 1-800-227-2600, TWO WORKING DAYS PRIOR TO DIGGING. NO CONSTRUCTION PERMIT, ISSUED BY THE PUBLIC WORKS DEPARTMENT, SHALL BE VALID INVOLVING UNDERGROUND FACILITIES, UNLESS THE APPLICANT HAS AN INQUIRY IDENTIFICATION NUMBER ISSUED BY U.S.A.

NOTES FOR TITLE SHEET (Continued) To be placed on the title sheet of all plans)

DECLARATION OF ENGINEER OF RECORD NOTE

DECLARATION OF ENGINEER OF RECORD

I HEREBY DECLARE THAT IN MY PROFESSIONAL OPINION, THE DESIGN OF THE IMPROVEMENTS AS SHOWN ON THESE PLANS COMPLIES WITH THE CURRENT PROFESSIONAL ENGINEERING STANDARDS AND PRACTICES. AS THE ENGINEER IN RESPONSIBLE CHARGE OF THE DESIGN OF THESE IMPROVEMENTS, I ACCEPT FULL RESPONSIBILITY FOR SUCH DESIGN. I UNDERSTAND AND ACKNOWLEDGE THAT THE PLAN CHECK OF THESE PLANS BY THE CITY OF UPLAND IS A REVIEW FOR THE LIMITED PURPOSE OF ENSURING THAT THESE PLANS COMPLY WITH CITY STANDARDS AND OTHER APPLICABLE CODES AND ORDINANCES. THE PLAN REVIEW PROCESS IS NOT A DETERMINATION OF THE TECHNICAL ADEQUACY OF THE DESIGN OF THE IMPROVEMENTS. SUCH PLAN CHECK DOES NOT THEREFORE RELIEVE ME OF MY DESIGN RESPONSIBILITY.

AS THE ENGINEER OF RECORD, I AGREE TO DEFEND AND INDEMNIFY THE CITY OF UPLAND, ITS OFFICERS, ITS AGENTS, AND ITS EMPLOYEES FROM ANY AND ALL LIABILITY, CLAIMS, DAMAGES, OR INJURIES TO ANY PERSON OR PROPERTY ARISING FROM NEGLIGENT ACTS, ERRORS OR OMISSIONS OF THE ENGINEER OF RECORD, HIS EMPLOYEES, HIS AGENTS OR HIS CONSULTANTS.

SIGNATURE: (REQUIRED AT MYLARS ONLY) DATE: _____
LICENSE NUMBER: _____

NOT FOR CONSTRUCTION NOTE:

PLEASE MARK ALL PLANS/ALL SHEETS EXCEPT MYLARS. NOT FOR CONSTRUCTION, FOR PLAN CHECK ONLY.

6.2 GENERAL NOTES FOR STREET IMPROVEMENT PLANS (PUBLIC & PRIVATE)

1. ALL WORK CALLED FOR ON THE PLANS SHALL COMPLY WITH CURRENT CITY OF UPLAND STANDARD SPECIFICATIONS, ADOPTED BY CITY COUNCIL, UNLESS OTHERWISE NOTED ON THE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

2. THE CONTRACTOR, BEFORE UNDERTAKING ANY GRADING OR CONSTRUCTION WORK OF ANY TYPE WITHIN THE PUBLIC RIGHT OF WAY MUST FIRST OBTAIN A CONSTRUCTION PERMIT FROM THE PUBLIC WORKS DEPARTMENT.

3. A TEMPORARY STREET CLOSURE PERMIT IS REQUIRED WHEN THE WORK IMPEDES VEHICULAR OR PEDESTRIAN TRAFFIC. PLEASE NOTE THAT CITY COUNCIL RESOLUTION NUMBER 1656, WHICH DEALS WITH THE PROMPT RESTORATION OF CITY STREETS DAMAGED DURING CONSTRUCTION, AND CHAPTER 12.08 OF THE UPLAND MUNICIPAL CODE WILL BE ENFORCED IN ALL CASES WHERE THE PROVISIONS ARE APPLICABLE.

4. INSPECTION BY THE CITY OF THE WORK CALLED FOR ON THE PLANS DOES NOT, IN ANY WAY, RELIEVE THE CONTRACTOR AND/OR DEVELOPER OF THEIR OBLIGATION TO PERFORM WORK IN COMPLIANCE WITH THE PLANS AND SPECIFICATIONS.

5. REQUESTS FOR DEVIATIONS FROM THE APPROVED PLANS, (EXCEPT MINOR ADJUSTMENTS IN THE FIELD TO MEET EXISTING CONDITIONS), SHALL BE MADE IN WRITING AND ARE NOT TO BE INITIATED UNLESS OR UNTIL THEY ARE APPROVED BY THE PUBLIC WORKS DIRECTOR OR A REPRESENTATIVE ACTING SPECIFICALLY UPON HIS INSTRUCTIONS.

6. ALL ELEVATIONS SHOWN ON THE PLANS ARE ESTABLISHED FROM CITY OF UPLAND BENCHMARKS.

7. QUANTITIES, AS SHOWN ON THE PLANS ARE ESTIMATED, AND THE CONTRACTOR IS ADVISED THAT FINAL QUANTITIES OF MATERIAL AND WORK IN PLACE MAY BE MORE OR LESS THAN THOSE INDICATED ON THE PLANS.

8. CONCRETE GUTTERS, ALLEY APPROACHES, DRIVEWAYS OR OTHER CONCRETE WORK THAT IS SUBJECT TO VEHICULAR TRAFFIC, SHALL BE BARRICADED AND NO VEHICULAR TRAFFIC IS PERMITTED THEREON FOR AT LEAST SEVEN DAYS FOLLOWING THE PLACEMENT OF THE CONCRETE WORK. WHEN THE GENERAL PROVISIONS CALL FOR CONCRETE WORK TO HAVE VEHICULAR TRAFFIC UPON IT SOONER THAN SEVEN DAYS AFTER PLACEMENT, OR WHEN THE CONTRACTOR FOR CONVENIENCE OF OPERATION SO DESIRES, THE CONCRETE WORK WILL CONTAIN AT LEAST EIGHT SACKS OF CEMENT PER CUBIC YARD, AND SHALL IF SO DIRECTED BY THE ENGINEER, BE USED, AND TRAFFIC WILL BE PERMITTED THEREON SEVENTY-TWO HOURS AFTER PLACING OF SAID EIGHT SACK CONCRETE.

9. IRRIGATION LINES WITHIN ANY CITY RIGHT-OF-WAY SHALL HAVE A TWENTY-FOUR INCH MINIMUM COVER FROM FINISH SURFACE; UNLESS SAID IRRIGATION LINE IS ENCASED IN CONCRETE OR BEDDED IN A SPECIAL CONCRETE CRADLE.

10. THE CONTRACTOR SHALL OPERATE IN A MANNER COMPLIANT WITH ALL APPLICABLE SECTIONS OF THE MUNICIPAL CODE AND COMPLIANT WITH ALL APPLICABLE CITY COUNCIL RESOLUTIONS.

11. THE LOCATION OF UNDERGROUND UTILITY OR IRRIGATION LINES AS SHOWN ON THE PLANS, IS APPROXIMATE, AND SINCE THE ACTUAL LOCATION MAY BE SOMEWHAT DIFFERENT FROM THAT SHOWN, THE CONTRACTOR IS REQUIRED TO CONTACT THE INTERESTED UTILITY OR WATER COMPANY BEFORE EXCAVATING IN THE VICINITY OF ANY SUCH LINES.

GENERAL NOTES FOR STREET IMPROVEMENTS (PUBLIC & PRIVATE) (CONTINUED)

12. PARKWAY TREES, INSTALLED BY THE DEVELOPER, SHALL BE PLANTED AND MAINTAINED IN ACCORDANCE WITH CITY OF UPLAND STANDARD DRAWING NUMBER CU-P-9 AND THE APPROVED STREET TREE LIST.

13. THE DEVELOPER, PER THE PUBLIC WORKS DEPARTMENT, WILL INSTALL ALL STREET NAME AND TRAFFIC REGULATORY SIGNS INDICATED IN THE PLANS. HIGH INTENSITY REFLECTIVE SHEETING WILL BE REQUIRED.

14. ALL STREET LIGHTS INDICATED ON THE PLANS SHALL BE INSTALLED BY THE SOUTHERN CALIFORNIA EDISON COMPANY. THE DEVELOPER SHALL WORK DIRECTLY WITH THE EDISON COMPANY WHEN THE LIGHTS ARE TO BE SERVED FROM ANY UNDERGROUND SYSTEM. WATER DEPARTMENT STANDARD W.26A AND W.26B DOES APPLY.

15. AN APPROVED WEED KILLER SHALL BE APPLIED TO THE PREPARED BASE PRIOR TO ASPHALT PAVING IN ALL AREAS WHERE THERE IS ANY EVIDENCE OF HUMUS OR ORGANIC MATERIAL PRESENT IN THE BASE (EITHER NATIVE OR IMPORTED) MATERIAL. ALL WEED KILLERS USED SHALL BE APPLIED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS.

16. THE FOLLOWING CITY OF UPLAND STANDARD DRAWINGS APPLY TO THIS PROJECT AND SHALL BE CONSIDERED AS PART OF THESE PLANS: CU-D-1, CU-D-2, CU-P-3, CU-P-4, CU-P-8, CU-R-2, CU-R-3, CU-S-1, CU-S-6, CU-Z-3, W.26A AND W.26B.

17. ALL PAVEMENT MARKING SHALL BE ALKYD THERMOPLASTIC

18. ALL TRAFFIC SIGNS SHALL BE CONSTRUCTED WITH HIGH INTENSITY REFLECTIVE SHEETING AND BE INSTALLED ON 2" SQUARE "QUICKPUNCH" POSTS WITH 8" CONCRETE FOOTING, 18" DEEP.

19. ALL WATER VALVES AND SEWER MANHOLES SHALL REMAIN ACCESSIBLE AND FREE OF DEBRIS THROUGHOUT ALL PHASES OF THE PROJECT.

20. INSTALL ¾" PLYWOOD FALSE BOTTOMS IN ALL SEWER MANHOLES WITHIN THE CONSTRUCTION AREA (CHECKED DAILY BY INSPECTOR).

21. PROVIDE TRAP AT FIRST MANHOLE DOWNSTREAM OF PROPOSED IMPROVEMENTS (CHECKED DAILY BY INSPECTOR).

22. STREETS SHALL BE PAVED WITH 4" A.B. OVER 8"A.B. CLASS 2 OR TO THE RECOMMENDATION OF THE SOILS COMPACTION REPORT, WHICHEVER IS GREATER.

23. FOOTHILL BLVD SHALL BE PAVED WITH 8" A.C. OVER 8" A.B. CLASS 2 OR TO THE RECOMMENDATION OF THE SOILS COMPACTION REPORT, WHICHEVER IS GREATER.

6.3 GENERAL NOTES FOR WATER AND SEWER PLANS (PUBLIC & PRIVATE)

1. ALL WORK AND MATERIAL SHALL CONFORM TO THE HIGHER STANDARD IN EITHER "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF WATER MAINS AND APPURTENANCES, APRIL 2011" ON FILE AT THE CITY WATER DEPARTMENT, CITY OF UPLAND, OR "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION," LATEST ISSUE AND AMENDMENTS, KNOWN AS THE "GREEN BOOK."

2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR LOCATING AND PROTECTING FROM DAMAGE ALL EXISTING FACILITIES AND IMPROVEMENTS WHETHER OR NOT SHOWN ON THESE PLANS. THE FACILITIES AND IMPROVEMENTS ARE BELIEVED TO BE CORRECTLY SHOWN BUT THE CONTRACTOR IS REQUIRED TO SATISFY HIMSELF AS TO THE COMPLETENESS AND ACCURACY OF THE LOCATIONS.

3. SAN ANTONIO WATER COMPANY, 139 N. EUCLID AVENUE, UPLAND, (909) 982-4107, MAY HAVE WATER LINES IN THIS AREA. CONTACT THEM FOR LOCATION, SIZE, AND DEPTH OF LINES, AND OTHER PERTINENT INFORMATION.

4. QUANTITIES SHOWN ON THE PLANS ARE ESTIMATED. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF QUANTITIES BEFORE BIDDING ON ANY ITEM.

5. THE CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS, DIVISION OF INDUSTRIAL SAFETY, BEFORE STARTING THE EXCAVATION OF ANY TRENCH FIVE FEET OR MORE IN DEPTH. SHORING, BRACING, SLOPING AND ALL OTHER PROVISIONS FOR WORKER PROTECTION SHALL CONFORM TO THE PROVISIONS CONTAINED IN ARTICLE 6 OF THE STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS CONSTRUCTION SAFETY ORDERS, EFFECTIVE AUGUST 8, 1965, AND AS AMENDED JULY 27, 1973. IF VARIATION FROM THESE STANDARDS IS DESIRED, A DETAILED PLAN SHALL BE PREPARED BY A REGISTERED CIVIL ENGINEER AND SUBMITTED TO THE PUBLIC WORKS DIRECTOR FOR APPROVAL.

6. ALL WATER AND SEWER MAINS SHALL MEET THE STATE OF CALIFORNIA, DEPARTMENT OF HEALTH REQUIREMENTS FOR THE SEPARATION BETWEEN WATER MAINS AND SANITARY SEWER.

7. THE CONTRACTOR IS REQUIRED TO REPAIR THE EXISTING PAVEMENT WHICH IS REMOVED OR DAMAGED BY HIS OPERATIONS IN ACCORDANCE WITH STANDARD DRAWING ORDINANCE NO. 1841 AND CU-Z-3 UNLESS ARRANGEMENTS ARE MADE WHICH COORDINATE STREET PAVING IN A MANNER ACCEPTABLE TO AND APPROVED BY THE PUBLIC WORKS DIRECTOR.

8. BEFORE CONNECTING TO THE CITY WATER SYSTEM, THE DEVELOPER MUST MEET THE REQUIREMENTS OF SECTION 13.12.130 OF THE UPLAND MUNICIPAL CODE RELATING TO THE TRANSFER OF WATER STOCK TO THE CITY OF UPLAND.

9. SERVICE LATERALS ARE TO BE PLACED AT THE CENTER THIRD OF THE LOT UNLESS OTHERWISE APPROVED BY THE CITY OF UPLAND.

10. SERVICE LATERALS ARE TO BE INSTALLED PER STANDARD DRAWING W.01 OR W.03, ON FILE AT THE CITY OF UPLAND.

11. FIRE HYDRANTS SHALL BE INSTALLED PER STANDARD DRAWING W.05 ON FILE AT THE CITY OF UPLAND.

12. CONNECTIONS TO EXISTING WATER MAINS SHALL BE BY "HOT TAP."

13. MINIMUM COVER OF WATER LINES SHALL BE AS FOLLOWS:

GENERAL NOTES FOR WATER AND SEWER PLANS (PUBLIC & PRIVATE) (CONTINUED)

DIAMETER OF PIPE	MINIMUM COVER
2”	24”
4”	30”
6”	36”
8”	42”
10”	48”
12”	48”
14”	52”

14. SADDLE CONNECTIONS ARE NOT PERMITTED TO THE SEWER MAIN. NEW CONNECTIONS REQUIRE A “TEE” OR “WYE” SECTION TO BE PLACED.

15. ACCESS TO WATER VALVES SHALL BE MAINTAINED DURING ALL PHASES OF THE PROJECT. VALVE BOXES TO REMAIN FREE AND CLEAR OF DEBRIS.

16. SEPARATION BETWEEN WATER INSTALLATIONS AND OTHER UTILITIES SHALL BE MAINTAINED (PER WATER DIVISION STD. W.25).

17. PROVIDE TRAP AT FIRST MANHOLE DOWNSTREAM OF PROPOSED IMPROVEMENTS. (CHECKED DAILY BY INSPECTOR)

18. PROVIDE ¾” PLYWOOD FALSE BOTTOMS FOR MANHOLES, BOTH NEW AND OLD, DURING CONSTRUCTION. (CHECKED DAILY BY INSPECTOR)

19. PROVIDE CLEANOUTS FOR EACH SEWER LATERAL 6 INCHES BACK OF SIDEWALK, ADJUST TO FINISH GRADE IN BOX MARKED SEWER.

20. REFERENCE PLANS USED: LIST CITY DRAWING NUMBER’S

6.4 GENERAL NOTES FOR STORM DRAIN PLANS (PUBLIC & PRIVATE)

1. ALL WORK CALLED FOR ON THE PLANS SHALL BE IN COMPLIANCE WITH CURRENT CITY OF UPLAND STANDARD SPECIFICATIONS, ADOPTED BY CITY COUNCIL AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CURRENT EDITION, UNLESS OTHERWISE NOTED ON THE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

2. THE CONTRACTOR SHALL OPERATE IN A MANNER COMPLIANT WITH ALL APPLICABLE SECTIONS OF THE UPLAND MUNICIPAL CODE AND CITY COUNCIL RESOLUTIONS.

3. THE CONTRACTOR, BEFORE UNDERTAKING ANY GRADING OR CONSTRUCTION WORK OF ANY TYPE WITHIN THE PUBLIC RIGHT OF WAY, MUST FIRST OBTAIN A CONSTRUCTION PERMIT FROM THE PUBLIC WORKS DEPARTMENT, LAND DEVELOPMENT & TRANSPORTATION DIVISION.

4. THE CONTRACTOR, BEFORE UNDERTAKING ANY GRADING OR CONSTRUCTION WORK OF ANY TYPE WITHIN THE SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT RIGHT-OF-WAY, MUST FIRST OBTAIN A CONSTRUCTION PERMIT FROM THE SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT.

5. A TEMPORARY STREET CLOSURE PERMIT FROM THE PUBLIC WORKS DEPARTMENT, TRANSPORTATION DIVISION, IS REQUIRED IN ALL CASES WHERE WORK WILL INTERFERE IN ANY WAY WITH VEHICULAR OR PEDESTRIAN TRAFFIC. THE CONTRACTOR IS ADVISED THAT CITY COUNCIL RESOLUTION NUMBER 1656, DEALING WITH PROMPT RESTORATION OF CITY STREETS AFFECTED BY CONSTRUCTION, AND CHAPTER 12.08 OF THE UPLAND MUNICIPAL CODE WILL BE ENFORCED IN ALL CASES WHERE THE PROVISIONS THEREOF ARE APPLICABLE.

6. HAUL ROUTES MUST USE CITY-APPROVED TRUCK ROUTES AS SHOWN ON THE CITY TRUCK ROUTE MAP. A SEPARATE PERMIT IS REQUIRED FROM THE CITY'S LAND DEVELOPMENT & TRANSPORTATION DIVISION.

7. INSPECTION BY THE CITY OF THE WORK CALLED FOR ON THE PLANS SHALL NOT RELIEVE THE CONTRACTOR AND/OR DEVELOPER IN ANY WAY, OF THEIR OBLIGATION TO PERFORM WORK IN COMPLIANCE WITH PLANS AND SPECIFICATIONS.

8. CONTRACTOR SHALL CONTACT THE CITY INSPECTOR, AND ALL OTHER PARTIES HAVING JURISDICTION REGARDING THE PROJECT, TO ARRANGE FOR A PRE-CONSTRUCTION MEETING A MINIMUM OF 2 WORKING DAYS PRIOR TO BEGINNING OF CONSTRUCTION.

9. ANY ALTERATIONS OR VARIANCES FROM THE PLANS, EXCEPT MINOR ADJUSTMENTS IN THE FIELD TO MEET EXISTING CONDITIONS, SHALL BE REQUESTED IN WRITING, AND MAY NOT BE INSTITUTED UNTIL APPROVED BY THE CITY ENGINEER, OR HIS REPRESENTATIVES, ACTION SPECIFICALLY UPON HIS INSTRUCTIONS.

10. ALL ELEVATIONS SHOWN ON THE PLANS SHALL BE ESTABLISHED FROM CITY OF UPLAND BENCHMARK.

11. THE CONTRACTOR SHALL RETAIN THE SERVICES OF A QUALIFIED CIVIL ENGINEER OR LAND SURVEYOR WHEN PROPOSED CONSTRUCTION REQUIRES DISTURBANCE OR REMOVAL OF CENTERLINE TIES OR OTHER SURVEY MONUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PAYMENT FOR THE SERVICES TO REESTABLISH REMOVED OR DESTROYED SURVEY MONUMENTS.

12.

GENERAL NOTES FOR STORM DRAIN PLANS (PUBLIC & PRIVATE) (Continued)

13. QUANTITIES, AS SHOWN ON THE PLANS, ARE ESTIMATED, AND THE CONTRACTOR IS ADVISED THAT FINAL QUANTITIES OF MATERIAL AND WORK IN PLACE MAY BE GREATER OR LESS THAN THOSE INDICATED ON THE PLANS.

14. CONCRETE FACILITIES, WHICH WILL BE SUBJECT TO VEHICULAR TRAFFIC, SHALL BE BARRICADED AND NO VEHICULAR TRAFFIC SOONER THAN SEVEN DAYS AFTER PLACING WILL BE PERMITTED. WHEN THE CONTRACTOR FOR CONVENIENCE OF OPERATION SO DESIRES, CONCRETE CONTAINING EIGHT SACKS OF CEMENT PER CUBIC YARD MAY, AND SHALL, IF SO DIRECTED BY THE ENGINEER, BE USED. TRAFFIC WILL BE PERMITTED THEREON SEVENTY-TWO HOURS AFTER PLACING OF SAID EIGHT-SACK CONCRETE.

15. ALL CONSTRUCTION OPERATIONS SHALL BE IN CONFORMANCE WITH THE REGULATIONS SET FORTH BY CAL-OSHA.

16. CONTRACTOR SHALL SUBMIT A TRENCH SHORING PLAN TO THE CITY ENGINEER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO ANY EXCAVATION FIVE FEET (5') OR GREATER IN DEPTH. IF THE PROPOSED TRENCH SHORING PLAN DEVIATES FROM THE STANDARDS SET FORTH BY THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA, CONTRACTOR SHALL HAVE A REGISTERED CIVIL ENGINEER, LICENSED IN THE STATE OF CALIFORNIA, CERTIFY THE ADEQUACY OF THE PROPOSED TRENCH SHORING SYSTEM. CONTRACTOR SHALL ALSO OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY IN ACCORDANCE WITH SECTION 7-10.4.1 SAFETY ORDERS OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. A COPY OF THE PERMIT SHALL BE SUBMITTED TO THE CITY ENGINEER PRIOR TO ANY EXCAVATION.

17. AT LEAST TWO (2) WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION, CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT (800) 422-4133 TO REQUEST THE UTILITY OWNERS TO MARK OR OTHERWISE INDICATE THE LOCATION OF THEIR SUBSURFACE FACILITIES. CONTRACTOR SHALL PROVIDE THE CITY ENGINEER, OR HIS REPRESENTATIVE, WITH TICKET NUMBER ISSUED. THE CONTRACTOR SHALL DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES, INCLUDING ALL SERVICE CONNECTIONS, WHICH HAVE BEEN MARKED BY THE RESPECTIVE OWNERS AND WHICH MAY AFFECT OR BE AFFECTED BY THE CONTRACTOR'S OPERATIONS. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT ALL UTILITIES AND STRUCTURES LOCATED IN THE PROJECT VICINITY.

18. PROTECT ALL UTILITIES, POLES, SIGNS, AND EXISTING IMPROVEMENTS IN PLACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR NOTED ON THE PLANS. WHERE RELOCATION OF THESE UTILITIES IS REQUIRED, THE CONTRACTOR SHALL COORDINATE CONSTRUCTION AS NECESSARY AND AS APPROVED.

19. WHERE CLEARANCE BETWEEN UTILITIES AND THE STORM DRAIN IS LIMITED AND CRITICAL, THE CONTRACTOR SHALL ASSURE HIMSELF BEFORE CONSTRUCTION (BY POTHOLING OR OTHER MEANS) THAT HE WILL BE ABLE TO COMPLETE THE STORM DRAIN INSTALLATION TO THE LINES AND GRADES AS SHOWN ON THE PLANS. IN NO CASE WILL THE STORM DRAIN PIPE BE ALLOWED TO BE CONSTRUCTED WITH AN ADVERSE INVERT SLOPE.

20. ALL STATIONING SHALL REFER TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED. CATCH BASIN STATIONING SHALL BE BASED ON STREET CENTERLINE STATIONING, UNLESS OTHERWISE NOTED.

21. STATIONING FOR LATERALS AND CONNECTOR PIPES SHALL REFER TO THE CENTERLINE INTERSECTION OF THE PIPE AND IS BASED ON STORM DRAIN STATIONING.

GENERAL NOTES FOR STORM DRAIN PLANS (PUBLIC & PRIVATE) (Continued)

22. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERT PIPES, OR SIMILAR STRUCTURES TO BE ABANDONED, SHALL BE SEALED WITH 6 INCHES OF CLASS “B” CONCRETE.

23. “V” IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF THE OUTLET CONNECTOR PIPE.

24. CATCH BASINS SHALL BE LOCATED SUCH THAT THE LOCAL DEPRESSION SHALL BEGIN AT CURB RETURN JOINTS, UNLESS OTHERWISE NOTED ON PLANS.

25. THE MINIMUM CONCRETE COVER BETWEEN REINFORCEMENT SURFACE AND PIPE INSIDE SURFACE FOR TRANSVERSE STEEL SHALL BE 1 ¼ INCHES. ASSUME 1 ½ INCHES TO CENTER OF BAR WHEN CALCULATING EFFECTIVE DEPTH. WHERE VELOCITIES ARE BETWEEN 20 TO 30 FT/SEC, THE CONCRETE COVER ON THE INSIDE FACE OF THE PIPE SHALL BE INCREASED ½ INCH. WHERE VELOCITIES EXCEED 30 FT/SEC, THE CLEARANCE ON THE INSIDE FACE SHALL BE INCREASED 1 INCH. DESIGN STRENGTH IN THESE REACHES SHALL BE F_C=4,000 PSI FOR VELOCITIES EXCEEDING 20 FT/SEC.

26. THROUGHOUT ALL PHASES OF CONSTRUCTION, THE CONTRACTOR SHALL KEEP THE WORK SITE CLEAN AND FREE FROM RUBBISH AND DEBRIS UNTIL FINAL ACCEPTANCE BY THE CITY COUNCIL. THE CONTRACTOR SHALL ALSO ABATE NUISANCE DUST BY CLEARING, SWEEPING, SPRINKLING WITH WATER, AND OTHER APPLICABLE DUST CONTROL MEASURES AS DIRECTED BY THE CITY THROUGHOUT THE CONSTRUCTION OPERATION.

27. AN APPROVED WEED KILLER SHALL BE APPLIED TO THE PREPARED BASE PRIOR TO ASPHALT PAVING IN ALL AREAS WHERE THERE IS ANY EVIDENCE OF HUMUS OR ORGANIC MATERIAL PRESENT IN THE BASE (EITHER NATIVE OR IMPORTED) MATERIAL. ALL WEED KILLERS USED SHALL BE APPLIED IN STRICT ACCORDANCE WITH THE MANUFACTURER SPECIFICATIONS AND INSTRUCTIONS.

28. SAWCUTS TO EXISTING PAVEMENTS SHALL BE CLEAN, STRAIGHT EDGES AS DIRECTED BY THE CITY INSPECTOR.

29. ALL UNSUITABLE MATERIAL SHALL BE REMOVED, AS REQUIRED BY THE CITY ENGINEER, SOILS ENGINEER OR ENGINEERING GEOLOGIST, FROM ALL AREAS TO RECEIVE COMPACTED FILL OR DRAINAGE STRUCTURES, AND SHALL BE HAULED TO A DUMP SITE APPROVED BY THE CITY ENGINEER.

30. ALL TREE ROOTS, ABANDONED IRRIGATION PIPELINES, UTILITY SERVICES, SEPTIC TANKS, AND SIMILAR MATERIAL SHALL BE REMOVED FROM THE CONSTRUCTION SITE, AND VOIDS CREATED THEREBY SHALL BE PROPERLY FILLED AND COMPACTED AS DIRECTED BY THE CITY ENGINEER, SOILS ENGINEER OR ENGINEERING GEOLOGIST.

31. ALL MANHOLE RIMS, WATER VALVE CANS, GAS VALVE, ETC. SHALL BE ADJUSTED TO FINISH GRADE BY THE CONTRACTOR AS PART OF THIS PROJECT.

32. ANY DAMAGE CAUSED BY THE CONTRACTOR’S OPERATIONS TO PUBLIC STREET, INCLUDING BUT NOT LIMITED TO HAUL ROUTES, ALLEYS, SIDEWALKS, CURBS AND GUTTERS, CROSS GUTTERS, OR TO PRIVATE PROPERTY, SHALL BE REPAIRED AT THE SOLE EXPENSE OF THE CONTRACTOR TO THE SATISFACTION OF THE CITY ENGINEER.

33. THE FOLLOWING CITY OF UPLAND STANDARD DRAWINGS APPLY TO THIS PROJECT, AND SHALL BE CONSIDERED PART OF THESE PLANS: CU-D-1, CU-D-2, CU-D-3, CU-P-4, CU-R-3, CU-S-1, CU-S-6, CU-Z-3, W.26A AND W.26B.

GENERAL NOTES FOR STORM DRAIN PLANS (PUBLIC & PRIVATE) (Continued)

34. INSTALL ¾ INCH PLYWOOD FALSE BOTTOMS IN ALL SEWER MANHOLES WITHIN THE CONSTRUCTION AREA (INSPECTOR TO CHECK DAILY).

35. CONTRACTOR SHALL INSTALL A TRAP AT THE FIRST SEWER MANHOLE DOWNSTREAM OF CONSTRUCTION AREA (INSPECTOR TO CHECK DAILY).

36. THE DEVELOPER SHALL BE RESPONSIBLE FOR SUBMITTING TO THE CITY, PROOF THAT A NOTICE OF INTENT (NOI) FOR THE GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY HAS BEEN FILED WITH AND APPROVED BY THE STATE WATER RESOURCES CONTROL BOARD. THE DEVELOPER SHALL SUBMIT A COPY OF THE WDID NUMBER OBTAINED FROM THE STATE WATER RESOURCE CONTROL BOARD TO THE CITY ENGINEER. CONSTRUCTION SHALL NOT COMMENCE WITHOUT THIS APPROVAL. THE DEVELOPER SHALL BE RESPONSIBLE TO COMPLY WITH THE GENERAL CONSTRUCTION ACTIVITY STORM WATER PERMIT BY IMPLEMENTING THEIR STORM WATER POLLUTION PREVENTION PLAN FOR THE DURATION OF THE PROJECT. THE SWPPP SHALL IDENTIFY POTENTIAL POLLUTANT SOURCES THAT MAY AFFECT THE QUALITY OF DISCHARGES TO THE STORM DRAIN SYSTEM AND SHALL INCLUDE THE DESIGN AND PLACEMENT OF RECOMMENDED BEST MANAGEMENT PRACTICES (BMP'S) TO EFFECTIVELY PROHIBIT THE ENTRY OF POLLUTANTS FROM THE CONSTRUCTION SITE INTO THE STORM DRAIN SYSTEM DURING CONSTRUCTION. THE APPLICANT/OWNER IS RESPONSIBLE FOR ENSURING THAT THE PROJECT CONTRACTORS AND SUBCONTRACTORS IMPLEMENT ALL APPLICABLE BMP'S.

37. ALL CATCH BASIN AND STORM DRAIN INLET FACILITIES SHALL BE STENCILED WITH THE APPROPRIATE "NO DUMPING" MESSAGE AS SUPPLIED BY THE PUBLIC WORKS DEPARTMENT, ENVIRONMENTAL DIVISION.

38. THE DEVELOPER'S ENGINEER SHALL KEEP A RECORD OF ALL CHANGES DURING CONSTRUCTION AND SHALL SUBMIT SUCH RECORDS TO THE CITY ENGINEER BEFORE A RELEASE OF OCCUPANCY WILL BE ISSUED.

39. IN THE EVENT THE DEVELOPER FAILS TO COMPLY WITH THE PROVISIONS OF THE PERMIT AND APPLICABLE LAWS. THE SURETY WILL PROMPTLY COMPLETE THE WORKS TO THE SATISFACTION OF THE PUBLIC WORKS DIRECTOR. IN THE EVENT SAID SURETY FAILS TO PROMPTLY COMPLETE THE WORK AS APPROVED ON THE PLANS, THE SURETY SHALL PAY THE CITY ALL COST AND EXPENSES INCURRED BY THE CITY IN MAKING THE PREMISES SAFE AND COMPLETING THE PROJECT TO THE SATISFACTION OF THE CITY ENGINEER.

6.5 GENERAL NOTES FOR GRADING PLANS

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH CHAPTER 15.52 OF THE UPLAND MUNICIPAL CODE AND ANY SPECIAL REQUIREMENTS OF THE PERMIT. A COPY OF THE APPROVED GRADING PLAN SHALL BE RETAINED ON THE JOB SITE WHILE WORK IS IN PROGRESS. WHEN REFERENCED ON THE PLANS, A COPY OF CITY OF UPLAND STANDARD PLANS SHALL ALSO BE RETAINED ON THE SITE.

2. GRADING SHALL NOT BE STARTED WITHOUT FIRST NOTIFYING THE CITY OF UPLAND PUBLIC WORKS INSPECTOR AT (909) 291-2963. A PRE-GRADING MEETING ON THE SITE IS REQUIRED BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOILS ENGINEER, ENGINEERING GEOLOGIST, AND CITY INSPECTOR. THE REQUIRED INSPECTIONS FOR GRADING WILL BE EXPLAINED AT THIS MEETING.

3. ISSUANCE OF A GRADING PERMIT DOES NOT ELIMINATE THE NEED FOR PERMITS FROM OTHER AGENCIES WITH REGULATORY RESPONSIBILITIES FOR CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE WORK AUTHORIZED ON THIS PLAN.

4. THE GRADING PERMIT AND AN APPROVED COPY OF THE GRADING PLAN SHALL BE ON THE PERMITTED SITE WHILE WORK IS IN PROGRESS.

5. PRELIMINARY SOIL AND GEOLOGY REPORTS AND ALL SUBSEQUENT REPORTS ARE CONSIDERED A PART OF THE APPROVED GRADING PLAN.

6. THE SOILS ENGINEER AND ENGINEERING GEOLOGIST SHALL PERFORM SUFFICIENT INSPECTIONS AND BE AVAILABLE DURING GRADING AND CONSTRUCTION TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS AND THE CODE WITHIN THEIR PURVIEW.

7. THE CIVIL ENGINEER SHALL BE AVAILABLE DURING GRADING TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, CODE AND ANY SPECIAL CONDITIONS OF THE PERMIT WITHIN THEIR PURVIEW.

8. AREAS TO RECEIVE FILL SHALL BE PROPERLY PREPARED AND APPROVED IN WRITING BY THE SOILS ENGINEER BEFORE PLACING FILL.

9. FILLS SHALL BE BENCHED INTO COMPETENT MATERIAL AS REQUIRED BY THE SOILS ENGINEER.

10. ALL EXISTING FILLS SHALL BE APPROVED BY THE SOILS ENGINEER OR REMOVED BEFORE PLACING ADDITIONAL FILLS.

11. FILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90% RELATIVE COMPACTION. AGGREGATE BASE FOR ASPHALTIC AREAS SHALL BE COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION. MAXIMUM DENSITY SHALL BE IN ACCORDANCE WITH CALIFORNIA BUILDING CODE (LATEST EDITION).

12. CUT AND FILL SLOPES SHALL BE NO STEEPER THAN 2-FOOT HORIZONTAL TO 1-FOOT VERTICAL (2:1) EXCEPT WHERE SPECIFICALLY APPROVED OTHERWISE.

13. ALL CUT SLOPES SHALL BE INVESTIGATED BOTH DURING AND AFTER GRADING BY THE ENGINEERING GEOLOGIST TO DETERMINE IF ANY SLOPE STABILITY PROBLEM EXISTS. SHOULD EXCAVATION DISCLOSE ANY GEOLOGICAL HAZARDS OR POTENTIAL GEOLOGICAL HAZARDS, THE ENGINEERING GEOLOGIST SHALL SUBMIT RECOMMENDED TREATMENT TO THE CITY INSPECTOR FOR APPROVAL.

GENERAL NOTES FOR GRADING PLANS (CONTINUED)

14. ALL TRENCH BACKFILLS SHALL BE TESTED AND APPROVED BY THE SOILS ENGINEER PER THE GRADING CODE.

15. ANY EXISTING IRRIGATION LINES AND CISTERNS SHALL BE REMOVED OR CRUSHED IN PLACE AND APPROVED BY THE CITY INSPECTOR AND SOILS ENGINEER.

16. ANY EXISTING WATER WELLS SHALL BE ABANDONED IN COMPLIANCE WITH THE SPECIFICATIONS APPROVED BY San Bernardino COUNTY DEPARTMENT OF PUBLIC HEALTH.

17. ANY EXISTING CESSPOOLS AND SEPTIC TANKS SHALL BE ABANDONED IN COMPLIANCE WITH THE CALIFORNIA PLUMBING CODE TO THE APPROVAL OF THE BUILDING OFFICIAL. A SEPARATE PERMIT MUST BE OBTAINED FROM THE CITY BUILDING DEPARTMENT.

18. THE CITY INSPECTOR, BEFORE EXCAVATION, SHALL APPROVE STOCKPILING OF EXCESS MATERIAL.

19. EXPORT SOIL MUST BE TRANSPORTED TO A LEGAL DUMP OR TO A PERMITTED SITE APPROVED BY THE CITY INSPECTOR.

20. THE PERMITTEE SHALL SUBMIT A HAUL ROUTE PLAN TO THE CITY ENGINEER WHEN EARTH AND/OR DEBRIS IS TRANSPORTED TO OR FROM A PERMITTED SITE ON PUBLIC ROADWAYS.

21. THE PERMITTEE IS RESPONSIBLE FOR DUST CONTROL MEASURES.

22. THE PERMITTEE SHALL GIVE REASONABLE NOTICE TO THE OWNER OF THE ADJOINING LANDS AND BUILDINGS BEFORE BEGINNING EXCAVATIONS, WHICH MAY AFFECT THE LATERAL AND SUBJACENT SUPPORT OF THE ADJOINING PROPERTY. THE NOTICE SHALL STATE THE INTENDED DEPTH OF EXCAVATION AND WHEN THE EXCAVATION WILL COMMENCE. THE PERMITTEE OR HIS AGENT SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED BY HIS/HER GRADING ACTIVITIES.

23. SLOPES EXCEEDING 5 FEET IN HEIGHT SHALL BE PLANTED WITH AN APPROVED PLANT MATERIAL. IN ADDITION, SLOPES EXCEEDING 15 FEET IN HEIGHT SHALL BE PROVIDED WITH AN APPROVED IRRIGATION SYSTEM UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

24. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE.

25. THE LOCATION AND PROTECTION OF ALL UTILITIES IS THE RESPONSIBILITY OF THE PERMITTEE.

26. ALL WATER VALVES AND SEWER MANHOLES SHALL REMAIN ACCESSIBLE AND FREE OF DEBRIS THROUGHOUT ALL PHASES OF THE PROJECT.

27. INSTALL ¾” PLYWOOD FALSE BOTTOMS IN ALL SEWER MANHOLES WITHIN THE CONSTRUCTION AREA (CHECKED DAILY BY INSPECTOR).

28. PROVIDE TRAP AT FIRST MANHOLE DOWNSTREAM OF PROPOSED IMPROVEMENTS (CHECKED DAILY BY INSPECTOR).

29. APPROVED PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING.

GENERAL NOTES FOR GRADING PLANS (CONTINUED)

30. GRADING OPERATIONS, INCLUDING MAINTENANCE OF EQUIPMENT, SHALL BE CONDUCTED BETWEEN THE HOURS OF 7:00 A.M. AND 3:30 P.M. MONDAY THROUGH FRIDAY. NO WORK SHALL BE ALLOWED ON WEEKENDS.

    A ALL CONSTRUCTION VEHICLES OR EQUIPMENT, FIXED OR MOBILE, OPERATED WITHIN 1,000 FEET OF A DWELLING SHALL BE EQUIPPED WITH PROPERLY OPERATING AND MAINTAINED MUFFLERS.

    B ALL OPERATIONS SHALL COMPLY WITH CITY OF UPLAND NOISE ORDINANCE (CHAPTER 4.5, UNNECESSARY NOISE.)

    C STOCKPILING AND/OR VEHICLE STAGING AREAS SHALL BE LOCATED AS FAR AS PRACTICABLE FROM DWELLINGS AND WITHIN THE LIMITS OF GRADING PERMIT.

31. GRADING AND EXCAVATION SHALL BE HALTED DURING PERIODS OF HIGH WINDS. ACCORDING TO AQMD MEASURE F-4, HIGH WINDS ARE DEFINED AS 30 MPH OR GREATER. THIS LEVEL OCCURS ONLY UNDER EXTREME CONDITIONS, SUCH AS SANTA ANA WIND CONDITIONS. USE WATER TRUCK FOR DUST CONTROL.

32. THE CIVIL ENGINEER, AS A CONDITION OF ROUGH GRADE APPROVAL, SHALL PROVIDE A BLUE TOP WITH ACCOMPANYING WITNESS STAKE, SET AT THE CENTER OF EACH PAD REFLECTING THE PAD ELEVATION FOR PRECISE PERMITS AND A BLUE TOP WITH WITNESS STAKE SET AT THE DRAINAGE SWALE HIGH POINT REFLECTING THE HIGH POINT ELEVATION FOR ROUGH GRADING PERMITS.

33. THE ENGINEERING GEOLOGIST SHALL PERFORM PERIODIC INSPECTIONS AND SUBMIT A COMPLETE REPORT AND MAP UPON COMPLETION OF THE ROUGH GRADING.

34. THE GRADING CONTRACTOR SHALL SUBMIT A STATEMENT OF COMPLIANCE TO THE APPROVED GRADING PLAN BEFORE FINAL APPROVAL.

35. IN THE EVENT THAT SOIL CONTAMINATION IS DISCOVERED DURING EXCAVATION OR REMOVAL OF AN EXISTING TANK IS NECESSARY, WORK SHALL BE STOPPED UNTIL A SITE ASSESSMENT AND MITIGATION PLAN HAS BEEN PREPARED, SUBMITTED AND APPROVED BY COUNTY OF SAN BERNARDINO DEPARTMENT OF ENVIRONMENTAL HEALTH.

36. THE DEVELOPER SHALL BE RESPONSIBLE FOR SUBMITTING TO THE CITY PROOF THAT A NOTICE OF INTENT (NOI) FOR THE GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY HAS BEEN FILED WITH AND APPROVED BY THE STATE WATER RESOURCES CONTROL BOARD. CONSTRUCTION SHALL NOT COMMENCE WITHOUT THIS APPROVAL. THE DEVELOPER SHALL BE RESPONSIBLE TO COMPLY WITH THE GENERAL CONSTRUCTION ACTIVITY STORM WATER PERMIT BY IMPLEMENTING THEIR STORM WATER POLLUTION PREVENTION PLAN FOR THE DURATION OF THE PROJECT. INDICATE WDID NUMBER ON PLANS.

6.6 GENERAL NOTES FOR EROSION CONTROL PLANS

1. IN THE CASE OF EMERGENCY, CALL _____ AT WORK PHONE NUMBER _____ _____ OR HOME PHONE NUMBER _____.

2. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.

3. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY INSPECTOR.

4. ALL REMOVABLE EROSION PROTECTIVE DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40%.

5. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS, AND BASINS.

6. GRADED AREAS ON THE PERMITTED AREA PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE IS TO BE DIRECTED TOWARD DESILTING FACILITIES.

7. THE PERMITTEE AND CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS ONTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.

8. THE PERMITTEE AND CONTRACTOR SHALL INSPECT THE EROSION CONTROL WORK AND ENSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.

9. ANY SLOPES WITH DISTURBED SOILS OR DENUDED VEGETATION MUST BE STABILIZED TO INHIBIT EROSION BY WIND AND WATER.

10. SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS MUST BE STABILIZED TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC WAY. ACCIDENTAL DEPOSITIONS MUST BE SWEPT UP IMMEDIATELY AND MAY NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.

11. CONSTRUCTION SITES SHALL BE MAINTAINED BY IMPLEMENTATION OF BEST MANAGEMENT PRACTICES (BMP) IN SUCH A MANNER THAT POLLUTANTS ARE NOT DISCHARGED FROM THE SITE TO THE MAXIMUM EXTENT PRACTICABLE.

12. ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEETFLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE, OR WIND.

13. STOCKPILES OF EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND AND WATER.

14. FUELS, OILS, SOLVENTS AND OTHER TOXIC MATERIALS MUST BE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MUST BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.

GENERAL NOTES FOR EROSION CONTROL PLANS (CONTINUED)

15. EXCESS OR WASTE CONCRETE MAY NOT BE WASHED INTO THE PUBLIC RIGHT-OF-WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTES ON SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.

16. ALL NON-STORMWATER DISCHARGES, UNLESS ACCEPTED OR AUTHORIZED BY AN NPDES PERMIT, REQUIRE PRIOR APPROVAL BY THE STATE WATER RESOURCES CONTROL BOARD.

17. TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND.

6.7. GENERAL FOR NOTES TRAFFIC CONTROL

1. ALL WORK AND MATERIALS SHALL COMPLY WITH THE WORK AREA TRAFFIC CONTROL HANDBOOK (W.A.T.C.H) LATEST EDITION.

2. ALL STRIPING AND MARKINGS SHALL CONFORM TO THE STATE OF CALIFORNIA, STANDARD PLANS AND SPECIFICATIONS, AND THE CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.), LATEST EDITION.

3. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES.

4. FLASHING YELLOW BEACONS TYPE “B” SHALL BE USED ON ALL W20-1 SIGNS AND ON ALL TYPE III BARRICADES GUARDING THE WORK AREA OVERNIGHT.

5. ALL SIGNS SHALL BE REFLECTORIZED AND STANDARD SIZE PER THE LATEST EDITION OF THE CALIFORNIA M.U.T.C.D.

6. ALL TUBULAR DELINEATORS AND CONES SHALL BE 28” MINIMUM HEIGHT, REFLECTORIZED AND MAINTAINED ERECT IN THE INDICATED POSITION AT ALL TIMES, AND SHALL BE REPAIRED, REPLACED, OR CLEANED AS NECESSARY TO PRESERVE THEIR APPEARANCE AND CONTINUITY, AND SHALL INCLUDE A 12” HIGH INTENSITY REFLECTORIZED SLEEVE, IF USED DURING NIGHT-TIME HOURS.

7. THE CONTRACTOR SHALL MAINTAIN, ON A CONTINUOUS BASIS, ALL SIGNS, DELINEATORS, BARRICADES, ETC., TO ENSURE PROPER FLOW AND SAFETY OF TRAFFIC DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL HAVE ALL SIGNS, DELINEATORS, BARRICADES, ETC., PROPERLY INSTALLED PRIOR TO COMMENCING CONSTRUCTION.

9. CONSTRUCTION OPERATIONS SHALL BE CONDUCTED IN SUCH A MANNER AS TO CAUSE AS LITTLE INCONVENIENCE AS POSSIBLE TO ABUTTING PROPERTY OWNERS.

10. ADDITIONAL TRAFFIC CONTROLS, TRAFFIC SIGNS, OR BARRICADING MAY BE REQUIRED IN THE FIELD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PLACEMENT OF ANY ADDITIONAL DEVICES NECESSARY TO ASSURE SAFETY TO THE PUBLIC AT ALL TIMES DURING CONSTRUCTION.

11. EXACT LOCATION AND TYPE OF CONSTRUCTION SIGNS SHALL BE DIRECTED BY THE ENGINEER BASED UPON CONSTRUCTION CONDITIONS.

12. MOVE DELINEATORS AND/OR CONES TO SIDEWALK DURING NON-WORKING HOURS. REMOVE BARRICADES ETC. FROM TRAVEL LANE.

13. REMOVE OR TURN OFF SIGNS DURING NON-WORK HOURS.

14. ALL CONFLICTING LINES, EXISTING CURB PAINT, AND MARKINGS SHALL BE REMOVED BY WET SANDBLASTING OR OTHER APPROVED METHOD PRIOR TO INSTALLATION OF NEW/TEMPORARY STRIPING. ALL CONFLICTING RAISED PAVEMENT MARKERS SHALL BE REMOVED. PAVEMENT THAT IS DAMAGED DUE TO REMOVAL OF MARKERS SHALL BE REPAIRED TO THE SATISFACTION OF THE PUBLIC WORKS DIRECTOR AND/OR PUBLIC WORKS INSPECTOR.

15. WORK HOURS SHALL BE 7:00 A.M. – 3:30 P.M., MONDAY THROUGH FRIDAY UNLESS NOTED ON THE PERMIT.

GENERAL FOR NOTES TRAFFIC CONTROL (Continued)

16. PRE-CONSTRUCTION MEETINGS SHALL BE ARRANGED WITH THE PUBLIC WORKS INSPECTOR & TRAFFIC ENGINEER.

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APPENDIX "C"

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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(Adopted May 7, 1976) (Amended November 6, 1992)
(Amended July 9, 1993) (Amended February 14, 1997)
(Amended December 11, 1998)(Amended April 2, 2004)
(Amended June 3, 2005)

RULE 403. FUGITIVE DUST

(a) Purpose

The purpose of this Rule is to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate fugitive dust emissions.

(b) Applicability

The provisions of this Rule shall apply to any activity or man-made condition capable of generating fugitive dust.

(c) Definitions

(1) ACTIVE OPERATIONS means any source capable of generating fugitive dust, including, but not limited to, earth-moving activities, construction/demolition activities, disturbed surface area, or heavy- and light-duty vehicular movement.

(2) AGGREGATE-RELATED PLANTS are defined as facilities that produce and / or mix sand and gravel and crushed stone.

(3) AGRICULTURAL HANDBOOK means the region-specific guidance document that has been approved by the Governing Board or hereafter approved by the Executive Officer and the U.S. EPA. For the South Coast Air Basin, the Board-approved region-specific guidance document is the Rule 403 Agricultural Handbook dated December 1998. For the Coachella Valley, the Board-approved region-specific guidance document is the Rule 403 Coachella Valley Agricultural Handbook dated April 2, 2004.

(4) ANEMOMETERS are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration criteria as contained in the most recent Rule 403 Implementation Handbook.

(5) BEST AVAILABLE CONTROL MEASURES means fugitive dust control actions that are set forth in Table 1 of this Rule.

(6) BULK MATERIAL is sand, gravel, soil, aggregate material less than two inches in length or diameter, and other organic or inorganic particulate matter.

(7) CEMENT MANUFACTURING FACILITY is any facility that has a cement kiln at the facility.

(8) CHEMICAL STABILIZERS are any non-toxic chemical dust suppressant which must not be used if prohibited for use by the Regional Water Quality Control Boards, the California Air Resources Board, the U.S. Environmental Protection Agency (U.S. EPA), or any applicable law, rule or regulation. The chemical stabilizers shall meet any specifications, criteria, or tests required by any federal, state, or local water agency. Unless otherwise indicated, the use of a non-toxic chemical stabilizer shall be of sufficient concentration and application frequency to maintain a stabilized surface.

(9) COMMERCIAL POULTRY RANCH means any building, structure, enclosure, or premises where more than 100 fowl are kept or maintained for the primary purpose of producing eggs or meat for sale or other distribution.

(10) CONFINED ANIMAL FACILITY means a source or group of sources of air pollution at an agricultural source for the raising of 3,360 or more fowl or 50 or more animals, including but not limited to, any structure, building, installation, farm, corral, coop, feed storage area, milking parlor, or system for the collection, storage, or distribution of solid and liquid manure; if domesticated animals, including horses, sheep, goats, swine, beef cattle, rabbits, chickens, turkeys, or ducks are corralled, penned, or otherwise caused to remain in restricted areas for commercial agricultural purposes and feeding is by means other than grazing.

(11) CONSTRUCTION/DEMOLITION ACTIVITIES means any on-site mechanical activities conducted in preparation of, or related to, the building, alteration, rehabilitation, demolition or improvement of property, including, but not limited to the following activities: grading, excavation, loading, crushing, cutting, planing, shaping or ground breaking.

(12) CONTRACTOR means any person who has a contractual arrangement to conduct an active operation for another person.

(13) DAIRY FARM is an operation on a property, or set of properties that are contiguous or separated only by a public right-of-way, that raises cows or

produces milk from cows for the purpose of making a profit or for a livelihood. Heifer and calf farms are dairy farms.

(14) DISTURBED SURFACE AREA means a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas which have:

(A) been restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions;

(B) been paved or otherwise covered by a permanent structure; or

(C) sustained a vegetative ground cover of at least 70 percent of the native cover for a particular area for at least 30 days.

(15) DUST SUPPRESSANTS are water, hygroscopic materials, or non-toxic chemical stabilizers used as a treatment material to reduce fugitive dust emissions.

(16) EARTH-MOVING ACTIVITIES means the use of any equipment for any activity where soil is being moved or uncovered, and shall include, but not be limited to the following: grading, earth cutting and filling operations, loading or unloading of dirt or bulk materials, adding to or removing from open storage piles of bulk materials, landfill operations, weed abatement through disking, and soil mulching.

(17) DUST CONTROL SUPERVISOR means a person with the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule 403 requirements at an active operation.

(18) FUGITIVE DUST means any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person.

(19) HIGH WIND CONDITIONS means that instantaneous wind speeds exceed 25 miles per hour.

(20) INACTIVE DISTURBED SURFACE AREA means any disturbed surface area upon which active operations have not occurred or are not expected to occur for a period of 20 consecutive days.

(21) LARGE OPERATIONS means any active operations on property which contains 50 or more acres of disturbed surface area; or any earth-moving operation with a daily earth-moving or throughput volume of 3,850 cubic

meters (5,000 cubic yards) or more three times during the most recent 365-day period.

(22) OPEN STORAGE PILE is any accumulation of bulk material, which is not fully enclosed, covered or chemically stabilized, and which attains a height of three feet or more and a total surface area of 150 or more square feet.

(23) PARTICULATE MATTER means any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.

(24) PAVED ROAD means a public or private improved street, highway, alley, public way, or easement that is covered by typical roadway materials, but excluding access roadways that connect a facility with a public paved roadway and are not open to through traffic. Public paved roads are those open to public access and that are owned by any federal, state, county, municipal or any other governmental or quasi-governmental agencies. Private paved roads are any paved roads not defined as public.

(25) PM_{10} means particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by the applicable State and Federal reference test methods.

(26) PROPERTY LINE means the boundaries of an area in which either a person causing the emission or a person allowing the emission has the legal use or possession of the property. Where such property is divided into one or more sub-tenancies, the property line(s) shall refer to the boundaries dividing the areas of all sub-tenancies.

(27) RULE 403 IMPLEMENTATION HANDBOOK means a guidance document that has been approved by the Governing Board on April 2, 2004 or hereafter approved by the Executive Officer and the U.S. EPA.

(28) SERVICE ROADS are paved or unpaved roads that are used by one or more public agencies for inspection or maintenance of infrastructure and which are not typically used for construction-related activity.

(29) SIMULTANEOUS SAMPLING means the operation of two PM_{10} samplers in such a manner that one sampler is started within five minutes of the other, and each sampler is operated for a consecutive period which must be not less than 290 minutes and not more than 310 minutes.

(30) SOUTH COAST AIR BASIN means the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange

County as defined in California Code of Regulations, Title 17, Section 60104. The area is bounded on the west by the Pacific Ocean, on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains, and on the south by the San Diego county line.

(31) STABILIZED SURFACE means any previously disturbed surface area or open storage pile which, through the application of dust suppressants, shows visual or other evidence of surface crusting and is resistant to wind-driven fugitive dust and is demonstrated to be stabilized. Stabilization can be demonstrated by one or more of the applicable test methods contained in the Rule 403 Implementation Handbook.

(32) TRACK-OUT means any bulk material that adheres to and agglomerates on the exterior surface of motor vehicles, haul trucks, and equipment (including tires) that have been released onto a paved road and can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(33) TYPICAL ROADWAY MATERIALS means concrete, asphaltic concrete, recycled asphalt, asphalt, or any other material of equivalent performance as determined by the Executive Officer, and the U.S. EPA.

(34) UNPAVED ROADS means any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by typical roadway materials. Public unpaved roads are any unpaved roadway owned by federal, state, county, municipal or other governmental or quasi-governmental agencies. Private unpaved roads are all other unpaved roadways not defined as public.

(35) VISIBLE ROADWAY DUST means any sand, soil, dirt, or other solid particulate matter which is visible upon paved road surfaces and which can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(36) WIND-DRIVEN FUGITIVE DUST means visible emissions from any disturbed surface area which is generated by wind action alone.

(37) WIND GUST is the maximum instantaneous wind speed as measured by an anemometer.

(d) Requirements

(1) No person shall cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that:

(A) the dust remains visible in the atmosphere beyond the property line of the emission source; or

(B) the dust emission exceeds 20 percent opacity (as determined by the appropriate test method included in the Rule 403 Implementation Handbook), if the dust emission is the result of movement of a motorized vehicle.

(2) No person shall conduct active operations without utilizing the applicable best available control measures included in Table 1 of this Rule to minimize fugitive dust emissions from each fugitive dust source type within the active operation.

(3) No person shall cause or allow PM_{10} levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samplers or other U.S. EPA-approved equivalent method for PM_{10} monitoring. If sampling is conducted, samplers shall be:

(A) Operated, maintained, and calibrated in accordance with 40 Code of Federal Regulations (CFR), Part 50, Appendix J, or appropriate U.S. EPA-published documents for U.S. EPA-approved equivalent method(s) for PM_{10}.

(B) Reasonably placed upwind and downwind of key activity areas and as close to the property line as feasible, such that other sources of fugitive dust between the sampler and the property line are minimized.

(4) No person shall allow track-out to extend 25 feet or more in cumulative length from the point of origin from an active operation. Notwithstanding the preceding, all track-out from an active operation shall be removed at the conclusion of each workday or evening shift.

(5) No person shall conduct an active operation with a disturbed surface area of five or more acres, or with a daily import or export of 100 cubic yards or more of bulk material without utilizing at least one of the measures listed in subparagraphs (d)(5)(A) through (d)(5)(E) at each vehicle egress from the site to a paved public road.

(A) Install a pad consisting of washed gravel (minimum-size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.

(B) Pave the surface extending at least 100 feet and at least 20 feet wide.

(C) Utilize a wheel shaker/wheel spreading device consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and 10 feet wide to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(D) Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(E) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the actions specified in subparagraphs (d)(5)(A) through (d)(5)(D).

(6) Beginning January 1, 2006, any person who operates or authorizes the operation of a confined animal facility subject to this Rule shall implement the applicable conservation management practices specified in Table 4 of this Rule.

(e) Additional Requirements for Large Operations

(1) Any person who conducts or authorizes the conducting of a large operation subject to this Rule shall implement the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards can not be met through use of Table 2 actions; and shall:

(A) submit a fully executed Large Operation Notification (Form 403 N) to the Executive Officer within 7 days of qualifying as a large operation;

(B) include, as part of the notification, the name(s), address(es), and phone number(s) of the person(s) responsible for the submittal, and a description of the operation(s), including a map depicting the location of the site;

(C) maintain daily records to document the specific dust control actions taken, maintain such records for a period of not less than three years; and make such records available to the Executive Officer upon request;

(D) install and maintain project signage with project contact signage that meets the minimum standards of the Rule 403 Implementation Handbook, prior to initiating any earthmoving activities;

(E) identify a dust control supervisor that:

(i) is employed by or contracted with the property owner or developer;

(ii) is on the site or available on-site within 30 minutes during working hours;

(iii) has the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule requirements;

(iv) has completed the AQMD Fugitive Dust Control Class and has been issued a valid Certificate of Completion for the class; and

(F) notify the Executive Officer in writing within 30 days after the site no longer qualifies as a large operation as defined by paragraph (c)(18).

(2) Any Large Operation Notification submitted to the Executive Officer or AQMD-approved dust control plan shall be valid for a period of one year from the date of written acceptance by the Executive Officer. Any Large Operation Notification accepted pursuant to paragraph (e)(1), excluding those submitted by aggregate-related plants and cement manufacturing facilities must be resubmitted annually by the person who conducts or authorizes the conducting of a large operation, at least 30 days prior to the expiration date, or the submittal shall no longer be valid as of the expiration date. If all fugitive dust sources and corresponding control measures or special circumstances remain identical to those identified in the previously accepted submittal or in an AQMD-approved dust control plan, the resubmittal may be a simple statement of no-change (Form 403NC).

(f) Compliance Schedule

The newly amended provisions of this Rule shall become effective upon adoption. Pursuant to subdivision (e), any existing site that qualifies as a large operation will have 60 days from the date of Rule adoption to comply with the notification and recordkeeping requirements for large operations. Any Large Operation

Notification or AQMD-approved dust control plan which has been accepted prior to the date of adoption of these amendments shall remain in effect and the Large Operation Notification or AQMD-approved dust control plan annual resubmittal date shall be one year from adoption of this Rule amendment.

(g) Exemptions

(1) The provisions of this Rule shall not apply to:

(A) Dairy farms.

(B) Confined animal facilities provided that the combined disturbed surface area within one continuous property line is one acre or less.

(C) Agricultural vegetative crop operations provided that the combined disturbed surface area within one continuous property line and not separated by a paved public road is 10 acres or less.

(D) Agricultural vegetative crop operations within the South Coast Air Basin, whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Agricultural Handbook;

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(E) Agricultural vegetative crop operations outside the South Coast Air Basin whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Coachella Valley Agricultural Handbook; and

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Coachella Valley Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(F) Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.

(G) Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions.

(H) Any contractor subsequent to the time the contract ends, provided that such contractor implemented the required control measures during the contractual period.

(I) Any grading contractor, for a phase of active operations, subsequent to the contractual completion of that phase of earth-moving activities, provided that the required control measures have been implemented during the entire phase of earth-moving activities, through and including five days after the final grading inspection.

(J) Weed abatement operations ordered by a county agricultural commissioner or any state, county, or municipal fire department, provided that:

(i) mowing, cutting or other similar process is used which maintains weed stubble at least three inches above the soil; and

(ii) any discing or similar operation which cuts into and disturbs the soil, where watering is used prior to initiation of these activities, and a determination is made by the agency issuing the weed abatement order that, due to fire hazard conditions, rocks, or other physical obstructions, it is not practical to meet the conditions specified in clause (g)(1)(H)(i). The provisions this clause shall not exempt the owner of any property from stabilizing, in accordance with paragraph (d)(2), disturbed surface areas which have been created as a result of the weed abatement actions.

(K) sandblasting operations.

(2) The provisions of paragraphs (d)(1) and (d)(3) shall not apply:

(A) When wind gusts exceed 25 miles per hour, provided that:

(i) The required Table 3 contingency measures in this Rule are implemented for each applicable fugitive dust source type, and;

(ii) records are maintained in accordance with subparagraph (e)(1)(C).

(B) To unpaved roads, provided such roads:

(i) are used solely for the maintenance of wind-generating equipment; or

(ii) are unpaved public alleys as defined in Rule 1186; or

(iii) are service roads that meet all of the following criteria:

(a) are less than 50 feet in width at all points along the road;

(b) are within 25 feet of the property line; and

(c) have a traffic volume less than 20 vehicle-trips per day.

(C) To any active operation, open storage pile, or disturbed surface area for which necessary fugitive dust preventive or mitigative actions are in conflict with the federal Endangered Species Act, as determined in writing by the State or federal agency responsible for making such determinations.

(3) The provisions of (d)(2) shall not apply to any aggregate-related plant or cement manufacturing facility that implements the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards of paragraphs (d)(1) and (d)(3) can not be met through use of Table 2 actions.

(4) The provisions of paragraphs (d)(1), (d)(2), and (d)(3) shall not apply to:

(A) Blasting operations which have been permitted by the California Division of Industrial Safety; and

(B) Motion picture, television, and video production activities when dust emissions are required for visual effects. In order to obtain this exemption, the Executive Officer must receive notification in writing at least 72 hours in advance of any such activity and no nuisance results from such activity.

(5) The provisions of paragraph (d)(3) shall not apply if the dust control actions, as specified in Table 2, are implemented on a routine basis for

each applicable fugitive dust source type. To qualify for this exemption, a person must maintain records in accordance with subparagraph (e)(1)(C).

(6) The provisions of paragraph (d)(4) shall not apply to earth coverings of public paved roadways where such coverings are approved by a local government agency for the protection of the roadway, and where such coverings are used as roadway crossings for haul vehicles provided that such roadway is closed to through traffic and visible roadway dust is removed within one day following the cessation of activities.

(7) The provisions of subdivision (e) shall not apply to:

(A) officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks.

(B) any large operation which is required to submit a dust control plan to any city or county government which has adopted a District-approved dust control ordinance.

(C) any large operation subject to Rule 1158, which has an approved dust control plan pursuant to Rule 1158, provided that all sources of fugitive dust are included in the Rule 1158 plan.

(8) The provisions of subparagraph (e)(1)(A) through (e)(1)(C) shall not apply to any large operation with an AQMD-approved fugitive dust control plan provided that there is no change to the sources and controls as identified in the AQMD-approved fugitive dust control plan.

(h) Fees

Any person conducting active operations for which the Executive Officer conducts upwind/downwind monitoring for PM_{10} pursuant to paragraph (d)(3) shall be assessed applicable Ambient Air Analysis Fees pursuant to Rule 304.1. Applicable fees shall be waived for any facility which is exempted from paragraph (d)(3) or meets the requirements of paragraph (d)(3).

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Backfilling	01-1 Stabilize backfill material when not actively handling; and 01-2 Stabilize backfill material during handling; and 01-3 Stabilize soil at completion of activity.	✓ Mix backfill soil with water prior to moving ✓ Dedicate water truck or high capacity hose to backfilling equipment ✓ Empty loader bucket slowly so that no dust plumes are generated ✓ Minimize drop height from loader bucket
Clearing and grubbing	02-1 Maintain stability of soil through pre-watering of site prior to clearing and grubbing; and 02-2 Stabilize soil during clearing and grubbing activities; and 02-3 Stabilize soil immediately after clearing and grubbing activities.	✓ Maintain live perennial vegetation where possible ✓ Apply water in sufficient quantity to prevent generation of dust plumes
Clearing forms	03-1 Use water spray to clear forms; or 03-2 Use sweeping and water spray to clear forms; or 03-3 Use vacuum system to clear forms.	✓ Use of high pressure air to clear forms may cause exceedance of Rule requirements
Crushing	04-1 Stabilize surface soils prior to operation of support equipment; and 04-2 Stabilize material after crushing.	✓ Follow permit conditions for crushing equipment ✓ Pre-water material prior to loading into crusher ✓ Monitor crusher emissions opacity ✓ Apply water to crushed material to prevent dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Cut and fill	05-1 Pre-water soils prior to cut and fill activities; and 05-2 Stabilize soil during and after cut and fill activities.	✓ For large sites, pre-water with sprinklers or water trucks and allow time for penetration ✓ Use water trucks/pulls to water soils to depth of cut prior to subsequent cuts
Demolition – mechanical/manual	06-1 Stabilize wind erodible surfaces to reduce dust; and 06-2 Stabilize surface soil where support equipment and vehicles will operate; and 06-3 Stabilize loose soil and demolition debris; and 06-4 Comply with AQMD Rule 1403.	✓ Apply water in sufficient quantities to prevent the generation of visible dust plumes
Disturbed soil	07-1 Stabilize disturbed soil throughout the construction site; and 07-2 Stabilize disturbed soil between structures	✓ Limit vehicular traffic and disturbances on soils where possible ✓ If interior block walls are planned, install as early as possible ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes
Earth-moving activities	08-1 Pre-apply water to depth of proposed cuts; and 08-2 Re-apply water as necessary to maintain soils in a damp condition and to ensure that visible emissions do not exceed 100 feet in any direction; and 08-3 Stabilize soils once earth-moving activities are complete.	✓ Grade each project phase separately, timed to coincide with construction phase ✓ Upwind fencing can prevent material movement on site ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Importing/exporting of bulk materials	09-1 Stabilize material while loading to reduce fugitive dust emissions; and 09-2 Maintain at least six inches of freeboard on haul vehicles; and 09-3 Stabilize material while transporting to reduce fugitive dust emissions; and 09-4 Stabilize material while unloading to reduce fugitive dust emissions; and 09-5 Comply with Vehicle Code Section 23114.	✓ Use tarps or other suitable enclosures on haul trucks ✓ Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage ✓ Comply with track-out prevention/mitigation requirements ✓ Provide water while loading and unloading to reduce visible dust plumes
Landscaping	10-1 Stabilize soils, materials, slopes	✓ Apply water to materials to stabilize ✓ Maintain materials in a crusted condition ✓ Maintain effective cover over materials ✓ Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slopes ✓ Hydroseed prior to rain season
Road shoulder maintenance	11-1 Apply water to unpaved shoulders prior to clearing; and 11-2 Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.	✓ Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs ✓ Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Screening	12-1 Pre-water material prior to screening; and 12-2 Limit fugitive dust emissions to opacity and plume length standards; and 12-3 Stabilize material immediately after screening.	✓ Dedicate water truck or high capacity hose to screening operation ✓ Drop material through the screen slowly and minimize drop height ✓ Install wind barrier with a porosity of no more than 50% upwind of screen to the height of the drop point
Staging areas	13-1 Stabilize staging areas during use; and 13-2 Stabilize staging area soils at project completion.	✓ Limit size of staging area ✓ Limit vehicle speeds to 15 miles per hour ✓ Limit number and size of staging area entrances/exists
Stockpiles/ Bulk Material Handling	14-1 Stabilize stockpiled materials. 14-2 Stockpiles within 100 yards of off-site occupied buildings must not be greater than eight feet in height; or must have a road bladed to the top to allow water truck access or must have an operational water irrigation system that is capable of complete stockpile coverage.	✓ Add or remove material from the downwind portion of the storage pile ✓ Maintain storage piles to avoid steep sides or faces

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Traffic areas for construction activities	15-1 Stabilize all off-road traffic and parking areas; and 15-2 Stabilize all haul routes; and 15-3 Direct construction traffic over established haul routes.	✓ Apply gravel/paving to all haul routes as soon as possible to all future roadway areas ✓ Barriers can be used to ensure vehicles are only used on established parking areas/haul routes
Trenching	16-1 Stabilize surface soils where trencher or excavator and support equipment will operate; and 16-2 Stabilize soils at the completion of trenching activities.	✓ Pre-watering of soils prior to trenching is an effective preventive measure. For deep trenching activities, pre-trench to 18 inches soak soils via the pre-trench and resuming trenching ✓ Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment
Truck loading	17-1 Pre-water material prior to loading; and 17-2 Ensure that freeboard exceeds six inches (CVC 23114)	✓ Empty loader bucket such that no visible dust plumes are created ✓ Ensure that the loader bucket is close to the truck to minimize drop height while loading
Turf Overseeding	18-1 Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and 18-2 Cover haul vehicles prior to exiting the site.	✓ Haul waste material immediately off-site

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category		Control Measure	Guidance
Unpaved roads/parking lots	19-1	Stabilize soils to meet the applicable performance standards; and	✓ Restricting vehicular access to established unpaved travel paths and parking lots can reduce stabilization requirements
	19-2	Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.	
Vacant land	20-1	In instances where vacant lots are 0.10 acre or larger and have a cumulative area of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles, prevent motor vehicle and/or off-road vehicle trespassing, parking and/or access by installing barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures.	

Table 2
DUST CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Earth-moving (except construction cutting and filling areas, and mining operations)	(1a)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR
	(1a-1)	For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
Earth-moving: Construction fill areas:	(1b)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Earth-moving: Construction cut areas and mining operations:	(1c)	Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b)	Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c)	Apply chemical stabilizers within five working days of grading completion; OR
	(2d)	Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a)	Apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR
	(3b)	Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR
	(3c)	Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR
	(3d)	Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Unpaved Roads	(4a)	Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR
	(4b)	Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR
	(4c)	Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
Open storage piles	(5a)	Apply chemical stabilizers; OR
	(5b)	Apply water to at least 80 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR
	(5c)	Install temporary coverings; OR
	(5d)	Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile. This option may only be used at aggregate-related plants or at cement manufacturing facilities.
All Categories	(6a)	Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.

TABLE 3
CONTINGENCY CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

Table 4
(Conservation Management Practices for Confined Animal Facilities)

SOURCE CATEGORY	CONSERVATION MANAGEMENT PRACTICES
Manure Handling **(Only applicable to Commercial Poultry Ranches)**	(1a) Cover manure prior to removing material off-site; AND (1b) Spread the manure before 11:00 AM and when wind conditions are less than 25 miles per hour; AND (1c) Utilize coning and drying manure management by removing manure at laying hen houses at least twice per year and maintain a base of no less than 6 inches of dry manure after clean out; or in lieu of complying with conservation management practice (1c), comply with conservation management practice (1d). (1d) Utilize frequent manure removal by removing the manure from laying hen houses at least every seven days and immediately thin bed dry the material.
Feedstock Handling	(2a) Utilize a sock or boot on the feed truck auger when filling feed storage bins.
Disturbed Surfaces	(3a) Maintain at least 70 percent vegetative cover on vacant portions of the facility; OR (3b) Utilize conservation tillage practices to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops (if applicable) in narrow slots or tilled strips; OR (3c) Apply dust suppressants in sufficient concentrations and frequencies to maintain a stabilized surface.
Unpaved Roads	(4a) Restrict access to private unpaved roads either through signage or physical access restrictions and control vehicular speeds to no more than 15 miles per hour through worker notifications, signage, or any other necessary means; OR (4b) Cover frequently traveled unpaved roads with low silt content material (i.e., asphalt, concrete, recycled road base, or gravel to a minimum depth of four inches); OR (4c) Treat unpaved roads with water, mulch, chemical dust suppressants or other cover to maintain a stabilized surface.
Equipment Parking Areas	(5a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (5b) Apply material with low silt content (i.e., asphalt, concrete, recycled road base, or gravel to a depth of four inches).

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APPENDIX "D"

TRUCK ROUTE MAP
FOR

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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Development Services Department
Engineering Divison
Telephone (909) 931-4137
Facsimile (909) 931-4321
Revision Date: October 24, 2011

Construction Traffic (Truck) Access Plan

Project Name: _____ Construction Permit # _____
(Tract/Parcel Map Site Plan or CUP #)

Project Location: _____

Company Name: _____

Contact Person: _____

Company Address: _____

Company Telephone: _____ Fax: _____

Company Email: _____

Construction traffic (truck) access to and from the above project site is limited to the following streets:

_____

_____

_____

_____

Trucks are restricted to the approved City Of Upland truck routes except as specified above.

This plan is valid for truck traffic associated with delivery of common construction material or removal of earthen materials during grading operations. Trucks or loads exceeding the weight or size limitations as specified in Section 35000 of the California Vehicle Code may require a special permit.

Applicant Signature: _____ Date: _____

Applicant Name: (Please Print) _____

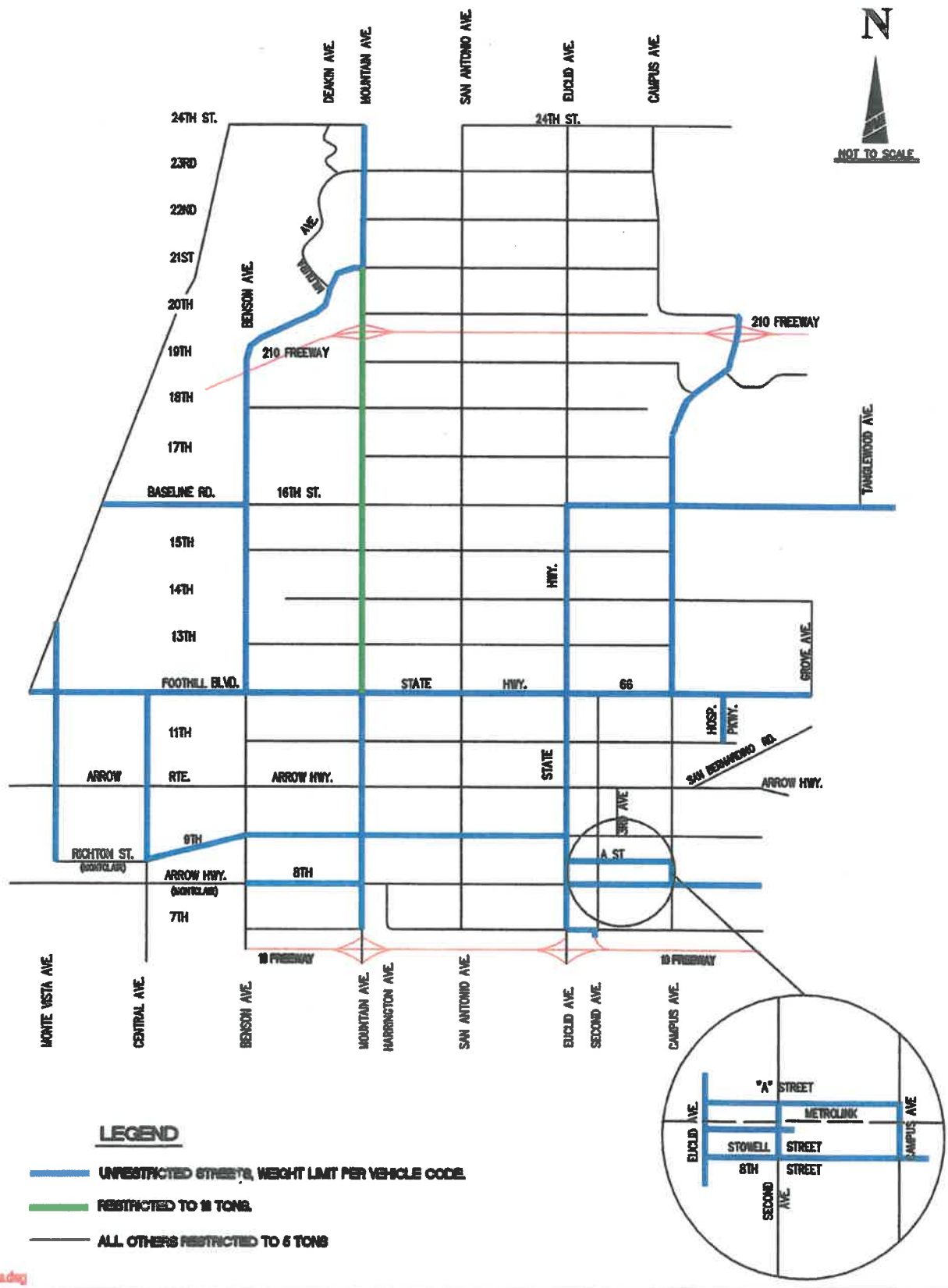
Approved By: _____ Date: _____

Routing:

☐ Applicant ☐ PD Traffic Division ☐ Project File ☐ PW Inspectors ☐ PW Transportation

File Name: R:\Originals\Forms\Const Access Plan.doc

CITY OF UPLAND
TRUCK ROUTES & RESTRICTED STREETS



APPENDIX "E"

BEST MANAGEMENT PRACTICES
FOR

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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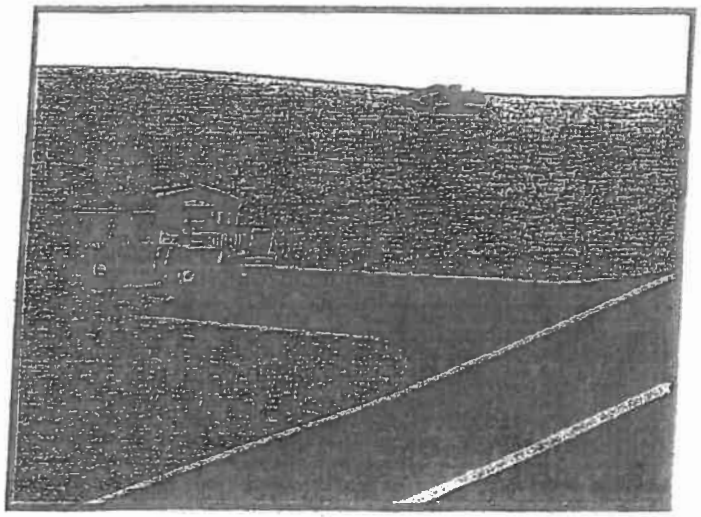
Stabilized Construction Entrance/Exit TC-1



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stabilized Construction Entrance/Exit TC-1

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

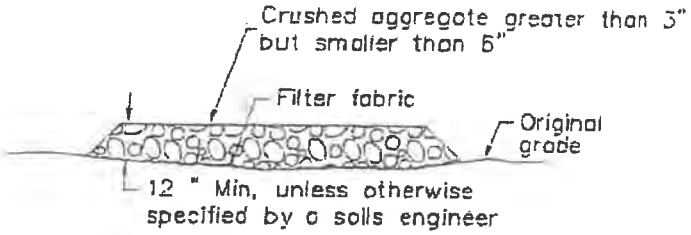
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Stabilized Construction Entrance/Exit TC-1



SECTION B–B
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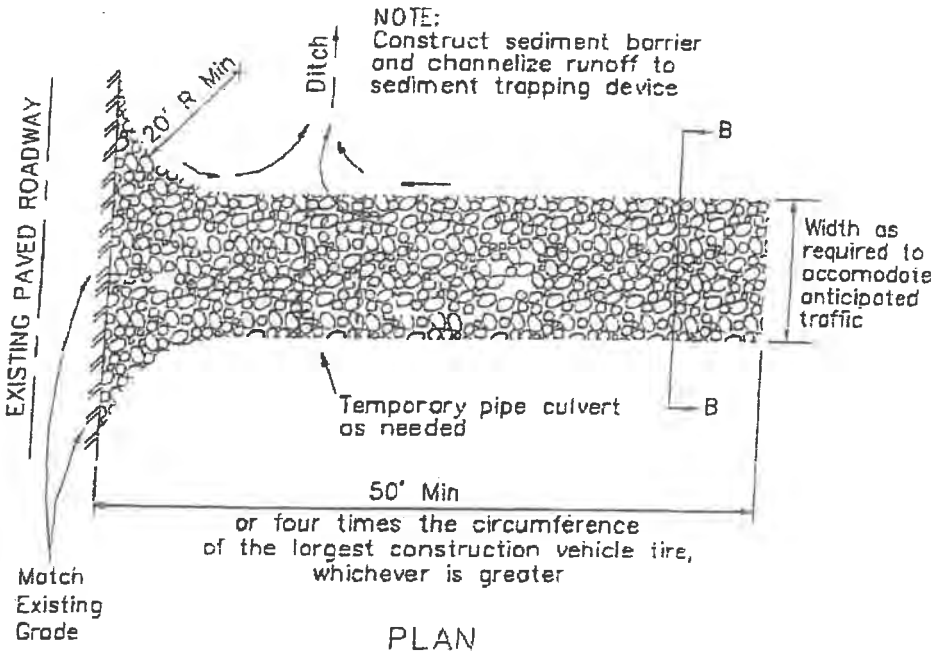
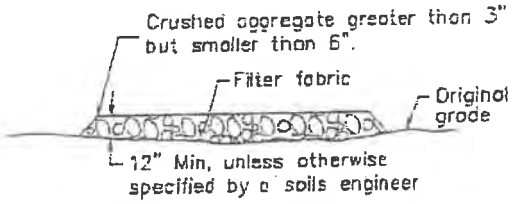
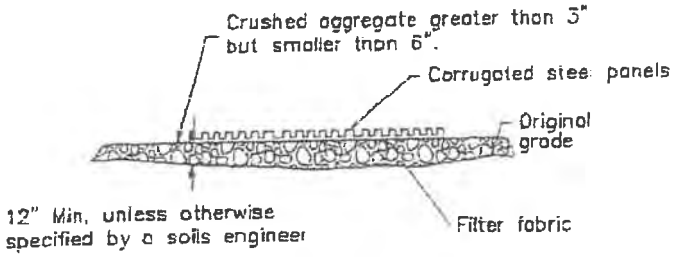


PLAN
NTS

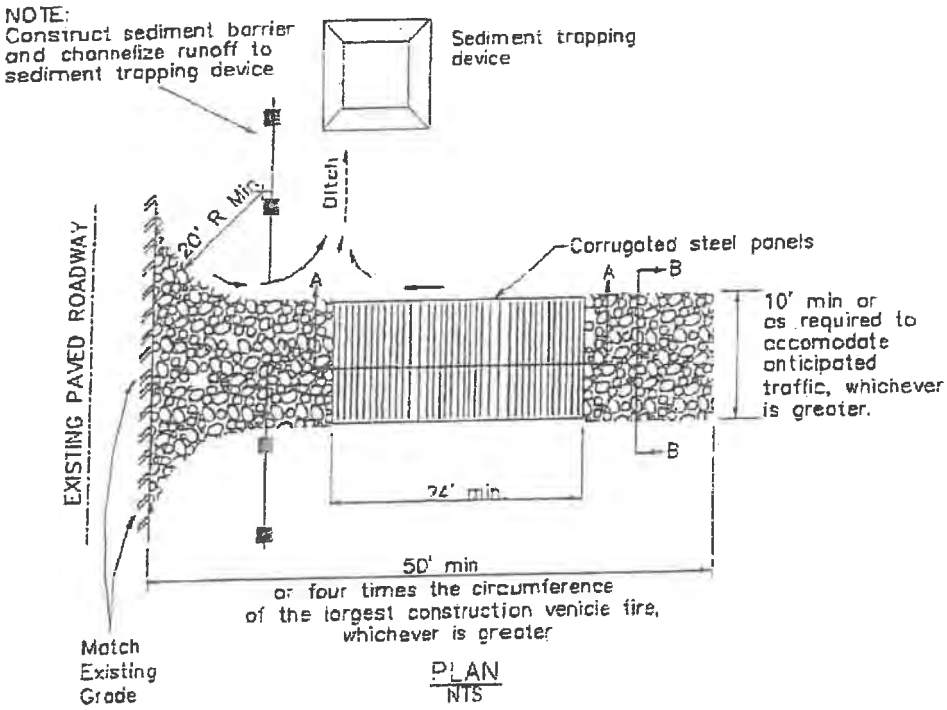
Stabilized Construction Entrance/Exit TC-1



SECTION B–B
NTS



SECTION A–A
NOT TO SCALE



PLAN
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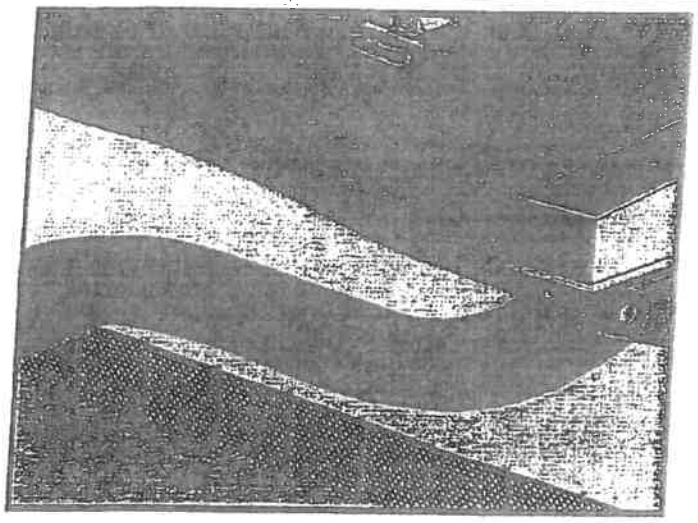
Stabilized Construction Roadway TC-2



Objectives		
EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
  - Phased construction projects and offsite road access
  - Construction during wet weather
- Construction roadways and detour roads:
  - Where mud tracking is a problem during wet weather
  - Where dust is a problem during dry weather
  - Adjacent to water bodies
  - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.

Stabilized Construction Roadway TC-2

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity--based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, impact weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

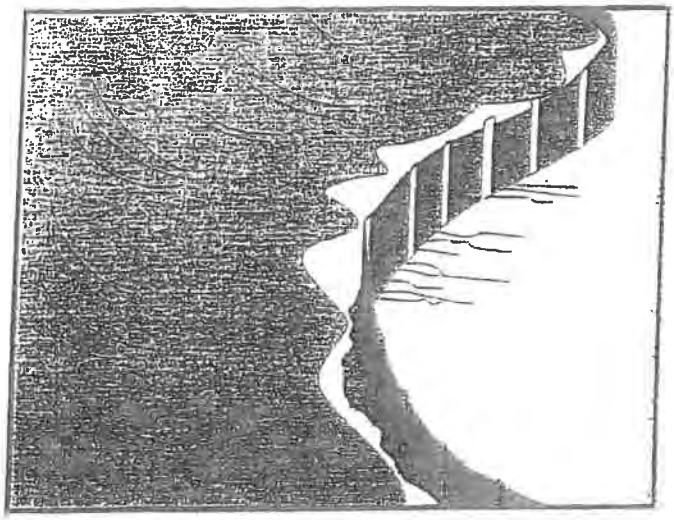
TC-2 Stabilized Construction Roadway

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Silt Fence

SE-1



Objectives

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Below other small cleared areas.

Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.

- Do not use in locations where ponded water may cause flooding.
- Do not place fence on a slope, or across any contour line. If not installed at the same elevation throughout, silt fences will create erosion.
- Filter fences will create a temporary sedimentation pond on the upstream side of the fence and may cause temporary flooding. Fences not constructed on a level contour will be overtopped by concentrated flow resulting in failure of the filter fence.
- Improperly installed fences are subject to failure from undercutting, overlapping, or collapsing.
  - Not effective unless trenched and keyed in.
  - Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
  - Do not allow water depth to exceed 1.5 ft at any point.

Implementation

General

A silt fence is a temporary sediment barrier consisting of filter fabric stretched across and attached to supporting posts, entrenched, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

Silt fences are preferable to straw bale barriers in many cases. Laboratory work at the Virginia Highway and Transportation Research Council has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bales. While the failure rate of silt fences is lower than that of straw bale barriers, there are many instances where silt fences have been improperly installed. The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Don't use in streams, channels, or anywhere flow is concentrated. Don't use silt fences to divert flow.
- Don't use below slopes subject to creep, slumping, or landslides.
- Select filter fabric that retains 85% of soil by weight, based on sieve analysis, but that is not finer than an equivalent opening size of 70.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.

- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area is permanently stabilized.

Design and Layout

Selection of a filter fabric is based on soil conditions at the construction site (which affect the equivalent opening size (EOS) fabric specification) and characteristics of the support fence (which affect the choice of tensile strength). The designer should specify a filter fabric that retains the soil found on the construction site yet that it has openings large enough to permit drainage and prevent clogging. The following criteria is recommended for selection of the equivalent opening size:

1. If 50 percent or less of the soil, by weight, will pass the U.S. Standard Sieve No. 200, select the EOS to retain 85 % of the soil. The EOS should not be finer than EOS 70.
2. For all other soil types, the EOS should be no larger than the openings in the U.S. Standard Sieve No. 70 except where direct discharge to a stream, lake, or wetland will occur, then the EOS should be no larger than Standard Sieve No. 100.

To reduce the chance of clogging, it is preferable to specify a fabric with openings as large as allowed by the criteria. No fabric should be specified with an EOS smaller than U.S. Standard Sieve No. 100. If 85% or more of a soil, by weight, passes through the openings in a No. 200 sieve, filter fabric should not be used. Most of the particles in such a soil would not be retained if the EOS was too large and they would clog the fabric quickly if the EOS were small enough to capture the soil.

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Filter fabric material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 °F to 120 °F.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Materials

- Silt fence fabric should be woven polypropylene with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

- There are new products that may use prefabricated plastic holders for the silt fence and use bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement.

Installation Guidelines

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line the proposed silt fence.

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength filter fabric is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench. When extra-strength filter fabric and closer post spacing are used, the mesh support fence may be eliminated. Filter fabric should be purchased in a long roll, and then cut to the length of the barrier. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with compacted native material.

- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where a silt fence is determined to be not practicable due to specific site conditions, the silt fence may be constructed,at the toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.

Costs

- Average annual cost for installation and maintenance (assumes 6 month useful life): $7 per lineal foot ($850 per drainage acre). Range of cost is $3.50 - $9.10 per lineal foot.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence must be inspected and maintained.
- Holes, depressions, or other ground disturbance caused by the removal of the silt fences should be backfilled and repaired.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), UESPA, 1990.

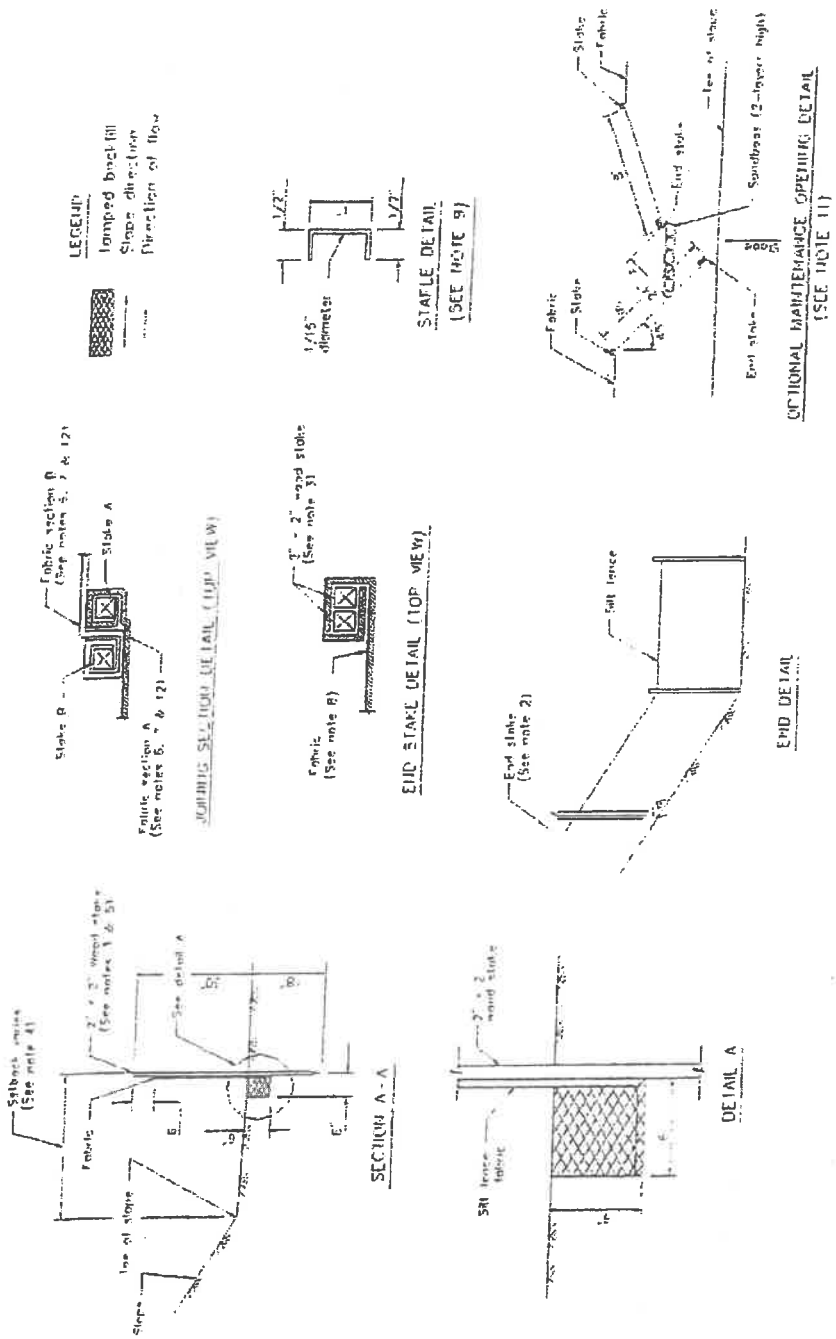
Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

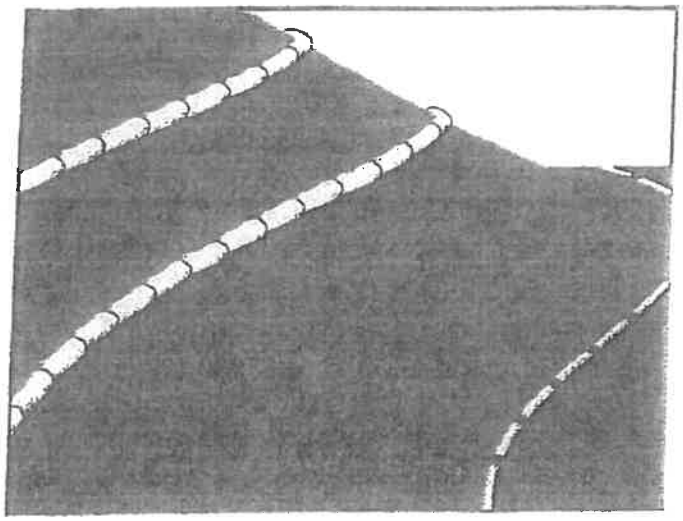
U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.


LEGEND
Tamped backfill
Slope direction
Direction of flow
STAPLE DETAIL
(SEE NOTE 9)
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
END STAKE DETAIL (TOP VIEW)
END DETAIL
SECTION A-A
DETAIL A

Gravel Bag Berm

SE-6



Objectives		
EC	Erosion Control	☒
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:

- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the filter, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Berms may have limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel–filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous.

Design and Layout

- Locate gravel bag berms on level contours.
  - Slopes between 20:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the slope toe.
  - Slopes 2:1 (H:V) or steeper: Gravel bags should be placed at a maximum interval of 25 ft (a closer spacing is more effective), with the first row placed the slope toe.
- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, consider moving the gravel bag barriers away from the slope toe to facilitate cleaning. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Top width = 12 in. minimum for one or two layer construction
  - Side slopes = 2:1 or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Top width = 12 in. minimum for one or two layer construction.
  - Side slopes = 2:1 or flatter.
- Butt ends of bags tightly
- On multiple row, or multiple layer construction, overlapp butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- ***Fill Material:*** Fill material should be 0.5 to 1 in. Class 2 aggregate base, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Gravel filter: Expensive, since off-site materials, hand construction, and demolition/removal are usually required. Material costs for gravel bags are average of $2.50 per empty gravel bag. Gravel costs range from $20-$35 per yd^3.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove gravel bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

APPENDIX “F”

SAMPLE PROJECT IDENTIFICATION SIGN

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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REPLACEMENT OF 7.5 MG RESERVOIR AND WATER IMPROVEMENTS (17TH STREET AND BENSON AVENUE)

Estimated Completion: JUNE 2022

City Council

Debbie Stone, Mayor ● Rudy Zuniga, Mayor Pro Tem
Janice Elliot ● Bill Velto, Council Members
Rosemary Hoerning, City Manager

For more information, please call the Upland Public Works Department (909) 291-2930

Size: 4' Vertical by 8' horizontal. Material: ½" Plywood with graffiti laminate. Colors: White background, green and black graphics, full color logo.

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APPENDIX “G”

GEOTECHNICAL REPORT

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

February 13, 2017
Revised February 17, 2017

File No. 33917-01R

Richard Brady & Associates
3710 Ruffin Road
San Diego, CA 92123

Attention: Mr. E. Javier Saunders, P.E.
Executive Vice-President

Subject: **GEOTECHNICAL INVESTIGATION**
City of Upland – Replacement of 7.5 Million Gallon Reservoir
City of Upland Project No. 9128
17th Street and Benson Avenue
Upland, California

Dear Mr. Saunders:

American Geotechnical is pleased to submit this geotechnical investigation report for the City of Upland Project No. 9128 Replacement of 7.5 million gallon Reservoir located at 17th Street and Benson Avenue in Upland, California. This work was performed in accordance with our proposal dated December 2, 2016, and our addendum proposal dated January 13, 2017. This report presents the results of our field investigation, laboratory testing, conclusions, and geotechnical recommendations.

1.0 SCOPE OF WORK

The scope of work performed during this investigation included the following:

- Review of available reports and maps pertaining to the geotechnical conditions of the site and surrounding areas;
- Site reconnaissance for marking the proposed boring locations for Underground Service Alert;
- Drilling of four small-diameter borings, AGSB-1 through AGSB-4 to a maximum depth of 21 feet below ground surface utilizing a hollow-stem auger drilling rig;
- Logging of the borings using visual and tactile methods;
- Collection of soil samples of representative materials encountered;
- Completion of a site-specific probabilistic seismic hazard analysis;

- Laboratory testing of the selected soil samples collected during the subsurface investigation;
- Engineering analyses of field and laboratory data; and,
- Preparation of this report summarizing our field investigation, laboratory testing, conclusions, and recommendations.

2.0 SITE DESCRIPTION AND PROPOSED IMPROVEMENTS

The proposed site for the reservoir replacement is adjacent to and east of the existing Reservoir 15 and includes a single, partially developed lot. The San Bernardino County Assessor's Parcel Number is 1005-271-03-0000. The lot includes about 4.76 acres in a roughly rectangular shape. The site is currently bare ground and is gently sloping to the south. There are small areas of concrete, an abandoned concrete foundation, a dilapidated building, an existing open reservoir, a gravel roadway, and other older improvements on the north and south portions of the site. The areas to the north, east, and south are fully developed with single-family residential properties. A site location map is shown on Plate 1.

It is proposed to use the site to design and construct a replacement 7.5 million gallon water tank for Reservoir 15, which will remain in service during replacement. The new reservoir will be located on the south portion of the site and have an inside wall radius of 123 feet with a wall height of 26.5 feet. The outside radius will be 126 feet. A shallow ring foundation is proposed to support the reservoir. The new reservoir will also have a ring drain around its perimeter.

We understand it is proposed to construct a new administration building to be located in the north portion of the site, apparently east of the existing open reservoir. Other details regarding the administration building are not currently known.

3.0 FIELD INVESTIGATION

3.1 Subsurface Exploration

Subsurface exploration consisted of drilling four truck-mounted, hollow-stem auger borings, AGSB-1 through AGSB-4. Two of these borings, AGSB-1 and AGSB-2 were drilled near the proposed new reservoir site and reached maximum depths of 11 feet and 17.5 feet below ground surface, respectively. Both borings encountered repeated drilling refusal on nested cobbles/boulders. In each case, the borings were moved a few feet and drilling restarted and drilling refusal was again

encountered. Alluvial deposits consisting of mostly sand, gravel, cobbles, and small boulders is very common to the area. These deposits exist to considerable depth as has seen apparent in the sidewalls of the regional quarries.

Borings AGSB-3 and AGSB-4 were located in the north portion of the site near what we understand to be the proposed location of the administration building. Both borings reached their intended maximum depth of 21 feet below ground surface. Boring locations are shown on Plate 2.
Earth materials encountered in the borings were logged in the field in accordance with the Unified Soil Classification System. Relatively undisturbed ring and bulk samples were collected at regular intervals in the borings and sampling blow counts were recorded for each 6 inches of penetration. Borings were backfilled with excavated cuttings and tamped with the drill steel. Boring logs are included in Appendix A. Samples were transported to our geotechnical laboratory for testing.

Materials encountered in the borings showed a relatively uniform soil column of gravelly sand and sandy gravel with relatively high blow counts from 47 to 91 for 12 inches of penetration. In many cases, sampling refusal was encountered on nested gravel/cobble/boulder horizons. Borings in the south portion of the site showed increased cobble/boulder horizons when compared to the north portion of the site based on drilling and sampling refusal; however, cobble/boulder horizons cannot be ruled out in the north portion of the site. The physical size of drilling and sampling equipment utilized for the field exploration limits the size of materials that may be seen and sampled in the field. Experience with similar sites in southern California indicate the cobble/boulder fraction of the earth materials that underlie the site may be 30 percent or more by weight.

Artificial fill was not encountered in our borings, but limited amounts of engineered fill were likely placed during construction of the various improvement remnants located on site.

Groundwater was not encountered to the maximum depth of exploration.

4.0 LABORATORY TESTING

Laboratory testing was performed on representative samples obtained during our field exploration. Samples were tested for the purpose of estimating material properties for use in subsequent engineering evaluations. Testing included in-situ moisture and density, maximum density/optimum

moisture content, gradation, consolidation, and chemical soil testing. A summary of laboratory test results is included in Appendix B.

5.0 SITE GEOLOGY AND SEISMICITY

5.1 Site Geology

The project site is located on the medial portion of the Cucamonga Alluvial Fan roughly 2 miles from the foothills of the San Gabriel Mountains. The site lies about 3,500 feet east of the historic channel of San Antonio Creek. Recent soils include Holocene alluvium in the form of coarse-grained, ancestral flood deposits of the San Antonio Creek. Engineering characteristics of the earth materials are described in previous sections of this report. The areal distribution of earth materials is shown on Plate 2.

We reviewed groundwater data available from the State of California GeoTracker GAMA website. GeoTracker shows that the three closest water wells to the subject site are as follows:

Well No.	Location	Depth to Groundwater	Date
01N08W36D001S	3,800' north	284.75'	10/5/2015
341219N1176980W001	1 mile southwest	256.57'	10/5/2015
01N07W33M001S	3.25 miles east	322.00'	3/1/2016

5.2 Site Seismicity

The area is located in the Transverse Ranges Geomorphic Province of California. The Transverse Ranges are dominated by two convergent fault systems. The first is northwest-trending, high-angle, strike slip faults of the San Andreas system projecting from the northern terminus of the Peninsular Ranges. The second is east-trending, low-angle reverse or reverse-oblique faults bounding the south margin of the Transverse Ranges. Faults in group one include the Palos Verdes, Newport-Inglewood, and the Whittier-Elsinore fault zones. Faults in group two include the Malibu-Santa Monica, Hollywood, and Sierra Madre fault zones. Since 1920, faults in these two systems have produced 17 moderate-sized, mainshock-aftershock sequences in the greater Los Angeles Basin.

Average rates of late-Quaternary slip along these faults provide an index of their relative activity. The San Andreas Fault has a slip rate of tens of millimeters per year, but most other faults have rates of

about 1 – 3 millimeters per year or less. Details concerning late-Quaternary slip rate on most major faults are poorly known, partly because these faults often splay into a broad zone of discontinuous segments as they approach the earth's surface, and partly because our historical database is small (roughly 165 years) compared to the Holocene (0-11,000 years before present) activity of these faults.

Seismic characteristics for the closest regional faults were compiled including distance to the site, maximum magnitude, fault length, and slip rate. These data were taken largely from Peterson, et. al., 1996 as updated by Wills, et. al., 2008. Seismic data for close in regional faults are summarized in the following table.

TABLE 1: Summary of Major Active Faults

Distance (km)	Name	Mmax	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
1.5	San Jose Char	6.4	0.5	75	NW	reverse	0	13	22
1.6	Cucamonga Char	7.1	5.00	45	N	reverse	0	13	28
5.2	Sierra Madre Char	7.0	3.00	45	N	reverse	0	13	57

5.2.1 Fault Rupture

The site is not located in a State of California Earthquake Fault Zone. Regional geologic maps show no known faults project into or cross the site.

5.2.2 Probabilistic Seismic Hazard Analysis

A probabilistic seismic hazard analysis (PSHA) was completed to determine ground motion parameters for the Maximum Considered Earthquake (MCE) in accordance with the ASCE7-10 with 2013 errata. The MCE is defined probabilistically as the ground motion with a 2 percent probability of exceedance in a 50-year exposure period. We used the U.S. Geological Survey/California Geological Survey fault model developed as part of 2008 National Seismic Hazards Mapping Project as a basis for the analysis.

We estimated the average shear wave velocity in the upper 30 meters below ground surface at the subject site to be 259 meters per second based on the exploratory borings completed for this investigation. The average shear wave velocity is consistent with a site class D.

We used the U.S. Geological Survey Hazard Tool Application for the analysis. Results are an average of 3 ground motion prediction equations also developed for the 2008 National Seismic Hazards Mapping Project including Boore and Atkinson, 2008, Abrahamson and Silva, 2008, and Chiou and Youngs, 2008. All results are mean plus one standard deviation.

Results of the analysis were plotted as probability of exceedance versus peak ground acceleration for a 50-year exposure period. Results indicate the MCE ground motion is equal to 1.08 g. A plot of return period versus peak ground accelerations is also provided and shows the MCE ground motion has a return period of 2,475 years. Results are summarized on Plate 3.

Uniform hazard response spectra for MCE horizontal ground motion are shown on Plate 3. Probability of exceedance curves were calculated for 10 undamped natural periods between 0.1 to 5 seconds for 2 percent, 5 percent, and 10 percent critical damping using the PSHA results. The design response spectrum and Risk Targeted MCE response spectrum from ASCE7-10 are also shown.

The vertical component of ground motion may be defined by scaling the corresponding horizontal accelerations by a factor of two-thirds.

We deaggregated the PSHA results for MCE peak ground acceleration to determine the magnitude-distance couple that is the primary contribution to hazard at the specified exposure period and risk. The primary contribution to hazard is from a moment magnitude M_w 6.6 earthquake on the Cucamonga Fault at a distance of about 1.6 kilometers. The magnitude-distance couple that contributes the most to hazard may vary at different periods of spectral acceleration.

5.2.3 Liquefaction

The site is not located in a State of California Seismic Hazard Zone for Liquefaction. Liquefaction is a phenomenon in which saturated granular sediments temporarily lose shear strength during periods of earthquake-induced strong ground shaking. The susceptibility of a site to liquefaction is a function of

the depth, density, and water content of the sediments and the magnitude of an earthquake. Saturated, unconsolidated silts, sands, silty sands, and gravels within 50 feet of the ground surface are most susceptible to liquefaction. Typical effects of liquefaction include loss of bearing strength, lateral spreading, and settlement.

The depth to groundwater at the subject site is in excess of 200 feet below ground surface based on nearby groundwater wells. This depth to groundwater precludes the possibility of liquefaction at the subject site.

5.2.4 Earthquake-Induced Landslides

The site is not located in a State of California Seismic Hazard Zone for Earthquake-Induced landslides. Regional geologic maps show no known landslides are located on site or in immediately adjacent areas.

5.2.5 Tsunamis and Seiches

Tsunamis are tidal waves generated by fault displacement or major ground movement on the floor of the ocean. The geographic location of the site precludes the possibility of damage due to Tsunamis.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. The waves can top dams or reservoirs and flood down-gradient areas. The elevation of the site and the local topographic conditions preclude the possibility of damage due to seiches.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Basis

Conclusions and recommendations contained in this report are based upon information provided, information gathered, subsurface exploration, laboratory testing, engineering and geologic evaluations, experience, and judgment. Recommendations contained herein should be considered minimums consistent with industry practice. More rigorous criteria could be adopted, if lower risk of future problems is desired. Where alternatives are presented, regardless of what approach is taken, some risk will remain, as is always the case. Usually the lowest risk is associated with the greatest cost.

6.2 Site Suitability

Geotechnical exploration, analyses, experience, and judgment result in the conclusion that the proposed construction of the water reservoir and administration building is feasible from a geotechnical standpoint. It is our opinion that the site can be improved without hazard of landslide or slippage, and improvement can occur without similar adverse impact on adjoining properties. Realizing this expectation will require adherence to good construction practice, agency and code requirements, the recommendations in this report, and possible addendum recommendations made after plan review and at the time of construction.

6.3 Seismic Design Considerations

6.3.1 CBC Design Parameters

The following seismic design parameters are recommended according to the 2016 Edition of the California Building Code (CBC). Final selection of the appropriate seismic design coefficients should be made by the structural consultant based on the local laws and ordinances, expected response of the proposed structure and the desired level of conservatism.

TABLE 2
Seismic Hazard Response Parameters and Design Parameters CBC (2016)

Latitude: 34.126° - Longitude: -117.682° Seismic Parameter	Period (Sec)	Symbol	Value
Mapped Spectral Acceleration Value, Soil Class B	0.2	S_s	2.420g
Mapped Spectral Acceleration Value, Soil Class B	1.0	S_1	0.899g
Site Coefficient, Subject Site Soil Classification D per 2016 CBC Table 1613.3.3(1)	--	F_a	1.000
Site Coefficient, Subject Site Soil Classification D per 2016 CBC Table 1613.3.3(2)	--	F_v	1.500
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	0.2	S_{MS}	2.420g
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	1.0	S_{M1}	1.349g
Design Spectral Response Acceleration Occupancy Category II per 2016 CBC Section 1613.3.4	0.2	S_{DS}	1.614g

TABLE 2 Seismic Hazard Response Parameters and Design Parameters CBC (2016)			
Latitude: 34.126° - Longitude: -117.682° Seismic Parameter	**Period (Sec)**	**Symbol**	**Value**
Design Spectral Response Acceleration Occupancy Category II per 2016 CBC Section 1613.3.4	1.0	S_{D1}	0.899g
Long Period Transition Period	-	T_L	8 sec
Peak Ground Acceleration Adjusted For Site Class Effects	-	PGA_M	0.933g
Building Assigned Acceleration Seismic Design Category per Table 1613.3.5 (1) and (2)	-	-	F

It should be realized that the purpose of the seismic design utilizing the above parameters is to safeguard against major structural failures and loss of life, but not to prevent damage altogether. Even if the structural engineer provides designs in accordance with the applicable codes for seismic design, the possibility of damage cannot be ruled out if moderate to strong shaking occurs because of a large earthquake. This is the case for essentially all structures in southern California.

6.4 Grading

General

It is anticipated that the proposed construction requires grading. When grading is conducted, it should be done in accordance with good construction practices, minimum code requirements, and the recommendations to follow. General guidelines for grading projects are also provided in Appendix C.

Site Preparation and Grading

Prior to the start of grading operations, utility lines within the project area, if any, should be located and marked in the field so they can be rerouted or protected during site development. All debris and perishable material should be removed from the site.

Based on the information obtained from our investigation, a minimum over-excavation of 7 feet is recommended throughout the pad area for the reservoir and the building. The actual removal depth may be locally increased based on the soil conditions encountered during grading. The maximum differential fill thickness should not exceed more than 5 feet across the pad. The over-excavation

should also provide for a minimum of 5 feet of a properly compacted fill blanket below the bottom of the foundation system. In areas where less critical improvements such as walkways, patio slabs, and pavements, minimum depth of over-excavation and re-compaction is 2 feet.

Based on our visual observations and subsurface exploration at the site, the material present on-site can be excavated with conventional construction equipment. A representative of the geotechnical engineer should be present to review all excavations prior to placing fill. Except at fixed boundary conditions, such as the existing building, the limits of remedial grading should extend a minimum of 5 feet beyond the footprint of the proposed improvements. In the area where the construction abuts the existing building, it is recommended that a temporary 1.5:1 (horizontal to vertical) backcut be made to help mitigate potential damage to existing structure. When excavations deeper than 4 feet are made, temporary construction slopes should be no steeper than 1.5:1 (horizontal to vertical). It should be realized that the site is underlain by gravelly sand or silty sand materials that are subjected to sloughing and caving. Sheeting and bracing should be provided by the contractor, as necessary, to protect workers in the excavation.

Where excavations undermine existing improvements, such as the existing walls, etc., temporary structural support should be provided to reduce the risk of damage resulting from undercutting. Permanent cut and fill slopes should not be constructed steeper than 2:1, and should be considered subject to review by the geotechnical consultant at the time of grading. These slopes should possess sufficient compacted fines to limit erosion risk. If upon construction, relatively clean, cohesionless sands are encountered, reconstruction by blending in fines to compacted fill and/or flattening of slopes will be advised.

Where fill is to be placed, the upper 6 to 8 inches of the surface exposed by the excavation should be scarified, moisture-conditioned to 2 to 3 percent over optimum moisture content, and compacted to 95 percent relative compaction.[1] If localized areas of relatively loose soil prevent proper compaction, over-excavation and re-compaction will be necessary. The on-site soil is generally suitable for use as compacted fill and backfill, provided that any cobbles or rock fragments greater than 4 inches are

[1] Relative compaction refers to the ratio of the in-place dry density of soil to the maximum dry density of the same material as obtained by the "modified proctor" (ASTM D1557) test procedure.

screened and removed from the soil prior to placement and compaction. A limitation of particle size to 2 inches is preferred. Compaction testing will be facilitated by a smaller, maximum particle size.

All grading should be conducted in accordance with the applicable codes, agency requirements, the aforementioned recommendations, and the grading guidelines that accompany this report as mentioned above.

Import Fill Material

The import fill material, if utilized, should meet the following criteria:

1. No particles larger than 4 inches in largest dimension (limit to 2 inches is preferred).
2. Free of perishable material.
3. Plasticity Index of 20 or less and Liquid Limit of 40 or less.
4. Expansion Index of 20 or less.

Hydro-Consolidation

Our investigation indicates potential for hydro-consolidation of near surface materials. Hydro-consolidation occurs when the soil becomes saturated. Since the proposed reservoir is going to be used for the purpose of water storage, we recommend that all efforts be taken not to allow water to leak into the subgrade. We recommend that a waterproofing system below the reservoir floor as well as side walls be designed and implemented.

Our investigation indicates that the potential for hydro-consolidation is particularly significant in the upper 20 feet. The above recommended over-excavation and recompaction will reduce this potential.

6.5 Temporary Shoring

As we understand, the proposed reservoir will be partially buried. As recommend above, the temporary excavation slopes should not be steeper than 1.5:1 (horizontal to vertical). If excavations with vertical walls are planned, temporary shoring should be designed and implemented at the site. Shoring could consist of soldier pile wall or a similar system. Cantilever temporary shoring, where deflection of the shoring will not impact the performance of adjacent structures, may be designed using the active equivalent fluid pressures of 40 pcf for level backfill conditions. Wherever the shoring is located close to the existing structures, braced shoring may be used to limit the deflection. If utilized, braced shoring

should be designed utilizing a uniform soil pressure of 25H in pounds per square foot (psf) where H is the depth of excavation in feet. Surcharge building and other loads (walls, equipment, traffic, etc.) located within a 1:1 (horizontal to vertical) projection from the base of the shoring should also be added to the above recommended lateral earth pressure. Allowable passive pressure is 300 psf.

Continuous lagging should be provided between the soldier piles. Lagging should be placed in a during excavation to minimize potential sloughing. The lagging should be backfilled with a minimum of one sack cement slurry or compacted granular soil.

It is difficult to predict the actual shoring deflection. However, it should be realized that some deflection will occur. The shoring should be designed to limit deflection to within tolerable limits. If greater deflection occurs during construction, additional bracing may be necessary.

Prior to construction, the shoring plans should be reviewed by the geotechnical consultants to verify conformance with the recommendations provided above.

6.6 Preliminary Foundation Recommendations

General

Minimum criteria for the design of foundations applicable to the project are provided below. The criteria should not be considered a substitute for design by a structural engineer. The structural engineer should analyze the actual soil-structure interaction and consider, as needed, bearing, strength, stiffness, and deflections in the various slab, foundation, and other elements of the proposed structure to develop appropriate, design-specific details. Other influences may have to be considered as conditions dictate. The structural engineer should consider all applicable codes and authoritative sources where needed. If analyses by the structural engineer result in less critical details than are provided herein as minimums, the minimums presented herein should be adopted. It is likely that some more restrictive details will be required. If the structural engineer has any questions or requires further assistance, please do not hesitate to call or otherwise transmit the engineer's requests.

Foundation Design

The proposed water reservoir can be supported on a conventional shallow (ring) foundation system and/or structural mat slab founded on compacted fill. A minimum 5 feet of compacted fill blanket below

the bottom of the footing is recommended. The administration building can also be supported on shallow foundation founded on a minimum 5 feet thick compacted fill. Allowable design parameters for foundations are provided below.

Minimum exterior and interior footings embedment into compacted fill (measured from lowest adjacent grade) ..... 24 inches

Minimum footing width .....1.5 feet

Allowable Bearing pressure

a. Sustained loads (pounds per square foot).....1,500 psf

b. Total loads (including wind or seismic, increase by 1/3rd).....2,000 psf

Resistance to lateral loads

a. Passive soil resistance (pounds per cubic foot) within compacted fill .....300 pcf

b. Coefficient of sliding friction..... 0.5

Subgrade modulus .....100 pci

The allowable bearing pressures are for dead plus long-term live loads and include a factor-of-safety of at least 3.0. The allowable bearing pressure indicated above can be increased by 500 psf for every additional foot of embedment, but not to exceed 2,500 psf. It should be noted that a minimum 5 feet of uniform fill blanket below the footing bottom is recommended above. As such, if the footing depth is increased, the minimum depth of removal and recompaction should also be increased accordingly.

Footings can be designed to resist lateral loads by using a combination of sliding friction and passive resistance. The coefficient of friction should be applied to dead load forces only. The upper one-foot of passive resistance should be neglected where the soil is not confined by slabs or pavements.

Footings designed and constructed in accordance with the foregoing criteria are expected to settle less than 1-inch. Differential settlement of approximately half of the total settlement is expected over a distance of about 50 feet.

Building Slab-on-Grade

The slab-on-grade in the interior of the building should be a minimum of 5 inches thick and reinforced with No. 4 bars at 16 inches on center, both ways. The structural engineer should provide final slab detailing as necessary based on the overall foundation design. The slab should be underlain by 15-mil Stego wrap membrane. The Stego membrane splices should be staggered between layers. The membrane should be sealed at all splices, around plumbing, and at the perimeter of slab areas. Every effort should be made to provide a continuous barrier and care should be taken not to puncture the membrane. Below the membrane and on top of the subgrade, an approximately 4-inch thick layer of free-draining crushed rock base (e.g., 3/4-inch rock) is recommended. The crushed rock should have no more than ten percent passing the 3/4-inch sieve or more than 3 percent passing the No. 200 sieve. To protect the Stego membrane from the angular corners of crushed rock, a layer of Mirafi 140N should be placed on the rock subgrade with 8 inch laps at splices.

6.7 Lateral Earth Pressure

The side walls of the water reservoir buried should be designed to resist the lateral earth pressure of 45 pounds per cubic foot (pcf) for level backfill conditions. If the structure is restrained at the top, an at-rest earth pressure of 60 pcf should be utilized in the design. The allowable passive pressure is 300 pcf. Appropriate allowances should be made for anticipated surcharge loading. It is assumed that the project engineer will incorporate an appropriately designed wall backdrain system for the purpose of mitigating potential for hydrostatic and/or seepage forces. It is also assumed that the walls are backfilled with predominantly granular, non-expansive materials. The uppermost 1.0 to 1.5 feet should be backfilled with more cohesive material to minimize surface infiltration.

For seismic loading condition, an additional seismic earth pressure of 34 pcf should be added to the static earth pressures given above. For simplicity, the seismic earth pressure can be applied as a uniform pressure equal to 17 times H, where H is the retaining height.

It should be pointed out that the use of heavy compaction equipment in close proximity to the retaining walls can result in excess wall movement and/or soil loadings exceeding the design values. In this regard, care should be taken during the backfilling operations.

6.8 Concrete

Laboratory testing indicated that the surface soil at the site has low levels of sulfates, and as such no special sulfate resistant concrete mix design is required. However, we recommend that low-permeable concrete be utilized for the project. For this purpose, the water-to-cement ratio in the concrete should be limited to 0.5 (0.45 preferred). Use of utilizing Type V cement is also preferred. Limited use (subject to approval of mix designs) of a water-reducing agent may be included to increase workability. The concrete should be properly cured to minimize risk of shrinkage cracking. One-inch hard rock mixes are recommended. Pea-gravel mixes are specifically not recommended but could be utilized for relatively non-critical improvements (e.g., flatwork) and other improvements provided the mix designs consider limiting shrinkage. Contractors/other designers should take care in all aspects of designing mixes, detailing, placing, finishing, and curing concrete. The mix designers and contractor are advised to consider all available steps to reduce cracking. The use of shrinkage compensating cement or fiber reinforcing should be considered. Mix designs proposed by the contractor should be considered subject to review by the project engineer.

6.9 Corrosion Potential

In addition to sulfate tests, Chloride, pH, and resistivity tests on near-surface site soil were performed. Results of these tests are presented in Appendix B. While nothing stands out among the test results as particularly problematic, appropriate design considerations should be made for the risk of damage from corrosion.

6.10 Field Construction Review

During construction, a number of reviews by this office are recommended to verify the site geotechnical conditions and conformance with the intentions of the recommendations for construction. Although not all possible geotechnical observation and testing services are required by the City, the more site

reviews requested, the lower the risk of future problems. The following site reviews are advised, some of which will probably be required by the agencies.

Preconstruction/pregrading meeting	Advised
Periodic soil and geologic observation and testing during any grading	Required
Foundation excavation	Required
Reinforcement for slab/foundations	Advised

Unless otherwise agreed to in writing, all supplemental consulting services will be provided on an as-needed, time-and-expense fee schedule basis.

7.0 REMARKS

Only a portion of the subsurface conditions have been reviewed and evaluated. Conclusions, recommendations, and other information contained in this report are based upon the assumption that subsurface conditions do not vary appreciably between and adjacent to observation points. Although no significant variation is anticipated, it must be recognized that variations can occur.

This report has been prepared for the sole use and benefit of our client. The intent of this report is to advise our client on geotechnical matters involving the proposed improvements. It should be understood that the geotechnical consulting provided and the contents of this report are not perfect. Any errors or omissions noted by any party reviewing this report and/or any other geotechnical aspect of the project should be reported to this office in a timely fashion. The client is the only party intended by this office to directly receive the advice. Subsequent use of this report can only be authorized by the client. Any transferring of information or other directed use by the client should be considered "advice by the client."

Geotechnical engineering is characterized by uncertainty. Geotechnical engineering is often described as an inexact science or art. Conclusions and recommendations presented herein are partly based upon the evaluation of technical information gathered, partly on experience, and partly on professional judgment. The conclusions and recommendations presented should be considered "advice." Other consultants could arrive at different conclusions and recommendations. Typically, "minimum" recommendations have been presented. Although some risk will always remain, lower risk of future problems would usually result if more restrictive criteria were adopted. Final decisions on matters presented are the responsibility of the

client and/or the governing agencies. No warranties in any respect are made as to the performance of the project.

We hope that this is the information you require at this time. Please contact our office should you have any questions.

Respectfully submitted,

AMERICAN GEOTECHNICAL, INC.

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G.E. 2504

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G.E. 103

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Enclosures: Appendix A – Boring Logs
Appendix B – Summary of Laboratory Testing Data
Appendix C – Geotechnical Guidelines for Grading Projects

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Abrahamson, N. A., and W. J. Silva (2008), Summary of the Abrahamson & Silva NGA Ground-Motion Relations, Earthquake Spectra, 24(1), 67-97.

Boore, D. M., and G. M. Atkinson (2008), Ground-motion prediction equations for the average horizontal component of PGA, PGV, and 5%-Damped PSA at spectral periods between 0.01s and 10.0s, Earthquake Spectra, 24(1), 99-138.

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Site Location Map

17th Street & Benson Avenue

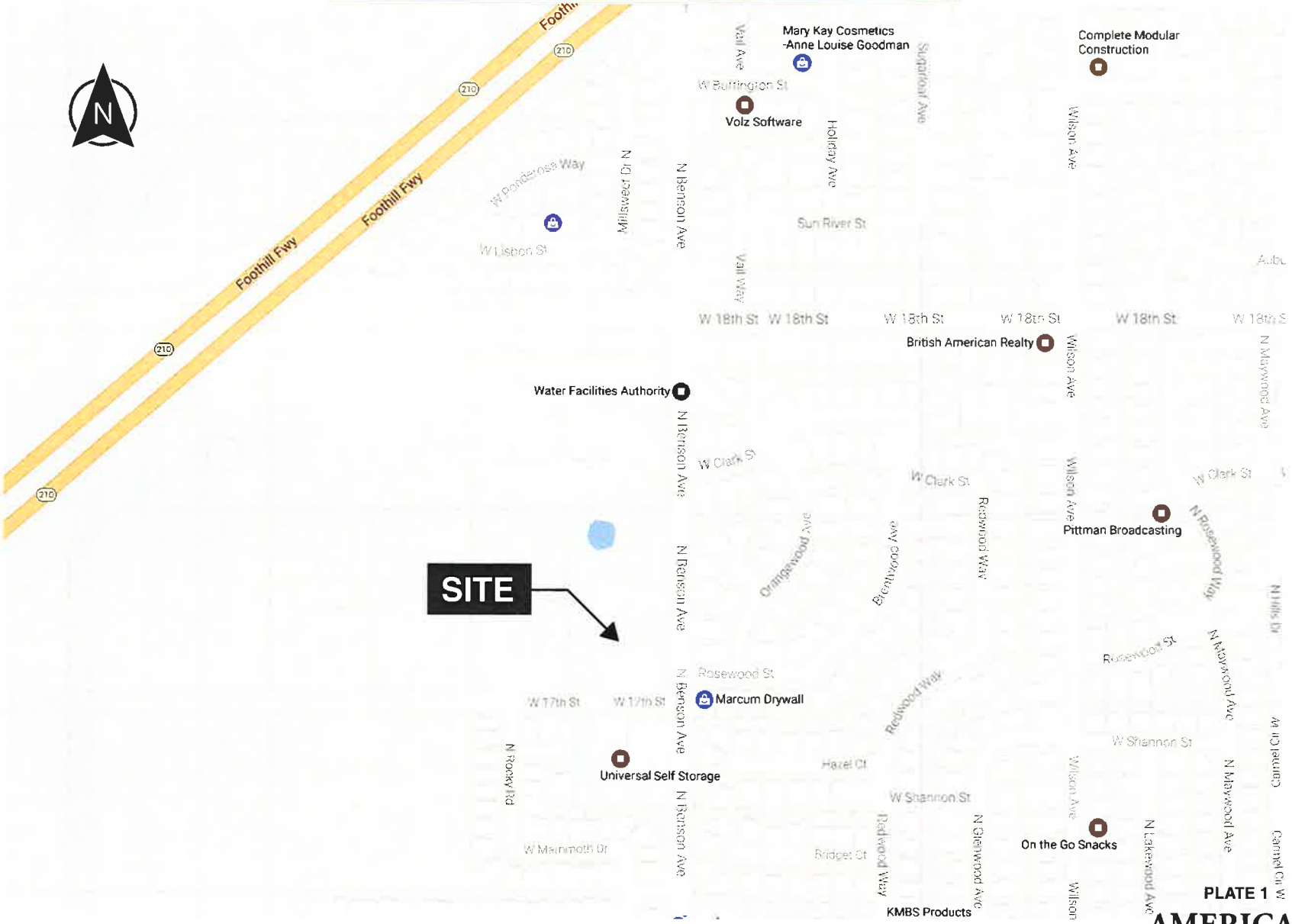


PLATE 1

AMERICAN GEOTECHNICAL, INC.

F.N. 33917-01 FEB 2017

PROPOSED RESERVOIR LAYOUT SITE PLAN

SCALE : 1" : 30'-0"

GEOLOGIC MAP
UPLAND-REPLACEMENT OF 7.5MG RESERVOIR
F.N. 33917-01 PLATE 2

BRADY
3710 Ruffin Road
San Diego, California 92123
Tel: (858) 496-0500
Fax: (858) 496-0505

NO.	REVISIONS:	DATE	BY:

THIS PLAN WAS ELECTRONICALLY SIGNED AND STAMPED

ENGINEER:	BRADY DESIGN GROUP
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	

VERTICAL CONTROL:
HORIZONTAL CONTROL:

SHEET TITLE PROPOSED RESERVOIR LAYOUT SITE PLAN

PROJECT: CITY OF UPLAND - REPLACEMENT OF 7.5 MG RESERVOIR

ADDRESS: 17th ST. & BENSON
UPLAND, CA 91786

CONTRACT NO.
PROJECT NO. 9128

DRAWING NO.
C4

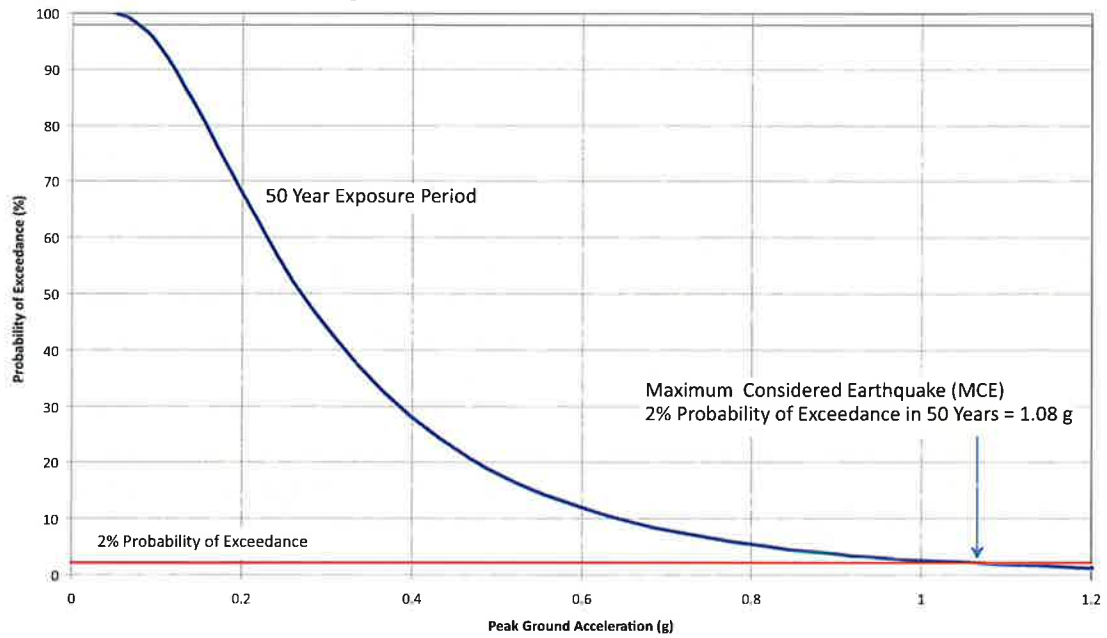
SHEET 1 OF 1 SHEETS

REVISION DATES (DESIGN STAGE ONLY)

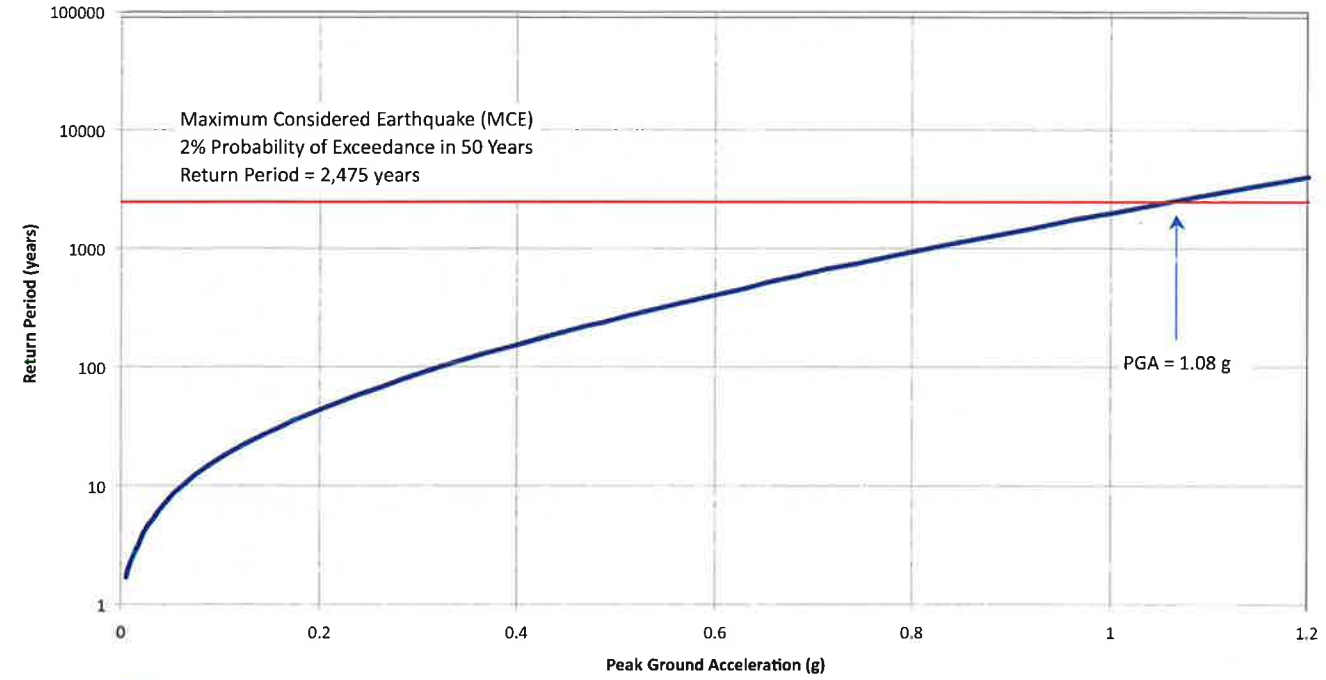
Sheet Version 3.0

P:\UPLAND\UPLAND.001.001.00\03 Eng & Design\DWG\02-Civ\UPLAND_C4.dwg 1/4/2017 3:36 PM Garrett Murawsky

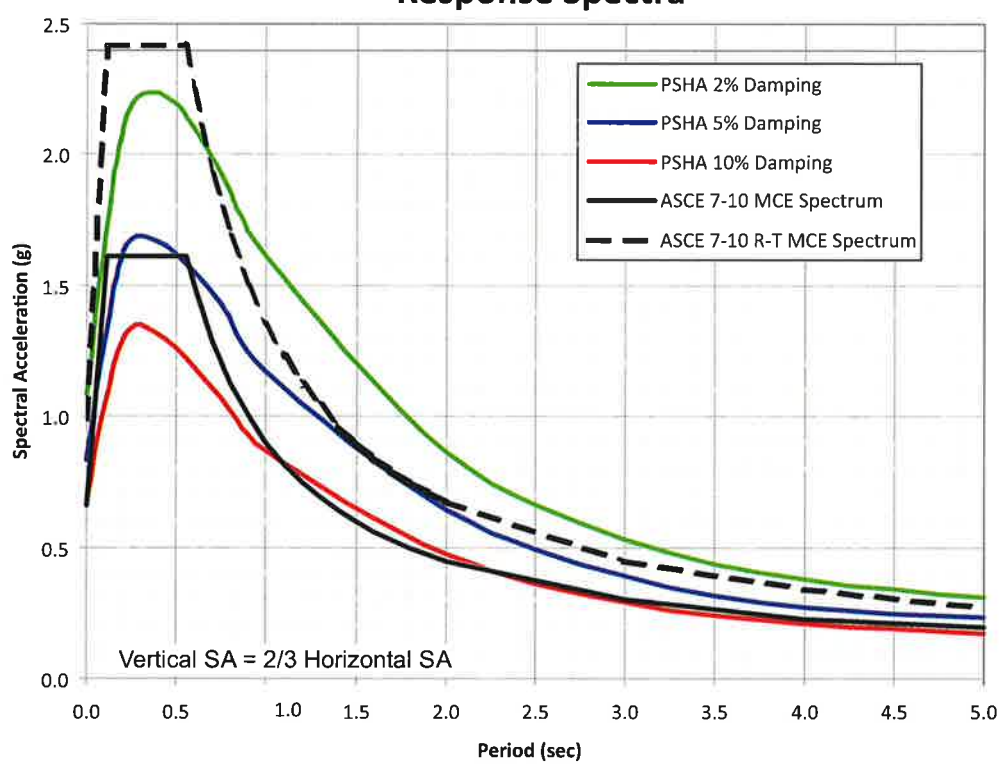
Probability of Exceedance Versus Acceleration



Return Period Versus Acceleration



Response Spectra



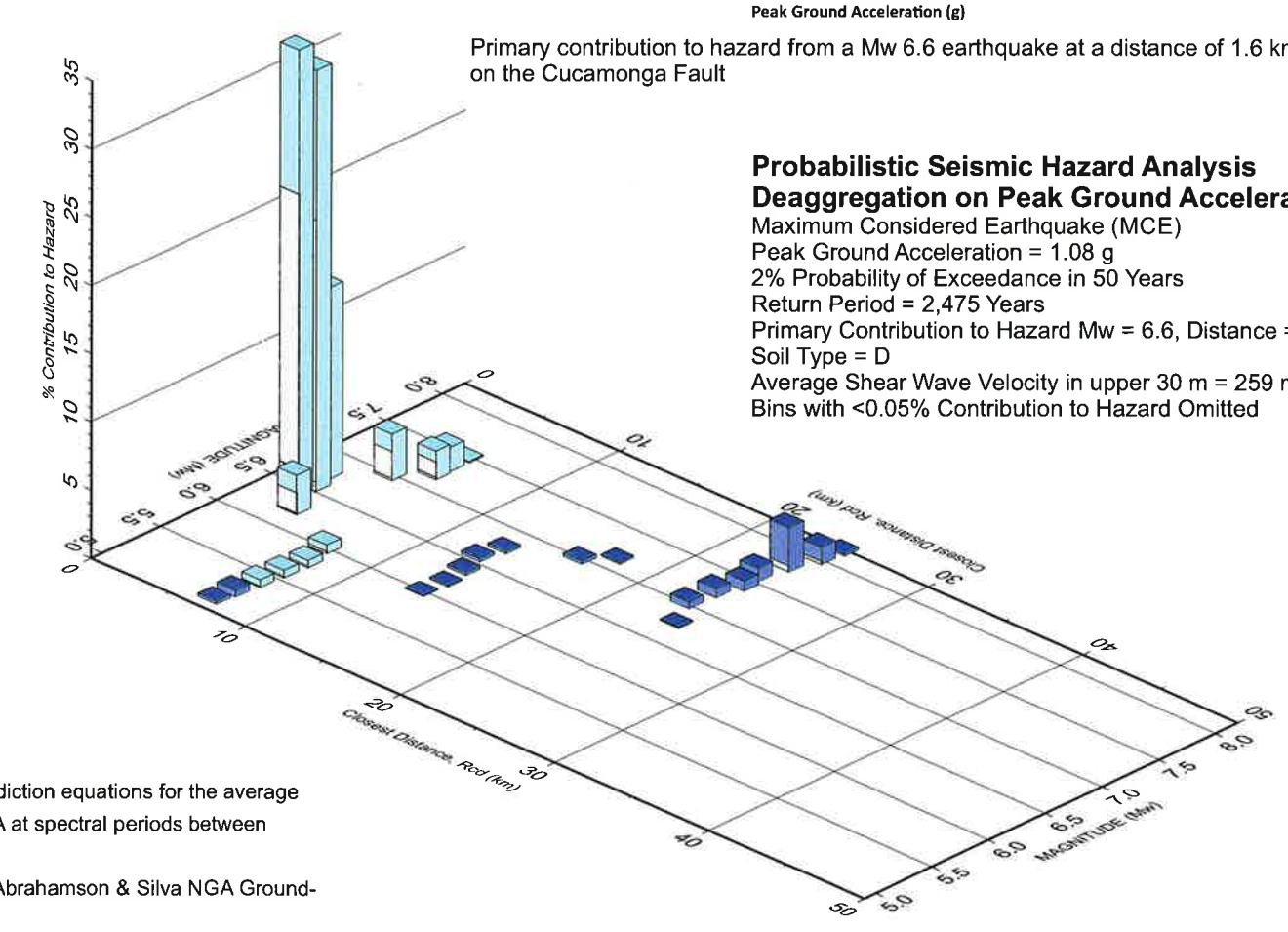
Upland Reservoir
Lat/Long = 34.126 / -117.682
V_{S30} = 259 m/s
Fault Model = USGS/CGS NSHMP 2008
Hazard Model = USGS Hazard Tool Application
Average from 3 GMPE's

Boore, D. M., and G. M. Atkinson (2008), Ground-motion prediction equations for the average horizontal component of PGA, PGV, and 5%-Damped PSA at spectral periods between 0.01s and 10.0s, Earthquake Spectra, 24(1), 99-138.

Abrahamson, N. A., and W. J. Silva (2008), Summary of the Abrahamson & Silva NGA Ground-Motion Relations, Earthquake Spectra, 24(1), 67-97.

Chiou, B. S.-J. and Youngs R. R. (2008), An NGA model for the average horizontal component of peak ground motion and response spectra, Earthquake Spectra, 24(1), 173-215.

Primary contribution to hazard from a Mw 6.6 earthquake at a distance of 1.6 km on the Cucamonga Fault



Probabilistic Seismic Hazard Analysis
Deaggregation on Peak Ground Acceleration
Maximum Considered Earthquake (MCE)
Peak Ground Acceleration = 1.08 g
2% Probability of Exceedance in 50 Years
Return Period = 2,475 Years
Primary Contribution to Hazard Mw = 6.6, Distance = 1.6 km
Soil Type = D
Average Shear Wave Velocity in upper 30 m = 259 m/s
Bins with <0.05% Contribution to Hazard Omitted

AMERICAN GEOTECHNICAL, INC.
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Probabilistic Seismic Hazard Analysis, Upland Reservoir

SCALE:	DATE:	FILE NO.:
N.T.S	FEB 2017	33917-01

FIGURE **3**

Appendix A

Boring Logs

Boring No:	**AGSB-1**	**FN:**	**33917-01**
Project Name:	Upland Reservoir	Sheet:	1 of 1
Location:	N. 17th Street and Benson	Start:	1/18/2017
Estimated Surface Elev.	+/- feet	End:	1/18/2017
Total Depth (ft.)	11 +/- feet	Initials:	JP
Drill Rig Type (hammer, drop, etc.)	CME 75, 140 ib, 30" drop		
Completion, Groundwater, etc.	Refusal at 11', No groundwater		

Depth (feet)	Sample Type: INTACT	Sample Type: BULK	Blow Counts	Dry Unit Wt (PCF)	Moisture Content (%)	Laboatory Tests	USCS Symbol	Graphic Log	Field Description
									Surface Condition: Bare Soil Area
									Subsurface Conditions: FORMATION; Color, Classification, Moisture content, density/stiffness, etc.
0									**Alluvium (0-11')**
									Gravelly Sand w/ cobbles and silt, medium to dark reddish brown, dry to slightly moist, very dense
	X		58						
5	X		53						@5' - no recovery
									refusal at 6', move boring over 5 ', restarted drilling
	X		27 for 8"						
									@8' **Sandy Gravel**, light brownish gray, dry, very dense, angular to subrounded.
10	X		72						
									Refusal at 11', boring backfilled with drillling cuts/spoils
									Refusal on nested cobbles/boulders; no gorund water encountered. Sampling blow counts likely affected by gravel, cobble and boulder fraction of earth materials.
15									
20									

Notes:

Plate **B1**

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Boring No:	**AGSB-2**	**FN:**	**33917-01**
Project Name:	Upland Reservoir	Sheet:	1 of 1
Location:	N. 17th Street and Benson	Start:	1/18/2017
Estimated Surface Elev.	+/- feet	End:	1/18/2017
Total Depth (ft.)	17.5 +/- feet	Initials:	JP
Drill Rig Type (hammer, drop, etc.)	CME 75, 140 ib, 30" drop		
Completion, Groundwater, etc.	Refusal at 17.5', No groundwater		

Depth (feet)	Sample Type: INTACT	Sample Type: BULK	Blow Counts	Dry Unit Wt (PCF)	Moisture Content (%)	Laboatory Tests	USCS Symbol	Graphic Log	Field Description
									Surface Condition: Bare soil area
									Subsurface Conditions: FORMATION; Color, Classification, Moisture content, density/stiffness, etc.
0									**Alluvium (0-17.5')**
									Gravelly Sand, medium reddish brown, dry to slightly moist, very dense, sand is fine to coarse grained, well graded
	X		91						
5	X		47						@5' - no recovery
									refusal at 6', move boring over 5 ', restarted drilling
	X		68						
									@8' becomes yellowish brown, slightly moist, sand is very fine to medium grained w/ silt
10	X		35 for 3"						
15	X		50 for 6"						
									Refusal at 17.5', boring backfilled with drillling cuts/spoils
20									

Notes:

Refusal on nested cobbles/boulders; no gorund water encountered. Sampling blow counts likely affected by gravel, cobble and boulder fraction of earth materials.

Plate **B2**

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Boring No:	**AGSB-3**	**FN:**	**33917-01**
Project Name:	Upland Reservoir	Sheet:	1 of 1
Location:	N. 17th Street and Benson	Start:	1/18/2017
Estimated Surface Elev.	+/- feet	End:	1/18/2017
Total Depth (ft.)	21 +/- feet	Initials:	JP
Drill Rig Type (hammer, drop, etc.)	CME 75, 140 ib, 30" drop		
Completion, Groundwater, etc.	No groundwater		

Depth (feet)	Sample Type: INTACT	Sample Type: BULK	Blow Counts	Dry Unit Wt (PCF)	Moisture Content (%)	Laboatory Tests	USCS Symbol	Graphic Log	Field Description
									Surface Condition: Bare soil area
									Subsurface Conditions: FORMATION; Color, Classification, Moisture content, density/stiffness, etc.
0									**Alluvium (0-21')**
									Gravelly Sand, medium reddish brown, slightly moist, very dense
	X		31						
5	X		35 for 3"						
	X		80 for 11"						
									@7.5' becomes light yellowish brown, slightly moist, sand is fine grained
10	X		50 for 3"						
15	X		67						
20	X		86						@20' becomes medium yellowish brown, coarse grained sand, sub-rounded and suab-angular gravel

Notes: Total Depth = 21', no groundwater encountered; boring backfilled with excavated spoils.
Sampling blow counts likely affected by gravel, cobble and boulder fraction of earth materials.

Plate **B3**

American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

Boring No:	**AGSB-4**	**FN:**	**33917-01**
Project Name:	Upland Reservoir	Sheet:	1 of 1
Location:	N. 17th Street and Benson	Start:	1/18/2017
Estimated Surface Elev.	+/- feet	End:	1/18/2017
Total Depth (ft.)	21 +/- feet	Initials:	JP
Drill Rig Type (hammer, drop, etc.)	CME 75, 140 ib, 30" drop		
Completion, Groundwater, etc.	No groundwater		

Depth (feet)	Sample Type: INTACT	Sample Type: BULK	Blow Counts	Dry Unit Wt (PCF)	Moisture Content (%)	Laboatory Tests	USCS Symbol	Graphic Log	Field Description
									Surface Condition: Bare soil area
									Subsurface Conditions: FORMATION; Color, Classification, Moisture content, density/stiffness, etc.
0									**Alluvium (0-21')**
									Gravelly Sand, medium brownish grey, slightly moist, dense, fine grained sand, sub-rounded to angular gravel
	X		39						
5	X		27						
	X		66						
10	X		80 for 10"						@10' becomes light brownish grey, dense to very dense, fine to very fine grained sand
15	X		50 for 5"						
20	X		85 for 9"						Boring terminatd at 21'

Notes: Total Depth = 21', no groundwater encountered; boring backfilled with excavated spoils.
Sampling blow counts likely affected by gravel, cobble and boulder fraction of earth materials.

Plate **B4**

American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

Appendix B

Summary of Laboratory Testing Data

TABLE B1 - Laboratory Testing Summary

Project: Upland Water Reservoir
File No.: 33917-01
Date: February 2017

Excavation ID	Sample Depth (feet)	Moisture Content (%)	Dry Density (pcf)	Saturation (%) S.G.=2.7	Swell (+)/ Collapse (-) (%)	COMPACTON			CHEMICAL ANALYSIS			
						Max. Density (pcf)	Opt. Moisture Content (%)	Relative Compaction (%)	Resistivity (Ohm-cm)	Chloride (mg/Kg)	Sulfate (mg/Kg)	pH
AGSB-1	0-5	-	-	-	-	139	7.2	-	8,100	13	36	8.38
AGSB-2	5-6	2.8	119.3	18	-0.35@600 psf	-	-	-	-	-	-	-
	10-11	3.1	124.6	24	-5.9@1200 psf	-	-	-	-	-	-	-
	15-16	3.0	119.0	20	-	-	-	-	-	-	-	-
AGSB-3	0-5	-	-	-	-	149.0	6.7	-	8,600	37	15	8.03
	5-6	4.2	103.5	18	-12.8@600 psf	-	-	-	-	-	-	-
	10-11	2.9	90.1	9	-5.6%@1200 psf	-	-	-	-	-	-	-
	20-21	2.3	121.4	16	-0.7@2400 psf	-	-	-	-	-	-	-
AGSB-4	5-6	2.9	124.8	22	-	-	-	-	-	-	-	-
	10-11	1.4	140.4	19	-	-	-	-	-	-	-	-
	20-21	2.3	114.8	13	-	-	-	-	-	-	-	-

Notes:

Sulfates (%) (multiply by 10,000 to get		Chlorides (%) (multiply by 10,000 to get mg/kg)		Resistivity (ohm-cm)	
0.00 - 0.10	Negligible	0.001 - 0.0025	Slightly Corrosive	Under 500	Very Corrosive
0.10 - 0.20	Moderate	0.0025 - 0.01	Moderately Corrosive	500 - 1000	Corrosive
0.20 - 2.00	Severe	0.01 - 0.05	Very Corrosive	1000 - 2000	Moderately Corrosive
Over 2.00	Very Severe	Over 0.05	Extremely Corrosive	2000 - 10,000	Mildly Corrosive
Sulfate directly affect concrete by chemical reactions.		Chlorides affect metal reinforcements, piping, and other metal components by corrosion.		Over 10,000	Negligible
				Resistivity indicates how corrosive soil can be.	

pH is a measure of how acidic/basic water is. The range goes from 0 - 14, with 7 being neutral (e.g. pure water). pHs of less than 7 indicate acidity, whereas a pH of greater than 7 indicates a base. pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water. Higher the acidic/base conditions higher the corrosiveness.

Note:Corrosion risk should not be based on soil test results alone. The characteristics of the at-risk improvements should be considered along with environmental influences that may affect corroion risk.

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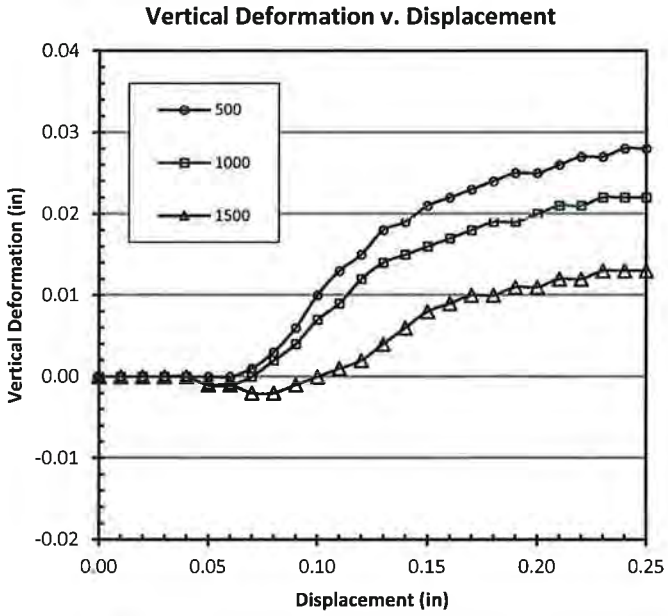
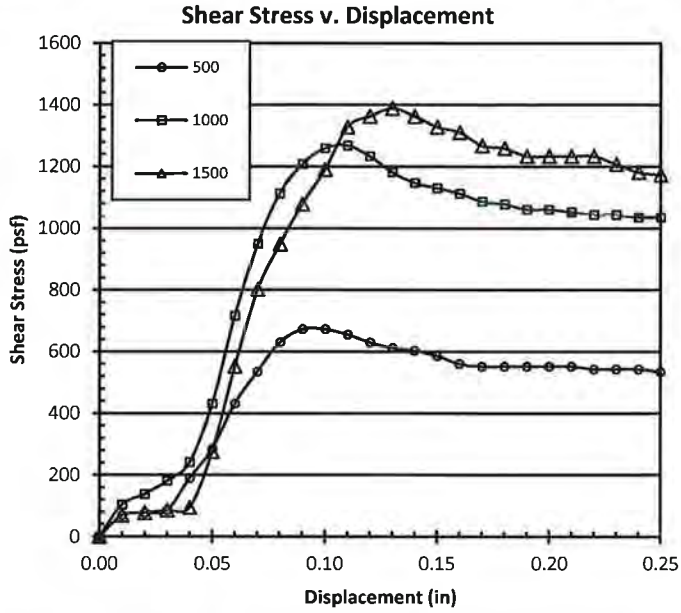
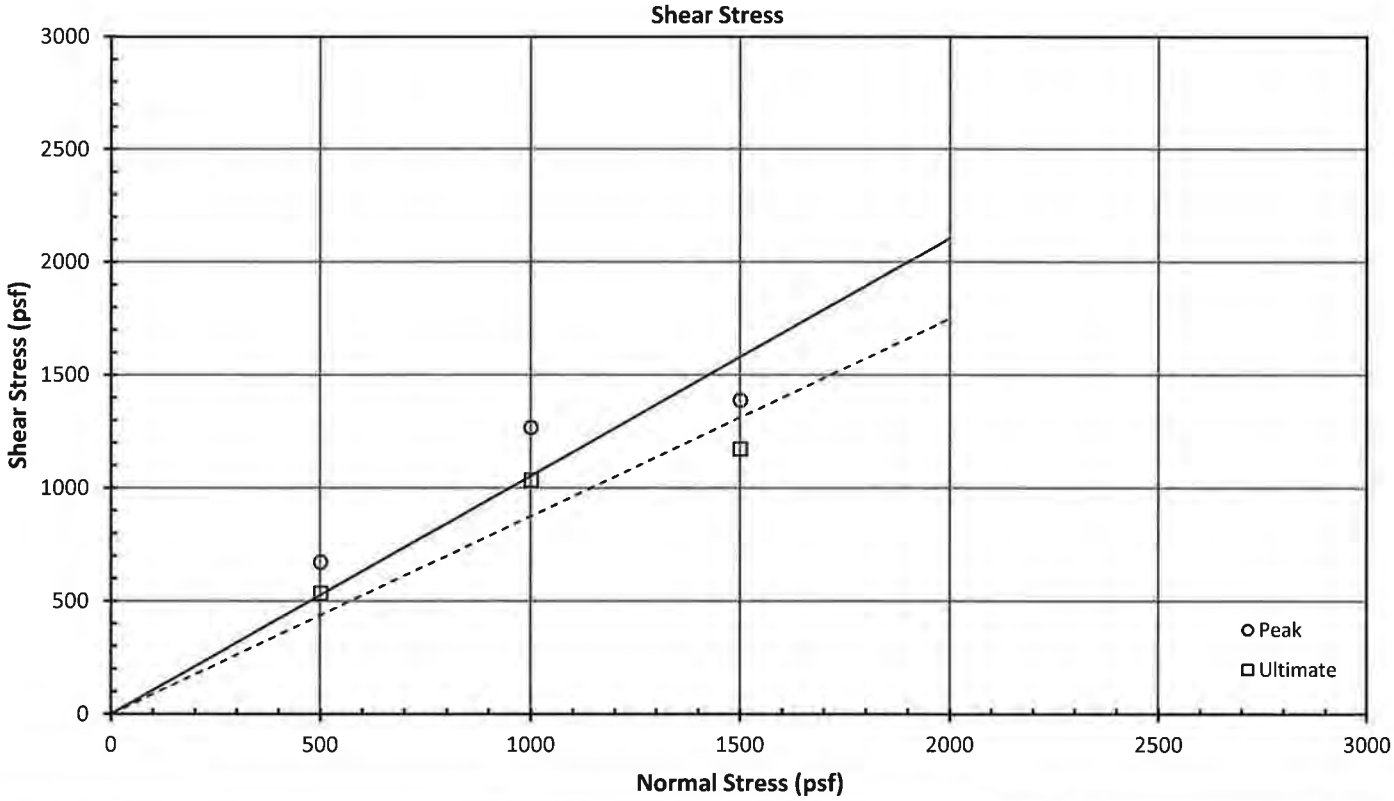
Samples Tested	1	2	3	4
Boring ID	AGSB-3	AGSB-3	AGSB-3	0
Depth (in/ft.)	0-5'	0-5'	0-5'	0
Initial Dry Density (pcf)	0	0	0	0
Initial Moisture Content (%)	0	0	0	0
Normal Stress (psf)	500	1000	1500	0
Maximum Shear Stress (psf)	673	1268	1389	0
Ultimate Shear Stress (psf)	535	1035	1173	0
ASTM D3080 Soil Type	Grav. Sand	Grav. Sand	Grav. Sand	0

	Peak	Ultim.
Friction, phi (Deg)	46	41
Cohesion (psf)	0	0

Sample Type:	Remold
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Strain Rate (in/min):	0.01





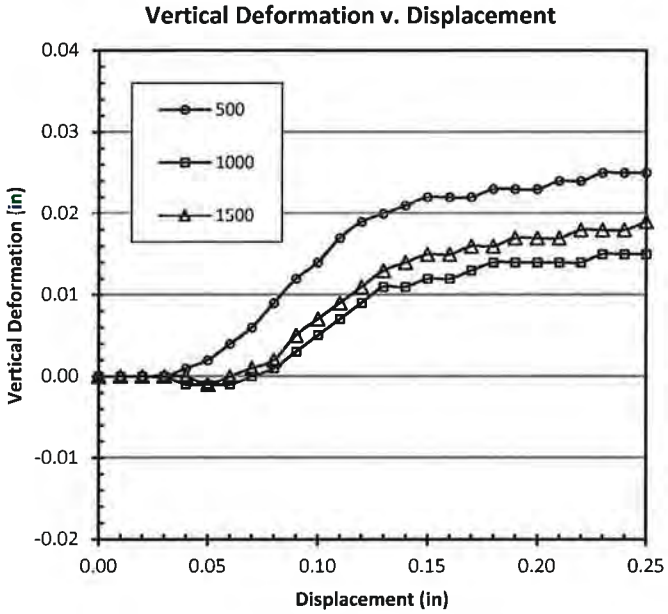


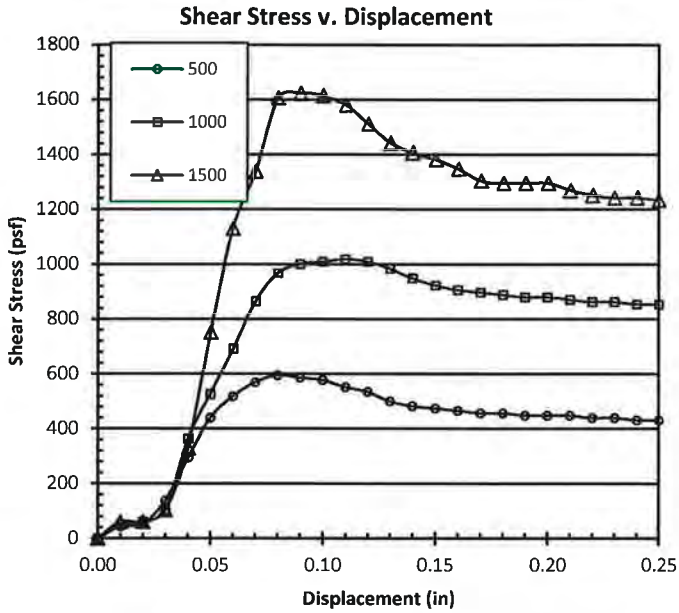
American Geotechnical, Inc.	DIRECT SHEAR TEST RESULTS Brady/Upland Water Res 15 N. 17th st./N. Benson Ave.,	F.N.: 33917-01 Date: Feb 2017	Plate B1

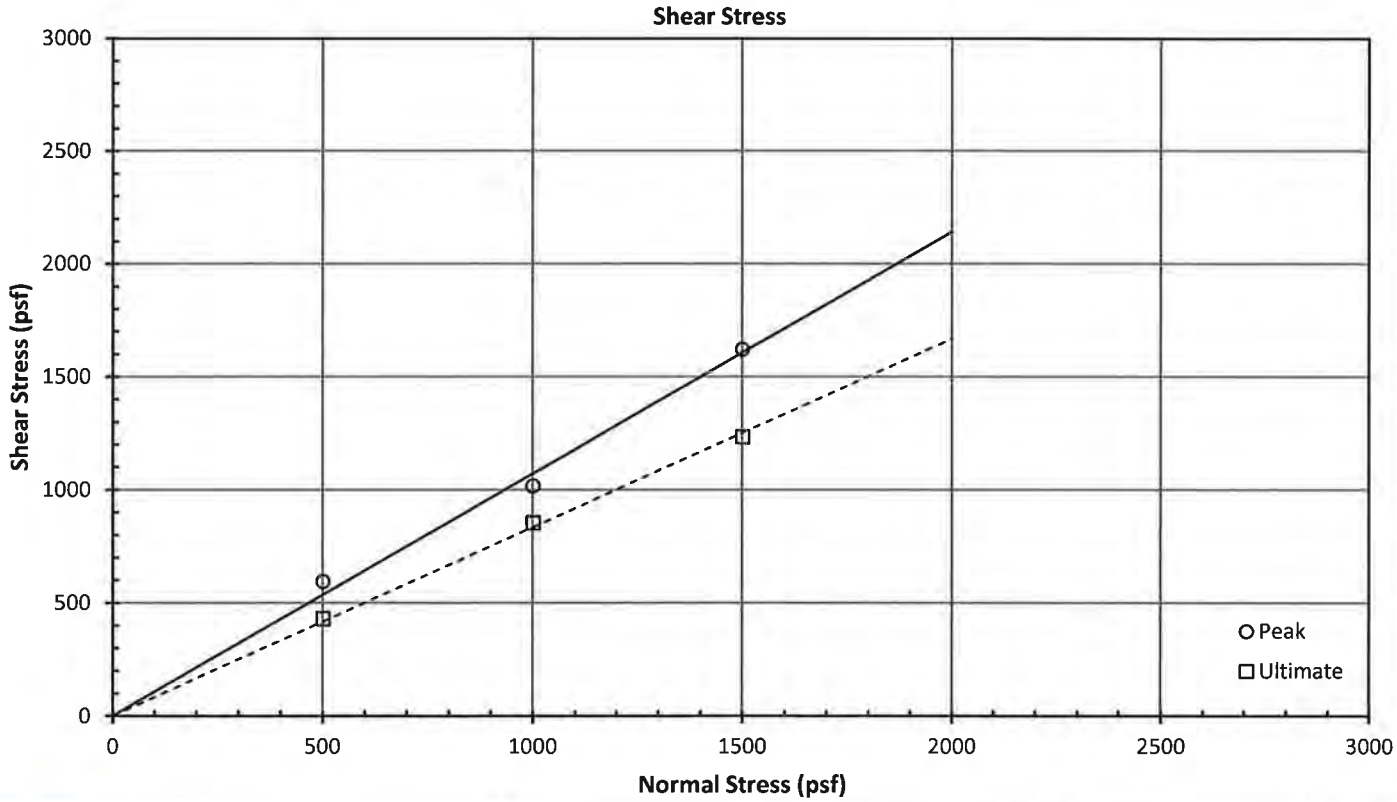
Samples Tested	1	2	3	4
Boring ID	AGSB-1	AGSB-1	AGSB-1	0
Depth (in/ft.)	0-5'	0-5'	0-5'	0
Initial Dry Density (pcf)	0	0	0	0
Initial Moisture Content (%)	0	0	0	0
Normal Stress (psf)	500	1000	1500	0
Maximum Shear Stress (psf)	595	1018	1622	0
Ultimate Shear Stress (psf)	431	854	1234	0
ASTM D3080 Soil Type	Grav. Sand	Grav. Sand	Grav. Sand	

	Peak	Ultim.
Friction, phi (Deg)	47	40
Cohesion (psf)	0	0

Sample Type:	Remold
Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Strain Rate (in/min):	0.01

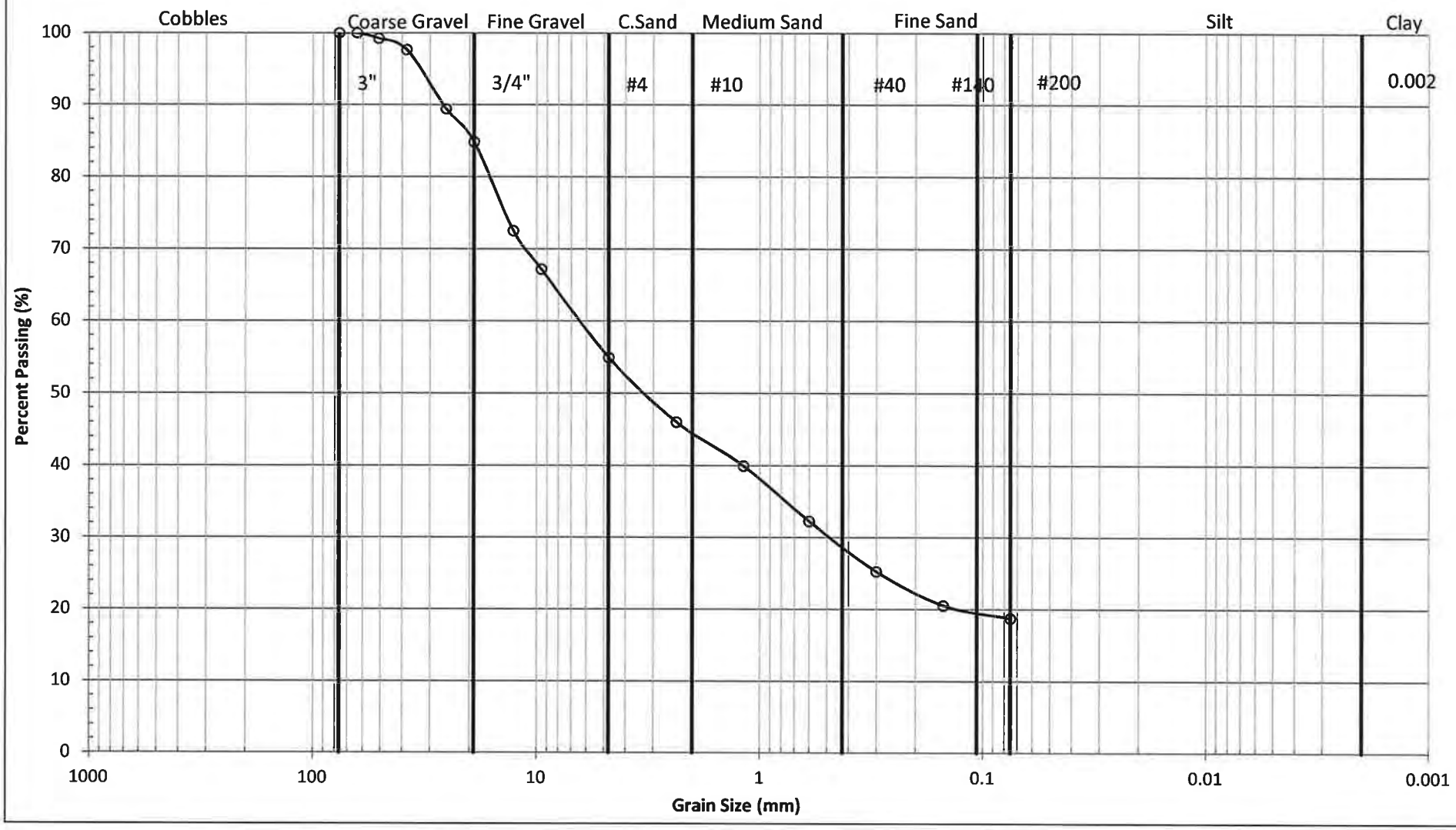






American Geotechnical, Inc.	**DIRECT SHEAR TEST RESULTS** Brady/Upland Water Res 15 N. 17th st./N. Benson Ave.,	F.N.: 33917-01 Date: Feb 2017	**Plate B2**

Grain Size



Project Name: Brady/Upland Water Res 15
Location: N. 17th st./N. Benson Ave.
File No: 33917-01
Date: 2/9/2017
Excavation: AGSB-1
Depth: 0-5'
By: RH

% Gravel =	45.1
% Sand =	36.2
% Fines =	18.7
SUM=	100

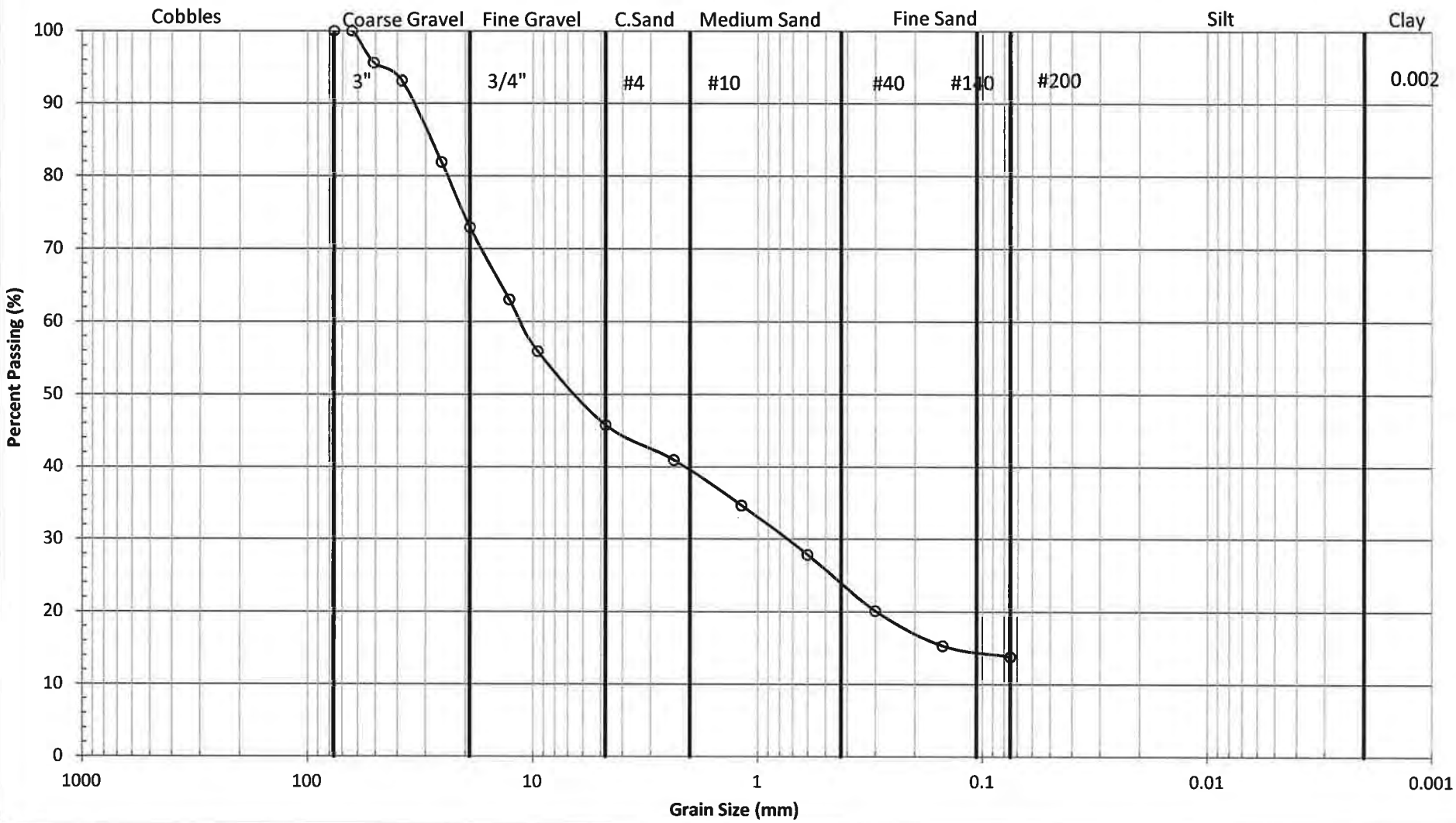
%>#200 =	81.3
%<#200 =	18.7

Soil Classification: Gravelly/Silty Sand with traces of asphalt chunk

American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

PLATE B3

Grain Size



Project Name: Brady/Upland Water Res 15
Location: N. 17th st./N. Benson Ave.
File No: 33917-01
Date: 2/9/2017
Excavation: AGSB-3
Depth: 0-5'
By: RH

% Gravel =	54.3
% Sand =	31.9
% Fines =	13.8
SUM=	100

%>#200 =	86.2
%<#200 =	13.8

Soil Classification: Gravelly/Silty Sand with traces of asphalt chunk

American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

PLATE B4

File No. 33917-01
February 13, 2017 *Revised February 17, 2017*

Appendix C

Geotechnical Guidelines for Grading Projects

GEOTECHNICAL GUIDELINES FOR GRADING PROJECTS

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Geotechnical Guidelines for Grading Projects

A. GENERAL

A1 The guidelines contained herein and the standard details attached hereto represent this firm's standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications.

A2 All plates attached hereto shall be considered as part of these guidelines.

A3 The Contractor should not vary from these guidelines without prior recommendation by the Geotechnical Consultant and the approval of the Client or his authorized representative. Recommendations by the Geotechnical Consultant and/or Client should not be considered to preclude requirements for approval by the controlling agency prior to the execution of any changes.

A4 These Standard Grading Guidelines and Standard Details may be modified and/or superseded by recommendations contained in the text of the preliminary geotechnical report and/or subsequent reports.

A5 If disputes arise out of the interpretation of these Grading Guidelines or Standard Details, the Geotechnical Consultant shall provide the governing interpretation.

B. DEFINITIONS OF TERMS

B1 ALLUVIUM – Unconsolidated detrital deposits resulting from flow of water, including sediments deposited in river beds, canyons, flood plains, lakes, fans at the foot of slopes, and estuaries.

B2 AS-GRADED (AS-BUILT) – The surface and subsurface conditions at completion of grading.

B3 BACK CUT – A temporary construction slope at the rear of earth retaining structures, such as buttresses, shear keys, stabilization fills, or retaining walls.

B4 BACKDRAIN – Generally a pipe and gravel or similar drainage system placed behind earth retaining structures, such as buttresses, stabilization fills, and retaining walls.

B5 BEDROCK – A more or less solid, relatively undisturbed rock in place either at the surface of beneath superficial deposits of soil.

B6 BENCH – A relatively level step and near-vertical rise excavated into sloping ground on which fill is to be placed.

B7 BORROW (IMPORT) – Any fill material hauled to the project site from off-site areas.

B8 BUTTRESS FILL – A fill mass, the configuration of which is designed by engineering calculations to stabilize a slope exhibiting adverse geologic features. A buttress is generally specified by minimum key width and depth and by maximum back cut angle. A buttress normally contains a back-drainage system.

B9 CIVIL ENGINEER – The Registered Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying, and verifying as-graded topographic conditions.

B10 CLIENT – The Developer or his authorized representative who is chiefly in charge of the project. He shall have the responsibility of reviewing the findings and recommendations made by the Geotechnical Consultant and shall authorize the Contractor and/or other consultants to perform work and/or provide services.

B11 COLLUVIUM – Generally loose deposits usually found near the base of slopes and brought there chiefly by gravity through slow, continuous downhill creep (also see Slope Wash).

B12 COMPACTION – Is the densification of a fill by mechanical means.

B13 CONTRACTOR – A person or company under contract or otherwise retained by the Client to perform demolition, grading, and other site improvements.

B14 DEBRIS – All products of clearing, grubbing, demolition, contaminated soil material unsuitable for reuse as compacted fill and/or any other material so designated by the Geotechnical Consultant.

B15 ENGINEERING GEOLOGIST – A Geologist holding a valid certificate of registration in the specialty of Engineering Geology.

B16 ENGINEERED FILL – A fill of which the Geotechnical Consultant or his representative, during grading, has made sufficient tests to enable him to conclude that the fill has been placed in substantial compliance with the recommendations of the Geotechnical Consultant and the governing agency requirements.

B17 EROSION – The wearing away of the ground surface as a result of the movement of wind, water, and/or ice.

B18 EXCAVATION – The mechanical removal of earth materials.

B19 EXISITNG GRADE – The ground surface configuration prior to grading.

B20 FILL – Any deposits of soil, rock, soil-rock blends, or other similar materials placed by man.

B21 FINISH GRADE – The ground surface configuration at which time the surface elevations conform to the approved plan.

B22 GEOFABRIC – Any engineering textile utilized in geotechnical applications including subgrade stabilization and filtering.

B23 GEOLOGIST – A representative of the Geotechnical Consultant educated and trained in the field of geology.

B24 GEOTECHNNICAL CONSULTANT - The Geotechnical Engineering and Engineering Geology consulting firm retained to provide technical services for the project. For the purpose of these guidelines, observations by the Geotechnical Consultant include observations by the Soil Engineer, Geotechnical Engineer, Engineering Geologist, and those performed by persons employed by and responsible to the Geotechnical Consultants.

B25 GEOTECHNICAL ENGINEER – A licensed Civil Engineer who applies scientific methods, engineering principles, and professional experience to the acquisition, interpretation, and use of knowledge of materials of the earth's crust for the evaluation of engineering problems. Geotechnical Engineering encompasses many of the engineering aspects of soil mechanics, rock mechanics, geology, geophysics, hydrology, and related sciences.

B26 GRADING – Any operation consisting of excavation, filling, or combinations thereof, and associated operations.

B27 LANDSLIDE DEBRIS – Material, generally porous and of low density, produced from instability of natural or manmade slopes.

B28 MAXIMUM DENSITY – Standard laboratory test for maximum dry unit weight. Unless otherwise specified, the maximum dry unit weight shall be determined in accordance with ASTM Method of Test D 1557-78.

B29 OPTIMUM MOISTURE – Test moisture content at the maximum density.

B30 RELATIVE COMPACTION – The degree of compaction (expressed as a percentage) of dry unit weight of a material as compared to the maximum dry unit weight of the material.

B31 ROUGH GRADE – The ground surface configuration at which time the surface elevations approximately conform to the approved plan.

B32 SITE – The particular parcel of land where grading is being performed.

B33 SHEAR KEY – Similar to buttress, however, it is generally constructed by excavating a slot within a natural slope in order to stabilize the upper portion of the slope without grading encroaching into the lower portion of the slope.

B34 SLOPE – Is an inclined ground surface, the steepness of which is generally specified as a ratio of horizontal:vertical (e.g., 2:1).

B35 SLOPE WASH – Soil and/or rock material that has been transported down a slope by mass wasting assisted by runoff water not confined by channels (also see Colluvium).

B36 SOIL – Naturally occurring deposits of sand, silt, clay, etc., or combinations thereof.

B37 SOIL ENGINEER – Licensed Civil Engineer experienced in soil mechanics (also see Geotechnical Engineer).

B38 STABILIZATION FILL – A fill mass, the configuration of which is typically related to slope height and is specified by the standards of practice for enhancing the stability of locally adverse conditions. A stabilization fill is normally specified by minimum key width and depth and by maximum back cut angle. A stabilization fill may or may not have a back-drainage system specified.

B39 SUBDRAIN – Generally a pipe and gravel or similar drainage system placed beneath a fill in the alignment of canyons or former drainage channels.

B40 SLOUGH – Loose, non-compacted fill material generated during grading operations.

B41 TAILINGS – Non-engineered fill which accumulates on or adjacent to equipment haul-roads.

B42 TERRACE – Relatively level step constructed in the face of a grade slope surface for drainage control and maintenance purposes.

B43 TOPSOIL – The presumably fertile upper zone of soil which is usually darker in color and loose.

B44 WINDROW – A string of large rock buried within engineered fill in accordance with guidelines set forth by the Geotechnical Consultant.

C. OBLIGATIONS OF PARTIES

C1 The Geotechnical Consultant should provide observation and testing services and should make evaluations to advise the Client on geotechnical matters. The Geotechnical Consultant should report his findings and recommendations to the Client or his authorized representative.

C2 The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the Geotechnical Consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

C3 The Contractor should be responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects including, but not limited to, earthwork in accordance with the project plans, specifications, and controlling agency requirements. During grading, the Contractor or his authorized representative should remain on-site. Overnight and on days off, the Contractor should remain accessible.

D. SITE PREPARATION

D1 The Client, prior to any site preparation or grading, should arrange and attend a meeting among the Grading Contractor, Design Engineer, Geotechnical Consultant, representatives of the appropriate governing authorities, as well as any other concerned parties. All parties should be given at least 48 hours' notice.

D2 Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, roots of trees, and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

D3 Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.), and other manmade surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cut-off and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the Geotechnical Consultant at the time of demolition.

D4 Trees, plants, or manmade improvements not planned to be removed or demolished should be protected by the Contractor from damage or injury.

D5 Debris generated during clearing, grubbing, and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing, and demolition operations should be performed under the observation of the Geotechnical Consultant.

D6 The Client or Contractor should obtain the required approvals from the controlling authorities for the project prior, during, and/or after demolition, site preparation, removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

E. SITE PROTECTION

E1 Protection of the site during the period of grading should be the responsibility of the Contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the Geotechnical Consultant, the Client, and the regulating agencies.

E2 The Contractor should be responsible for the stability of all temporary excavations. Recommendations by the Geotechnical Consultant pertaining to temporary excavations (e.g., back cuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the Contractor. Recommendations by the Geotechnical Consultant should not be considered to preclude more restrictive requirements by the regulating agencies.

E3 Precautions should be taken during the performance of site clearing, excavations, and grading to protect the work site from flooding, ponding, or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away

from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

E4 During periods of rainfall, plastic sheeting should be kept reasonably accessible to prevent unprotected slopes from becoming saturated. Where necessary during periods of rainfall, the Contractor should install check dams, desilting basins, rip-rap, sandbags, or other devices or methods necessary to control erosion and provide safe conditions.

E5 During periods of rainfall, the Geotechnical Consultant should be kept informed by the Contractor as to the nature of remedial or preventative work being performed (e.g., pumping, placement of sandbags or plastic sheeting, other labor, dozing, etc.).

E6 Following periods of rainfall, the Contractor should contact the Geotechnical Consultant and arrange a walkover of the site in order to visually assess rain-related damage. The Geotechnical Consultant may also recommend excavations and testing in order to aid in his assessments. At the request of the Geotechnical Consultant, the Contractor shall make excavations in order to evaluate the extent of rain-related damage.

E7 Rain-related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress, and other adverse conditions identified by the Geotechnical Consultant. Soil adversely affected should be classified as Unsuitable Materials and should be subject to over-excavation and replacement with compacted fill or other remedial grading as recommended by the Geotechnical Consultant.

E8 Relatively level areas where saturated soils and/or erosion gullies exist to depths of greater than 1 foot should be over-excavated to unaffected, competent material. Where less than 1 foot in depth, unsuitable materials may be processed in-place to achieve near-optimum moisture conditions, then thoroughly recompacted in accordance in with the applicable specifications. If the desired results are not achieved, the affected materials should be over-excavated, then replaced in accordance with the applicable specifications.

E9 In slope areas where saturated soil and/or erosion gullies exist to depths of greater than 1 foot, they should be over-excavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be over-excavated and replaced as compacted fill in accordance with slope repair recommendations herein. As field conditions dictate, other slope repair procedures may be recommended by the Geotechnical Consultant.

F. EXCAVATIONS

F1 UNSUITABLE MATERIALS

F1.1 Materials which are unsuitable should be excavated under observation and recommendations of the Geotechnical Consultant. Unsuitable materials include but may not be limited to dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock, and non-engineered, or otherwise deleterious fill materials.

F1.2 Material identified by the Geotechnical Consultant as unsatisfactory due to its moisture conditions should be over-excavted, watered or dried as needed, and thoroughly blended to a uniform near-optimum moisture condition (as per guidelines reference 7.2.1) prior to placement as compacted fill.

F2 CUT SLOPES

F2.1 Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal:vertical).

F2.2 If excavations for cut slopes expose loose, cohesionless, significantly fractured, or otherwise unsuitable material, over-excavation and replacement of the unsuitable materials with a compacted stabilization fill should be accomplished as recommended by the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, stabilization fill construction should conform to the requirements of the Standard Details.

F2.3 The Geotechnical Consultant should review cut slopes during excavation. The Geotechnical Consultant should be notified by the contractor prior to beginning slope excavations.

F2.4 If during the course of grading adverse or potentially adverse geotechnical conditions are encountered, which were not anticipated in the preliminary report, the Geotechnical Consultant should explore, analyze, and make recommendations to treat these problems.

F2.5 When cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top-of-cut.

F3 PAD AREAS

F3.1 All lot pad areas including side yard terraces above stabilization fills or buttresses should be over-excavated to provide for a minimum of 3 feet (refer to Standard Details) of compacted fill over the entire pad area. Pad areas with both fill and cut materials exposed and pad areas containing both very shallow (less than 3 feet) and deeper fill should be over-excavated to provide for a uniform compacted fill blanket with a minimum of 3 feet in thickness (refer to Standard Details). Cut areas exposing significantly varying material types should also be over-excavated to provide for at least a 3-foot thick compacted fill blanket. Geotechnical conditions may require greater depth of over-excavation. The actual depth should be delineated by the Geotechnical Consultant during grading.

F3.2 For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

G. COMPACTED FILL

All fill materials should be compacted as specified below or by other methods specifically recommended by the Geotechnical Consultant. Unless otherwise specified, the minimum degree of compaction (relative compaction) should be 90 percent of the laboratory maximum density.

G1 PLACEMENT

G1.1 Prior to placement of compacted fill, the Contractor should request a review by the Geotechnical Consultant of the exposed ground surface. Unless otherwise recommended, the exposed ground surface should then be scarified (6 inches minimum), watered, or dried as needed, thoroughly blended to achieve near-optimum moisture conditions, then thoroughly compacted to a minimum of 90 percent of the maximum density. The review by the Geotechnical Consultant should not be considered to preclude the requirement of inspection and approval by the governing agency.

G1.2 Compacted fill should be placed in thin horizontal lifts not exceeding 8 inches in loose thickness prior to compaction. Each lift should be watered or dried as needed, thoroughly blended to achieve near-optimum moisture conditions, then thoroughly

compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

G1.3 The Contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials. If necessary, excavation equipment should be "shut down" temporarily in order to permit proper compaction of fills. Earth moving equipment should only be considered a supplement and not substituted for conventional compaction equipment.

G1.4 When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal:vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least 6-foot wide benches and a minimum of 4 feet of vertical bench height within the firm natural ground, firm bedrock, or engineered compacted fill. No compacted fill should be placed in an area subsequent to keying and benching until the area has been reviewed by the Geotechnical Consultant. Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill. Typical keying and benching details have been included within the accompanying Standard Details.

G1.5 Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as described above. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

G1.6 Fill should be tested for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D1556-64, D2922-78, and/or D2937-71. Tests should be provided for about every 2 vertical feet of 1,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be

removed or otherwise handled as recommended by the Geotechnical Consultant.

G1.7 The Contractor should assist the Geotechnical Consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill.

G1.8 As recommended by the Geotechnical Consultant, the Contractor should "shut down" or remove grading equipment from an area being tested.

G1.9 The Geotechnical Consultant should maintain a plan with estimated locations of field tests. Unless the Client provides for actual surveying of test locations, the estimated locations by the Geotechnical Consultant should only be considered rough estimates and should not be utilized for the purpose of preparing cross sections showing test locations, or in any case for the purpose of after-the-fact evaluating of the sequence of fill placement.

G2 MOISTURE

G2.1 For field testing purposes, "near-optimum" moisture will vary with material type and other factors including compaction procedures. "Near optimum" may be specifically recommended in Preliminary Investigation Reports and/or may be evaluated during grading. As a preliminary guideline, "near optimum" should be considered from 1 percent below to 3 percent above optimum.

G2.2 Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface of previously compacted fill should be processed by scarification, watered or dried as needed, thoroughly blended to near-optimum moisture conditions, then recompacted to a minimum of 90 percent of laboratory maximum dry density. Where wet or other dry or other unsuitable materials exist to depths of greater than 1 foot, the unsuitable materials should be over-excavated.

G2.3 Following a period of flooding, rainfall, or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described in Section E6 herein.

G3 FILL MATERIAL

G3.1 Excavated on-site materials which are acceptable to the Geotechnical Consultant may be utilized as compacted fill, provided trash, vegetation, and other deleterious materials are removed prior to placement.

G3.2 Where import materials are required for use on-site, the Geotechnical Consultant should be notified at least 72 hours in advance of importing in order to sample and test materials from proposed borrow sites. No import materials should be delivered for use on-site without prior sampling and testing by the Geotechnical Consultant.

G3.3 Where oversized rock or similar irreducible material is generated during grading, it is recommended, where practical, to waste such material off-site or on-site in areas designated as "non-structural rock disposal areas". Rock placed in disposal areas should be placed with sufficient fines to fill voids. The rock should be compacted in lifts to an unyielding condition. The disposal area should be covered with at least 3 feet of compacted fill which is free of oversized material. The upper 3 feet should be placed in accordance with the guidelines for compacted fill herein.

G3.4 Rocks 12 inches in maximum dimension and smaller may be utilized within the compacted fill, provided they are placed in such manner that nesting of the rock is avoided. Fill should be placed and thoroughly compacted over and around all rock. The amount of rock should not exceed 40 percent by dry weight passing the ¾-inch sieve size. The 12 inch and 40 percent recommendations herein may vary as field conditions dictate.

G3.5 During the course of grading operation, rocks or similar irreducible materials greater than 12 inches maximum dimension (oversized material) may be generated. These rocks should not be placed within the compacted fill unless placed as recommended by the Geotechnical Consultant.

G3.6 Where rocks or similar irreducible materials of greater than 12 inches but less than 4 feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the accompanying Standard Details is recommended. Rocks greater than 4 feet should be broken down or disposed off-site. Rocks up to 4 feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 20 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below

areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, over-excavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock such that voids are filled. Windrows of oversized material should be staggered so that successive strata of oversized material are not in the same vertical plane.

The Contractor should be aware that the placement of rock in windrows will significantly slow the grading operation and may require additional equipment and/or special equipment.

G3.7 It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the Geotechnical Consultant at the time of placement.

G3.8 Material that is considered unsuitable by the Geotechnical Consultant should not be utilized in the compacted fill.

G3.9 During grading operations, placing and mixing the materials from the cut and/or borrow areas may result in soil mixtures which possess unique physical properties. Testing may be required of samples obtained directly from the fill areas in order to verify conformance with the specifications. Processing of these additional samples may take two or more working days. The Contractor may elect to move the operation to other areas within the project or may continue placing compacted fill pending laboratory and field test results. Should he elect the second alternative, fill placed is done so at the Contractor's risk.

G3.10 Any fill placed in areas not previously reviewed and evaluated by the Geotechnical Consultant and/or in other areas without prior notification to the Geotechnical Consultant may require removal and recompaction at the Contractor's expense. Determination of over-excavations should be made upon review of field conditions by the Geotechnical Consultant.

G4 FILL SLOPES

G4.1 Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal:vertical).

G4.2 Except as specifically recommended otherwise or as otherwise provided for in these grading guidelines (Reference G4.3), compacted fill slopes should be overbuilt and cut back to grade, exposing the firm, compacted

fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be over-excavated and reconstructed under the guidelines of the Geotechnical Consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the Contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

G4.3 Although no construction procedure produces a slope free from risk of future movement, overfilling and cutting back of slope to a compacted inner core is, given no other constraints, the most desirable procedure. Other constraints, however, must often be considered. These constraints may include property line situations, access, the critical nature of the development, and cost. Where such constraints are identified, slope face compaction on slopes of 2:1 or flatter may be attempted as a second-best alternative by conventional construction procedures including backrolling techniques upon specific recommendation by the Geotechnical Consultant.

Fill placement should proceed in thin lifts (i.e., 6 to 8-inch loose thickness). Each lift should be moisture conditioned and thoroughly compacted. The desired moisture condition should be maintained and/or reestablished where necessary during the period between successive lifts. Selected lifts should be tested to ascertain that desired compaction is being achieved. Care should be taken to extend compactive effort to the outer edge of the slope.

Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately establish desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding 4 feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly backrolled utilizing a conventional sheetsfoot-type roller. Care should be taken to maintain the desired moisture conditions and/or reestablishing the same as needed prior to backrolling. Upon achieving final grade, the slope should again be moisture conditioned and thoroughly backrolled. The use of a side-boom roller will probably be necessary, and vibratory methods are strongly recommended. Without delay, so as to avoid (if possible) further moisture conditioning, the slopes should then be grid-rolled to achieve a relatively smooth surface and uniformly compact condition.

In order to monitor slope construction procedures, moisture and density tests should be taken at regular intervals. Failure to achieve the desired results will likely result in a recommendation by the Geotechnical Consultant to over-excavate the slope surfaces followed by reconstruction of the slopes utilizing overfilling and cutting back procedures and/or further attempt at the conventional backrolling approach. Other recommendations may also be provided which could be commensurate with field conditions.

G4.4 Where placement of fill above a natural slope or above a cut slope is proposed, the fill slope configuration, as presented in the accompanying Standard Details, should be adopted.

G4.5 For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and pad gradients of at least 2 percent in soil areas.

G5 OFF-SITE FILL

G5.1 Off-site fill should be treated in the same manner as recommended in these specifications for site preparation, excavation, drains, compaction, etc.

G5.2 Off-site canyon fill should be placed in preparation for future additional fill as shown in the accompanying Standard Details.

G5.3 Off-site fill subdrains temporarily terminated (up canyon) should be surveyed for future relocation and connection.

H. DRAINAGE

H1 Canyon subdrain systems specified by the Geotechnical Consultant should be installed in accordance with the Standard Details.

H2 Typical subdrains for compacted fill buttresses, slope stabilizations, or sidehill masses should be installed in accordance with the specifications of the accompanying Standard Details.

H3 Roof, pad, and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, concrete swales).

H4 For drainage over soil areas immediately away from structures, (i.e., within 10 feet) a minimum of 5 percent gradient should be maintained. If physical obstructions or lot lines prohibit 10-foot distance, a 5 percent slope can be provided to an approved alternative method of diverting water away from buildings (i.e., swales or drain pipes). Pad drainage of at least 2 percent should be maintained over soil areas. Pad drainage may be reduced to at least 1 percent for projects where no slopes exist, either natural or manmade, of greater than 10 feet in height and where no slopes are planned, either natural or manmade, steeper than 2:1 (horizontal:vertical slope ratio).

H5 Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns can be detrimental to slope stability and foundation performance.

I. STAKING

I1 In all fill areas, the fill should be compacted prior to the placement of the stakes. This particularly is important on fill slopes. Slope stakes should not be placed until the slope is thoroughly compacted (backrolled). If stakes must be placed prior to the completion of compaction procedures, it must be recognized that they will be removed and/or demolished at such time as compaction procedures resume.

I2 In order to allow for remedial grading operations, which could include over-excavations or slope stabilization, appropriate staking offsets should be provided. For finished slope and stabilization back cut areas, we recommend at least a 10-foot setback from proposed toes and tops-of-cut.

J. MAINTENANCE

J1 LANDSCAPE PLANTS

In order to enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect would be the best party to consult regarding actual types of plants and planting configuration.

J2 IRRIGATION

J2.1 Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

J2.2 Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

J2.3 Though not a requirement, consideration should be given to the installation of near-surface moisture monitoring control devices. Such devices can aid in the maintenance of relatively uniform and reasonably constant moisture conditions.

J2.4 Property owners should be made aware that overwatering of slopes is detrimental to slope stability.

J3 MAINTENANCE

J3.1 Periodic inspections of landscaped slope areas should be planned, and appropriate measures should be taken to control weeds and enhance growth of the landscape plants. Some areas may require occasional replanting and/or reseeding.

J3.2 Terrace drains and downdrains should be periodically inspected and maintained free of debris. Damage to drainage improvements should be repaired immediately.

J3.3 Property owners should be made aware that burrowing animals can be detrimental to slope stability. A preventative program should be established to control burrowing animals.

J3.4 As a precautionary measure, plastic sheeting should be readily available or kept on hand to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended beginning with the period of time prior to landscape planting.

J4 REPAIRS

J4.1 If slope failure occurs, the Geotechnical Consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

J4.2 If slope failure occurs as a result of exposure to periods of heavy rainfall, the failure area and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

J4.3 In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer 1 foot to 3 feet of the slope face).

K. TRENCH BACKFILL

K1 Utility trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

K2 As an alternative, granular material (sand equivalent greater than 30) may be thoroughly jetted in-place. Jetting should only be considered to apply to trenches no greater than 2 feet in width and 4 feet in depth. Following jetting operations, trench backfill should be thoroughly mechanically compacted and/or wheel-rolled from the surface.

K3 Backfill of exterior and interior trenches extending below a 1:1 projection from the outer edge of foundations should be mechanically compacted to a minimum of 90 percent of the laboratory maximum density.

K4 Within slab areas, but outside the influence of foundations, trenches up to 1-foot wide and 2-feet deep may be backfilled with sand and consolidated by jetting, flooding, or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped, or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted, or spot testing may be elected if deemed necessary based on review of backfill operations during construction.

K5 If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the Contractor may elect the utilization of lightweight mechanical compaction equipment and/or shading of the conduit with clean granular material which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate upon review by the Geotechnical Consultant at the time of construction.

K6 In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the Geotechnical Consultant.

K7 Clean granular backfill and/or bedding are not recommended in slope areas unless provisions are made for a drainage system to mitigate the potential build-up of seepage forces.

L. STATUS OF GRADING

Prior to proceeding with any grading operation, the Geotechnical Consultant should be notified at least two working days in advance in order to schedule the necessary observation and testing services.

L1 Prior to any significant expansion or cut back in the grading operation, the Geotechnical Consultant should be provided with adequate notice (i.e., two days) in order to make appropriate adjustments in observation and testing services.

L2 Following completion of grading operations and/or between phases of a grading operation, the Geotechnical Consultant should be provided with at least two working days' notice in advance of commencement of additional grading operations.

American Geotechnical, Inc.
GEOTECHNICAL ENGINEERING / MATERIALS TESTING & INSPECTION

February 17, 2017

File No. 33917-01

Richard Brady & Associates
3710 Ruffin Road
San Diego, CA 92123

Attention: Mr. E. Javier Saunders, P.E.
Executive Vice-President

Subject: **ADDENDUM**
City of Upland – Replacement of 7.5 Million Gallon Reservoir
17th Street and Benson Avenue
Upland, California

Reference: **GEOTECHNICAL INVESTIGATION**
City of Upland – Replacement of 7.5 Million Gallon Reservoir
Upland, California
By: American Geotechnical, Inc.
Dated: February 13, 2017(revised February 17, 2017)

Dear Mr. Saunders:

This letter report provides updated foundation design recommendations for the proposed water reservoir at the site. As we understand, the reservoir is partially buried approximately 5 to 11 feet into the ground. A shallow foundation system consisting of a continuous ring along the perimeter and pad foundation in the interior is proposed. The updated allowable bearing capacity chart for the ring foundation is presented on the attached Plate 1. The allowable bearing capacities are provided for different foundation widths and embedment depths. The capacity chart for varying widths of interior square pad foundation is presented on Plate 2. We also recommend that a downward drag coefficient of 0.45 be utilized in the design. All other geotechnical recommendations provided in the report are still applicable and utilized in the design.

22725 Old Canal Road, Yorba Linda, CA 92887 - (714) 685-3900 - FAX (714) 685-3909
2640 Financial Court, Suite A, San Diego, CA 92117 - (858) 450-4040 - FAX (858) 457-0814
3100 Fite Circle, Suite 103, Sacramento, CA 95827 - (916) 368-2088 - FAX (916) 368-2188
5600 Spring Mountain Road, Suite 201, Las Vegas, NV 89146 - (702) 562-5046 - FAX (702) 562-2457

We hope that this is the information you require at this time. Please contact our office should you have any questions.

Respectfully submitted,
AMERICAN GEOTECHNICAL, INC.

Arumugam Alvappillai, Ph.D.
Principal Engineer
G.E. 2504

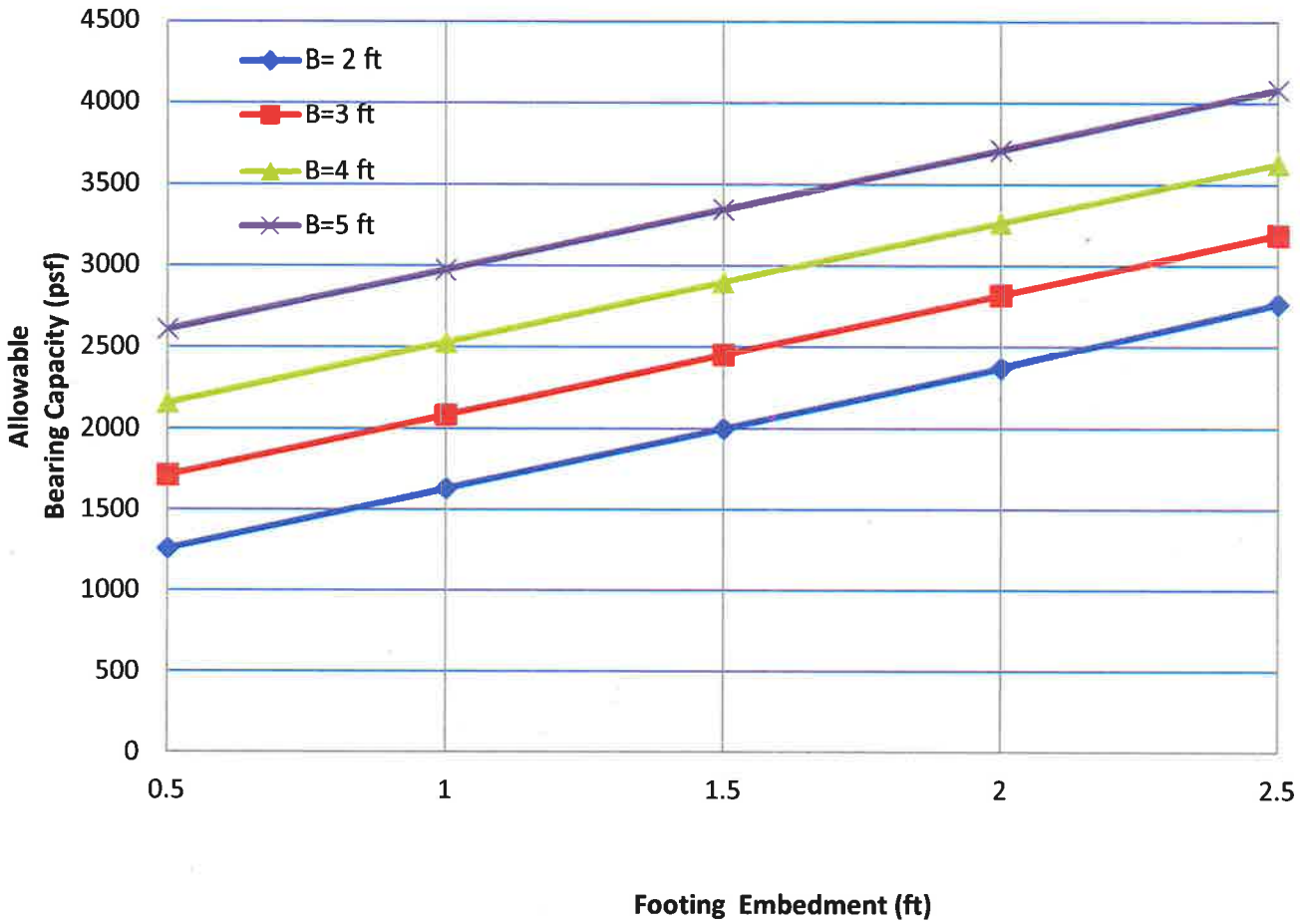
Douglas S. Santo
Chief Engineering Geologist
C.E.G. 1866

Enclosures: Plates 1 and 2

Distribution: Addressee (Email: jsaunders@rbrady.net)

wpdata/OC/ 33917-01 Addendum Letter – Alvappillai -D Santo 2-17-17

Bearing Capacity Chart
Perimeter Ring Foundation



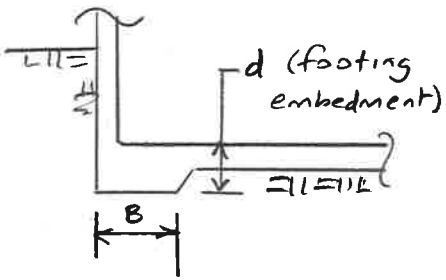
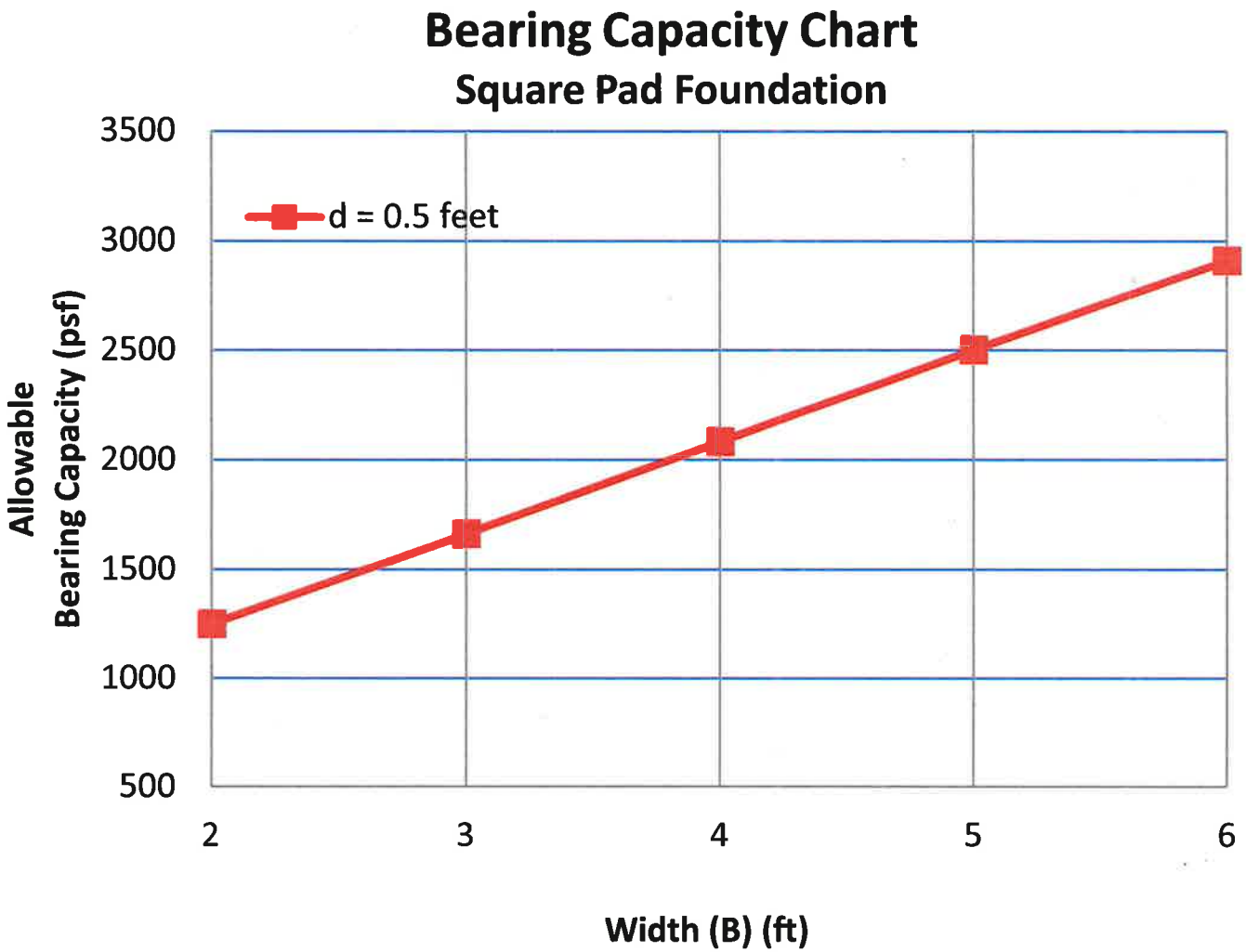


Plate 1


Bearing Capacity Chart
Square Pad Foundation
d = 0.5 feet
Allowable Bearing Capacity (psf)
3500
3000
2500
2000
1500
1000
500
2
3
4
5
6
Width (B) (ft)

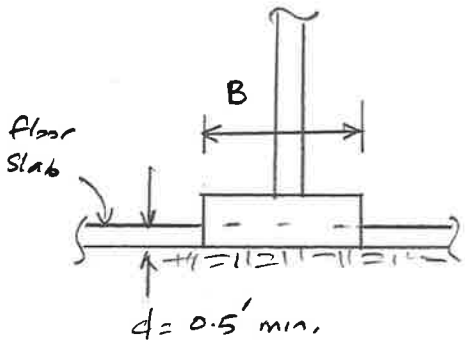

B
Floor Slab
d = 0.5' min.

Plate 2

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APPENDIX “H”

ARCHITECTURAL RENDERING

SPECIFICATIONS
FOR
Project No. 9128
Bid No. 2020-06
REPLACEMENT OF 7.5 MG RESERVOIR
AND WATER IMPROVEMENTS
(460 NORTH EUCLID AVENUE, UPLAND, CA 91786)

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VIEW NORTH FROM 17th ST.

June 27, 2017

BRADY
3710 Ruffin Road
San Diego, California 92123
P:858.496.0500 F:858.496.0505

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ARCHITECTS, INC.

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VIEW WEST FROM BENSON ST.

June 27, 2017

BRADY
3710 Ruffin Road
San Diego, California 92123
P:858.496.0500 F:858.496.0505

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ARCHITECTS, INC.

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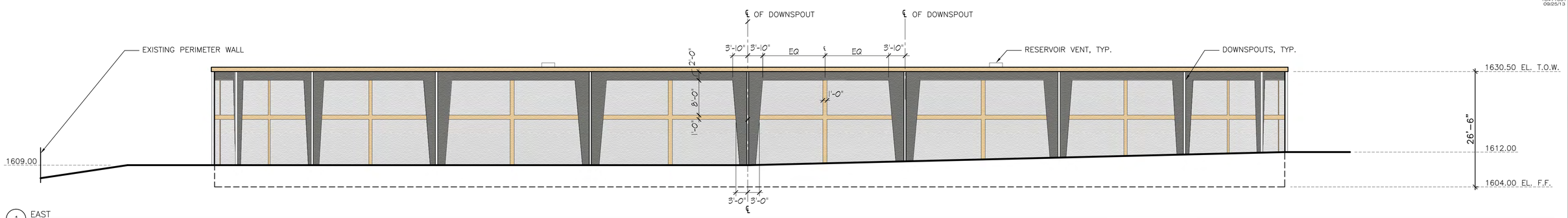
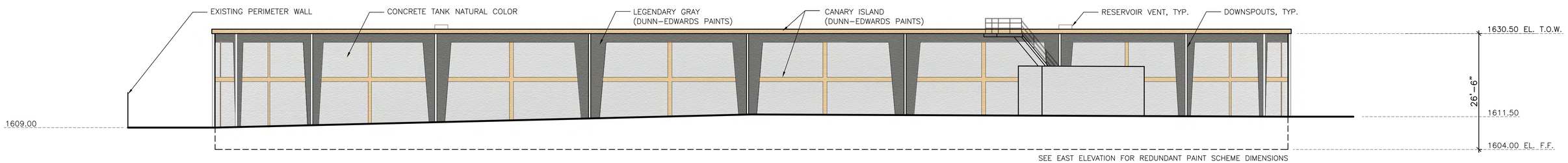


1 EAST
SCALE: 3/32" = 1'-0"



2 NORTH
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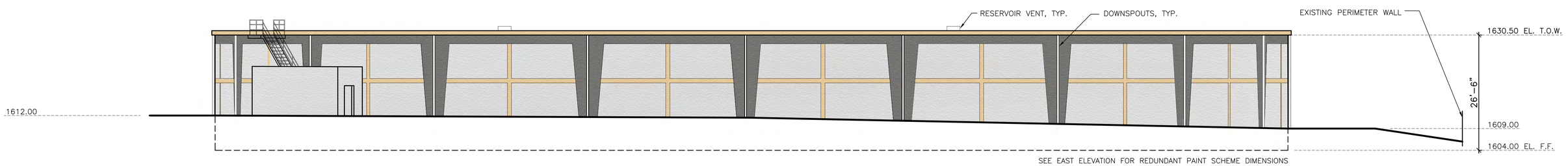
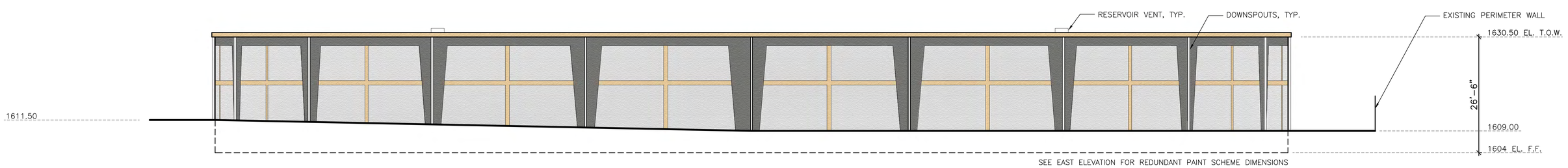


3 WEST
SCALE: 3/32" = 1'-0"



4 SOUTH
SCALE: 3/32" = 1'-0"

Underground Service Alert
CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVISIONS

MARK	DATE	INITIAL	DESCRIPTION	DATE	APP'VD

PLANS PREPARED BY
BRADY
3710 Ruffin Road
San Diego, California 92123
P:858.496.0500 F:858.496.0505

SEAL: REGISTERED PROFESSIONAL ENGINEER KIMBERLY D. BRADY No. 36228 Exp 06-30-18 STRUCTURAL STATE OF CALIFORNIA

DRAWN BY:
DESIGNED BY:
CHECKED BY:
RECOMMENDED BY:

REVIEWED BY CITY STAFF

DEPARTMENT	INITIAL	DATE

APPROVED BY:
DIRECTOR OF PUBLIC WORKS — DATE
R.C.E. 44766 EXP. DATE 03/31/17

RECOMMENDED BY: ENGINEERING STAFF
RECOMMENDED BY: DEVELOPMENT SERVICES

CITY OF UPLAND

REPLACEMENT OF 7.5 MG RESERVOIR AND WATER IMPROVEMENTS

RESERVOIR EXTERIOR ELEVATIONS

SHEET
OF SHEETS
FILE NO.

PLAN NO. WT-9128
PROJECT NO. 9128

J:\0482 Upland Reservoir Design\03-Drawings\Upland Reservoir\Sheets\Reservoir Elevations.dwg 7/26/2017 4:29 PM SebastianB

90% DESIGN SUBMITTAL

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APPENDIX "I"

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CONSTRUCTION INSTALLMENT SALE AGREEMENT

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR

AND WATER IMPROVEMENTS

(460 N. EUCLID AVENUE, UPLAND, CA 91786)

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DRINKING WATER

CITY OF UPLAND

AND

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CONSTRUCTION
INSTALLMENT SALE AGREEMENT

REPLACEMENT OF 7.5 MG RESERVOIR AT 17TH STREET AND BENSON AVENUE
PROJECT No. 3610050-001C

AGREEMENT No. SWRCB0000000000D190200800

PROJECT FUNDING AMOUNT: $16,500,000.00

ELIGIBLE WORK START DATE: OCTOBER 1, 2016
ELIGIBLE CONSTRUCTION START DATE: DECEMBER 11, 2018
CONSTRUCTION COMPLETION DATE: APRIL 1, 2022
FINAL DISBURSEMENT REQUEST DATE: OCTOBER 1, 2022
FINAL PAYMENT DATE: APRIL 1, 2052
RECORDS RETENTION END DATE: APRIL 1, 2058

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AGREEMENT

1. AUTHORITY.

(a) The State Water Resources Control Board (State Water Board) is authorized, and implements its authority, to provide financial assistance under this Agreement pursuant to Section 116760 et seq. of the Health and Safety Code, and Resolution Nos. 2019-0032 and 2019-0006.

(b) The Recipient is authorized to enter into this Installment Sale Agreement (Agreement) pursuant to Resolution No. 6463.

2. INTENTION.

(a) The Recipient desires to receive financial assistance for and undertake work required for the drinking water construction project (Project) set forth on the Cover Page and described in Exhibit A of this Agreement from the State Water Board according to the terms and conditions set forth in this Agreement.

(b) The State Water Board proposes to assist in providing financial assistance for eligible costs of the Project in the amount set forth in Exhibit B, according to the terms and conditions set forth in this Agreement, with the expectation that the Recipient shall repay all of the financial assistance to the State Water Board.

(c) The Recipient intends to evidence its obligation to submit Payments to the State Water Board and secure its obligation with Net Revenues of its water enterprise, as set forth in Exhibit B, according to the terms and conditions set forth in this Agreement.

(d) The Recipient intends to certify and evidence its compliance with the Tax Covenants set forth in Exhibit F.

3. AGREEMENT, TERM, DOCUMENTS INCORPORATED BY REFERENCE.

In consideration of the mutual representations, covenants and agreements herein set forth, the State Water Board and the Recipient, each binding itself, its successors and assigns, do mutually promise, covenant, and agree to the terms, provisions, and conditions of this Agreement.

(a) The Recipient hereby sells to the State Water Board and the State Water Board hereby purchases from the Recipient the Project. Simultaneously therewith, the Recipient hereby purchases from the State Water Board, and the State Water Board hereby sells to the Recipient, the Project in accordance with the provisions of this Agreement. All right, title, and interest in the Project shall immediately vest in the Recipient on the date of execution and delivery of this Agreement by both parties without further action on the part of the Recipient or the State Water Board.

(b) Subject to the satisfaction of any condition precedent to this Agreement, this Agreement shall become effective upon the signature of both the Recipient and the State Water Board. Conditions precedent are not limited to the following:

i. The Recipient must deliver an opinion of bond counsel and general counsel satisfactory to the State Water Board's counsel dated on or after the date that the Recipient signs this Agreement.
ii. The Recipient must deliver to the Division a resolution authorizing this Agreement.

(c) Upon execution, the term of the Agreement shall begin on the Eligible Work Start Date and extend through the Final Payment Date.

(d) This Agreement includes the following exhibits and attachments thereto:

i. EXHIBIT A – SCOPE OF WORK
ii. EXHIBIT B – FUNDING TERMS
iii. EXHIBIT C – GENERAL & PROGRAMMATIC TERMS & CONDITIONS
iv. EXHIBIT D – SPECIAL CONDITIONS
v. EXHIBIT E – PAYMENT SCHEDULE
vi. EXHIBIT F – TAX CERTIFICATE

(e) This Agreement includes the following documents incorporated by reference:

i. the Final Plans & Specifications, dated May 23, 2017, which are the basis for the construction contract to be awarded by the Recipient;
ii. the Drinking Water System Permit No. CA 3610050;
iii. the Recipient's Reimbursement Resolution No. 6464 dated August 13, 2018;
iv. the Recipient's Tax Questionnaire dated August 2, 2018.
v. the Davis-Bacon requirements found at: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/docs/davisbacon/davis-bacon_requirements_2018_dwsrf-governmental_entities_(public).pdf;

4. PARTY CONTACTS

State Water Board		City of Upland	
Section:	Division of Financial Assistance		
Name:	Marques Tamanaha	Name:	Rosemary Hoerning – Interim City Manager
Address:	1001 I Street, 16th Floor	Address:	P.O. Box 460
City, State, Zip:	Sacramento, CA 95814	City, State, Zip:	Upland, CA 91785
Phone:	(916) 449-5645	Phone:	(909) 291-2931
Fax:		Fax:	
Email:	Marques.Tamanaha@waterboards.ca.gov	Email:	rhoerning@ci.upland.ca.us

The Recipient may change its contact upon written notice to the Division, which notice shall be accompanied by authorization from the Recipient's Authorized Representative. The State Water Board will notify the Project Director of any changes to its contact.

While the foregoing are contacts for day-to-day communications regarding Project work, the Recipient shall provide official communications and events of Notice as set forth in Exhibit C to the Division's Deputy Director.

5. DEFINITIONS.

Unless otherwise specified, each capitalized term used in this Agreement has the following meaning:

"Additional Payments" means the reasonable extraordinary fees and expenses of the State Water Board, and of any assignee of the State Water Board's right, title, and interest in and to this Agreement, in

connection with this Agreement, including all expenses and fees of accountants, trustees, staff, contractors, consultants, costs, insurance premiums and all other extraordinary costs reasonably incurred by the State Water Board or assignee of the State Water Board."

"Allowance" means an amount based on a percentage of the accepted bid for an eligible project to help defray the planning, design, and construction engineering and administration costs of the Project.

"Agreement" means this agreement, including all exhibits and attachments hereto.

"Authorized Representative" means the duly appointed representative of the Recipient as set forth in the certified original of the Recipient's authorizing resolution that designates the authorized representative by title.

"Bank" means the California Infrastructure and Economic Development Bank.

"Bond Funded Portion of the Project Funds" means any portion of the Project Funds which was or will be funded with Bond Proceeds.

"Bond Proceeds" means original proceeds, investment proceeds, and replacement proceeds of Bonds.

"Bonds" means any series of bonds issued by the Bank, the interest on which is excluded from gross income for federal tax purposes, all or a portion of the proceeds of which have been, are, or will be applied by the State Water Board to fund all or any portion of the Project Costs or that are secured in whole or in part by Payments paid hereunder.

"Charge In Lieu of Interest" means any fee or charge in lieu of some or all of, but not to exceed, the interest that would otherwise be owed under this Agreement, as set forth in Exhibit E.

"Code" as used in Exhibit F of this Agreement means the Internal Revenue Code of 1986, as amended, and any successor provisions and the regulations of the U.S. Department of the Treasury promulgated thereunder.

"Completion of Construction" means the date, as determined by the Division after consultation with the Recipient, that the work of building and erection of the Project is substantially complete, and is identified in Exhibit A of this Agreement.

"Cover Page" means the front page of this Agreement.

"Days" means calendar days unless otherwise expressly indicated.

"Debt Service" means, as of any date, with respect to outstanding System Obligations and, in the case of the additional debt tests in Exhibit B of this Agreement, any System Obligations that are proposed to be outstanding, the aggregate amount of principal and interest scheduled to become due (either at maturity or by mandatory redemption), together with any Charge In Lieu of Interest on this Obligation or other System Obligations to the State Water Board, calculated with the following assumptions:

a. Principal payments (unless a different subdivision of this definition applies for purposes of determining principal maturities or amortization) are made in accordance with any amortization schedule published for such principal, including any minimum sinking fund payments;

b. Interest on a variable rate System Obligation that is not subject to a swap agreement and that is issued or will be issued as a tax-exempt obligation under federal law, is the average of the SIFMA Municipal Swap Index, or its successor index, during the 24 months preceding the date of such calculation;

c. Interest on a variable rate System Obligation that is not subject to a swap agreement and that is issued or will be issued as a taxable obligation under federal law, is the average of LIBOR, or its successor index, during the 24 months preceding the date of such calculation;

d. Interest on a variable rate System Obligation that is subject to a swap agreement is the fixed swap rate or cap strike rate, as appropriate, if the variable rate has been swapped to a fixed rate or capped pursuant to an interest rate cap agreement or similar agreement;

e. Interest on a fixed rate System Obligation that is subject to a swap agreement such that all or a portion of the interest has been swapped to a variable rate shall be treated as variable rate debt under subdivisions (b) or (c) of this definition of Debt Service;

f. Payments of principal and interest on a System Obligation are excluded from the calculation of Debt Service to the extent such payments are to be paid from amounts then currently on deposit with a trustee or other fiduciary and restricted for the defeasance of such System Obligations;

g. If 25% or more of the principal of a System Obligation is not due until its final stated maturity, then principal and interest on that System Obligation may be projected to amortize over the lesser of 30 years or the Useful Life of the financed asset, and interest may be calculated according to subdivisions (b)-(e) of this definition of Debt Service, as appropriate.

"Deputy Director" means the Deputy Director of the Division.

"District Office" means District Office of the Division of Drinking Water of the State Water Board.

"Division" means the Division of Financial Assistance of the State Water Board or any other segment of the State Water Board authorized to administer this Agreement.

"Division of Drinking Water" means the Division of Drinking Water of the State Water Board.

"Eligible Construction Start Date" means the date set forth on the Cover Page of this Agreement, establishing the date on or after which construction costs may be incurred and eligible for reimbursement hereunder.

"Eligible Work Start Date" means the date set forth on the Cover Page of this Agreement, establishing the date on or after which any non-construction costs may be incurred and eligible for reimbursement hereunder.

"Enterprise Fund" means the enterprise fund of the Recipient in which Revenues are deposited.

"Event of Default" means the occurrence of any of the following events:

a) Failure by the Recipient to make any payment required to be paid pursuant to this Agreement, including Payments;
b) A representation or warranty made by or on behalf of the Recipient in this Agreement or in any document furnished by or on behalf of the Recipient to the State Water Board pursuant to this Agreement shall prove to have been inaccurate, misleading or incomplete in any material respect;
c) A material adverse change in the condition of the Recipient, the Revenues, or the System, which the Division reasonably determines would materially impair the Recipient's ability to satisfy its obligations under this Agreement.
d) Failure by the Recipient to comply with the additional debt test or reserve fund requirement, if any, in Exhibit B or Exhibit D of this Agreement;
e) Failure to operate the System or the Project without the Division's approval;

f) Failure by the Recipient to observe and perform any covenant, condition, or provision in this Agreement, which failure shall continue for a period of time, to be determined by the Division;
g) The occurrence of a material breach or event of default under any System Obligation that results in the acceleration of principal or interest or otherwise requires immediate prepayment, repurchase or redemption;
h) Initiation of proceedings seeking arrangement, reorganization, or any other relief under any applicable bankruptcy, insolvency, or other similar law; the appointment of or taking possession of the Recipient's property by a receiver, liquidator, assignee, trustee, custodian, conservator, or similar official; the Recipient's entering into a general assignment for the benefit of creditors; the initiation of resolutions or proceedings to terminate the Recipient's existence, or any action in furtherance of any of the foregoing;
i) A determination pursuant to Gov. Code section 11137 that the Recipient has violated any provision in Article 9.5 of Chapter 1 of Part 1 of Division 3 of Title 2 of the Government Code;
j) Loss of the Recipient's rights, licenses, permits, or privileges necessary for the operation of the System or the Project, or the occurrence of any material restraint on the Recipient's enterprise by a government agency or court order.

"Final Budget Approval (FBA)" means the Division-approved final budget for the Project, as set forth in Exhibit B.

"Final Disbursement Request Date" means the date set forth as such on the Cover Page of this Agreement, after which date, no further Project Funds disbursements may be requested.

"Final Payment Date" is the date by which all principal and accrued interest due under this Agreement is to be paid in full to the State Water Board and is specified on the Cover Page of this Agreement.

"Fiscal Year" means the period of twelve (12) months terminating on June 30 of any year, or any other annual period selected and designated by the Recipient as its Fiscal Year in accordance with applicable law.

"Force Account" means the use of the Recipient's own employees, equipment, or resources for the Project.

"GAAP" means generally accepted accounting principles, the uniform accounting and reporting procedures set forth in publications of the American Institute of Certified Public Accountants or its successor, or by any other generally accepted authority on such procedures, and includes, as applicable, the standards set forth by the Governmental Accounting Standards Board or its successor, or the Uniform System of Accounts, as adopted by the California Public Utilities Commission for water utilities.

"Initiation of Construction" means the date that notice to proceed with work is issued for the Project, or, if notice to proceed is not required, the date of commencement of building and erection of the Project.

"Listed Event" means, so long as the Recipient has outstanding any System Obligation subject to Rule 15c2-12, any of the events required to be reported pursuant to Rule 15c2-12(b)(5).

"Maximum Annual Debt Service" means the maximum amount of Debt Service due on System Obligations in any Fiscal Year during the period commencing with the Fiscal Year for which such calculation is made and terminating with the last Fiscal Year in which Debt Service for any System Obligations will become due.

"Net Revenues" means, for any Fiscal Year, all Revenues received by the Recipient less the Operations and Maintenance Costs for such Fiscal Year.

"Obligation" means the obligation of the Recipient to make Payments (including Additional Payments) as provided herein, as evidenced by the execution of this Agreement, proceeds of such obligations being used to fund the Project as specified in the Project Description in Exhibit A and Exhibit B and in the documents thereby incorporated by reference.

"Operations and Maintenance Costs" means the reasonable and necessary costs paid or incurred by the Recipient for maintaining and operating the System, determined in accordance with GAAP, including all reasonable expenses of management and repair and all other expenses necessary to maintain and preserve the System in good repair and working order, and including all reasonable and necessary administrative costs of the Recipient that are charged directly or apportioned to the operation of the System, such as salaries and wages of employees, overhead, taxes (if any), the cost of permits, licenses, and charges to operate the System and insurance premiums; but excluding, in all cases depreciation, replacement, and obsolescence charges or reserves therefor and amortization of intangibles.

"Material Obligation" means an obligation of the Recipient that is material to this transaction other than a System Obligation.

"Parity Obligation" means the Installment Sale Agreement executed December 1, 2011 by and between the Upland Public Financing Authority and the City of Upland.

"Payment" means any payment due to the State Water Board from the Recipient pursuant to this Agreement.

"Policy" means the State Water Board's "Policy for Implementing the Drinking Water State Revolving Fund," as amended from time to time, including the Intended Use Plan in effect as of the execution date of this Agreement.

"Project" means the Project financed by this Agreement as described in Exhibits A and B and in the documents incorporated by reference herein.

"Project Completion" means the date, as determined by the Division after consultation with the Recipient, that operation of the Project is initiated or is capable of being initiated, whichever comes first.

"Project Costs" means the incurred costs of the Recipient which are eligible for financial assistance under this Agreement, which are allowable costs as defined under the Policy, and which are reasonable, necessary and allocable by the Recipient to the Project under GAAP, and may include capitalized interest.

"Project Funds" means all moneys disbursed to the Recipient by the State Water Board for eligible Project Costs pursuant to this Agreement.

"Recipient" means City of Upland.

"Records Retention End Date" means the last date that the Recipient is obligated to maintain records and is set forth on the Cover Page of this Agreement.

"Regional Water Quality Control Board" or "Regional Water Board" means the appropriate Regional Water Quality Control Board.

"Reimbursement Resolution" means the Recipient's reimbursement resolution identified and incorporated by reference in this Agreement.

"Reserve Fund" means the reserve fund required pursuant to Exhibit B of this Agreement.

"Revenues" means, for each Fiscal Year, all gross income and revenue received or receivable by the Recipient from the ownership or operation of the System, determined in accordance with GAAP, including all rates, fees, and charges (including connection fees and charges) as received by the Recipient for the services of the System, and all other income and revenue howsoever derived by the Recipient from the ownership or operation of the System or arising from the System, including all income from the deposit or investment of any money in the Enterprise Fund or any rate stabilization fund of the Recipient or held on the Recipient's behalf, and any refundable deposits made to establish credit, and advances or contributions in aid of construction.

"Rule 15c2-12(b)(5)" means Rule 15c2-12(b)(5) promulgated by the Securities and Exchange Commission pursuant to the Securities Exchange Act of 1934, as amended.

"Senior Obligation" means a debt obligation payable senior to this Obligation. There are no Senior Obligations.

"SRF" means the Drinking Water State Revolving Fund.

"State" means State of California.

"State Water Board" means the State Water Resources Control Board.

"Subordinate Obligation" means the Purchase and Sale Agreement executed March 31, 2019 and amended May 21, 2019 by and between the San Antonio Water Company and the City of Upland.

"System" means all drinking water collection, transport, treatment, storage, and delivery facilities, including land and easements thereof, owned by the Recipient, including the Project, and all other properties, structures, or works hereafter acquired and constructed by the Recipient and determined to be a part of the System, together with all additions, betterments, extensions, or improvements to such facilities, properties, structures, or works, or any part thereof hereafter acquired and constructed.

"System Obligation" means any obligation of the Recipient payable from the Revenues, including but not limited to this Obligation, any Parity Obligation, any Subordinate Obligation, and such additional obligations as may hereafter be issued in accordance with the provisions of such obligations and this Agreement.

"Useful Life" means the economically useful life of the Project beginning at Completion of Construction and is set forth in Exhibit A.

"Year" means calendar year unless otherwise expressly indicated.

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CITY OF UPLAND:

By: Rosemary Hoerning
Name: Rosemary Hoerning
Title: Interim City Manager

Date: November 26, 2019

STATE WATER RESOURCES CONTROL BOARD:

By: J. B. M
Name: Leslie Laudon
Title: Deputy Director
Division of Financial Assistance

Date: 12-11-19

EXHIBIT A – SCOPE OF WORK

A.1. PROJECT DESCRIPTION, USEFUL LIFE, AND SCOPE OF WORK.

(a) The Project is the project set forth on the Cover Page of this Agreement.

(b) The Useful Life of this Project is at least 75 years.

(c) Scope of Work.

The Recipient will construct a new 7.5 million gallon prestressed concrete reservoir adjacent to their existing Reservoir 15.

A.2. STANDARD PROJECT REQUIREMENTS.

A.2.1 Acknowledgments.

The Recipient shall include the following acknowledgment in any document, written report, or brochure prepared in whole or in part pursuant to this Agreement:

"Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board. California's Drinking Water State Revolving Fund is capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds. The contents of this document do not necessarily reflect the views and policies of the foregoing, nor does mention of trade names or commercial products constitute endorsement or recommendation for use."

A.2.2 Reports

A.2.2.1 Progress Reports.

(a) The Recipient must provide a progress report to the Division each quarter, beginning no later than 90 days after execution of this Agreement.

(b) The Recipient must provide a progress report with each disbursement request. Failure to provide a complete and accurate progress report may result in the withholding of Project Funds, as set forth in Exhibit B.

(c) A progress report must contain the following information:

i. A summary of progress to date including a description of progress since the last report, percent construction complete, percent contractor invoiced, and percent schedule elapsed;

ii. A description of compliance with environmental requirements;

iii. A listing of change orders including amount, description of work, and change in contract amount and schedule; and

iv. Any problems encountered, proposed resolution, schedule for resolution, and status of previous problem resolutions.

A.2.2.2 Project Completion Report.

(a) The Recipient must submit a Project Completion Report to the Division with a copy to the appropriate District Office on or before the due date established by the Division and the Recipient at the time of final project inspection. The Project Completion Report must include the following:

i. Description of the Project,

ii. Description of the water reliability problem the Project sought to address,

iii. Discussion of the Project's likelihood of successfully addressing that water reliability problem in the future, and

iv. Summary of compliance with applicable environmental conditions.

(b) If the Recipient fails to submit a timely Project Completion Report, the State Water Board may stop processing pending or future applications for new financial assistance, withhold disbursements under this Agreement or other agreements, and begin administrative proceedings.

A.2.2.3 As Needed Reports.

The Recipient must provide expeditiously, during the term of this Agreement, any reports, data, and information reasonably required by the Division, including but not limited to material necessary or appropriate for evaluation of the funding program or to fulfill any reporting requirements of the state or federal government.

A.2.2.4 DBE Reports for SRF Projects.

The Recipient must report DBE utilization to the Division on the DBE Utilization Report, State Water Board Form DBE UR334. The Recipient must submit such reports to the Division annually within ten (10) calendar days following October 1 until such time as the "Notice of Completion" is issued. The Recipient must comply with 40 CFR § 33.301 and require its contractors and subcontractors on the Project to comply.

A.2.3 Signage.

The Recipient shall place a sign at least four feet tall by eight feet wide made of ¾ inch thick exterior grade plywood or other approved material in a prominent location on the Project site and shall maintain the sign in good condition for the duration of the construction period. The sign must include the following disclosure statement and color logos (available from the Division):

a. "Funding for this $16,500,000.00 Replacement of 7.5 MG Reservoir at 17th Street and Benson Avenue project has been provided in full or in part by the Drinking Water State Revolving Fund through an agreement with the State Water Resources Control Board. California's Drinking Water State Revolving Fund is capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds."

b. The Project sign may include another agency's required promotional information so long as the above logos and disclosure statement are equally prominent on the sign. The sign shall be prepared in a professional manner.

A.2.4 Commencement of Operations.

Upon Completion of Construction of the Project, the Recipient must expeditiously initiate Project operations.

A.3 DATES & DELIVERABLES.

(a) Time is of the essence.

(b) The Recipient must expeditiously proceed with and complete construction of the Project.

(c) The following dates are established as on the Cover Page of this Agreement:

i. Eligible Work Start Date
ii. Eligible Construction Start Date
iii. Completion of Construction Date
iv. Final Disbursement Request Date
v. Records Retention End Date
vi. Final Payment Date

(d) The Recipient must award the prime construction contract timely.

(e) The Recipient agrees to start construction no later than June 1, 2020.

(f) The Recipient must deliver any request for extension of the Completion of Construction date no less than 90 days prior to the Completion of Construction date.

(g) The undisbursed balance of this Agreement will be deobligated if the Recipient does not provide its final Disbursement Request to the Division on or before the Final Disbursement Request Date, unless prior approval has been granted by the Division.

EXHIBIT B – FUNDING TERMS

B.1. FUNDING AMOUNTS AND DISBURSEMENTS

B.1.1 Funding Contingency and Other Sources.

(a) If this Agreement's funding for any fiscal year expires due to reversion or is reduced, substantially delayed, or deleted by the Budget Act, by Executive Order, or by order or action of the Department of Finance, the State Water Board has the option to either cancel this Agreement with no liability accruing to the State Water Board, or offer an amendment to the Recipient to reflect the reduced amount.

(b) If funding for Project Costs is made available to the Recipient from sources other than this Agreement, the Recipient must notify the Division. The Recipient may retain such funding up to an amount which equals the Recipient's share of Project Costs. To the extent allowed by requirements of other funding sources, excess funding must be remitted to the State Water Board to be applied to Payments due hereunder, if any.

B.1.2 Estimated Reasonable Cost.

The estimated reasonable cost of the total Project, including associated planning and design costs is sixteen million, five hundred thousand dollars and no cents ($16,500,000.00).

B.1.3 Project Funding Amount;

Subject to the terms of this Agreement, the State Water Board agrees to provide Project Funds not to exceed the amount of the Project Funding Amount set forth on the Cover Page of this Agreement.

B.1.4 Reserved

B.1.5 Budget Costs

Budget costs are contained in the Project Cost Table below:

TASK	DESCRIPTION	TOTAL COSTS
1	Components/Facilities Construction Cost:	$10,700,000
2	Change Order Contingency:	$2,072,000
	Subtotal:	$12,772,000
	Allowances (Soft Cost):	
3	Facilities Planning and Design	$800,000
4	Construction Management:	$1,200,000
5	Pre-purchased Materials:	$0
5	Administration:	$0

6	Land/Right-of-Way:	$1,728,000
7	Other Costs (explain below):	$0
	Allowance Sub Total:	$3,728,000
Approved Eligible DWSRF Project Total:		$16,500,000

Final Budget Approval to be inserted upon amendment.

B.1.6 Contingent Disbursement.

(a) The State Water Board's disbursement of funds hereunder is contingent on the Recipient's compliance with the terms and conditions of this Agreement.

(b) The State Water Board's obligation to disburse Project Funds is contingent upon the availability of sufficient funds to permit the disbursements provided for herein. If sufficient funds are not available for any reason, including but not limited to failure of the federal or State government to appropriate funds necessary for disbursement of Project Funds, the State Water Board shall not be obligated to make any disbursements to the Recipient under this Agreement. This provision shall be construed as a condition precedent to the obligation of the State Water Board to make any disbursements under this Agreement. Nothing in this Agreement shall be construed to provide the Recipient with a right of priority for disbursement over any other agency. If any disbursements due the Recipient under this Agreement are deferred because sufficient funds are unavailable, it is the intention of the State Water Board that such disbursement will be made to the Recipient when sufficient funds do become available, but this intention is not binding.

(c) Construction costs and disbursements are not available until after this Agreement has been amended to incorporate FBA.

(d) No costs incurred prior to the Eligible Work Start Date are eligible for reimbursement.

Construction costs incurred prior to the Eligible Construction Start Date are not eligible for reimbursement.

(e) Failure to proceed according to the timelines set forth in this Agreement may require the Recipient to repay to the State Water Board all disbursed Project Funds.

(f) The Recipient agrees to ensure that its final Disbursement Request is received by the Division no later than the Final Disbursement Request Date, unless prior approval has been granted by the Division. If the Final Disbursement Request is not received timely, the undisbursed balance of this Agreement will be deobligated.

(g) The Recipient is not entitled to interest earned on undisbursed funds

B.1.7 Disbursement Procedure.

Except as may be otherwise provided in this Agreement, disbursement of Project Funds will be made as follows:

1. Upon execution and delivery of this Agreement by both parties, the Recipient may request immediate disbursement of any eligible incurred planning and design allowance costs as specified below from the Project Funds through submission to the State Water

Board of the Disbursement Request Form 260 and Form 261, or any amendment thereto, duly completed and executed.

2. The Recipient must submit a disbursement request for costs incurred prior to the date this Agreement is executed by the State Water Board no later than ninety (90) days after this Agreement is executed by the State Water Board. Late disbursement requests may not be honored.

3. The Recipient may request disbursement of eligible construction and equipment costs consistent with budget amounts referenced below and in B.1.5. (Note that this Agreement will be amended to incorporate FBA after final budget approval.)

4. Additional Project Funds will be promptly disbursed to the Recipient upon receipt of Disbursement Request Form 260 and Form 261, or any amendment thereto, duly completed and executed by the Recipient for incurred costs consistent with this Agreement, along with receipt of progress reports due under Exhibit A.

5. The Recipient must not request disbursement for any Project Cost until such cost has been incurred and is currently due and payable by the Recipient, although the actual payment of such cost by the Recipient is not required as a condition of disbursement request. Supporting documentation (e.g., receipts) must be submitted with each Disbursement Request. The amount requested for administration costs must include a calculation formula (i.e., hours or days worked times the hourly or daily rate = total amount claimed). Disbursement of Project Funds will be made only after receipt of a complete, adequately supported, properly documented, and accurately addressed Disbursement Request.

6. The Recipient must spend Project Funds within 30 days of receipt. If the Recipient earns interest earned on Project Funds, it must report that interest immediately to the State Water Board. The State Water Board may deduct earned interest from future disbursements.

7. The Recipient shall not request a disbursement unless that Project Cost is allowable, reasonable, and allocable.

8. Notwithstanding any other provision of this Agreement, no disbursement shall be required at any time or in any manner which is in violation of or in conflict with federal or state laws, policies, or regulations.

9. No work or travel outside the State of California is permitted under this Agreement unless the Division provides prior written authorization. Failure to comply with this restriction may result in termination this Agreement, pursuant to Exhibit C. Any reimbursement for necessary travel and per diem shall be at rates not to exceed those set by the California Department of Human Resources at http://www.calhr.ca.gov/employees/Pages/travel-reimbursements.aspx. as of the date costs are incurred by the Recipient.

B.1.8 Withholding of Disbursements.

Notwithstanding any other provision of this Agreement, the State Water Board may withhold all or any portion of the Project Funds upon the occurrence of any of the following events:

(a) The Recipient's failure to maintain reasonable progress on the Project as determined by the Division;

(b) Placement on the ballot or passage of an initiative or referendum to repeal or reduce the Recipient's taxes, assessments, fees, or charges levied for operation of the System or payment of debt service on System Obligations;
(c) Commencement of litigation or a judicial or administrative proceeding related to the Project, System, or Revenues that the State Water Board determines may impair the timely satisfaction of Recipient's obligations under this Agreement;
(d) Any investigation by the District Attorney, California State Auditor, Bureau of State Audits, United States Environmental Protection Agency's Office of Inspector General, the Internal Revenue Service, Securities and Exchange Commission, a grand jury, or any other state or federal agency, relating to the Recipient's financial management, accounting procedures, or internal fiscal controls;
(e) A material adverse change in the condition of the Recipient, the Revenues, or the System, that the Division reasonably determines would materially impair the Recipient's ability to satisfy its obligations under this Agreement, or any other event that the Division reasonably determines would materially impair the Recipient's ability to satisfy its obligations under this Agreement,
(f) The Recipient's material violation of, or threat to materially violate, any term of this Agreement;
(g) Suspicion of fraud, forgery, embezzlement, theft, or any other misuse of public funds by the Recipient or its employees, or by its contractors or agents regarding the Project or the System;
(h) An event requiring Notice as set forth in Exhibit C;
(i) An Event of Default or an event that the Division determines may become an Event of Default.

B.1.9 Fraud and Misuse of Public Funds.

All requests for disbursement submitted must be accurate and signed by the Recipient's Authorized Representative under penalty of perjury. All costs submitted pursuant to this Agreement must only be for the work or tasks set forth in this Agreement. The Recipient must not submit any invoice containing costs that are ineligible or have been reimbursed from other funding sources unless required and specifically noted as such (i.e., match costs). Any eligible costs for which the Recipient is seeking reimbursement shall not be reimbursed from any other source. Double or multiple billing for time, services, or any other eligible cost is improper and will not be compensated. Any suspected occurrences of fraud, forgery, embezzlement, theft, or any other misuse of public funds may result in suspension of disbursements and, notwithstanding any other section in this Agreement, the termination of this Agreement requiring the repayment of all Project Funds disbursed hereunder. Additionally, the Deputy Director of the Division may request an audit and refer the matter to the Attorney General's Office or the appropriate district attorney's office for criminal prosecution or the imposition of civil liability.

B.2 RECIPIENT'S PAYMENT OBLIGATION, PLEDGE, AND RESERVE

B.2.1 Project Costs.

The Recipient must pay any and all costs connected with the Project including, without limitation, any and all Project Costs and Additional Payments. If the Project Funds are not sufficient to pay the Project Costs in full, the Recipient must nonetheless complete the Project and pay that portion of the Project Costs in excess of available Project Funds, and shall not be entitled to any reimbursement therefor from the State Water Board.

B.2.2 Estimated Principal Payment Due.

The estimated amount of principal that will be due to the State Water Board from the Recipient under this Agreement is sixteen million, five hundred thousand dollars and no cents ($16,500,000.00).

B.2.3 Interest Rate and In-Lieu of Interest Charges.

(a) The Recipient agrees to make all Payments according to the schedule in Exhibit E, and as otherwise set forth herein, at an interest rate of one point nine % (1.9%) per annum.

(b) Interest will accrue beginning with each disbursement.

(c) In lieu of, and not to exceed, interest otherwise due under this Agreement, the Recipient agrees to pay the following charge(s), as further set forth in Exhibit E:

- an Administrative Service Charge
- a Drinking Water Small Community Emergency Grant Fund Charge

B.2.4 Reserved.

B.2.5 Obligation Absolute.

The obligation of the Recipient to make the Payments and other payments required to be made by it under this Agreement, from the Net Revenues and/or other amounts legally available to the Recipient therefor, is absolute and unconditional, and until such time as the Payments and Additional Payments have been paid in full, the Recipient must not discontinue or suspend any Payments or other payments required to be made by it hereunder when due, whether or not the Project, or any related part thereof is operating or operable or has been completed, or its use is suspended, interfered with, reduced or curtailed or terminated in whole or in part, and such Payments and other payments shall not be subject to reduction whether by offset or otherwise and shall not be conditional upon the performance or nonperformance by any party of any agreement for any cause whatsoever.

B.2.6 Payment Timing.

(a) The Recipient must pay interest annually until one year after Completion of Construction. Beginning no later than one year after Completion of Construction, the Recipient must submit annual Payment of the principal of the Project Funds, together with all interest accruing annually. The Recipient must make Payments fully amortizing the total principal of the Project by the Final Payment Date. Payments are based on a standard fully amortized assistance amount with equal annual payments.

(b) The remaining balance is the previous balance, plus the disbursements, plus the accrued interest on both, plus any Charge In Lieu of Interest, less the Payment. Payment calculations will be made beginning one (1) year after Completion of Construction. Exhibit E is a payment schedule based on the provisions of this Exhibit and an estimated disbursement schedule. Actual payments will be based on actual disbursements.

(c) Upon Completion of Construction and submission of necessary reports by the Recipient, the Division will prepare an appropriate payment schedule and supply the same to the Recipient. The Division may amend this schedule as necessary to accurately reflect amounts due under this Agreement. The Division will prepare any necessary amendments to the payment schedule and send them to the Recipient. The Recipient must make each Payment on or before the due date therefor. A ten (10) day grace period will be allowed, after which time a penalty in the amount of costs incurred by the State Water Board will be assessed for late payment. These costs may include, but are not limited to, lost interest earnings, staff time, bond debt service default penalties, if any, and other related costs. For purposes of penalty assessment, payment will be deemed to have been made if payment is deposited in the U.S. Mail within the grace period with postage prepaid and properly addressed. Any penalties assessed will not be added

to the assistance amount balance, but will be treated as a separate account and obligation of the Recipient. The interest penalty will be assessed from the payment due date.

(d) The Recipient is obligated to make all payments required by this Agreement to the State Water Board, notwithstanding any individual default by its constituents or others in the payment to the Recipient of fees, charges, taxes, assessments, tolls or other charges ("Charges") levied or imposed by the Recipient. The Recipient must provide for the punctual payment to the State Water Board of all amounts which become due under this Agreement and which are received from constituents or others in the payment to the Recipient. In the event of failure, neglect or refusal of any officer of the Recipient to levy or cause to be levied any Charge to provide payment by the Recipient under this Agreement, to enforce or to collect such Charge, or to pay over to the State Water Board any money collected on account of such Charge necessary to satisfy any amount due under this Agreement, the State Water Board may take such action in a court of competent jurisdiction as it deems necessary to compel the performance of all duties relating to the imposition or levying and collection of any of such Charges and the payment of the money collected therefrom to the State Water Board. Action taken pursuant hereto shall not deprive the State Water Board of, or limit the application of, any other remedy provided by law or by this Agreement.

(e) Each Payment must be paid in lawful money of the United States of America by check or other acceptable form of payment set forth at www.waterboards.ca.gov/make_a_payment.
The Recipient must pay Payments and Additional Payments from Net Revenues and/or other amounts legally available to the Recipient therefor.

B.2.7 Pledged Revenues.

B.2.7.1 Establishment of Enterprise Fund and Reserve Fund.

In order to carry out its System Obligations, the Recipient covenants that it shall establish and maintain or shall have established and maintained the Enterprise Fund. All Revenues received shall be deposited when and as received in trust in the Enterprise Fund. As required in this Exhibit, the Recipient must establish and maintain a Reserve Fund.

B.2.7.2 Pledge of Net Revenues, Enterprise Fund, and Reserve Fund.

The Obligation hereunder shall be secured by a lien on and pledge of the Enterprise Fund, Net Revenues, and any Reserve Fund on parity with the Parity Obligations and subordinate to the Senior Obligations. The Recipient hereby pledges and grants such lien on and pledge of the Enterprise Fund, Net Revenues, and any Reserve Fund to secure the Obligation, including payment of Payments and Additional Payments hereunder. The Net Revenues in the Enterprise Fund, shall be subject to the lien of such pledge without any physical delivery thereof or further act, and the lien of such pledge shall be valid and binding as against all parties having claims of any kind in tort, contract, or otherwise against the Recipient.

B.2.7.3 Application and Purpose of the Enterprise Fund.

Subject to the provisions of any outstanding System Obligation, money on deposit in the Enterprise Fund shall be applied and used first, to pay Operations and Maintenance Costs, and thereafter, all amounts due and payable with respect to the System Obligations. After making all payments hereinabove required to be made in each Fiscal Year, the Recipient may expend in such Fiscal Year any remaining money in the Enterprise Fund for any lawful purpose of the Recipient, including payment of subordinate debt.

B.2.8 No Prepayment.

The Recipient may not prepay any portion of the principal and interest due under this Agreement without the written consent of the Deputy Director of the Division.

B.2.9 Reserve Fund.

Prior to Completion of Construction, the Recipient must establish a restricted Reserve Fund, held in its Enterprise Fund, equal to one year's Debt Service on this Obligation. The Recipient must maintain the Reserve Fund throughout the term of this Agreement. The Reserve Fund is subject to lien and pledged as security for this Obligation, and its use is restricted to payment of this Obligation during the term of this Agreement.

B.3 RATES, FEES AND CHARGES.

(a) The Recipient must, to the extent permitted by law, fix, prescribe and collect rates, fees and charges for the System during each Fiscal Year which are reasonable, fair, and nondiscriminatory and which will be sufficient to generate Revenues in the amounts necessary to cover Operations and Maintenance Costs, and must ensure that Net Revenues are equal to at least 125% of the Maximum Annual Debt Service with respect to all outstanding System Obligations, so long as System Obligations other than this Obligation are outstanding. Upon defeasance of all System Obligations other than this Obligation, this ratio must be at least 110%, except where System Obligations are defeased pursuant to refunding obligations.

(b) The Recipient may make adjustments from time to time in such fees and charges and may make such classification thereof as it deems necessary, but shall not reduce the rates, fees and charges then in effect unless the Net Revenues from such reduced rates, fees, and charges will at all times be sufficient to meet the requirements of this section.

(c) Upon consideration of a voter initiative to reduce Revenues, the Recipient must make a finding regarding the effect of such a reduction on the Recipient's ability to satisfy the rate covenant set forth in this Section. The Recipient must make its findings available to the public and must request, if necessary, the authorization of the Recipient's decision-maker or decision-making body to file litigation to challenge any such initiative that it finds will render it unable to satisfy the rate covenant set forth in this Agreement and its obligation to operate and maintain the Project for its Useful Life. The Recipient must diligently pursue and bear any and all costs related to such challenge. The Recipient must notify and regularly update the State Water Board regarding the status of any such challenge.

B.4 ADDITIONAL DEBT.

(a) The Recipient's future debt that is secured by Revenues pledged herein may not be senior to this Obligation, except where the new senior obligation refunds or refinances a senior obligation with the same lien position as the existing senior obligation, the new senior obligation has the same or earlier repayment term as the refunded senior debt, the new senior debt service is the same or lower than the existing debt service, and the new senior debt will not diminish the Recipient's ability to satisfy its SRF obligation(s).

(b) The Recipient may issue additional parity or subordinate debt only if all of the following conditions are met:

i. Net Revenues in the most recent Fiscal Year, excluding transfers from a rate stabilization fund, if any, meet the ratio for rate covenants set forth in this Exhibit and with respect to any outstanding and proposed additional obligations;
ii. The Recipient is in compliance with any reserve fund requirement of this Obligation.
iii. The Recipient's non-subordinate debt is rated "A," or higher, by at least two of the nationally recognized rating agencies.

B.5 NO LIENS.

The Recipient must not make any pledge of or place any lien on the Project, System, or Revenues except as otherwise provided or permitted by this Agreement.

EXHIBIT C – GENERAL & PROGRAMMATIC TERMS & CONDITIONS

C.1 REPRESENTATIONS & WARRANTIES.

The Recipient represents, warrants, and commits to the following as of the Eligible Work Start Date and continuing thereafter for the term of this Agreement:

C.1.1 Application and General Recipient Commitments.

The Recipient has not made any untrue statement of a material fact in its application for this financial assistance, or omitted to state in its application a material fact that makes the statements in its application not misleading.

The Recipient agrees to comply with all terms, provisions, conditions, and commitments of this Agreement, including all incorporated documents.

The Recipient agrees to fulfill all assurances, declarations, representations, and commitments in its application, accompanying documents, and communications filed in support of its request for funding under this Agreement.

C.1.2 Authorization and Validity.

The execution and delivery of this Agreement, including all incorporated documents, has been duly authorized by the Recipient. Upon execution by both parties, this Agreement constitutes a valid and binding obligation of the Recipient, enforceable in accordance with its terms, except as such enforcement may be limited by law.

C.1.3 No Violations.

The execution, delivery, and performance by Recipient of this Agreement, including all incorporated documents, do not violate any provision of any law or regulation in effect as of the date set forth on the first page hereof, or result in any breach or default under any contract, obligation, indenture, or other instrument to which Recipient is a party or by which Recipient is bound as of the date set forth on the Cover Page.

C.1.4 No Litigation.

There are no actions, claims, investigations, suits, or proceedings before any governmental authority, court, or administrative agency pending and notice of which has been served upon and received by Recipient or, to Recipient's knowledge, threatened which materially affect the financial condition or operations of the Recipient, the System, the Revenues, and/or the Project.

There are no proceedings, actions, or offers by a public entity to acquire by purchase or the power of eminent domain the System or any of the real or personal property related to or necessary for the Project.

C.1.5 Property Rights.

The Recipient owns or has sufficient property rights in the Project property for the longer of the Useful Life or the term of this Agreement, either in fee simple or for a term of years that is not subject to third-party revocation during the Useful Life of the Project.

C.1.6 Solvency and Insurance.

None of the transactions contemplated by this Agreement will be or have been made with an actual intent to hinder, delay, or defraud any present or future creditors of Recipient. The Recipient is solvent and will not be rendered insolvent by the transactions contemplated by this Agreement. The Recipient is able to pay its debts as they become due. The Recipient maintains sufficient insurance coverage considering the scope of this Agreement, including, for example but not necessarily limited to, general liability, automobile liability, workers compensation and employer liability, professional liability.

C.1.7 Legal Status and Eligibility.

The Recipient is duly organized and existing and in good standing under the laws of the State of California. Recipient must at all times maintain its current legal existence and preserve and keep in full force and effect its legal rights and authority. The Recipient acknowledges that changes to its legal or financial status may affect its eligibility for funding under this Agreement and commits to maintaining its eligibility. Within the preceding ten years, the Recipient has not failed to demonstrate compliance with state or federal audit disallowances.

C.1.8 Financial Statements and Continuing Disclosure.

The financial statements of Recipient previously delivered to the State Water Board as of the date(s) set forth in such financial statements: (a) are materially complete and correct; (b) present fairly the financial condition of the Recipient; and (c) have been prepared in accordance with GAAP. Since the date(s) of such financial statements, there has been no material adverse change in the financial condition of the Recipient, nor have any assets or properties reflected on such financial statements been sold, transferred, assigned, mortgaged, pledged or encumbered, except as previously disclosed in writing by Recipient and approved in writing by the State Water Board.

The Recipient is current in its continuing disclosure obligations associated with its material debt, if any.

C.1.9 System Obligations

The Recipient has no System Obligations other than those defined in this Agreement.

C.1.10 No Other Material Debt.

The Recipient has no Material Obligations other than System Obligations.

C.2 DEFAULTS AND REMEDIES

In addition to any other remedy set forth in this Agreement, the following remedies are available under this Agreement.

C.2.1 Return of Funds; Acceleration; and Additional Payments.

Notwithstanding any other provision of this Agreement, if the Division determines that an Event of Default has occurred, the Recipient may be required, upon demand, immediately to do each of the following, in each instance payable solely from the Revenues or other legally available amounts:

i. return to the State Water Board any grant or principal forgiveness amounts received pursuant to this Agreement;
ii. accelerate the payment of any principal owed under this Agreement, all of which shall be immediately due and payable;
iii. pay interest at the highest legal rate on all of the foregoing; and

iv. pay any Additional Payments.

C.2.3 Judicial remedies.

Whenever the State Water Board determines that an Event of Default shall have occurred, the State Water Board may enforce its rights under this Agreement by any judicial proceeding, whether at law or in equity. Without limiting the generality of the foregoing, the State Water Board may:

i. by suit in equity, require the Recipient to account for amounts relating to this Agreement as if the Recipient were the trustee of an express trust;
ii. by mandamus or other proceeding, compel the performance by the Recipient and any of its officers, agents, and employees of any duty under the law or of any obligation or covenant under this Agreement, including but not limited to the imposition and collection of rates for the services of the System sufficient to meet all requirements of this Agreement; and
iii. take whatever action at law or in equity as may appear necessary or desirable to the State Water Board to collect the Payments then due or thereafter to become due, or to enforce performance of any obligation or covenant of the Recipient under this Agreement.

Upon the filing of a suit or other commencement of judicial proceedings to enforce the rights of the State Water Board under this Agreement, the State Water Board may make application for the appointment of a receiver or custodian of the Revenues, pending such proceeding, with such power as the court making such appointment may confer.

C.2.4 Termination.

Upon an Event of Default, the State Water Board may terminate this Agreement. Interest shall accrue on all amounts due at the highest legal rate of interest from the date that the State Water Board delivers notice of termination to the Recipient.

C.2.5 Damages for Breach of Tax-Exempt Status.

In the event that any breach of any of the provisions of this Agreement by the Recipient results in the loss of tax-exempt status for any bonds of the State or any subdivision or agency thereof, or if such breach results in an obligation on the part of the State or any subdivision or agency thereof to reimburse the federal government by reason of any arbitrage profits, the Recipient must immediately reimburse the State or any subdivision or agency thereof in an amount equal to any damages paid by or loss incurred by the State or any subdivision or agency thereof due to such breach.

C.2.6 Damages for Breach of Federal Conditions.

In the event that any breach of any of the provisions of this Agreement by the Recipient results in the failure of Project Funds to be used pursuant to the provisions of this Agreement, or if such breach results in an obligation on the part of the State or any subdivision or agency thereof to reimburse the federal government, the Recipient must immediately reimburse the State or any subdivision or agency thereof in an amount equal to any damages paid by or loss incurred by the State or any subdivision or agency thereof due to such breach.

C.2.7 Remedies and Limitations.

None of the remedies available to the State Water Board shall be exclusive of any other remedy, and each such remedy shall be cumulative and in addition to every other remedy given hereunder or now or

hereafter existing at law or in equity. The State Water Board may exercise any remedy, now or hereafter existing, without exhausting and without regard to any other remedy.

Any claim of the Recipient is limited to the rights, remedies, and claims procedures provided to the Recipient under this Agreement.

C.2.8 Non-Waiver.

Nothing in this Agreement shall affect or impair the Recipient's Obligation to pay Payments as provided herein or shall affect or impair the right of the State Water Board to bring suit to enforce such payment. No delay or omission of the State Water Board in the exercise of any right arising upon an Event of Default shall impair any such right or be construed to be a waiver of any such Event of Default. The State Water Board may exercise from time to time and as often as shall be deemed expedient by the State Water Board, any remedy or right provided by law or pursuant to this Agreement.

C.2.9 Status Quo.

If any action to enforce any right or exercise any remedy shall be brought and either discontinued or determined adversely to the State Water Board, then the State Water Board shall be restored to its former position, rights and remedies as if no such action had been brought.

C.3 STANDARD CONDITIONS

C.3.1 Access, Inspection, and Public Records.

The Recipient must ensure that the State Water Board, the Governor of the State, the United States Environmental Protection Agency, the Office of Inspector General, any member of Congress, or any authorized representative of the foregoing, will have safe and suitable access to the Project site at all reasonable times during Project construction and thereafter for the term of the Agreement. The Recipient acknowledges that, except for a subset of information regarding archaeological records, the Project records and locations are public records, including but not limited to all of the submissions accompanying the application, all of the documents incorporated into this Agreement by reference, and all reports, disbursement requests, and supporting documentation submitted hereunder.

C.3.2 Accounting and Auditing Standards; Financial Management Systems; Records Retention.

(a) The Recipient must maintain project accounts according to GAAP as issued by the Governmental Accounting Standards Board (GASB) or its successor. The Recipient must maintain GAAP-compliant project accounts, including GAAP requirements relating to the reporting of infrastructure assets.

(b) The Recipient must comply with federal standards for financial management systems. The Recipient agrees that, at a minimum, its fiscal control and accounting procedures will be sufficient to permit preparation of reports required by the federal government and tracking of Project funds to a level of expenditure adequate to establish that such funds have not been used in violation of federal or state law or the terms of this Agreement. To the extent applicable, the Recipient is bound by, and must comply with, the provisions and requirements of the federal Single Audit Act of 1984, Office of Management and Budget (OMB) Circular No. A-133 and 2 CFR Part 200, subpart F, and updates or revisions, thereto.

(c) Without limitation of the requirement to maintain Project accounts in accordance with GAAP, the Recipient must:

i. Establish an official file for the Project which adequately documents all significant actions relative to the Project;

ii. Establish separate accounts which will adequately and accurately depict all amounts received and expended on the Project, including all assistance funds received under this Agreement;
iii. Establish separate accounts which will adequately depict all income received which is attributable to the Project, specifically including any income attributable to assistance funds disbursed under this Agreement;
iv. Establish an accounting system which will accurately depict final total costs of the Project, including both direct and Indirect Costs;
v. Establish such accounts and maintain such records as may be necessary for the State to fulfill federal reporting requirements, including any and all reporting requirements under federal tax statutes or regulations; and
vi. If Force Account is used by the Recipient for any phase of the Project, other than for planning, design, and construction engineering and administration provided for by allowance, accounts will be established which reasonably document all employee hours charged to the Project and the associated tasks performed by each employee.

(d) The Recipient must maintain separate books, records and other material relative to the Project. The Recipient must also retain such books, records, and other material for itself and for each contractor or subcontractor who performed or performs work on this project for a minimum of thirty-six (36) years after Completion of Construction. The Recipient must require that such books, records, and other material are subject at all reasonable times (at a minimum during normal business hours) to inspection, copying, and audit by the State Water Board, the California State Auditor, the Bureau of State Audits, the United States Environmental Protection Agency (USEPA), the Office of Inspector General, the Internal Revenue Service, the Governor, or any authorized representatives of the aforementioned. The Recipient must allow and must require its contractors to allow interviews during normal business hours of any employees who might reasonably have information related to such records. The Recipient agrees to include a similar duty regarding audit, interviews, and records retention in any contract or subcontract related to the performance of this Agreement. The provisions of this section survive the term of this Agreement.

C.3.3 Amendment.

No amendment or variation of the terms of this Agreement shall be valid unless made in writing and signed by both the Recipient and the Deputy Director or designee.

Requests for amendments must be in writing and directed to the contact listed in Section 4 and to the Division's Chief of Loans and Grants Administration Section.

C.3.4 Assignability.

This Agreement is not assignable by the Recipient, either in whole or in part, without the consent of the State Water Board in the form of a formal written amendment to this Agreement.

C.3.5 Audit.

(a) The Division may call for an audit of financial information relative to the Project if the Division determines that an audit is desirable to assure program integrity or if an audit becomes necessary because of state or federal requirements. If an audit is called for, the audit must be performed by a certified public accountant independent of the Recipient and at the cost of the Recipient. The audit must be in the form required by the Division.

(b) Audit disallowances must be returned to the State Water Board.

C.3.6 Bonding.

Where contractors are used, the Recipient must not authorize construction to begin until each contractor has furnished a performance bond in favor of the Recipient in the following amounts: faithful performance (100%) of contract value; labor and materials (100%) of contract value. This requirement shall not apply to any contract for less than $25,000.00.

C.3.7 Competitive Bidding

Recipient must adhere to any applicable state law or local ordinance for competitive bidding and applicable labor laws.

If Recipient is a private entity, any construction contracts related in any way to the Project must be let by competitive bid procedures which assure award of such contracts to the lowest responsible bidders. Recipient must not award a construction contract until a summary of bids and identification of the selected lowest responsible bidder is submitted to and approved in writing by the Division. Recipient must provide a full explanation if Recipient is proposing to award a construction contract to anyone other than the lowest responsible bidder.

C.3.8 Compliance with Applicable Laws, Rules, and Requirements.

The Recipient must, at all times, comply with and require its contractors and subcontractors to comply with all applicable federal and state laws, rules, guidelines, regulations, and requirements. Without limitation of the foregoing, to the extent applicable, the Recipient must:

(a) Comply with the provisions of the adopted environmental mitigation plan, if any, for the term of this Agreement;

(b) Comply with the Policy; and

(c) Comply with and require compliance with the state and federal requirements set forth elsewhere in this Agreement.

C.3.9 Computer Software.

The Recipient certifies that it has appropriate systems and controls in place to ensure that state funds will not be used in the performance of this Agreement for the acquisition, operation or maintenance of computer software in violation of copyright laws.

C.3.10 Conflict of Interest.

The Recipient certifies that its owners, officers, directors, agents, representatives, and employees are in compliance with applicable state and federal conflict of interest laws.

C.3.11 Continuous Use of Project; No Lease, Sale, Transfer of Ownership, or Disposal of Project.

The Recipient agrees that, except as provided in this Agreement, it will not abandon, substantially discontinue use of, lease, sell, transfer ownership of, or dispose of all or a significant part or portion of the Project during the Useful Life of the Project without prior written approval of the Division. Such approval may be conditioned as determined to be appropriate by the Division, including a condition requiring repayment of all disbursed Project Funds or all or any portion of all remaining funds covered by this Agreement together with accrued interest and any penalty assessments that may be due.

C.3.12 Data Management.

The Recipient will undertake appropriate data management activities so that Project data can be incorporated into statewide data systems.

C.3.13 Disputes.

(a) The Recipient may appeal a staff decision within 30 days to the Deputy Director of the Division or designee, for a final Division decision. The Recipient may appeal a final Division decision to the State Water Board within 30 days. The Office of the Chief Counsel of the State Water Board will prepare a summary of the dispute and make recommendations relative to its final resolution, which will be provided to the State Water Board's Executive Director and each State Water Board Member. Upon the motion of any State Water Board Member, the State Water Board will review and resolve the dispute in the manner determined by the State Water Board. Should the State Water Board determine not to review the final Division decision, this decision will represent a final agency action on the dispute.

(b) This clause does not preclude consideration of legal questions, provided that nothing herein shall be construed to make final the decision of the State Water Board, or any official or representative thereof, on any question of law.

(c) Recipient must continue with the responsibilities under this Agreement during any dispute.

(d) This section relating to disputes does not establish an exclusive procedure for resolving claims within the meaning of Government Code sections 930 and 930.4.

C.3.14 Environmental Clearance.

(a) Notwithstanding any other provision, the State Water Board has no binding obligation to provide funding under this Agreement except for activities excluded from, not subject to, or exempt under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). No work that is subject to CEQA or NEPA may proceed under this Agreement until the State Water Board has provided approval to proceed. Upon receipt and review of the Recipient's environmental documents, the State Water Board shall make the appropriate environmental findings before determining whether to approve construction or implementation funding for the Project under this Agreement. Providing approval for such construction or implementation funding is fully discretionary. The State Water Board may require changes in the scope of work or additional mitigation as a condition to providing construction or implementation funding under this Agreement. Recipient shall not perform any work subject to CEQA and/or NEPA before the State Water Board completes its environmental review and specifies any changes in scope or additional mitigation that may be required. Proceeding with work subject to CEQA and/or NEPA without approval by the State Water Board shall constitute a breach of a material provision of this Agreement.

(b) If this Project includes modification of a river or stream channel, the Recipient must fully mitigate environmental impacts resulting from the modification. The Recipient must provide documentation that the environmental impacts resulting from such modification will be fully mitigated considering all of the impacts of the modification and any mitigation, environmental enhancement, and environmental benefit resulting from the Project, and whether, on balance, any environmental enhancement or benefit equals or exceeds any negative environmental impacts of the Project.

C.3.15 Governing Law.

This Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.

C.3.16 Income Restrictions.

The Recipient agrees that any refunds, rebates, credits, or other amounts (including any interest thereon) accruing to or received by the Recipient under this Agreement must be paid by the Recipient to the State Water Board, to the extent that they are properly allocable to costs for which the Recipient has been reimbursed by the State Water Board under this Agreement.

C.3.17 Indemnification and State Reviews.

The parties agree that review or approval of Project plans and specifications by the State Water Board is for administrative purposes only, including conformity with application and eligibility criteria, and expressly not for the purposes of design defect review or construction feasibility, and does not relieve the Recipient of its responsibility to properly plan, design, construct, operate, and maintain the Project. To the extent permitted by law, the Recipient agrees to indemnify, defend, and hold harmless the State Water Board, the Bank, and any trustee, and their officers, employees, and agents for the Bonds, if any (collectively, "Indemnified Persons"), against any loss or liability arising out of any claim or action brought against any Indemnified Persons from and against any and all losses, claims, damages, liabilities, or expenses, of every conceivable kind, character, and nature whatsoever arising out of, resulting from, or in any way connected with (1) the System or the Project or the conditions, occupancy, use, possession, conduct, or management of, work done in or about, or the planning, design, acquisition, installation, or construction, of the System or the Project or any part thereof; (2) the carrying out of any of the transactions contemplated by this Agreement or any related document; (3) any violation of any applicable law, rule or regulation, any environmental law (including, without limitation, the Federal Comprehensive Environmental Response, Compensation and Liability Act, the Resource Conservation and Recovery Act, the California Hazardous Substance Account Act, the Federal Water Pollution Control Act, the Clean Air Act, the Toxic Substances Control Act, the Occupational Safety and Health Act, the Safe Drinking Water Act, the California Hazardous Waste Control Law, and California Water Code Section 13304, and any successors to said laws), rule or regulation or the release of any toxic substance on or near the System or the Project; or (4) any untrue statement or alleged untrue statement of any material fact or omission or alleged omission to state a material fact necessary to make the statements required to be stated therein, in light of the circumstances under which they were made, not misleading with respect to any information provided by the Recipient for use in any disclosure document utilized in connection with any of the transactions contemplated by this Agreement, except those arising from the gross negligence or willful misconduct of the Indemnified Persons. The Recipient must also provide for the defense and indemnification of the Indemnified Parties in any contractual provision extending indemnity to the Recipient in any contract let for the performance of any work under this Agreement, and must cause the Indemnified Parties to be included within the scope of any provision for the indemnification and defense of the Recipient in any contract or subcontract. To the fullest extent permitted by law, the Recipient agrees to pay and discharge any judgment or award entered or made against Indemnified Persons with respect to any such claim or action, and any settlement, compromise or other voluntary resolution. The provisions of this section survive the term of this Agreement.

C.3.18 Independent Actor.

The Recipient, and its agents and employees, if any, in the performance of this Agreement, shall act in an independent capacity and not as officers, employees, or agents of the State Water Board.

C.3.19 Integration.

This Agreement constitutes the complete and final agreement between the parties. No oral or written understanding or agreement not incorporated in this Agreement shall be binding on either party.

C.3.20 Leveraging Covenants.

(a) Notwithstanding any other provision hereof, the Recipient covenants and agrees that it will comply with the Tax Covenants set forth in Exhibit F of this Agreement.

(b) The Recipient covenants to furnish such financial, operating and other data pertaining to the Recipient as may be requested by the State Water Board to: (i) enable the State Water Board to cause the issuance of Bonds and provide for security therefor; or (ii) enable any underwriter of Bonds issued for the benefit of the State Water Board to comply with Rule 15c2-12(b)(5). The Recipient further covenants to provide the State Water Board with copies of all continuing disclosure documents or reports that are disclosed pursuant to (i) the Recipient's continuing disclosure undertaking or undertakings made in connection with any outstanding System Obligation, (ii) the terms of any outstanding System Obligation, or (iii) a voluntary disclosure of information related to an outstanding System Obligation. The Recipient must disclose such documents or reports to the State Water Board at the same time such documents or reports are submitted to any dissemination agent, trustee, nationally recognized municipal securities information repository, the Municipal Securities Rulemaking Board's Electronic Municipal Market Access (EMMA) website or other person or entity.

C.3.21 No Discrimination.

(a) The Recipient must comply with Government Code section 11135 and the implementing regulations (Cal. Code Regs, tit. 2, § 11140 et seq.), including, but not limited to, ensuring that no person is unlawfully denied full and equal access to the benefits of, or unlawfully subjected to discrimination in the operation of, the Project or System on the basis of sex, race, color, religion, ancestry, national origin, ethnic group identification, age, mental disability, physical disability, medical condition, genetic information, marital status, or sexual orientation as such terms are defined under California law, for as long as the Recipient retains ownership or possession of the Project.

(b) If Project Funds are used to acquire or improve real property, the Recipient must include a covenant of nondiscrimination running with the land in the instrument effecting or recording the transfer of such real property.

(c) The Recipient must comply with the federal American with Disabilities Act of 1990 and implementing regulations as required by Government Code section 11135(b).

(d) The Recipient's obligations under this section shall survive the term of this Agreement.

(e) During the performance of this Agreement, Recipient and its contractors and subcontractors must not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, sexual orientation, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, denial of family care leave, or genetic information, gender, gender identity, gender expression, or military and veteran status.

(f) The Recipient, its contractors, and subcontractors must ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment.

(g) The Recipient, its contractors, and subcontractors must comply with the provisions of the Fair Employment and Housing Act and the applicable regulations promulgated thereunder. (Gov. Code, §12990, subds. (a)-(f) et seq.;Cal. Code Regs., tit. 2, § 7285 et seq.) Such regulations are incorporated into this Agreement by reference and made a part hereof as if set forth in full.

(h) The Recipient, its contractors, and subcontractors must give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

(i) The Recipient must include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under this Agreement.

C.3.22 No Third Party Rights.

The parties to this Agreement do not create rights in, or grant remedies to, any third party as a beneficiary of this Agreement, or of any duty, covenant, obligation, or undertaking established herein.

C.3.23 No Obligation of the State.

Any obligation of the State Water Board herein contained shall not be an obligation, debt, or liability of the State and any such obligation shall be payable solely out of the moneys encumbered pursuant to this Agreement.

C.3.24 Notice.

Upon the occurrence of any of the following events, the Recipient must provide notice as set forth below.

(a) Within 24 hours of the following, the Recipient must notify the Division by phone at (916) 327-9978 and by email to Marques.Tamanaha@waterboards.ca.gov; Uyen.Trinh-Le@waterboards.ca.gov and DrinkingWaterSRF@waterboards.ca.gov:
   i. The seizure of, or levy on, any Revenues securing this Agreement;
   ii. Any discovery of any potential tribal cultural resource and/or archaeological or historical resource. Should a potential tribal cultural resource and/or archaeological or historical resource be discovered during construction, the Recipient must ensure that all work in the area of the find will cease until a qualified archaeologist has evaluated the situation and made recommendations regarding preservation of the resource, and the Division has determined what actions should be taken to protect and preserve the resource. The Recipient must implement appropriate actions as directed by the Division.

(b) Within five (5) business days, the Recipient must notify the Division by phone at (916) 327-9978; by email to Lance.Reese@waterboards.ca.gov Marques.Tamanaha@waterboards.ca.gov; Uyen.Trinh-Le@waterboards.ca.gov and DrinkingWaterSRF@waterboards.ca.gov; and by mail to the contact address set forth in Section 4 of this Agreement of the occurrence of any of the following events:

   i. Bankruptcy, insolvency, receivership or similar event of the Recipient, or actions taken in anticipation of any of the foregoing;
   ii. Change of ownership of the Project or the System or change of management or service contracts, if any, for operation of the System;
   iii. Loss, theft, damage, or impairment to Project, the Revenues or the System;
   iv. Failure to meet any debt service coverage test in Exhibit B of this agreement;
   v. Draws on the Reserve Fund;
   vi. Listed Events or Events of Default, except as otherwise set forth in this section;
   vii. Failure to observe or perform any covenant or comply with any condition in this Agreement.
   viii. An offer from a public entity to purchase the Project or the System or any portion thereof, or any of the real or personal property related to or necessary for the Project; or
   ix. A proceeding or action by a public entity to acquire the Project or the System by power of eminent domain.

x. Incurrence of a System Obligation or Material Obligation by the Recipient; or
xi. A default, event of acceleration, termination event, modification of terms, or other similar event under the terms of a System Obligation or Material Obligation of the Recipient, any of which reflect financial difficulties.

(c) Within ten (10) business days, the Recipient must notify the Division by phone at (916) 327-9978, by email to Marques.Tamanaha@waterboards.ca.gov; Uyen.Trinh-Le@waterboards.ca.gov and DrinkingWaterSRF@waterboards.ca.gov, and by mail to the contact address set forth in Section 4 of this Agreement of the following events:

i. Material defaults on System Obligations, other than this Obligation;
ii. Unscheduled draws on debt service reserves held for System Obligations, other than this Obligation, if any, reflecting financial difficulties;
iii. Unscheduled draws on credit enhancements on System Obligations, if any, reflecting financial difficulties;
iv. Substitution of credit or liquidity providers, if any, or their failure to perform;
v. Any litigation pending or threatened with respect to the Project or the Recipient's technical, managerial or financial capacity to operate the System or the Recipient's continued existence,
vi. Circulation of a petition to repeal, reduce, or otherwise challenge the Recipient's rates for services of the System,
vii. Consideration of dissolution, or disincorporation, or any other event that could materially impair the Revenues;
viii. Adverse tax opinions, the issuance by the Internal Revenue Service or proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-TEB) or other material notices of determinations with respect to the tax status of any tax-exempt bonds;
ix. Rating changes on outstanding System Obligations, if any;
x. Issuance of additional Parity Obligations; or
xi. Enforcement actions by or brought on behalf of the State Water Board or Regional Water Board;

(d) The Recipient must notify the Division promptly by phone at (916) 327-9978, by email to Marques.Tamanaha@waterboards.ca.gov; Uyen.Trinh-Le@waterboards.ca.gov and DrinkingWaterSRF@waterboards.ca.gov, and by mail to the contact address set forth in Section 4 of this Agreement of any of the following events:

i. The discovery of a false statement of fact or representation made in this Agreement or in the application to the Division for this financial assistance, or in any certification, report, or request for disbursement made pursuant to this Agreement, by the Recipient, its employees, agents, or contractors;
ii. Any substantial change in scope of the Project. The Recipient must undertake no substantial change in the scope of the Project until prompt written notice of the proposed change has been provided to the Division and the Division has given written approval for the change;
iii. Cessation of all major construction work on the Project where such cessation of work is expected to or does extend for a period of thirty (30) days or more;
iv. Any circumstance, combination of circumstances, or condition, which is expected to or does delay Completion of Construction for a period of ninety (90) days or more;
v. Discovery of any unexpected endangered or threatened species, as defined in the federal Endangered Species Act. Should a federally protected species be unexpectedly encountered during construction of the Project, the Recipient

agrees to promptly notify the Division. This notification is in addition to the Recipient's obligations under the federal Endangered Species Act;

vi. Any Project monitoring, demonstration, or other implementation activities required in Exhibit A or Exhibit D of this Agreement, if any;

vii. Any public or media event publicizing the accomplishments and/or results of this Agreement and provide the opportunity for attendance and participation by state representatives with at least ten (10) working days' notice to the Division;

viii. Any allegation of research misconduct involving research activities that are supported in whole or in part with EPA funds under this Project, as required by Exhibit C.4.3(xxvi).

ix. Any events requiring notice to the Division pursuant to the provisions of this Agreement;

x. Completion of Construction of the Project, and actual Project Completion;

xi. The award of the prime construction contract for the Project;

xii. Initiation of construction of the Project.

C.3.25 Operation and Maintenance; Insurance.

The Recipient agrees to sufficiently and properly staff, operate and maintain all portions of the System during the Useful Life of the Project in accordance with all applicable state and federal laws, rules, and regulations.

The Recipient will procure and maintain or cause to be maintained insurance on the System with responsible insurers, or as part of a reasonable system of self-insurance, in such amounts and against such risks (including damage to or destruction of the System) as are usually covered in connection with systems similar to the System. Such insurance may be maintained by a self-insurance plan so long as such plan provides for (i) the establishment by the Recipient of a separate segregated self-insurance fund in an amount determined (initially and on at least an annual basis) by an independent insurance consultant experienced in the field of risk management employing accepted actuarial techniques and (ii) the establishment and maintenance of a claims processing and risk management program.

In the event of any damage to or destruction of the System caused by the perils covered by such insurance, the net proceeds thereof shall be applied to the reconstruction, repair or replacement of the damaged or destroyed portion of the System. The Recipient must begin such reconstruction, repair or replacement as expeditiously as possible, and must pay out of such net proceeds all costs and expenses in connection with such reconstruction, repair or replacement so that the same must be completed and the System must be free and clear of all claims and liens. If such net proceeds are insufficient to reconstruct, repair, or restore the System to the extent necessary to enable the Recipient to pay all remaining unpaid principal portions of the Payments, if any, in accordance with the terms of this Agreement, the Recipient must provide additional funds to restore or replace the damaged portions of the System.

Recipient agrees that for any policy of insurance concerning or covering the construction of the Project, it will cause, and will require its contractors and subcontractors to cause, a certificate of insurance to be issued showing the State Water Board, its officers, agents, employees, and servants as additional insured; and must provide the Division with a copy of all such certificates prior to the commencement of construction of the Project.

C.3.26 Permits, Subcontracting, and Remedies.

Recipient must procure all permits, licenses and other authorizations necessary to accomplish the work contemplated in this Agreement, pay all charges and fees, and give all notices necessary and incidental

to the due and lawful prosecution of the work. Signed copies of any such permits or licenses must be submitted to the Division before any construction begins.

The Recipient must not contract or allow subcontracting with excluded parties. The Recipient must not contract with any party who is debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which this funding is authorized. For any work related to this Agreement, the Recipient must not contract with any individual or organization on the State Water Board's List of Disqualified Businesses and Persons that is identified as debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which funding under this Agreement is authorized. The State Water Board's List of Disqualified Businesses and Persons is located at
http://www.waterboards.ca.gov/water_issues/programs/enforcement/fwa/dbp.shtml

C.3.27 Professionals.

The Recipient agrees that only licensed professionals will be used to perform services under this Agreement where such services are called for. All technical reports required pursuant to this Agreement that involve planning, investigation, evaluation, design, or other work requiring interpretation and proper application of engineering, architectural, or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to Business and Professions Code, sections 5536.1, 6735, 7835, and 7835.1. To demonstrate compliance with California Code of Regulations, title 16, sections 415 and 3065, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

C.3.28 Prevailing Wages.

The Recipient agrees to be bound by all applicable provisions of State Labor Code regarding prevailing wages. The Recipient must monitor all agreements subject to reimbursement from this Agreement to ensure that the prevailing wage provisions of the State Labor Code are being met.

In addition, the Recipient agrees to comply with the Davis-Bacon provisions incorporated by reference in Section 3 of this Agreement.

C.3.29 Public Funding.

This Project is publicly funded. Any service provider or contractor with which the Recipient contracts must not have any role or relationship with the Recipient, that, in effect, substantially limits the Recipient's ability to exercise its rights, including cancellation rights, under the contract, based on all the facts and circumstances.

C.3.30 Recipient's Responsibility for Work.

The Recipient shall be responsible for all work and for persons or entities engaged in work performed pursuant to this Agreement, including, but not limited to, contractors, subcontractors, suppliers, and providers of services. The Recipient shall be responsible for responding to any and all disputes arising out of its contracts for work on the Project. The State Water Board will not mediate disputes between the Recipient and any other entity concerning responsibility for performance of work.

C.3.31 Related Litigation.

Under no circumstances may the Recipient use funds from any disbursement under this Agreement to pay costs associated with any litigation the Recipient pursues against the State Water Board or any Regional Water Quality Control Board. Regardless of the outcome of any such litigation, and notwithstanding any conflicting language in this Agreement, the Recipient agrees to repay all of the disbursed funds plus interest in the event that Recipient does not complete the project.

C.3.32 Rights in Data.

The Recipient agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work produced in the performance of this Agreement are subject to the rights of the State as set forth in this section. The State shall have the right to reproduce, publish, and use all such work, or any part thereof, in any manner and for any purposes whatsoever and to authorize others to do so. If any such work is copyrightable, the Recipient may copyright the same, except that, as to any work which is copyrighted by the Recipient, the State reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, and use such work, or any part thereof, and to authorize others to do so, and to receive electronic copies from the Recipient upon request.

C.3.33 State Water Board Action; Costs and Attorney Fees.

Any remedy provided in this Agreement is in addition to and not in derogation of any other legal or equitable remedy available to the State Water Board as a result of breach of this Agreement by the Recipient, whether such breach occurs before or after completion of the Project, and exercise of any remedy provided by this Agreement by the State Water Board shall not preclude the State Water Board from pursuing any legal remedy or right which would otherwise be available. In the event of litigation between the parties hereto arising from this Agreement, it is agreed that each party shall bear its own costs and attorney fees.

C.3.34 Timeliness.

Time is of the essence in this Agreement.

C.3.35 Unenforceable Provision.

In the event that any provision of this Agreement is unenforceable or held to be unenforceable, then the parties agree that all other provisions of this Agreement have force and effect and shall not be affected thereby.

C.3.36 Venue.

Any action arising out of this Agreement shall be filed and maintained in the Superior Court in and for the County of Sacramento, California.

C.3.37 Waiver and Rights of the State Water Board.

Any waiver of rights by the State Water Board with respect to a default or other matter arising under this Agreement at any time shall not be considered a waiver of rights with respect to any other default or matter. Any rights and remedies of the State Water Board provided for in this Agreement are in addition to any other rights and remedies provided by law.

C.4 MISCELLANEOUS STATE AND FEDERAL REQUIREMENTS

C.4.1 Reserved

C.4.2 State Cross-Cutters.

Recipient represents that, as applicable, it complies and covenants to maintain compliance with the following for the term of the Agreement:

i. The California Environmental Quality Act (CEQA), as set forth in Public Resources Code 21000 et seq. and in the CEQA Guidelines at Title 14, Division 6, Chapter 3, Section 15000 et seq.

ii. Water Conservation requirements, including regulations in Division 3 of Title 23 of the California Code of Regulations.

iii. Monthly Water Diversion Reporting requirements, including requirements set forth in Water Code section 5103.

iv. Public Works Contractor Registration with Department of Industrial Relations requirements, including requirements set forth in Sections 1725.5 and 1771.1 of the Labor Code.

v. Volumetric Pricing & Water Meters requirements, including the requirements of Water Code sections 526 and 527.

vi. Urban Water Management Plan requirements, including the Urban Water Management Planning Act (Water Code, § 10610 et seq.).

vii. Urban Water Demand Management requirements, including the requirements of Section 10608.56 of the Water Code.

viii. Delta Plan Consistency Findings requirements, including the requirements of Water Code section 85225 and California Code of Regulations, title 23, section 5002.

ix. Agricultural Water Management Plan Consistency requirements, including the requirements of Water Code section 10852.

x. Charter City Project Labor Requirements, including the requirements of Labor Code section 1782 and Public Contract Code section 2503.

C.4.3 Federal Requirements and Cross-Cutters for SRF Funding.

The Recipient acknowledges, warrants compliance with, and covenants to continuing compliance with the following federal terms and conditions for the Useful Life of the Project:

i. Unless the Recipient has obtained a waiver from USEPA on file with the State Water Board or unless this Project is not a project for the construction, alteration, maintenance or repair of a public water system or treatment work, the Recipient shall not purchase "iron and steel products" produced outside of the United States on this Project. Unless the Recipient has obtained a waiver from USEPA on file with the State Water Board or unless this Project is not a project for the construction, alteration, maintenance or repair of a public water system or treatment work, the Recipient hereby certifies that all "iron and steel products" used in the Project were or will be produced in the United States. For purposes of this section, the term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials. "Steel" means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

ii. The Recipient must include in full the Wage Rate Requirements (Davis-Bacon) language incorporated by reference in Section 3 of this Agreement in all construction contracts and subcontracts.

iii. The Recipient must comply with the signage requirements set forth in Exhibit A.

iv. The Recipient shall notify the State Water Board and the USEPA contact of public or media events publicizing the accomplishment of significant events related to this Project and provide the opportunity for attendance and participation by federal representatives with at least ten (10) working days' notice.

v. The Recipient shall comply with applicable EPA general terms and conditions found at http://www.epa.gov/ogd, including but not limited to the following:

vi. No Recipient may receive funding under this Agreement unless it has provided its DUNS number to the State Water Board.

vii. The Recipient represents and warrants that it and its principals are not excluded or disqualified from participating in this transaction as such terms are defined in Parts 180 and 1532 of Title 2 of the Code of Federal Regulations (2 CFR). If the Recipient is excluded after execution of this Agreement, the Recipient shall notify the Division within ten (10) days and shall inform the Division of the Recipient's exclusion in any request for amendment of this Agreement. The Recipient shall comply with Subpart C of Part 180 of 2 CFR, as supplemented by Subpart C of Part 1532 of 2 CFR. Such compliance is a condition precedent to the State Water Board's performance of its obligations under this Agreement. When entering into a covered transaction as defined in Parts 180 and 1532 of 2 CFR, the Recipient shall require the other party to the covered transaction to comply with Subpart C of Part 180 of 2 CFR, as supplemented by Subpart C of Part 1532 of 2 CFR.

viii. To the extent applicable, the Recipient shall disclose to the State Water Board any potential conflict of interest consistent with USEPA's Final Financial Assistance Conflict of Interest Policy at https://www.epa.gov/grants/epas-final-financial-assistance-conflict-interest-policy. A conflict of interest may result in disallowance of costs.

ix. USEPA and the State Water Board have the right to reproduce, publish, use and authorize others to reproduce, publish and use copyrighted works or other data developed under this assistance agreement.

x. Where an invention is made with Project Funds, USEPA and the State Water Board retain the right to a worldwide, nonexclusive, nontransferable, irrevocable, paid-up license to practice the invention owned by the Recipient. The Recipient must utilize the Interagency Edison extramural invention reporting system at http://iEdison.gov and shall notify the Division when an invention report, patent report, or utilization report is filed.

xi. The Recipient agrees that any reports, documents, publications or other materials developed for public distribution supported by this Agreement shall contain the Disclosure statement set forth in Exhibit A.

xii. The Recipient acknowledges that it is encouraged to follow guidelines established under Section 508 of the Rehabilitation Act, codified at 36 CFR Part 1194, with respect to enabling individuals with disabilities to participate in its programs supported by this Project.

xiii. The Recipient, its employees, contractors and subcontractors and their employees warrants that it will not engage in severe forms of trafficking in persons, procure a commercial sex act during

the term of this Agreement, or use forced labor in the performance of this Agreement. The Recipient must include this provision in its contracts and subcontracts under this Agreement. The Recipient must inform the State Water Board immediately of any information regarding a violation of the foregoing. The Recipient understands that failure to comply with this provision may subject the State Water Board to loss of federal funds. The Recipient agrees to compensate the State Water Board for any such funds lost due to its failure to comply with this condition, or the failure of its contractors or subcontractors to comply with this condition. The State Water Board may unilaterally terminate this Agreement if the Recipient that is a private entity is determined to have violated the foregoing.

xiv. The Recipient certifies to the best of its knowledge and belief that:

a. No federal appropriated funds have been paid or will be paid, by or on behalf of the Recipient, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
b. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Agreement, the Recipient shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions, and notify the State Water Board.

The Recipient shall require this certification from all parties to any contract or agreement that the Recipient enters into and under which the Recipient incurs costs for which it seeks disbursements under this Agreement.

xv. The Recipient must comply with the following federal non-discrimination requirements:

a. Title VI of the Civil Rights Act of 1964, which prohibits discrimination based on race, color, and national origin, including limited English proficiency (LEP).
b. Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination against persons with disabilities.
c. The Age Discrimination Act of 1975, which prohibits age discrimination.
d. Section 13 of the Federal Water Pollution Control Act Amendments of 1972, which prohibits discrimination on the basis of sex.
e. 40 CFR Part 7, as it relates to the foregoing.

xvi. If the Project relates to construction of a publicly owned treatment works, where the Recipient contracts for program management, construction management, feasibility studies, preliminary engineering, design, engineering, surveying, mapping, or architectural related services, the Recipient shall ensure that any such contract is negotiated in the same manner as a contract for architectural and engineering services is negotiated under chapter 11 of title 40, United States Code, or an equivalent State qualifications-based requirement as determined by the State Water Board.

xvii. If the Project relates to construction of a publicly owned treatment works, the Recipient certifies that it has developed and is implementing a fiscal sustainability plan for the Project that includes an inventory of critical assets that are a part of the Project, an evaluation of the condition and performance of inventoried assets or asset groupings, a certification that the recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan, and a plan for maintaining, repairing, and, as necessary, replacing the Project and a plan for funding such activities.

xviii. Executive Order No. 11246. The Recipient shall include in its contracts and subcontracts related to the Project the following provisions:

"During the performance of this contract, the contractor agrees as follows:"(a) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

"(b) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

"(c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

"(d) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

"(e) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

"(f) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

"(g) The contractor will include the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of Sept. 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, That in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States."

xix. The Recipient agrees to comply with the requirements of USEPA's Program for Utilization of Small, Minority and Women's Business Enterprises as set forth in Exhibit A.

xx. Procurement Prohibitions under Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; 42 USC § 7606; 33 USC § 1368. Except where the purpose of this Agreement is to remedy the cause of the violation, the Recipient may not procure goods, services, or materials from suppliers excluded under the federal System for Award Management: http://www.sam.gov/ .

xxi. Uniform Relocation and Real Property Acquisition Policies Act, Pub. L. 91-646, as amended; 42 USC §§4601-4655. The Recipient must comply with the Act's implementing regulations at 49 CFR 24.101 through 24.105.

xxii. The Recipient agrees that if its network or information system is connected to USEPA networks to transfer data using systems other than the Environmental Information Exchange Network or USEPA's Central Data Exchange, it will ensure that any connections are secure.

xxiii. All geospatial data created pursuant to this Agreement that is submitted to the State Water Board for use by USEPA or that is submitted directly to USEPA must be consistent with Federal Geographic Data Committee endorsed standards. Information on these standards may be found at www.fgdc.gov.

xxiv. If the Recipient is a water system that serves 500 or fewer persons, the Recipient represents that it has considered publicly-owned wells as an alternative drinking water supply.

xxv. The Recipient represents that it is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and it is not a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

xxvi. The Recipient agrees to immediately notify the Project Manager in writing about any allegation of research misconduct involving research activities that are supported in whole or in part with EPA funds under this Project, including fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results, or ordering, advising, or suggesting that subordinates engage in research misconduct.

xxvii. The Recipient agrees to comply with, and require all contractors and subcontractors to comply with, EPA's Scientific Integrity Policy, available at https://www.epa.gov/osa/policy-epa-scientific-integrity, when conducting, supervising, and communicating science and when using or applying the results of science. For purposes of this condition scientific activities include, but are not limited to, computer modelling, economic analysis, field sampling, laboratory experimentation, demonstrating new technology, statistical analysis, and writing a review article on a scientific issue.

The Recipient shall not suppress, alter, or otherwise impede the timely release of scientific findings or conclusions; intimidate or coerce scientists to alter scientific data, findings, or professional opinions or exert non-scientific influence on scientific advisory boards; knowingly misrepresent, exaggerate, or downplay areas of scientific uncertainty; or otherwise violate the EPA's Scientific Integrity Policy. The Recipient must refrain from acts of research misconduct, including publication or reporting, as described in EPA's Policy and Procedures for Addressing Research Misconduct, Section 9.C, and must ensure scientific findings are generated and

disseminated in a timely and transparent manner, including scientific research performed by contractors and subcontractors.

xxviii. The Recipient agrees to comply with the Animal Welfare Act of 1966 (7 USC 2131-2156). Recipient also agrees to abide by the "U.S. Government Principles for the Utilization and Care of Vertebrate Animals used in Testing, Research, and Training," available at http://grants.nih.gov/grants/olaw/references/phspol.htm#USGovPrinciples.

Exhibit C

EXHIBIT D – SPECIAL CONDITIONS

Technical:

1. The Recipient shall submit proof of land ownership for the Project facilities. The Division will not amend the Agreement to include the Final Budget Approval or process construction disbursements without receipt of documentation demonstrating land ownership.

Environmental:

1. The Recipient shall implement the mitigation measures BIO-1, CUL-1 through CUL-4, and HYD-1, as identified in the New 7.5 MG Reservoir and Related Water System Improvements Project, Mitigated Negative Declaration and Mitigation Monitoring and Reporting Plan (SCH #2017111003).

EXHIBIT E – PAYMENT SCHEDULE

See the attached preliminary Payment Schedule dated [Date]. The final Payment Schedule will be forwarded to the Recipient after all disbursements have been paid and construction of the Project has been completed.

EXHIBIT F – TAX CERTIFICATE

F.1 Purpose.

The purpose of this Exhibit F is to establish the reasonable expectations of the Recipient regarding the Project and the Project Funds, and is intended to be and may be relied upon for purposes of Sections 103, 141 and 148 of the Code and as a certification described in Section 1.148-2(b)(2) of the Treasury Regulations. This Exhibit F sets forth certain facts, estimates and circumstances which form the basis for the Recipient's expectation that neither the Project nor the Bond Funded Portion of the Project Funds is to be used in a manner that would cause the Obligation to be classified as "arbitrage bonds" under Section 148 of the Code or "private activity bonds" under Section 141 of the Code.

F.2 Tax Covenant.

The Recipient agrees that it will not take or authorize any action or permit any action within its reasonable control to be taken, or fail to take any action within its reasonable control, with respect to the Project which would result in the loss of the exclusion of interest on the Bonds from gross income for federal income tax purposes under Section 103 of the Code.

F.3 Governmental Unit.

The Recipient is a state or local governmental unit as defined in Section 1.103-1 of the Treasury Regulations or an instrumentality thereof (a "Governmental Unit") and is not the federal government or any agency or instrumentality thereof.

F.4 Financing of a Capital Project.

The Recipient will use the Project Funds to finance costs it has incurred or will incur for the construction, reconstruction, installation or acquisition of the Project. Such costs shall not have previously been financed with the proceeds of any other issue of tax-exempt obligations.

F.5 Ownership and Operation of Project.

The Recipient exclusively owns and, except as provided in Section F.12 hereof, operates the Project.

F.6 Temporary Period.

The Recipient reasonably expects that at least eighty-five percent (85%) of the Bond Funded Portion of the Project Funds will be allocated to expenditures for the Project within three (3) years of the earlier of the effective date of this Agreement or the date the Bonds are issued ("Applicable Date"). The Recipient has incurred, or reasonably expects that it will incur within six (6) months of the Applicable Date, a substantial binding obligation (i.e., not subject to contingencies within the control of the Recipient or a related party) to a third party to expend at least five percent (5%) of the Bond Funded Portion of the Project Funds on Project Costs. The completion of acquisition, construction, improvement and equipping of the Project and the allocation of the Bond Funded Portion of the Project Funds to Project Costs will proceed with due diligence.

F.7 Working Capital.

No operational expenditures of the Recipient or any related entity are being, have been or will be financed or refinanced with Project Funds.

F.8 Expenditure of Proceeds.

The Bond Funded Portion of the Project Funds shall be used exclusively for the following purposes: (i) Reimbursement Expenditures (as defined in Section F.20 below), (ii) Preliminary Expenditures (as defined in Section F.20 below) in an aggregate amount not exceeding twenty percent (20%) of the Bond Funded Portion of the Project Funds, (iii) capital expenditures relating to the Project originally paid by the Recipient on or after the date hereof, (iv) interest on the Obligation through the later of three (3) years after the Applicable Date or one (1) year after the Project is placed in service, and (v) initial operating expenses directly associated with the Project in the aggregate amount not more than five percent (5%) of the Bond Funded Portion of the Project Funds.

F.9 Private Use and Private Payments.

No portion of the Project Funds or the Project is being, has been or will be used in the aggregate for any activities that constitute a Private Use (as defined below). No portion of the principal of or interest with respect to the Payments will be secured by any interest in property (whether or not the Project) used for a Private Use or in payments in respect of property used for a Private Use, or will be derived from payments in respect of property used for a Private Use. "Private Use" means any activity that constitutes a trade or business that is carried on by persons or entities, other than a Governmental Unit. The leasing of the Project or the access by or the use of the Project by a person or entity other than a Governmental Unit on a basis other than as a member of the general public shall constitute a Private Use. Use by or on behalf of the State of California or any of its agencies, instrumentalities or subdivisions or by any local Governmental Unit and use as a member of the general public will be disregarded in determining whether a Private Use exists. Use under an arrangement that conveys priority rights or other preferential benefits is generally not use on the same basis as the general public. Arrangements providing for use that is available to the general public at no charge or on the basis of rates that are generally applicable and uniformly applied do not convey priority rights or other preferential benefits. For this purpose, rates may be treated as generally applicable and uniformly applied even if (i) different rates apply to different classes of users, such as volume purchasers, if the differences in rates are customary and reasonable; or (ii) a specially negotiated rate arrangement is entered into, but only if the user is prohibited by federal law from paying the generally applicable rates, and the rates established are as comparable as reasonably possible to the generally applicable rates. An arrangement that does not otherwise convey priority rights or other preferential benefits is not treated, nevertheless, as general public use if the term of the use under the arrangement, including all renewal options, is greater than 200 days. For this purpose, a right of first refusal to renew use under the arrangement is not treated as a renewal option if (i) the compensation for the use under the arrangement is redetermined at generally applicable, fair market value rates that are in effect at the time of renewal; and (ii) the use of the financed property under the same or similar arrangements is predominantly by natural persons who are not engaged in a trade or business.

F.10 No Sale, Lease or Private Operation of the Project.

The Project (or any portion thereof) will not be sold or otherwise disposed of, in whole or in part, to any person who is not a Governmental Unit prior to the final maturity date of the Obligation. The Project will not be leased to any person or entity that is not a Governmental Unit prior to the final maturity date of the Obligation. Except as permitted under Section F.12 hereof, the Recipient will not enter any contract or arrangement or cause or permit any contract or arrangement to be entered with persons or entities that are not Governmental Units if that contract or arrangement would confer on such persons or entities any right to use the Project on a basis different from the right of members of the general public. The contracts or arrangements contemplated by the preceding sentence include but are not limited to management contracts, take or pay contracts or put or pay contracts, and capacity guarantee contracts.

F.11 No Disproportionate or Unrelated Use.

No portion of the Project Funds or the Project is being, has been, or will be used for a Private Use that is unrelated or disproportionate to the governmental use of the Project Funds.

F.12 Management and Service Contracts.

The Recipient represents that, as of the date hereof, it is not a party to any contract, agreement or other arrangement with any persons or entities engaged in a trade or business (other than Governmental Units) that involve the management or operation of property or the provision of services at or with respect to the Project that does not comply with the standards of the Treasury Regulations, Revenue Procedure 97-13, as modified by Revenue Procedure 2001-39 and IRS Notice 2014-67, or Revenue Procedure 2017-13, as applicable. The Recipient represents that it will not be party to any such contract, agreement or arrangement with any person or entity that is not a Governmental Unit for the management of property or the provision of services at or with respect to the Project, while the Obligation (including any obligation or series thereof issued to refund the Obligation, as the case may be) is outstanding, except: (a) with respect to any contract, agreement or arrangement that does not constitute "private business use" of the Project under Code §141(b), or (b) with respect to any contract, agreement or arrangement that complies with (i) Revenue Procedure 97-13, 1997-1 C.B. 632, as amended by Revenue Procedure 2001-39, 2001-2 C.B. 38, and as amplified by Notice 2014-67, with respect to contracts entered into before August 18, 2017 and not materially modified or extended after August 18, 2017, or (ii) Revenue Procedure 2017-13, with respect to contracts entered into or materially modified or extended on or after August 18, 2017, or (c) with respect to any contract, agreement or arrangement that does not give rise to use of the Bond Funded Portion of the Project Funds or the Project by a non-Governmental Unit of more than the amount of such non-qualified use permitted by the Code, or (d) in the event that the Recipient receives an opinion of counsel, satisfactory to the State Water Board and the Bank and expert in the issuance of state and local government bonds the interest on which is excluded from gross income under Section 103 of the Code ("Nationally-Recognized Bond Counsel"), that such contract, agreement or arrangement will not adversely affect the exclusion of the interest on the Obligation from gross income for federal income taxation purposes.

F.13 No Disposition of Financed Property.

As of the date hereof, the Recipient does not expect to sell or otherwise dispose of any portion of the Project, in whole or in part, prior to the final maturity date of the Obligation.

F.14 Useful Life of Project.

As of the date hereof, the Recipient reasonably expects that the economic useful life of the Project, commencing at Project Completion, will be at least equal to the term of this Agreement, as set forth in Exhibit A hereto.

F.15 Payments.

Payments generally are expected to be derived from assessments, taxes, fees, charges or other current Revenues of the Recipient in each year, and such current Revenues are expected to equal or exceed the Payments during each payment period. Any amounts accumulated in a sinking fund or bona fide debt service fund to pay Payments (whether or not deposited to a fund or account established by the Recipient) will be disbursed to pay Payments within thirteen months of the initial date of accumulation or deposit. Any such fund used for the payment of Payments will be depleted once a year except for a reasonable carryover amount not exceeding the greater of earnings on such fund or one-twelfth of the Payments in either case for the immediately preceding year.

F.16 No Other Replacement Proceeds.

The Recipient will not use any of the Bond Funded Portion of the Project Funds to replace or substitute other funds of the Recipient that were otherwise to be used to finance the Project or which are or will be used to acquire securities, obligations or other investment property reasonably expected to produce a yield that is materially higher than the yield on the Bonds.

F.17 No Sinking or Pledged Fund.

Except as set forth in Section F.18 below, the Recipient will not create or establish any sinking fund or pledged fund which will be used to pay Payments on the Obligation within the meaning of Section 1.148-1(c) of the

Treasury Regulations. If any sinking fund or pledged fund comes into being with respect to the Obligation before the Obligation has been fully retired which may be used to pay the Payments, the Recipient will invest such sinking fund and pledged fund moneys at a yield that does not exceed the yield on the Bonds.

F.18 Reserve Amount.

The State Water Board requires that the Recipient maintain and fund a separate account in an amount equal to one (1) year of debt service with respect to the Obligation (the "Reserve Amount") as set forth in Exhibit B. The Recipient represents that the Reserve Amount is and will be available to pay debt service with respect to the Obligation, if and when needed. The Reserve Amount consists solely of revenues of the Recipient and does not include any proceeds of any obligations the interest on which is excluded from gross income for federal income tax purposes or investment earnings thereon. The aggregate of the Reserve Amount, up to an amount not exceeding the lesser of (i) ten percent of the aggregate principal amount of the Obligation, (ii) the maximum annual debt service with respect to the Obligation, or (iii) 125 percent of the average annual debt service with respect to the Obligation, will be treated as a reasonably required reserve fund.

F.19 Reimbursement Resolution.

The "reimbursement resolution" adopted by the Recipient is incorporated herein by reference.

F.20 Reimbursement Expenditures.

Reimbursements are disallowed, except as specifically authorized in Exhibit B or Exhibit D of this Agreement. To the extent so authorized, a portion of the Bond Funded Portion of the Project Funds may be applied to reimburse the Recipient for Project Costs paid before the date hereof, so long as the Project Cost was (i) not paid prior to sixty (60) days before the Recipient's adoption of a declaration of official intent to finance the Project, (ii) not paid more than eighteen (18) months prior to the date hereof or the date the Project was placed-in-service, whichever is later, and (iii) not paid more than three (3) years prior to the date hereof (collectively, "Reimbursement Expenditures"), unless such cost is attributable to a "preliminary expenditure." Preliminary expenditure for this purpose means architectural, engineering, surveying, soil testing and similar costs incurred prior to the commencement of construction or rehabilitation of the Project, but does not include land acquisition, site preparation and similar costs incident to the commencement of acquisition, construction or rehabilitation of the Project. Preliminary expenditures may not exceed 20% of the Bond Funded Portion of the Project Funds.

F.21 Change in Use of the Project.

The Recipient reasonably expects to use all of the Bond Funded Portion of the Project Funds and the Project for the entire stated term to maturity of the Obligation. Absent an opinion of Nationally-Recognized Bond Counsel to the effect that such use of the Bond Funded Portion of the Project Funds will not adversely affect the exclusion from federal gross income of interest on the Bonds pursuant to Section 103 of the Code, the Recipient will use the Bond Funded Portion of the Project Funds and the Project solely as set forth in this Agreement.

F.22 Rebate Obligations.

If the Recipient satisfies the requirements of one of the spending exceptions to rebate specified in Section 1.148-7 of the Treasury Regulations, amounts earned from investments, if any, acquired with the Bond Funded Portion of the Project Funds will not be subject to the rebate requirements imposed under Section 148(f) of the Code. If the Recipient fails to satisfy such requirements for any period, it will notify the State Water Board and the Bank immediately and will comply with the provisions of the Code and the Treasury Regulations at such time, including the payment of any rebate amount calculated by the State Water Board or the Bank.

F.23 No Federal Guarantee.

The Recipient will not directly or indirectly use any of the Bond Funded Portion of the Project Funds in any manner that would cause the Bonds to be "federally guaranteed" within the meaning of Section 149(b) of the Code, taking into account various exceptions including any guarantee related to investments during an initial

temporary period until needed for the governmental purpose of the Bonds, investments as part of a bona fide debt service fund, investments of a reasonably required reserve or replacement fund, investments in bonds issued by the United States Treasury, investments in refunding escrow funds or certain other investments permitted under the Treasury Regulations.

F.24 No Notices or Inquiries from IRS.

Within the last 10 years, the Recipient has not received any notice of a final action of the Internal Revenue Service that determines that interest paid or payable on any debt obligation of the Recipient is or was includable in the gross income of an owner or beneficial owner thereof for federal income tax purposes under the Code.

F.25 Amendments.

The provisions in this Exhibit may be amended, modified or supplemented at any time to reflect changes in the Code upon obtaining written approval of the State Water Board and the Bank and an opinion of Nationally-Recognized Bond Counsel to the effect that such amendment, modification or supplement will not adversely affect the exclusion from federal gross income of interest on the Bonds pursuant to Section 103 of the Code.

F.26 Reasonable Expectations.

The Recipient warrants that, to the best of its knowledge, information and belief, and based on the facts and estimates as set forth in the tax covenants in this Exhibit, the expectations of the Recipient as set forth in this Exhibit are reasonable. The Recipient is not aware of any facts or circumstances that would cause it to question the accuracy or reasonableness of any representation made in the provisions in this Exhibit.

F.27 Assignment.

The Recipient consents to any pledge, sale, or assignment to the Bank or a trustee for the benefit of the owners of the Bonds, if any, at any time of any portion of the State Water Board's estate, right, title, and interest and claim in, to and under this Agreement and the right to make all related waivers and agreements in the name and on behalf of the State Water Board, as agent and attorney-in-fact, and to perform all other related acts which are necessary and appropriate under this Agreement, if any, and the State Water Board's estate, right, title, and interest and claim in, to and under this Agreement to Payments (but excluding the State Water Board's rights to Additional Payments and to notices, opinions and indemnification under each Obligation).

APPENDIX "J"

GUIDELINES FOR MEETING THE CALIFORNIA STATE REVOLVING FUND (CASRF) PROGRAMS (CLEAN WATER AND DRINKING WATER SRF) DISADVANTAGED BUSINESS ENTERPRISE REQUIREMENTS

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR

AND WATER IMPROVEMENTS

(460 N. EUCLID AVENUE, UPLAND, CA 91786)

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California State Water Resources Control Board
Division of Financial Assistance
1001 I Street • Sacramento, California 95814 • (916) 341-5700 FAX (916) 341-5707
Mailing Address: P. O. Box 944212 • Sacramento, California • 94244-2120
Internet Address: http://www.waterboards.ca.gov

Guidelines for Meeting the California State Revolving Fund (CASRF) Programs (Clean Water and Drinking Water SRF) Disadvantaged Business Enterprise Requirements

The Disadvantaged Business Enterprise (DBE) Program is an outreach, education, and objectives program designed to increase the participation of DBEs in the Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) Programs.

How to Achieve the Purpose of the Program

Recipients of CWSRF/DWSRF financing that are subject to the DBE requirements (recipients) are required to seek, and are encouraged to use, DBEs for their procurement needs. Recipients should award a "fair share" of sub-agreements to DBEs. This applies to all sub-agreements for equipment, supplies, construction, and services.

The key functional components of the DBE Program are as follows:

- Fair Share Objectives
- DBE Certification
- Six Good Faith Efforts
- Contract Administration Requirements
- DBE Reporting

Disadvantaged Business Enterprises are:

- Entities owned and/or controlled by socially and economically disadvantaged individuals as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note) (10% statute), and Public Law 102-389 (42 U.S.C. 4370d) (8% statute), respectively;
- Minority Business Enterprise (MBE) - entities that are at least 51% owned and/or controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note), and Public Law 102-389 (42 U.S.C. 4370d), respectively;
- Women Business Enterprise (WBE) - entities that are at least 51% owned and/or controlled by women;
- Small Business Enterprise (SBE);
- Small Business in a Rural Area (SBRA);
- Labor Surplus Area Firm (LSAF); or
- Historically Underutilized Business (HUB) Zone Small Business Concern or a concern under a successor program.

Certifying DBE Firms:

Under the DBE Program, entities can no longer self-certify and contractors and sub-contractors must be certified at bid opening. Contractors and sub-contractors must provide to the CASRF recipient proof of DBE certification. Certifications will be accepted from the following:

- The U.S. Environmental Protection Agency (USEPA)
- The Small Business Administration(SBA)
- The Department of Transportation's State implemented DBE Certification Program (with U.S. citizenship)
- Tribal, State and Local governments
- Independent private organization certifications

If an entity holds one of these certifications, it is considered acceptable for establishing status under the DBE Program.

Six Good Faith Efforts (GFE)

All CWSRF/DWSRF financing recipients are required to complete and ensure that the prime contractor complies with the GFE below to ensure that DBEs have the opportunity to compete for financial assistance dollars.

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practical through outreach and recruitment activities. For Tribal, State and Local Government Recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs. Posting solicitations for bids or proposals for a minimum of 30 calendar days in a local newspaper, before the bid opening date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs.
4. Encourage contracting with a group of DBEs when a contract is too large for one firm to handle individually.
5. Use the services of the SBA **and/or** Minority Business Development Agency (MBDA) of the US Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the above steps.

The forms listed in the table below and attached to these guidelines; must be completed and submitted with the GFE:

FORM NUMBER	FORM NAME	REQUIREMENT	PROVIDED BY	COMPLETED BY	SUBMITTED TO
SWRCB Form 4500-2 or EPA Form	DBE Sub-Contractor Participation Form	As Needed to Report Issues	Recipient	Sub-contractor	EPA DBE Coordinator
SWRCB Form 4500-3 or EPA Form	DBE Sub-Contractor Performance Form	Include with Bid or Proposal Package	Prime Contractor	Sub-Contractor	SWRCB by Recipient
SWRCB Form 4500-4 or EPA Form	DBE Sub-Contractor Utilization Form	Include with Bid or Proposal Package	Recipient	Prime Contractor	SWRCB by Recipient

The completed forms must be submitted with each Bid or Proposal. The recipient shall review the bidder's documents closely to determine that the GFE was performed **prior** to bid or proposal opening date. Failure to complete the GFE and to substantiate completion of the GFE before the bid opening date could jeopardize CWSRF/DWSRF financing for the project. The following situations and circumstances require action as indicated:

1. If the apparent successful low bidder was rejected, a complete explanation must be provided.
2. Failure of the apparent low bidder to **perform** the GFE **prior** to bid opening constitutes a non-responsive bid. The construction contract may then be awarded to the next low, responsive, and responsible bidder that meets the requirements or the Recipient may re-advertise the project.
3. If there is a bid dispute, all disputes shall be settled **prior** to submission of the Final Budget Approval Form.

Administration Requirements

- A recipient of CWSRF/DWSRF financing must require entities receiving funds to create and maintain a Bidders List if the recipient of the financing agreement is subject to, or chooses to follow, competitive bidding requirements.
- The Bidders list must include all firms that bid or quote on prime contracts, or bid or quote on subcontracts, including both DBEs and non-DBEs.

- Information retained on the Bidder's List must include the following:
    1. Entity's name with point of contact;
    2. Entity's mailing address and telephone number;
    3. The project description on which the entity bid or quoted and when;
    4. Amount of bid/quote; and
    5. Entity's status as a DBE or non-DBE.
- The Bidders List must be kept until the recipient is no longer receiving funding under the agreement.
- The recipient shall include Bidders List as part of the Final Budget Approval Form.
- A recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the Recipient.
- A recipient must be notified in writing by its prime contractor prior to any termination of a DBE subcontractor by the prime contractor.
- If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six GFEs if soliciting a replacement subcontractor.
- A recipient must require its prime contractor to employ the six GFEs even if the prime contractor has achieved its fair share objectives.

Reporting Requirements

For the duration of the construction contract(s), the recipient is required to submit to the State Water Resources Control Board DBE reports annually by October 10 of each fiscal year on the attached Utilization Report form (UR-334). Failure to provide this information as stipulated in the financial agreement language may be cause for withholding disbursements.

CONTACT FOR MORE INFORMATION

SWRCB, CASRF – Barbara August (916) 341-6952 barbara.august@waterboards.ca.gov

US EPA, Region 9 – Joe Ochab (415) 972-3761 ochab.joe@epa.gov

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Disadvantaged Business Enterprise (DBE) Program

DBE Subcontractor Participation Form

A Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE[1] subcontractor[2] the opportunity to describe work received and/or report any concerns regarding the funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the DBE Coordinator at any time during the project period of performance.

Subcontractor Name	Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.	Email Address	
Prime Contractor Name	Issuing/Funding Entity	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

Please use the space below to report any concerns regarding the above funded project:

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

Send completed Form 4500-2 to:
Mr. Joe Ochab, DBE Coordinator
US EPA, Region 9
75 Hawthorne Street
San Francisco, CA 94105

FORM 4500-2 (DBE Subcontractor Participation Form)

Disadvantaged Business Enterprise (DBE) Program

DBE Subcontractor Performance Form

This form is intended to capture the DBE[1] subcontractor's[2] description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name	Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.	Email Address	
Prime Contractor Name	Issuing/Funding Entity	

Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: _ DOT _ SBA Other: _____	Meets/exceeds EPA certification standards? YES NO Unknown	

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)

Revised 12/2016

Disadvantaged Business Enterprise (DBE) Program

DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE[1] subcontractor's[2] and the estimated dollar amount of each subcontract. A Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name	Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.	Email Address	
Issuing/Funding Entity		

I have identified potential DBE certified subcontractors. YES NO

If *yes*, please complete the table below. If *no*, please explain:

Subcontractor Name/ Company Name	Company Address / Phone / Email	Estimated Dollar Amount	Currently DBE Certified?

--Continue on back if needed--

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

STATE WATER RESOURCES CONTROL BOARD – DIVISION OF FINANCIAL ASSISTANCE
DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION
CALIFORNIA STATE REVOLVING FUNDS (CASRF)
FORM UR-334

1. Grant/Finance Agreement Number:	**2. Annual Reporting Period** **10/1/___ through 09/30/_**	**3. Purchase Period of Financing Agreement:**
4. Total Payments Paid to Prime Contractor or Sub-Contractors During Current Reporting Period: $		
5. Recipient's Name and Address:	**6. Recipient's Contact Person and Phone Number:**	

7. List All DBE Payments Paid by Recipient or Prime Contractor During Current Reporting Period:

Payment or Purchase Paid by Recipient or Prime Contractor	Amount Paid to Any DBE Contractor or Sub-Contractor For Service Provided to Recipient		Date of Payment (MM/DD/YY)	Procurement Type Code** (see below)	Name and Address of DBE Contractor of Sub-Contractor or Vendor
	MBE	**WBE**			

8. Initial here if no DBE contractors or sub-contractors paid during current reporting period:	
9. Initial here if all procurements for this contract are completed:	
10. Comments:	
11. Signature and Title of Recipient's Authorized Representative	**12. Date**

Email Form UR-334 to:

DrinkingWaterSRF@waterboards.ca.gov OR CleanWaterSRF@waterboards.ca.gov

Questions may be directed to:

Barbara August, SWRCB
Barbara.August@waterboards.ca.gov
Phone: (916) 341-6952
Fax: (916) 327-7469

****Procurement Type:**
1. Construction
2. Supplies
3. Services (includes business services; professional services; repair services and personnel services)
4. Equipment

STATE WATER RESOURCES CONTROL BOARD - DIVISION OF FINANCIAL ASSISTANCE
DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION
CALIFORNIA STATE REVOLVING FUNDS

INSTRUCTIONS FOR COMPLETING FORM UR-334

Box 1 Grant or Financing Agreement Number.

Box 2 Annual reporting period.

Box 3 Enter the dates between which you made procurements under this financing agreement or grant.

Box 4 Enter the total amount of payments paid to the contractor or sub-contractors during this reporting period.

Box 5 Enter Recipient's Name and Address.

Box 6 Enter Recipient's Contact Name and Phone Number.

Box 7 Enter details for the **DBE purchases only** and be sure to limit them to the current period. 1) Use either an "R" or a "C" to represent "Recipient" or "Contractor." 2) Enter a dollar total for DBE and total the two columns at the bottom of the section. 3) Provide the payment date. 4) Enter a product type choice from those at the bottom of the page. 5) List the vendor name and address in the right-hand column

Box 8 Initial here if no DBE contractors or sub-contractors were paid during this reporting period.

Box 9 Initial this box only if all purchases under this financing agreement or grant have been completed during this reporting period or a previous period. If you initial this box, we will no longer send you a survey.

Box 10 This box is for explanatory information or questions.

Box 11 Provide an authorized representative signature.

Box 12 Enter the date form completed.

APPENDIX "K"

DAVIS-BACON COMPLIANCE REQUIREMENTS

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR

AND WATER IMPROVEMENTS

(460 N. EUCLID AVENUE, UPLAND, CA 91786)

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Davis-Bacon Requirements for DWSRF Projects

For purposes of this Exhibit only, “subrecipient” or “sub recipient” means the Recipient as defined in this Agreement.

For purposes of this Exhibit only, “recipient” or “State recipient” means the State Water Board.

I. Requirements Under the Safe Drinking Water Act, Section 1452(a)(5) For Sub recipients That Are Governmental Entities:

If a sub recipient has questions regarding when Davis-Bacon (DB) applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State Water Board at DavisBacon@waterboards.ca.gov or phone (916) 327-7323. The recipient or sub recipient may also obtain additional guidance from DOL’s web site at http://www.dol.gov/whd/.

1. **Applicability of the Davis-Bacon (DB) prevailing wage requirements**.

Under the Safe Drinking Water Act, Section 1452(a)(5), DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in who le or in part by assistance made available by a drinking water treatment revolving loan fund. If a sub recipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the sub recipient must discuss the situation with the recipient State before authorizing work on that site.

2. **Obtaining Wage Determinations.**

(a) Sub recipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the sub recipient shall monitor www.Beta.SAM.gov weekly to ensure that the wage determination contained in the solicitation remains current. The sub recipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the sub recipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the sub recipient.

(ii) If the sub recipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the sub recipient, obtains an extension of the 90 day

period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The sub recipient shall monitor www.Beta.SAM.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the sub recipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the sub recipient shall insert the appropriate DOL wage determination from www.Beta.SAM.gov into the ordering instrument.

(c) Sub recipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a sub recipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the sub recipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the sub recipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The sub recipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the sub recipient(s) shall insert in full in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project carried out in whole or in part with assistance made available by the DWSRF, and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the Safe Drinking Water Act, Section 1452(a)(5), the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers

or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis- Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii) (A) The sub recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the sub recipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The sub recipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each

such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the sub recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the sub recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/whd/forms/wh347instr.htm or its successor site.

The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the sub recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub recipient(s).

(B) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of

Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job

site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may by appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and sub recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of $100,000.

(a) Contract Work Hours and Safety Standards Act. The sub recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of $25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The sub recipient**,** upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (a)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Sub recipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Sub recipient shall insert in any such contract a clause providing hat the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The sub recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(3), all interviews must be conducted in confidence. The sub recipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The sub recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Sub recipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB. Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."

(c) The sub recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The sub recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the sub recipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Sub recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The sub recipient shall periodically review contractors and subcontractor's use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Sub recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at http://www.dol.gov/whd/america2.htm.

LABOR STANDARDS INTERVIEW

CONTRACT NUMBER	EMPLOYEE INFORMATION		
	LAST NAME	FIRST NAME	MI
NAME OF PRIME CONTRACTOR	STREET ADDRESS		
NAME OF EMPLOYER	CITY	STATE	ZIP CODE
SUPERVISOR'S NAME			
LAST NAME / FIRST NAME / MI	WORK CLASSIFICATION	WAGE RATE	

ACTION	CHECK BELOW YES	NO
Do you work over 8 hours per day?		
Do you work over 40 hours per week?		
Are you paid at least time and a half for overtime hours?		
Are you receiving any cash payments for fringe benefits required by the posted wage determination decision?		

WHAT DEDUCTIONS OTHER THAN TAXES AND SOCIAL SECURITY ARE MADE FROM YOUR PAY?

	TOOLS YOU USE	
HOW MANY HOURS DID YOU WORK ON YOUR LAST WORK DAY BEFORE THIS INTERVIEW?		
DATE OF LAST WORK DAY BEFORE INTERVIEW *(YYMMDD)*		
DATE YOU BEGAN WORK ON THIS PROJECT *(YYMMDD)*		

THE ABOVE IS CORRECT TO THE BEST OF MY KNOWLEDGE

EMPLOYEE'S SIGNATURE			DATE *(YYMMDD)*
INTERVIEWER	SIGNATURE	TYPED OR PRINTED NAME	DATE *(YYMMDD)*

INTERVIEWER'S COMMENTS

WORK EMPLOYEE WAS DOING WHEN INTERVIEWED	ACTION *(If explanation is needed, use comments section)*	YES	NO
	IS EMPLOYEE PROPERLY CLASSIFIED AND PAID?		
	ARE WAGE RATES AND POSTERS DISPLAYED?		

FOR USE BY PAYROLL CHECKER

IS ABOVE INFORMATION IN AGREEMENT WITH PAYROLL DATA?

☐ YES ☐ NO

COMMENTS

CHECKER

LAST NAME	FIRST NAME	MI	JOB TITLE
SIGNATURE			DATE *(YYMMDD)*

U.S. Department of Labor
Wage and Hour Division

PAYROLL

(For Contractor's Optional Use; See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

U.S. Wage and Hour Division

Rev. Dec. 2008

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐	ADDRESS	OMB No.:1235-0008 Expires: 04/30/2021

PAYROLL NO.	FOR WEEK ENDING	PROJECT AND LOCATION	PROJECT OR CONTRACT NO.

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE / HOURS WORKED EACH DAY							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS: FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	(9) NET WAGES PAID FOR WEEK
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that is will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,

all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

EMPLOYEE RIGHTS
UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WWW.WAGEHOUR.DOL.GOV

WHD U.S. Wage and Hour Division

DERECHOS DEL EMPLEADO

BAJO LA LEY DAVIS-BACON

PARA OBREROS Y MECÁNICOS EMPLEADOS EN PROYECTOS DE CONSTRUCCIÓN FEDERAL O CON ASISTENCIA FEDERAL

LA SECCIÓN DE HORAS Y SUELDOS DEL DEPARTAMENTO DE TRABAJO DE EEUU

SALARIOS PREVALECIENTES

No se le puede pagar menos de la tasa de pago indicada en la Decisión de Salarios Davis-Bacon fijada con este Aviso para el trabajo que Ud. desempeña.

SOBRETIEMPO

Se le ha de pagar no menos de tiempo y medio de su tasa básica de pago por todas las horas trabajadas en exceso de 40 en una semana laboral. Existen pocas excepciones.

CUMPLIMIENTO

Se pueden retener pagos por contratos para asegurarse que los obreros reciban los salarios y el pago de sobretiempo debidos, y se podría aplicar daños y perjuicios si no se cumple con las exigencias del pago de sobretiempo. Las cláusulas contractuales de Davis-Bacon permiten la terminación y exclusión de contratistas para efectuar futuros contratos federales hasta tres años. El contratista que falsifique los registros certificados de las nóminas de pago o induzca devoluciones de salarios puede ser sujeto a procesamiento civil o criminal, multas y/o encarcelamiento.

APRENDICES

Las tasas de aprendices sólo se aplican a aprendices correctamente inscritos bajo programas federales o estatales aprobados.

PAGO APROPIADO

Si Ud. no recibe el pago apropiado, o precisa de información adicional sobre los salarios aplicables, póngase en contacto con el Contratista Oficial que aparece abajo:

o póngase en contacto con la Sección de Horas y Sueldos del Departamento de Trabajo de EEUU.

Para obtener información adicional:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WWW.WAGEHOUR.DOL.GOV

U.S. Wage and Hour Division

"General Decision Number: CA20200026 07/03/2020

Superseded General Decision Number: CA20190026

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

County: San Bernardino County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	01/10/2020
2	01/31/2020
3	03/06/2020
4	05/08/2020
5	05/15/2020
6	05/29/2020

7	06/12/2020
8	07/03/2020

ASBE0005-002 09/01/2019

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems)	$ 43.77	22.48
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls)	$ 28.92	18.73

ASBE0005-004 07/01/2019

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)	$ 20.63	12.17

BOIL0092-003 03/01/2018

	Rates	Fringes
BOILERMAKER	$ 44.07	33.52

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* BRCA0004-011 05/01/2020

	Rates	Fringes
BRICKLAYER; MARBLE SETTER	$ 41.48	18.63

*The wage scale for prevailing wage projects performed in Blythe, China lake, Death Valley, Fort Irwin, Twenty-Nine Palms, Needles and 1-15 corridor (Barstow to the Nevada

State Line) will be Three Dollars ($3.00) above the standard San Bernardino/Riverside County hourly wage rate

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BRCA0018-004 06/01/2019

	Rates	Fringes
MARBLE FINISHER	$ 33.43	14.11
TILE FINISHER	$ 28.23	12.65
TILE LAYER	$ 40.07	18.36

BRCA0018-010 09/01/2018

	Rates	Fringes
TERRAZZO FINISHER	$ 31.25	13.41
TERRAZZO WORKER/SETTER	$ 38.39	14.18

CARP0409-001 07/01/2018

	Rates	Fringes
CARPENTER		
(1) Carpenter, Cabinet Installer, Insulation Installer, Hardwood Floor Worker and acoustical installer	$ 41.84	19.17
(2) Millwright	$ 42.91	19.17
(3) Piledrivermen/Derrick Bargeman, Bridge or Dock Carpenter, Heavy Framer, Rock Bargeman or Scowman, Rockslinger, Shingler (Commercial)	$ 42.54	19.17
(4) Pneumatic Nailer, Power Stapler	$ 40.09	19.17
(5) Sawfiler	$ 39.83	19.17
(6) Scaffold Builder	$ 31.60	19.17
(7) Table Power Saw Operator	$ 40.93	19.17

FOOTNOTE: Work of forming in the construction of open cut sewers or storm drains, on operations in which horizontal lagging is used in conjunction with steel H-Beams driven or placed in pre- drilled holes, for that portion of a lagged trench against which concrete is poured, namely, as a substitute for back forms (which work is performed by piledrivers): $0.13 per hour additional.

CARP0409-002 07/01/2016

	Rates	Fringes
Diver		
(1) Wet	$ 712.48	17.03
(2) Standby	$ 356.24	17.03
(3) Tender	$ 348.24	17.03
(4) Assistant Tender	$ 324.24	17.03

Amounts in ""Rates' column are per day

CARP0409-005 07/01/2015

	Rates	Fringes
Drywall		
DRYWALL INSTALLER/LATHER	$ 37.35	11.08
STOCKER/SCRAPPER	$ 10.00	7.17

CARP0409-008 08/01/2010

	Rates	Fringes
Modular Furniture Installer	$ 17.00	7.41

ELEC0440-004 12/01/2019

COMMUNICATIONS AND SYSTEMS WORK

	Rates	Fringes
Communications System		
Installer	$ 35.09	3%+15.50
Technician	$ 33.09	15.89

SCOPE OF WORK:
Installation, testing, service and maintenance of systems utilizing the transmission and/or transference of voice, sound, vision and digital for commercial, educational, security and entertainment purposes for the following: TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, nurse call systems, radio page, school intercom and sound, burglar alarms, fire alarms, and low voltage master clock systems in commercial buildings. Communication Systems that transmit or receive information and/or control systems

that are intrinsic to the above listed systems; inclusion or exclusion of terminations and testings of conductors determined by their function; excluding all other data systems or multiple systems which include control function or power supply; excluding installation of raceway systems, conduit systems, line voltage work, and energy management systems. Does not cover work performed at China Lake Naval Ordnance Test Station.

ELEC0477-002 06/01/2020

	Rates	Fringes
Electricians:.....	$ 43.25	3%+24.83

CABLE SPLICER: $1.50 per hour above Electrician rate.
TUNNEL WORK: 10% above Electrician rate.

ZONE PAY:
Zone A - 80 road miles from Post Office, 455 Orange Show Lane, San Bernardino, will be a free zone for all contractors
Zone B - Any work performed outside Zone A's 80 road miles, shall add $12.00 per hour to the current wage scale.

ELEC1245-001 01/01/2020

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	$ 58.09	19.74
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	$ 46.40	18.55
(3) Groundman.....	$ 35.47	18.17
(4) Powderman.....	$ 51.87	18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

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ELEV0018-001 01/01/2020

	Rates	Fringes
ELEVATOR MECHANIC	$ 57.40	34.765+a+b

FOOTNOTE:
a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
b. PAID HOLIDAYS: New Years Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0012-003 07/01/2018

	Rates	Fringes
OPERATOR: Power Equipment (All Other Work)		
GROUP 1	$ 45.30	25.25
GROUP 2	$ 46.08	25.25
GROUP 3	$ 46.37	25.25
GROUP 4	$ 47.86	25.25
GROUP 5	$ 48.96	25.25
GROUP 6	$ 48.08	25.25
GROUP 8	$ 48.19	25.25
GROUP 9	$ 49.29	25.25
GROUP 10	$ 48.31	25.25
GROUP 11	$ 49.41	25.25
GROUP 12	$ 48.48	25.25
GROUP 13	$ 48.58	25.25
GROUP 14	$ 48.61	25.25
GROUP 15	$ 48.69	25.25
GROUP 16	$ 48.81	25.25
GROUP 17	$ 48.98	25.25
GROUP 18	$ 49.08	25.25
GROUP 19	$ 49.19	25.25
GROUP 20	$ 49.31	25.25
GROUP 21	$ 49.48	25.25
GROUP 22	$ 49.58	25.25
GROUP 23	$ 49.69	25.25
GROUP 24	$ 49.81	25.25
GROUP 25	$ 49.98	25.25
OPERATOR: Power Equipment (Cranes, Piledriving & Hoisting)		
GROUP 1	$ 46.65	25.25
GROUP 2	$ 47.43	25.25
GROUP 3	$ 47.72	25.25

GROUP 4.....$ 47.86 25.25
GROUP 5.....$ 48.08 25.25
GROUP 6.....$ 48.19 25.25
GROUP 7.....$ 48.31 25.25
GROUP 8.....$ 48.48 25.25
GROUP 9.....$ 48.65 25.25
GROUP 10.....$ 49.65 25.25
GROUP 11.....$ 50.65 25.25
GROUP 12.....$ 51.65 25.25
GROUP 13.....$ 52.65 25.25

OPERATOR: Power Equipment
(Tunnel Work)

GROUP 1.....$ 47.15 25.25
GROUP 2.....$ 47.93 25.25
GROUP 3.....$ 48.22 25.25
GROUP 4.....$ 48.39 25.25
GROUP 5.....$ 48.58 25.25
GROUP 6.....$ 48.69 25.25
GROUP 7.....$ 48.81 25.25

PREMIUM PAY:

$3.75 per hour shall be paid on all Power Equipment Operator work on the followng Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: $2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator (includes loed, lull or similar types under 5 tons; Generator operator; Generator, pump or compressor plant operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator); Concrete mixer operator-skip type; Conveyor operator; Fireman; Forklift operator (includes loed, lull or similar types over 5 tons; Hydrostatic pump operator; oiler crusher (asphalt or concrete plant); Petromat laydown machine; PJU side dum jack; Screening and conveyor machine operator (or

similar types); Skiploader (wheel type up to 3/4 yd. without attachment); Tar pot fireman; Temporary heating plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar type (Skid steer); Equipment greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter radioman (ground); Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or similar type); Boring machine operator; Boxman or mixerman (asphalt or concrete); Chip spreading machine operator; Concrete cleaning decontamination machine operator; Concrete Pump Operator (small portable); Drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum); Equipment greaser (grease truck); Guard rail post driver operator; Highline cableway signalman; Hydra-hammer-aero stomper; Micro Tunneling (above ground tunnel); Power concrete curing machine operator; Power concrete saw operator; Power-driven jumbo form setter operator; Power sweeper operator; Rock Wheel Saw/Trencher; Roller operator (compacting); Screed operator (asphalt or concrete); Trenching machine operator (up to 6 ft.); Vacuum or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant engineer; Batch plant operator; Bit sharpener; Concrete joint machine operator (canal and similar type); Concrete planer operator; Dandy digger; Deck engine operator; Derrickman (oilfield type); Drilling machine operator, bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum); Drilling machine operator; Hydrographic seeder machine operator (straw, pulp or seed), Jackson track maintainer, or similar type; Kalamazoo Switch tamper, or similar type; Machine tool operator; Maginnis internal full slab vibrator, Mechanical berm, curb or gutter(concrete or asphalt); Mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar); Micro tunnel system (below ground); Pavement breaker operator (truck mounted); Road oil mixing machine operator; Roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck); Self-propelled tar pipelining machine operator; Skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.); Slip form pump operator (power

driven hydraulic lifting device for concrete forms); Tractor operator-bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (gunite work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bendng machine operator; Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity): Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less tha 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth- moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self- loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote- control earth-moving equipment operator (operating a second piece of equipment: $1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine,

Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds.and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDRIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without

attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

ENGINEERS ZONES

$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N,m R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County

boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1s, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1, T17N, R14E, SBM

$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point whch is the SW corner of Section 34.T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a think strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM

to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE 1/4 of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

ENGI0012-004 08/01/2015

	Rates	Fringes
OPERATOR: Power Equipment (DREDGING)		
(1) Leverman	$ 49.50	23.60
(2) Dredge dozer	$ 43.53	23.60
(3) Deckmate	$ 43.42	23.60
(4) Winch operator (stern		

winch on dredge).....$ 42.87 23.60
(5) Fireman-Oiler,
Deckhand, Bargeman,
Leveehand.....$ 42.33 23.60
(6) Barge Mate.....$ 42.94 23.60

IRON0377-002 07/01/2019

	Rates	Fringes
Ironworkers:		
Fence Erector	$ 33.58	24.66
Ornamental, Reinforcing and Structural	$ 40.00	33.30

PREMIUM PAY:

$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland,
Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

LABO0300-005 01/01/2018

	Rates	Fringes
Asbestos Removal Laborer	$ 33.19	17.78

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of

decontamination stations.

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* LABO0345-001 07/01/2020

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1	$ 45.05	19.62
GROUP 2	$ 44.10	19.62
GROUP 3	$ 40.56	19.62

FOOTNOTE: GUNITE PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0"" above base level and which work must be performed in whole or in part more than 75'-0"" above base level, that work performed above the 75'-0"" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

LABO0783-002 07/01/2019

	Rates	Fringes
LABORER (TUNNEL)		
GROUP 1	$ 40.19	19.07
GROUP 2	$ 40.51	19.07
GROUP 3	$ 40.97	19.07
GROUP 4	$ 41.66	19.07
LABORER		
GROUP 1	$ 35.24	20.09
GROUP 2	$ 35.79	20.09
GROUP 3	$ 36.34	20.09
GROUP 4	$ 37.89	20.09

GROUP 5.....$ 38.24 20.09

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete screeding for rough strike-off; Concrete, water curing; Demolition laborer, the cleaning of brick if performed by a worker performing any other phase of demolition work, and the cleaning of lumber; Fire watcher, limber, brush loader, piler and debris handler; Flag person; Gas, oil and/or water pipeline laborer; Laborer, asphalt-rubber material loader; Laborer, general or construction; Laborer, general clean-up; Laborer, landscaping; Laborer, jetting; Laborer, temporary water and air lines; Material hose operator (walls, slabs, floors and decks); Plugging, filling of shee bolt holes; Dry packing of concrete; Railroad maintenance, repair track person and road beds; Streetcar and railroad construction track laborers; Rigging and signaling; Scaler; Slip form raiser; Tar and mortar; Tool crib or tool house laborer; Traffic control by any method; Window cleaner; Wire mesh pulling - all concrete pouring operations

GROUP 2: Asphalt shoveler; Cement dumper (on 1 yd. or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute handler, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundation, footings, curbs, gutters and sidewalks; Concrete curer, impervious membrane and form oiler; Cutting torch operator (demolition); Fine grader, highways and street paving, airport, runways and similar type heavy construction; Gas, oil and/or water pipeline wrapper - pot tender and form person; Guinea chaser; Headerboard person - asphalt; Laborer, packing rod steel and pans; Membrane vapor barrier installer; Power broom sweeper (small); Riprap stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Sandblaster (pot tender); Septic tank digger and installer(lead); Tank scaler and cleaner; Tree climber, faller, chain saw operator, Pittsburgh chipper and similar type brush shredder; Underground laborer, including caisson bellower

GROUP 3: Buggymobile person; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2-1/2 ft. drill steel or longer; Dri-pak-it machine; Gas, oil and/or water pipeline wrapper, 6-in. pipe and over, by any method, inside and out; High scaler (including drilling of same); Hydro seeder and similar type; Impact wrench multi-plate; Kettle person, pot person and workers applying asphalt, lay-kold, creosote, lime caustic and similar type materials (""applying"" means applying, dipping, brushing or handling

of such materials for pipe wrapping and waterproofing); Operator of pneumatic, gas, electric tools, vibrating machine, pavement breaker, air blasting, come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's backup person, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services; Rock slinger; Rotary scarifier or multiple head concrete chipping scarifier; Steel headerboard and guideline setter; Tamper, Barko, Wacker and similar type; Trenching machine, hand-propelled

GROUP 4: Asphalt raker, lute person, ironer, asphalt dump person, and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), grinder or sander; Concrete saw person, cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Head rock slinger; Laborer, asphalt- rubber distributor boot person; Laser beam in connection with laborers' work; Oversize concrete vibrator operator, 70 lbs. and over; Pipelayer performing all services in the laying and installation of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid gas, air, or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No-joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzle person), water blasting, Porta Shot-Blast

GROUP 5: Blaster powder, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller: All power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power; Toxic waste removal

TUNNEL LABORER CLASSIFICATIONS

GROUP 1: Batch plant laborer; Changehouse person; Dump person; Dump person (outside); Swamper (brake person and switch person on tunnel work); Tunnel materials handling person; Nipper; Pot tender, using mastic or other materials (for example, but not by way of limitation, shotcrete, etc.)

GROUP 2: Chucktender, cabletender; Loading and unloading

agitator cars; Vibrator person, jack hammer, pneumatic tools (except driller); Bull gang mucker, track person; Concrete crew, including rodder and spreader

GROUP 3: Blaster, driller, powder person; Chemical grout jet person; Cherry picker person; Grout gun person; Grout mixer person; Grout pump person; Jackleg miner; Jumbo person; Kemper and other pneumatic concrete placer operator; Miner, tunnel (hand or machine); Nozzle person; Operating of troweling and/or grouting machines; Powder person (primer house); Primer person; Sandblaster; Shotcrete person; Steel form raiser and setter; Timber person, retimber person, wood or steel; Tunnel Concrete finisher

GROUP 4: Diamond driller; Sandblaster; Shaft and raise work

LABO0783-005 07/01/2018

	Rates	Fringes
Brick Tender	$ 32.26	18.40

LABO1184-001 07/01/2019

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer	$ 36.70	15.05
(2) Vehicle Operator/Hauler	$ 36.87	15.05
(3) Horizontal Directional Drill Operator	$ 38.72	15.05
(4) Electronic Tracking Locator	$ 40.72	15.05
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1	$ 37.91	18.06
GROUP 2	$ 39.21	18.06
GROUP 3	$ 41.22	18.06
GROUP 4	$ 42.96	18.06

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

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LABO1414-003 08/07/2019

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER....	$ 34.82	20.02
PLASTER TENDER.....	$ 37.37	20.02

Work on a swing stage scaffold: $1.00 per hour additional.

Work at Military Bases - $3.00 additional per hour:
Coronado Naval Amphibious Base, Fort Irwin, Marine Corps Air Station-29 Palms, Imperial Beach Naval Air Station, Marine Corps Logistics Supply Base, Marine Corps Pickle Meadows, Mountain Warfare Training Center, Naval Air Facility-Seeley, North Island Naval Air Station, Vandenberg AFB.

PAIN0036-001 07/01/2019

	Rates	Fringes

Painters: (Including Lead
Abatement)
(1) Repaint (excludes San
Diego County).....$ 28.59 15.97
(2) All Other Work.....$ 32.12 16.09

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

PAIN0036-008 10/01/2019

	Rates	Fringes
DRYWALL FINISHER/TAPER	$ 42.18	19.52

PAIN0036-015 01/01/2020

	Rates	Fringes
GLAZIER	$ 43.45	23.39

FOOTNOTE: Additional $1.25 per hour for work in a condor, from the third (3rd) floor and up Additional $1.25 per hour for work on the outside of the building from a swing stage or any suspended contrivance, from the ground up

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PAIN1247-002 01/01/2020

	Rates	Fringes
SOFT FLOOR LAYER	$ 37.55	13.78

PLAS0200-008 08/07/2019

	Rates	Fringes
PLASTERER	$ 43.73	16.03

FORT IRWIN; MARINE CORPS AIR STATION 29 PALMS, AND MARINE CORPS LOGISTICS SUPPLY BASE: $3.00 additional per hour.

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* PLAS0500-002 07/01/2020

	Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...$ 38.50 25.91

PLUM0016-002 09/01/2019

	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Work at Edwards AFB	$ 58.38	23.66
Work at Fort Irwin Army Base	$ 61.88	23.66
Work at Marine Corps Logistic Base at Nebo, Marine Corps Logistic Base at Yermo and Twenty-Nine Palms Marine Base	$ 58.38	23.66
Work ONLY on new additions and remodeling of bars, restaurants, stores and commercial buildings, not to exceed 5,000 sq. ft. of floor space	$ 49.83	22.68
Work ONLY on strip malls, light commercial, tenant improvement and remodel work	$ 38.05	21.01
All other work except work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space and work on strip malls, light commercial, tenant improvement and remodel work	$ 51.38	23.66

PLUM0345-001 09/01/2019

	Rates	Fringes
PLUMBER		
Landscape/Irrigation Fitter	$ 34.40	23.05
Sewer & Storm Drain Work	$ 38.49	20.43

ROOF0036-002 08/01/2019

	Rates	Fringes

ROOFER.....$ 39.52 17.47

FOOTNOTE: Pitch premium: Work on which employees are exposed to pitch fumes or required to handle pitch, pitch base or pitch impregnated products, or any material containing coal tar pitch, the entire roofing crew shall receive $1.75 per hour ""pitch premium"" pay.

SFCA0669-009 04/01/2019

Does not include the northern part of the City of Chino, or the Cities of Montclair and Ontario

	Rates	Fringes
SPRINKLER FITTER	$ 39.73	23.90

SFCA0709-004 01/01/2020

THE NORTHERN PART OF THE CITY OF CHINO, AND THE CITIES OF MONTCLAIR AND ONTARIO:

	Rates	Fringes
SPRINKLER FITTER (Fire)	$ 46.51	28.63

SHEE0105-003 01/01/2020

LOS ANGELES (South of a straight line drawn between Gorman and Big Pines)and Catalina Island, INYO, KERN (Northeast part, East of Hwy 395), MONO ORANGE, RIVERSIDE, AND SAN BERNARDINO COUNTIES

	Rates	Fringes
SHEET METAL WORKER		
(1) Commercial - New Construction and Remodel work	$ 45.78	28.96
(2) Industrial work including air pollution control systems, noise abatement, hand rails, guard rails, excluding aritechtural sheet metal work, excluding A-C,		

heating, ventilating
systems for human comfort...$ 45.78 28.96

TEAM0011-002 07/01/2019

	Rates	Fringes
TRUCK DRIVER		
GROUP 1	$ 31.59	29.59
GROUP 2	$ 31.74	29.59
GROUP 3	$ 31.87	29.59
GROUP 4	$ 32.06	29.59
GROUP 5	$ 32.09	29.59
GROUP 6	$ 32.12	29.59
GROUP 7	$ 32.37	29.59
GROUP 8	$ 32.62	29.59
GROUP 9	$ 32.82	29.59
GROUP 10	$ 33.12	29.59
GROUP 11	$ 33.62	29.59
GROUP 12	$ 34.05	29.59

WORK ON ALL MILITARY BASES:
PREMIUM PAY: $3.00 per hour additional.
[29 palms Marine Base, Camp Roberts, China Lake, Edwards AFB, El Centro Naval Facility, Fort Irwin, Marine Corps Logistics Base at Nebo & Yermo, Mountain Warfare Training Center, Bridgeport, Point Arguello, Point Conception, Vandenberg AFB]

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1: Truck driver

GROUP 2: Driver of vehicle or combination of vehicles - 2 axles; Traffic control pilot car excluding moving heavy equipment permit load; Truck mounted broom

GROUP 3: Driver of vehicle or combination of vehicles - 3 axles; Boot person; Cement mason distribution truck; Fuel truck driver; Water truck - 2 axle; Dump truck, less than 16 yds. water level; Erosion control driver

GROUP 4: Driver of transit mix truck, under 3 yds.; Dumpcrete truck, less than 6-1/2 yds. water level

GROUP 5: Water truck, 3 or more axles; Truck greaser and tire person ($0.50 additional for tire person); Pipeline and utility working truck driver, including winch truck and

plastic fusion, limited to pipeline and utility work;
Slurry truck driver

GROUP 6: Transit mix truck, 3 yds. or more; Dumpcrete truck, 6-1/2 yds. water level and over; Vehicle or combination of vehicles - 4 or more axles; Oil spreader truck; Dump truck, 16 yds. to 25 yds. water level

GROUP 7: A Frame, Swedish crane or similar; Forklift driver; Ross carrier driver

GROUP 8: Dump truck, 25 yds. to 49 yds. water level; Truck repair person; Water pull - single engine; Welder

GROUP 9: Truck repair person/welder; Low bed driver, 9 axles or over

GROUP 10: Dump truck - 50 yds. or more water level; Water pull - single engine with attachment

GROUP 11: Water pull - twin engine; Water pull - twin engine with attachments; Winch truck driver - $1.25 additional when operating winch or similar special attachments

GROUP 12: Boom Truck 17K and above

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates

the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal

process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

APPENDIX "L"

CONTRACT DOCUMENT CLARIFICATIONS (FROM PREVIOUS BIDDING)

FOR

SPECIFICATIONS

FOR

Project No. 9128

Bid No. 2020-06

REPLACEMENT OF 7.5 MG RESERVOIR

AND WATER IMPROVEMENTS

(460 N. EUCLID AVENUE, UPLAND, CA 91786)

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ITEM NO. 1:

Specification Section 03314, 2.01D, states that concrete for all tank elements shall have a minimum compressive strength of 4,000 psi at twenty-eight days. Specification Section 03300, 2.11.A.2, states "Minimum 5,000 psi for reservoir core wall." To clarify any possible confusion, the contract drawings clearly indicate that the corewall and shotcrete shall be 5,000 psi at 28 days, and other tank concrete is 4,000psi at 28 days.

ITEM NO. 2:

Specification Section 03300, 3.07, E. 1 and 2 state "Forms may be removed as soon as the concrete has developed sufficient strength to prevent sagging, excess deflection, misalignment, spalling, cracking, breaking of edges and surfaces and any other damage to the concrete. Removal of wall footing forms shall not be started any sooner than 12 hours of accumulated time with the ambient air temperature above 50° after completion of the pour." To clarify, this form removal procedure is also adequate for removal of the core wall forms as well, which is consistent with means and methods for AWWA D110 Type I Tanks.

ITEM NO. 3:

Specification Section 03314, 2.07, describes guidelines for exterior wall surfaces coatings. To clarify, coatings on the reservoir roof are not required, but the exterior curb at the top of the wall as shown on Detail 1, Drawing S-5 shall receive the same coating that will be applied to the exterior wall as Specified in Section 09902, Architectural Paints and Coatings: Exterior of Concrete Tanks.

ITEM NO. 4:

Drawing C-2 show an Overhead Electrical (OHE) line in close proximity of the eastern access road coming from Benson Avenue. To clarify, this overhead electrical line will be removed prior beginning the reservoir construction work.

ITEM NO. 5:

Drawing S-5 calls for a 1.75"x5"x6" bearing plate (typical, top and bottom). Drawing S-5 shows a 2"x5.5"x7" bearing plate. To clarify, the 2"x5.5"x7" bearing plate is correct.

ITEM NO. 6

Drawings S-4 and S-5 show a ½" thick roof bearing pad, while Drawing S-6 shows ¾" thick. To clarify, the 3/4" bearing pad at the top of the roof is correct.

ITEM NO. 7:

Drawing S-5 calls for a 6"x8"x3/8" roof can. Drawing S-6 shows a 3/16" roof can thickness. To clarify, a 6"x8"x3/16" can is correct.

ITEM NO. 8:

Specification Section 16111 calls for underground conduit to be PVC and above ground to be PVC Coated, note #14 on E-3 calls for all underground not encased in concrete to be PVC coated. To clarify, all underground conduit runs installed in vehicular traffic areas are to be concrete encased. Otherwise, concrete encasement is not required. For slurry requirements reference specification section 02350-2.04. For concrete trenching requirements reference specification section 02740.

ITEM NO. 9

Specification Section 16126, 3.1 calls for Instrumentation cable to be installed in PVC coated conduit. To clarify, all conduit installations shall adhere to the requirements as described in Specification Section 16111.

ITEM NO. 10

Drawing E-3, note #11 references the use of expansion fittings in straight runs over 200'. To clarify, PVC coated expansion fittings are not required for direct burial straight run applications until stub-up. All conduit stub-up/floor penetration locations are to be installed as shown in Details #6 and #7 on Drawing E-9.

ITEM NO. 11

Drawing E-9, Detail 8 shows a standard lighting detail to include the base, ground rod, and GFI. Drawing E-10, Detail 1 also shows the light standard but without the grounding, GFI and the base and rebar is sized differently. To clarify, a weatherproof GFI duplex receptacle IS NOT required to be installed on light poles. Only one (1) handhole is required on all light poles. Reference Detail 1 on drawing E-10.

ITEM NO. 12

Specification Section 16450, Grounding System. To clarify, install grounding system as described in Specification Section 16450. Sizes and general installation direction are listed in this specification section.

ITEM NO. 13

Drawing E-8. To clarify, all underground conduits are to be a minimum size of 1”. The minimum size above ground conduit is ¾”. Transitioning from 1” conduit below ground to ¾” above ground is not required. Conduit sizes should be maintained from underground to above ground transitions.

ITEM NO. 14

Specification Section 01011-4 calls for Installation of Security Systems. To clarify, install 100 feet of 2” spare conduit from the MCC to pullbox.

ITEM NO. 15

Specification Section 11242 – Liquid Chemical Injection System calls out an Allen Bradley CompactLogix PLC is to be provided by the Manufacturer of the Liquid Chemical Injection Systems. To clarify, the Liquid Chemical Injection System PLC is to be provided and programmed by the Manufacturer.

ITEM NO. 16

To clarify, the depth of cobble groundcover as shown on Drawing L-7 Landscape and Planting Plan, use 2" - 4" grade cobble.

ITEM NO. 17

To clarify the model of ball valve (manifolds) as shown on the legend, Drawing L-2 Landscape and Irrigation Legend and Details, ball valve shall be Spears #2122 slip socket both ends as indicated in the legend.

ITEM NO. 18

To clarity, Drawing L-2 Landscape and Irrigation Legend and Details, the model of drip indicator is OPERIND. The model for the quick coupler valve is HQ33DLRC.

ITEM NO. 19

To clarify, the main line pipe fittings shall be PVC SCH 40. The Mainline PVC socket fittings shall be SCH 40, and Mainline PVC threaded fittings shall be SCH 80.

ITEM NO. 20

The City of Upland's SCADA integrator is managed by SOFFA Electric, INC. For further information regarding SCADA system integration needs, Please Contact:

Salib Mansour, PE
Director of Engineering
SOFFA ELECTRIC, INC.
5901 Corvette Street
Commerce, CA, 90040
(323) 728-0230
Salib.Mansour@soffaelectric.com

ITEM NO. 21

Delete any references to Section 3-2 SELF-PERFORMANCE in the 2018 Greenbook. For clarification purposes, there is no minimum self-performance requirement for the General Contractor. The reservoir portion of the project can be considered a "Specialty Item" that represents a significant portion of the total project construction cost. The intent of the Specifications was to allow any General Contractor who attended either of the two mandatory pre-bid job walks, that did not possess the qualifications to construct the tank with his/her own resources as specified in the NOTICE INVITING SEALED BIDS OR PROPOSALS, PREQUALIFICATION OF THE CONTRACTOR, to bid the project by subcontracting the reservoir construction work to a qualified Reservoir Subcontractor.