CONTRACT DOCUMENTS AND SPECIFICATIONS FOR

Culver Boulevard Filtration and Retention Project PR-002 Culver Boulevard Realignment Project PZ-460



CITY OF CULVER CITY

BID NO. #XXXX

Public Works Department City of Culver City

9770 Culver Boulevard

Culver City, CA 90232-0507

(310) 253-5600

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SECTION A

NOTICE INVITING BIDS

CITY OF CULVER CITY NOTICE INVITING SEALED BIDS FOR

CULVER BOULEVARD FILTRATION AND RETENTION PROJECT PR-002 CULVER BOULEVARD REALIGNMENT PROJECT PZ-460 BID NO. #XXXX

1. ANNOUNCEMENT

Notice is hereby given that sealed bids will be accepted by the City of Culver City, California, for furnishing all labor, services, materials, and equipment, and performing all work to provide for a complete and acceptable project, including site work for:

CULVER BOULEVARD FILTRATION AND RETENTION PROJECT, BID NO. #XXXX

In the City of Culver City and in strict accordance with the plans and specifications in the Office of the Public Works Director and City Engineer of the City of Culver City, 9770 Culver Boulevard, Culver City, CA. 90232.

2. **DESCRIPTION OF WORK:**

The work to be done consists of furnishing all materials, equipment, tools, labor and incidentals as required in the specifications and contract documents, for the following project(s): "Culver Boulevard Filtration and Retention Project PR-002 and Culver Boulevard Realignment Project PZ-460".

3. COMPLETION OF WORK:

All work to be done under this contract shall be completed within **Five hundred and forty (540) calendar days**, beginning on the date the Contractor actually commences the Work or on the tenth (10th) day after the issuance of the "Notice to Proceed" by the City Engineer, whichever comes first.

4. **BIDDING PROCEDURES**

All bids and bidding procedures must comply with the "Instruction to Bidders", Section B of the Bid Documents.

5. SUBMISSION OF BIDS

Bids must be filed with the Office of the City Clerk, at 9770 Culver Boulevard, Culver City, CA. 90232, not later than $\underline{3:00 \ PM}$ on $\underline{XX/XX/XXXX}$ at which time they will be publicly opened in the City Council Chambers. Bids will later be referred to the City Council of the City of Culver City for the appropriate action.

6. BID SECURITY

Each Bidder shall submit a form of Bid Guaranty such as a money order, a cashier's check, certified check, cash, or surety bond for the sum of ten percent (10%) of the total amount of the bid and made payable to the City of Culver City as a guaranty that the Bidder, if its bid is accepted, will enter into a satisfactory contract and furnish a bond for the faithful performance thereof, and for the payment of labor and materials costs, and insurance in accordance with the requirements of the contract documents.

7. BID DOCUMENTS

A copy of the plans and specifications (contained on a DVD) shall be obtained only from the Engineering Division counter, 9770 Culver Blvd., Culver City, Ca 90232, 2nd floor in City Hall only, (310) 253-5600, for a <u>\$15.00</u> fee. There is a <u>\$15.00</u> mailing fee in addition to the non-refundable fee, or your Federal Express number. Any addendum will be e-mailed and/or faxed only to the bid holders that have obtained the bid package directly from the City's Engineering Division.

8. PRE-BID CONFERENCE (MANDATORY)

A Pre-bid Conference will be held on XXXXXX XX, XXXX at XX am in the Patacchia Conference Room, 9770 Culver Boulevard, First Floor, Culver City, CA 90232. Attendance of all bidders at this pre-bid conference is mandatory, no exceptions. A site tour will follow the meeting.

9. FORM AND STYLE OF BIDS

Bids must be prepared on the forms provided with the BID DOCUMENTS and must be in compliance with the INSTRUCTIONS TO BIDDERS. Bidders shall not change the wording of the forms provided, except as required by Addendum.

10. QUESTIONS/REQUESTS FOR INTERPRETATION

Pursuant to Section B-4, all questions shall be directed to Lee Torres, P.E. Senior Civil Engineer at 310.253.6457 or Leonardo.TorresJr@culvercity.org. All questions and/or clarifications shall be submitted to Leonardo.TorresJr@culvercity.org in word or PDF formatted documents.

11. RIGHT TO REJECT BIDS

The Owner reserves the right to reject any or all bids as the best interests of the Owner may dictate. Bidders are referred to Section B-18 of the "INSTRUCTIONS TO BIDDERS," for additional qualification requirements.

12. WAGE RATES AND PUBLIC WORKS CONTRACTOR REGISTRATION PROGRAM

In accordance with the California Labor Code, no worker employed in work under contract to the Owner shall be paid less than the State of California Prevailing wage rates. Contractor shall comply with all other Federal, State and local laws related to labor.

Pursuant to California Labor Code Section 1771.1(a), "A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded."

13. CONTRACTOR'S LICENSE

All bidders shall be licensed under provisions of Chapter 9, Division 3 of the Business and Professions Code of the State of California to do the type of work contemplated in the project. In accordance with provisions of California Public Contract Code Section 3300, the Owner has determined that the Contractor shall possess a valid Class **"A"** License at the time that the bid is submitted. Failure to possess the specified license shall render the bid as non-responsive

BY ORDER OF THE COUNCIL OF THE CITY OF CULVER CITY, CALIFORNIA

By: Jeremy Green, City Clerk

PUBLISHED: Culver City News on XXXX XX, XXXX

--End of Section-

SECTION B

INSTRUCTIONS TO BIDDERS

SECTION B - INSTRUCTIONS TO BIDDERS

1. DEFINITIONS

Alternate Bid

"Alternate Bid" shall mean an amount stated in the Bid as set forth in the supplementary bid forms, to be added to or deducted from the Total Base Bid, if the corresponding substitution or change in the Work, materials or other items as described in the Bid Documents, is accepted by Owner.

Total Base Bid

"Total Base Bid" shall mean the sum stated in the Total Base Bid Form for which the Bidder offers to perform the Work described in the Bidding Documents for Bid Schedule A, Bid Schedule B, and Bid Schedule C combined. The Total Base Bid is the base to which work, materials, or other items may be added to or from which work, materials, or other items may be deleted, for sums stated in the Alternate Bid form.

Bid Date

"Bid Date" shall mean the deadline (including date and time) set forth in the Notice Inviting Bids accompany these Instructions.

Bid Form

"Bid Forms" shall mean the Total Base Bid Form, the Supplementary Bid Forms, and other additions attached hereto, all of which constitute part of the Bid Documents.

Bid Documents

"Bid Documents" shall mean all documents provided by Owner to Bidder for Bidder's use and consideration in preparation of its Bid. Bidding documents include the Notice Inviting Bids, these Instructions to Bidders and any supplements or additions hereto, the Bid Proposal Form, the Supplementary Bid Forms, the Statement of Contractor's Qualifications, other sample bid and contract forms, the Contract Documents, Drawings, Plans, and Specifications, all documents referenced in the Contract Documents, and all Addenda issued prior to execution of the Contract.

<u>Bidder</u>

"Bidder" shall mean any individual, firm, partnership, corporation, or combination thereof, submitting a Bid for the work, acting directly or through a duly authorized representative.

Sub-bidder

"Sub-bidder" shall mean a person or entity who submits a Bid to a Bidder for materials, equipment or labor (including quantity surveyors) for a portion of the Work and who is identified on the appropriate Supplementary Bid Form.

Contract Documents

"Contract Documents" shall mean all documents executed by Owner and Bidder to evidence their agreements relating to the Work. The Contract Documents include, but are not limited to, the Owner-Contractor Agreement; any supplementary and other conditions or provisions; the Drawings, the Plans, the Specifications and all Addenda issued prior to execution of the Owner-Contractor Agreement; and all modifications thereof.

<u>Unit Price</u>

"Unit Price" shall mean an amount stated in the Supplementary Bid Form as a price unit of measurement for materials, equipment and/or services or a portion of the Work as described in the Bid Documents and shall include all elements of the described portion of the Work, including materials, labor, overhead and profit.

<u>Work</u>

"Work" shall mean the construction required by the Contract Documents and includes all tools, materials, and labor necessary to produce such construction and all materials and equipment incorporated or to be incorporated in such construction.

2. BID AND BID FORMS

Owner Supplied Forms

Bid forms (Section C, "Bid Forms") have been provided with this document by the Office of the Public Works Director/City Engineer of the City of Culver City. All bids for this project must be submitted on said original supplied by the Office of the City Engineer of the City of Culver City. Bid forms shall be completely filled out and signed by the Bidder or, if a partnership, by all partners or, if a corporation, by its President, Secretary and Treasurer, in the designated spaces.

Filling-in Forms

All blank spaces for unit prices, extensions and totals must be filled in. Signatures shall be completely and personally executed. If erasures are made, they must be initialed by the Bidder over his signature.

Modifications Prohibited

Bids shall not contain any recapitulation, inserted by the Bidder, of work to be done. Alternative proposals will not be considered unless specifically requested. No oral or telephone modifications will be considered.

Submitting Bids

All bids must be submitted in sealed envelopes bearing on the outside the name of the Bidder, the Bidder's business address and the name of the project for which the bid is submitted. Any bid received after the scheduled closing time for receipt of bids will be returned to the Bidder unopened. It is the sole responsibility of the Bidder to see that his bid is timely received.

ALTERNATE BIDS

The Contractor shall complete bid schedules for all Alternate Bids. Failure to complete all bid schedules will be considered a non-responsive bid.

Bids May Be Rejected

Bids may be rejected if there is any alteration of the bid form, additions not called for, conditional bids, qualifying provisions, incomplete entries, or irregularities of any kind. The Owner reserves the right to reject any or all bids.

3. ADDENDA

3.1 Addenda

Addenda will be e-mailed and/or faxed to all bidders who have received complete sets of Bid documents from the Engineering Division counter, 9770 Culver Blvd., Culver City, Ca 90232. Copies of Addenda will be made available for inspection in the Office of the Public Works Director/City Engineer at 9770 Culver Boulevard, Culver City, California, 90232.

It is the bidder's responsibility to provide its e-mail and fax number to ensure timely delivery of addenda.

3.2 Acknowledgment of Addenda

Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge its receipt in the Bid Form. Failure to acknowledge all addenda may result the bid proposal being deemed as non-responsive by the City.

4. INTERPRETATION OF PLANS AND SPECIFICATIONS

If any person contemplating submitting a bid for the project is in doubt as to the meaning of any requirement of plans or specifications or finds any discrepancies in or omissions from the plans or specifications, he may submit to the Public Works Director/City Engineer a written request for an interpretation or correction thereof. The person making the request will be responsible for its prompt delivery. Interpretations or corrections will be made by addenda to specifications or by dated revisions of plans with a copy of each addition or change being furnished, through the Public Works Director/City Engineer or Construction Manager, to each known prospective Bidder. Questions concerning the contract form, bonding requirements or similar documents shall be directed to the City Attorney through the Office of the City Engineer.

5. EXAMINATION OF SITE, PLANS, SPECIFICATIONS AND OTHER DOCUMENTS

Each Bidder shall carefully examine the plans, these specifications and the forms for all other contract documents and shall visit the site of the proposed work to fully inform him/herself of all existing conditions and limitations that may affect the execution and cost of work under the contract. He/She shall include in the individual bid prices the cost of all labor, materials, supplies, overhead and profit for each such bid item. The failure or omission of any Bidder to obtain and examine the plans or specifications, any form, instrument, addendum, or any other document, or to visit and acquaint him/herself with conditions at the construction site, shall in no respect relieve him/her from any obligation imposed by his/her bid or by award or execution of the contract. The submission of a bid shall be taken as prima facie evidence that the Bidder has read, understands and agrees to comply with all instructions contained herein.

6. COMPLETE BIDDING AND CONTRACT DOCUMENTS

A complete set of Bid documents contains the following documents:

- 1. Notice Inviting Bids, Section A;
- 2. Instruction to Bidders, Section B;
 - 3. Any or all addenda/addendum;
- 4. Bid Forms, Section C;
- 5. Award and Execution of Contract, Section D;
 - 6. General Provisions, Section E;
 - 7. Technical Specifications, Section F, appendices and appended drawings.
- 7. BID GUARANTY

Bid Guaranty Enclosed with Bid

Each bid shall be presented under sealed cover and be accompanied by an approved form of Bid Guaranty such as a cashier's check, money order, certified check or cash, or surety bond in favor of the Owner for an amount of at least ten percent (10%) of the amount of the bid as a guaranty

that the Bidder will provide bonds and insurance, and enter into a contract with the Owner for construction of the project. No bid shall be considered, unless such Bid Guaranty is enclosed.

In lieu of the foregoing, any bid may be accompanied by a surety bond in said amount, furnished by a surety authorized to do surety business in the State of California, guaranteeing that said bidder will enter into the contract and file the required bonds within the designated period.

Owner to Enforce Bid Guaranty

If within the time frame specified in Section B-18 of these Specifications, the successful bidder fails or neglects to enter into the contract and file the required bonds, the Owner may deposit in its treasury said bid security and not return it to the defaulting bidder.

Bid Guaranty Return

Upon execution of the contract with the successful Bidder, the Bid Guaranties of all Bidders will be returned by the City Clerk of the City of Culver City.

8. REJECTION OF BIDS

The Owner reserves the right to reject any or all bids and to waive any apparent clerical errors or discrepancies, or minor informalities if to do so seems to best serve the interests of the Owner.

9. WITHDRAWAL OF BIDS

Any Bidder may withdraw his bid, without obligation, either personally or by written request, at any time prior to the scheduled closing time for receipt of bids, provided that such personal or written request is delivered to the place specified in Section 5 of the "NOTICE INVITING BIDS" for receipt of Bids, prior to the Bid Date.

10. FACSIMILE MODIFICATION OF BIDS

No facsimile modification of bids will be allowed.

11. OPENING OF BIDS

Bid will be opened and publicly read aloud at the time and place designated in the Notice Inviting Bids.

12. BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm or corporation shall be allowed to make, or file, or be interested in, more than one bid for the same work, unless alternative bids are specifically requested. A person, firm or corporation that has submitted a sub proposal to a Bidder or that has quoted prices of materials to a Bidder is not hereby disqualified from submitting a sub proposal or quoting prices to other Bidders.

13. NON-COLLUSION DECLARATION

The Owner requires all Bidders to execute a Non-Collusion Declaration in the bid proposal included in the Bid Documents. The Owner also reserves the right to require that the Bidder shall, before awarding any subcontract, obtain from any or all proposed Subcontractors a Non-Collusion Declaration in the form included in the Bid Documents.

14. LIST OF SUBCONTRACTORS FILED WITH BID

In accordance with the provisions of the Public Contracts Code of the State of California relating to listing of subcontractors, each Bidder must submit with his bid the name and location of place of business of each proposed Subcontractor who will perform work or labor or render service to the Bidder for the construction of the project covered by the bid, in an amount in excess of one-half of one percent (0.5%) of the Bidder's bid and shall state the portion of the work which will be done by each Subcontractor.

15. LICENSING OF CONTRACTORS

All Bidders and Subcontractors submitting bids shall be licensed in accordance with the provisions of the Business and Professions Code of the State of California pertaining to the licensing of contractors. The license shall be valid and active at the time of submitting a bid and remain so throughout the duration of the Contract for the successful bidder and sub-bidders.

16. APPROXIMATE ESTIMATES

The quantities set forth on the bid form, if any, are approximate only, being given as a basis for the comparison of bids; and the Owner does not, expressly or by implication, agree that these will be the final quantities. The Bidder agrees that the Owner will not be responsible if any of said quantities are found to be incorrect; and the Bidder agrees not to make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission or misstatement shall be discovered in the estimated quantities, the same shall not invalidate the contract executed pursuant to this bid or release the Bidder from the execution and completion of the whole or part of the work herein specified, in accordance with these specifications and the plans herein mentioned and the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation otherwise than as provided for in the contract executed pursuant to this bid.

17. GENERAL REQUIREMENTS

It is the purpose of the Owner, pursuant to these specifications, to realize work on a project, which is complete in every detail and respect. The Bidder shall furnish all equipment, materials and labor and perform all work required to accomplish this purpose. The Bidder shall not omit any item of work or fail to furnish any element, component or part thereof, whether or not such is specifically called for in the Contract Documents, which is necessary for a satisfactory completion of the project.

18. AWARD OF CONTRACT

The contract will be awarded to the lowest responsible and responsive Bidder. If award is made, it will be based on the lowest responsive and responsible total base bid Contract price. Selection of any or all alternates shall be at the sole discretion of the Owner. The Owner, however, reserves the right to reject any or all bids, and, so far as permitted by law, to waive any informality in the bids received in order to serve the best interests of the Owner. If an award is made, the contract shall be awarded within ninety (90) days after the opening of the bids. Within ten (10) days of the mailing by the Owner of notification of award of contract and the contract form, Bidder shall provide and return to the Owner all required bonds and insurance documents and the executed formal contract. In determining if a Bidder is a responsive bidder, the Owner shall consider the following in addition to other requirements in these bid documents:

- a. Quality of services offered.
- b. Proven capacity of the Bidder to perform the contract or provide the supplies or services required in a timely and competent manner. The evaluation of the Contractor's capacity to perform the contract or provide the supplies or services required in a timely and competent manner shall be based on the information

provided by the Contractor in Section C-5 "Declaration of Bidder's Qualifications," as well as other pertinent data available to the Owner.

c. Character, integrity, reputation, judgment, experience and efficiency of the Bidder.

19. BONDS

The successful bidder will be required to file and pay for costs of bonds in the proper sums from a bonding company acceptable to the Owner. Forms for these bonds are included in Section D. The "Labor and Materials Payment Bond" and "Faithful Performance Bond" shall be for one hundred percent (100%) of the contract price (including base bid, adjustments and addenda).

20. INSURANCE CERTIFICATES AND POLICIES

Proof of insurance in an amount required by the Bid Specifications Section D-4 must be provided and endorsed to name: The City of Culver City, members of its City Council, its boards and commissions, officers, agents, and employees as additional insured for the particular operations of the insured which affect the Owner.

21. HOLD HARMLESS

To the fullest extent permitted by law, Contractor shall indemnify, defend (at Contractor's sole expense, with legal counsel approved by City) and hold harmless the City of Culver City, members of its City Council, its boards and commissions, officers, agents, and employees (hereinafter, "Indemnitees"), from and against all loss, damage, cost, expense, liability, claims, demands, suits, attorneys' fees and judgments arising from or in any manner connected to Contractor's or its employees or agent's wrongful or negligent acts, errors or omissions related to this Agreement. This indemnification includes, but is not limited to, tort liability to a third person for bodily injury and property damage.

Contractor agrees that this obligation to indemnify, defend and hold harmless extends to liability and/or claims arising from INDEMNITEES' active or passive negligence.

Notwithstanding the foregoing, nothing herein shall be construed to require Contractor to indemnify an INDEMNITEE from any claim arising from the sole negligence, active negligence or willful misconduct of that INDEMNITEE.

The duty to defend referenced herein is wholly independent from the duty to indemnify, arises upon written notice by City to Contractor of a claim within the potential scope of this indemnification provision, and exists regardless of any determination of the ultimate liability of Contractor, City or any Indemnitee.

22. ASSIGNMENT OF CONTRACT RESTRICTED

No assignment by the Bidder of any contract to be entered into in accordance with Notice Inviting Bids and these instructions or any part thereof, or of funds to be received there under, will be recognized by the Owner unless such assignment had prior written approval of the Owner and the surety on all bonds had notice of such assignment in writing and has consented thereto in writing.

In entering into the Contract or any Subcontract for the Project, the Contractor and Subcontractor offer and agree to assign to the Owner all right, title and interest in and to all causes of action they may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from the Contract or any Subcontract. This assignment shall be deemed made and

effective at the time the Owner tender's final payment to the Contractor, without further acknowledgment by the parties.

23. SHORING

Pursuant to the provisions of the California Labor Code Section 6707, each bid submitted in response to this Invitation to Bid shall contain, as a bid item, adequate sheeting, shoring, and bracing, or equivalent method, for protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders. By listing this sum, the bidder warrants that its action does not convey tort liability to the Owner, the Engineer, the Construction Manager, and their employees, agents and subconsultants.

24. OTHER PERMITS, FEES AND LICENSES

The Contractor shall, prior to the start of construction, obtain, pay, and comply with all necessary permits as required as the result of its work, including but not limited to the permit(s) described herein and as attached in the appendix.

In addition to the requirements above noted, the Contractor **shall possess a valid City of Culver City business license** at the time of contract agreement execution and for the duration of the contract. The fee for said business license shall be based upon the total amount bid for the contract. Amount of fee may be obtained from the City of Culver City, Finance Department, Treasury Division at (310) 253-5870.

All bidders are encouraged to utilize Culver City subcontractors and suppliers to the extent they are available, competitive and qualified. However, no bid will be affected either positively or negatively by the inclusion or exclusion of such Culver City businesses.

25. DIFFERING SITE CONDITIONS

a. Contractor's Notification

Promptly notify the Agency's Engineer if you find either of the following conditions:

- 1. Physical conditions differing materially from either of the following:
 - Contract documents
 - Job site examination
- 2. Physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the Contract

Include details explaining the information you relied on and the material differences you discovered.

If you fail to promptly notify the Engineer, you waive the differing site condition claim for the period between your discovery of the differing site condition and your notification to the Engineer. If you disturb the site after discovery and before the Engineer's investigation, you waive the differing site condition claim.

b. Engineer's Investigation and Decision

Upon your notification, the Engineer investigates job site conditions and:

1. Notifies you whether to resume affected work

2. Decides whether the condition differs materially and is cause for an adjustment of time, payment, or both.

26. PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS

The agency shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the agency, of the contract work, and pay

SECTION B

retainage to the prime contractor based on these acceptances. The prime contractor, or subcontractor, shall return all monies withheld in retention from a subcontractor within 30 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the agency. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30 days may take place only for good cause and with the agency's prior written approval. Any violation of this provision shall subject the violating prime contractor or subcontractor to the penalties, sanctions and other remedies specified in Section 7108.5 of the Business and Professions Code. These requirements shall not be construed to limit or impair any contractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

27. QUALITY ASSURANCE

The Agency uses a Quality Assurance Program (QAP) to ensure a material is produced to comply with the Contract.

You may examine the records and reports of tests the Agency performs if they are available at the job site.

Schedule work to allow time for QAP.

-- End of Section --

SECTION C

BID FORMS

BID F	ORM
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FIRM			
ADDRESS			
FAX NUMBER			

FOR

CULVER BOULEVARD FILTRATION AND RETENTION PROJECT PR-002 CULVER BOULEVARD REALIGNMENT PROJECT PZ-460

FOR

CITY OF CULVER CITY CULVER CITY, CALIFORNIA

BID NO. #XXXX

1 TOTAL BID BASE FORM

TO THE HONORABLE CITY COUNCIL CITY OF CULVER CITY, CALIFORNIA

This Bid is submitted in accordance with the advertised "Notice Inviting Bids" requesting sealed bids for furnishing all labor, services, materials and equipment and performing all work necessary for: Culver Boulevard Filtration and Retention Project PR-002 and Culver Boulevard Realignment Project PZ-460.

Having carefully examined the location of the proposed work and the Bid Documents for same and read the accompanying proposed requirements, and attended the pre-bid conference, the undersigned Bidder hereby proposes and agrees to enter into a contract to furnish all equipment, materials and labor necessary to complete all work described in the Bid Documents for the project under the supervision of the City Engineer of the City of Culver City for the sum set forth in the following schedule **Culver Boulevard Filtration and Retention Project PR-002 and Culver Boulevard Realignment Project PZ-460**.

The undersigned further agrees, in case of award, to execute the contract for the within described work and improvements, within ten (10) days following written notice of award of contract. All work to be done under this contract shall be completed within **Five hundred and forty (540) calendar days**, beginning on the date stipulated in the written Notice to Proceed issued by the City Engineer.

Liquidated damages of **\$1000** per calendar day shall be assessed based upon the applicable number of days noted above. The Contract Time shall commence on the date the Contractor actually commences the Work or on the tenth (10th) day after the issuance of the Notice to Proceed, whichever comes first. The Contractor shall retain the right to fully complete (including Final Completion, Punch List Correction and project Close-Out) the Work in less days than established

by above, however, <u>neither</u> shall a reduction or increase to the Contract Sum be made, if the Work is so fully completed in less days than established by this Section C-1, <u>no</u> Claim shall be made or granted for Compensable Delay, or any other increase in Contract Sum, if, for any reason, including but not limited to delay caused by the Owner, the Contractor does not so fully complete the Work in less days than established herein.

(NOTE: All amounts and totals given in the Bid Schedule are subject to verification by the Owner.)

The undersigned has complete Bid Schedule A, Bid Schedule B, Bid Schedule C and provided a total base bid amount in figures and words for Bid Schedule A, Bid Schedule B, and Bid Schedule C combined. Bid Schedule A represent bid items that are common to Project PR-002 and PZ-460 and the total bid item value provided for each bid item shall apply to work performed on both projects throughout duration of the contract. Bid Schedule B represents bid items that apply to Project PZ-460 only.

BID SCHEDULE A: CULVER BOULEVARD FILTRATION AND RETENTION PROJECT (PR-002) AND CULVER BOULEVARD REALIGNMENT PROJECT (PZ-460) <u>COMBINED</u>

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	Unit Cost	TOTAL
1A	Mobilization/Demobilization and Clean-Up (maximum 5% of total bid)	1	LS	\$	\$
2A	Traffic Control	1	LS	\$	\$
3A	Stormwater Pollution Prevention Plan (SWPPP) Development and Implementation	1	LS	\$	\$
	\$				
TOTAL BID SCHEDULE A IN WORDS (Bid Item No. 1A-3A):					

BID SCHEDULE B: CULVER BOULEVARD FILTRATION AND RETENTION PROJECT (PR-002) ONLY

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL
1B	Start-up and Testing	1	LS	\$	\$
2B	O&M Manuals	1	LS	\$	\$
3B	Record Drawings	1	LS	\$	\$
4B	Demolition and Relocation	1	LS	\$	\$
5B	Hauling, Fill, and Grading	1	LS	\$	\$
6B	Shoring	1	LS	\$	\$
7B	Construct Paving	1	LS	\$	\$
8B	Construct Diversion Structures	1	LS	\$	\$
9B	Install Pretreatment Devices	1	LS	\$	\$
10B	Construct Wet Well and Install Submersible Pumps	1	LS	\$	\$
11B	Construct Underground Storage Gallery	1	LS	\$	\$
12B	Water Filtration Systems	1	LS	\$	\$
13B 14B	Construct Storm Drain System (includes excavation, pipe replacement at the pump station area, piping, structures, filter inserts, valves, etc.) Install Electrical Service and Instrumentation	1	LS	\$	\$\$
15B	Active Controls	1	LS	\$	\$
				*	· ·
TOTAL BID SCHEDULE B IN FIGURES (Bid items 1B-15B):					1
TOTAL BID SCHEDULE B IN WORDS (Bid items 1B-15B):					

BID SCHEDULE C: CULVER BOULEVARD REALIGNMENT PROJECT (PZ-460) ONLY

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	Unit Cost	TOTAL
1C	Clearing and Grubbing	1	LS	\$	\$
2C	Roadway Excavation (22.5" Depth)	5,662	CY	\$	\$
3C	Asphalt Concrete (AC)	732	TON	\$	\$
4C	Construct 2" Asphalt Rubber Hot Mix (ARHM) Finish Course Pavement	453	TON	\$	\$
5C	PCC Bus Pad Monolithic with C&G	4,522	SF	\$	\$
6C	6" Crushed Miscellaneous Base (CMB)	767	TON	\$	\$
7C	16" Crushed Miscellaneous Base (CMB)	3,646	TON	\$	\$
8C	11" Crushed Miscellaneous Base (CMB)	360	TON	\$	\$
9C	8 ½" PCC with #3 Rebar Pavement	5,269	SF	\$	\$
10C	4" Decomposed Granite (DG) Ped Path	176	TON	\$	\$
11C	8" Type A2-8 Curb & Gutter (C&G)	1,047	LF	\$	\$
12C	8" Type A1-8 Curb	2,284	LF	\$	\$
13C	6" Type A1-6 Curb	2,096	LF	\$	\$
14C	6" Type A3-8 Curb & Gutter (C&G)	1,043	LF	\$	\$
15C	6" Rolled Curb	57	LF	\$	\$
16C	12" Concrete Mow Strip	1,802	LF	\$	\$
17C	5" PCC Pavement (Cobble Stones) over 4" CMB	22,360	SF	\$	\$
18C	6" PCC Pavement over 4" CMB	1,760	SF	\$	\$
19C	4" PCC Sidewalk	25,847	SF	\$	\$
20C	4" AC Bike Lane over 4" CMB	428	TON	\$	\$
21C	ADA Ramps (incl. upper/lower landing, gutter, domes, grooves border) over 4" CMB	20	EA	\$	\$
22C	Construct New 7.0' Catch basin north of median at Harter	1	EA	\$	\$
23C	18" Full Depth Slot Pave	156	TON	\$	\$
24C	Parkway Drain	1	LS	\$	\$
25C	Adjust MH Frame and Cover	2	EA	\$	\$
26C	Traffic Signal at Harter & Culver & Interconnect	1	LS	\$	\$
27C	Traffic Signal at Huron & Culver & Interconnect	1	LS	\$	\$
28C	City Street Lighting and Pedestrian Lighting	1	LS	\$	\$
29C	Signage & Striping	1	LS	\$	\$
30C	Landscape, Irrigation & Hardscape	1	LS	\$	\$

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	U	nit Cost	TOTAL
31C	Construction Staking	1	LS	\$		\$
32C	General Conditions	1	LS	\$		\$
33C	Bonding and Inspection	1	LS	\$		\$
34C	Contingency	1	LS	\$		\$
35C	Demolition	1	LS	\$		\$
TOTAL BID SCHEDULE "C" IN FIGURES (Bid items 1C-35C):						
TOTAL BID SCHEDULE "C" IN WORDS (Bid items 1C-35C):						

TOTAL BASE BID AMOUNT IN FIGURES (SCHEDULES A + B + C):

TOTAL BASE BID AMOUNT IN WORDS (SCHEDULES A + B + C): _____

THE CONTRACT WILL BE AWARDED TO THE RESPONSIBLE CONTRACTOR WHO SUBMITS THE LOWEST TOTAL BASE BID AMOUNT (SCHEDULES A+B+C COMBINED) WITH RESPONSIVE AND RESPONSIBLE BID PROPOSAL. THE CITY RESERVES THE RIGHT TO AWARD THE CONTRACT AMOUNT BASED ON AVAILABLE BUDGET AND PRIORITIES.

The undersigned has carefully checked the above figures and understands that the City, or any officer thereof, will not be responsible for any errors or omissions on the part of the undersigned in submitting this bid. In case of a discrepancy between words and figures, the figures shall prevail, and in case of a discrepancy between unit prices and totals, the unit prices shall prevail. The unit price amounts for each item shall include all indirect costs (i.e., permit fee, business license fee, mobilization, coordination, supervision, overhead and profit, etc.), incidental work (i.e. traffic control, safety devices, protection of utilities, utility investigation and "pot holes," work necessary for the protection of life and limb, etc.) and other work required by the contract but not listed above.

Payment for all work on the above items shall be made subject to verification in the field of the actual quantity of work performed.

Exclusions: Includes everything necessary to complete the project with the following exceptions only:

2 RECEIPT AND ACKNOWLEDGMENT OF ADDENDUM

We acknowledge that the following addenda numbers have been received and have been examined as part of the Contract Documents. Failure to acknowledge any or all addenda or addendum may result the bid proposal being deemed as non-responsive by the City.

Addenda Number	Date Received	Initials

3 CERTIFICATION

The undersigned Bidder certifies that:

- 1. Bidder has, by investigation of the site of the work and otherwise, understands the nature and location of the work and has fully informed the Owner as to all conditions and matters, which can in any way affect the work or cost thereof.
- 2. Bidder will cooperate fully with the Owner to ensure the Owner's best interests are protected and the work expedited to completion. In the event of any disagreement, the City Engineer shall fully review the matter and provide a determination. His judgment shall be final and binding upon all parties concerned.
- 3. Where demolition is necessary for the project described herein, the successfully awarded Contractor shall conform to the South Coast Air Quality Management District (S.C.A.Q.M.D.) Rule 1403, as amended. The Contractor shall mail the Rule 1403 Notification within five (5) calendar days after the Notice to Commence Work is mailed by the Owner. Once the S.C.A.Q.M.D Rule 1403 Notification has been post marked and mailed, the Contractor shall begin work no later than fifteen (15) calendar days after the mailing date. The duration set for the completion of this project will begin on the date work actually commences by the Contractor. In any case, the work shall not begin later than twenty (20) days after the date in which the Owner mailed the Notification to Commence Work.
- 4. All bonds, certificates, endorsement forms shall be submitted at the time of the execution of the contract.

THE UNDERSIGNED BIDDER IS AWARE OF THE FACT THAT THE OWNERRESERVESTHE RIGHT TO REJECT ANY OR ALL BIDS BUT THAT IF A BID IS ACCEPTED, THE CONTRACT WILL BE AWARDED TO THE LOWEST RESPONSIBLE AND RESPONSIVE BIDDER.

4 BIDDER INFORMATION

Name of Individual Bidder:				
Bid Prepared By:				
Business Address:				
Business Telephone Number:				
Fax Number:				
Contractor License No:	Class:			
OR:				
California Public Works Contractor Registr	ration No:			
Name of Partnership Bidder:				
Bid Prepared By:				

CITY OF CULVER CITY

Business Address:

Fax Number:

Business Telephone Number:

List Names and Business addresses of All Partners Below:

If the Bidder is a Corporation, list corporate information below:

Name of Corporate Bidder:_____

By:

(Signature of President of Corporation)

(Signature of Secretary of Corporation)

By:

(Signature of Treasurer of Corporation)

Business Address:	 	

Fax Number:	

Business Telephone Number:_____

Corporation organized under laws of State of:_____ Contractor Licona . . .

Contractor License No:	

5 **DECLARATION OF BIDDER'S QUALIFICATIONS**

Each Bidder must be properly licensed and must submit the following information on this form. If necessary, include supplement information as a separate package.

5.1 Authorization and Declaration

> The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by Owner or their designated representative in verification of the recitals comprising this Declaration of Bidder's Qualifications. The undersigned declares under penalty of perjury that all of the qualification information submitted with this form is true and correct and that this Declaration was executed in

(City, County) of Californ	nia, on		_(Date).
Signature:			
Title (Printed):			
Business Name, Addres	s, Telephone Num	bers (if different that	n Section C-4)
Business Name:			
Business Address:			
Business Telephone & F	ax Numbers:		
License Bidders must be license	s in the State of Ca	alifornia as "A" Con	tractor.
Complete the informatio	n requested below		
License Number	Class	Date Issued	Expiration Date
License Number	Class	Date Issued	Expiration Date
License Number	Class	Date Issued	Expiration Date
Suretv			

A. Indicate the names of all surety companies utilized by Bidder in last five (5) years and state if the Surety(ies) bonding the Bidder's jobs have had to complete any part of Bidder's Contract (attach separate sheet if necessary).

Surety Name & Address

Period Covered

Jobs Completed by Surety

Surety Name & Address

Period Covered

CITY OF CULVER CITY

Jobs Completed by Surety

- B. If a Bid Guaranty (Section C-7) is provided in lieu of a Bid Bond (Section C-6), the Bidder shall attach a notarized statement from Surety(ies) proposed to be utilized on the project, indicating Bidder's total bonding capacity and certifying that: (1) currently available bonding capacity exceeds **\$4,500,000** and (2) Surety(ies) will provide bonding in the event that Bidder is awarded the project.
- C. Indicate below that the surety is licensed and admitted as a surety insurer in the State of California.

Surety Name and Address

Licensed & Admitted in CA (Y/N)

Surety Name and Address

Licensed & Admitted in CA (Y/N)

Surety Name and Address

Licensed & Admitted in CA (Y/N)

D. Indicate below those projects with disputed amounts in excess of \$50,000 or portions of any such project, which have been terminated by an Owner, Owner's representative, or other contracting party and which required completion by another party in the last five (5) years. State the project Name, Location, Owner, with address and phone number, contract amount, and reason for disputed amount or termination (attach separate sheet if necessary.)

Project Name and Location

Owner

Contract Value

Reasons for Disputed Amount or Termination

Disputed Amount

5.5 Insurance

CITY OF CULVER CITY

- A. Provide a statement from the Worker's Compensation carrier specifying Contractor's current Experience Modification Rate for Worker's Compensation for the State of California. In addition, provide a list of the above referenced ratings and corresponding company for the last three (3) years.
- B. Provide statement from insurance carrier indicating that the minimum scope and limits of insurance will be provided as required in Section D-4, of this document.
- C. Indicate below that the surety is licensed and admitted as a surety insurer in the State of California.

Ins. Co. Name and Address

Licensed & Admitted in CA/Y/N

Ins. Co. Name and Address

Licensed & Admitted in CA/Y/N

5.6.1 Construction Experience

Furnish a list of at least three (3) similar (scope of work and cost) projects completed in the past five (5) years, two (2) of which must have been built in the State of California. Construction experience shall be provided for each project type (PR-002 and PZ-460) Provide the following information for each project on the attached form. Copy additional forms as required.

- *i* Project name and location
- *ii* Contact name, address and telephone number for Owner & Architect/Engineer
- *iii* Base and final contract amounts
- *iv* Type of project and major project components. Provide approximate percent of construction cost associated with each construction component.
- *v* Date project was completed (i.e., date of filing of Notice of Completion, etc.).
- *vi* Indicate completion rate of projects by showing initial contract time, time extensions, and number of days that project was completed early or late, all expressed in calendar days.

SIMILAR PROJECTS FOR LAST FIVE (5) YEARS PROJECT PR-002

Project Name and Location		
Owner	Engineer	
Address and telephone		
Project Components		
Contract Amounts (\$)	Date Completed	
Project Name and Location		
Owner	Engineer	
Address and telephone		
Project Components		
Contract Amounts (\$)	Date Completed	
Project Name and Location		
Owner	Engineer	
Address and telephone		
Project Components		

SIMILAR PROJECTS FOR LAST FIVE (5) YEARS

PROJECT PZ-460

Project Name and Location		
Owner		Engineer
Address and telephone		
Project Components		
Contract Amounts (\$)	Date Completed	
Project Name and Location		
Owner		Engineer
Address and telephone		
Project Components		
Contract Amounts (\$)	Date Completed	
Project Name and Location		
Owner		Engineer
Address and telephone		
Project Components		
Contract Amounta (\$)	Date Completed	

5.7 Staff Roster/Functions

List all members of your staff that <u>will be assigned to or responsible for work</u> on this project (except clerical) and show their job titles/functions. Include Company Officers.

Name	Function	Years w/Firm	Years Total
Name	Function	Years w/Firm	Years Total
Name	Function	Years w/Firm	Years Total
Name	Function	Years w/Firm	Years Total
Name	Function	Years w/Firm	Years Total

5.8 Arbitration and Litigation History

Indicate below all arbitration and/or litigation against bidder in the last five (5) years, including all claims by owners. Indicate yes or no (Y/N) which claims were resolved against bidder in litigation or arbitration or which resulted against in any payment by the Bidder or its insurers/sureties or reduction in compensation on any Bidder. Failure to provide this information on any contract undertaken in the past five (5) years may result in disqualification. Indicate final status (Resolved or Unresolved) of each claim. Attach separate sheet if necessary.

Project Name	Amount of Claim				
Nature of Claim	Resolution (Y/N) Against Bidder	Final Status			
Project Name	Amo	ount of Claim			
Nature of Claim	Resolution (Y/N) Against Bidder	Final Status			
Project Name	Amo	ount of Claim			
Nature of Claim	Resolution (Y/N) Against Bidder	Final Status			

6 BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we,	, as Principal, and
	, as Surety (Local Agent
Contact Telephone Number ,	_), are held and firmly bound unto the Owner in
the sum of	Dollars
(\$) to be paid to said Own	ner its successors and assigns, for which payment
well and truly will 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 certain Bid of the above-bounden Principal submitted for the following improvement project:

CULVER BOULEVARD INFILATRATION AND RETENTION PROJECT PR-002 CULVER BOULEVARD REALIGNMENT PROJECT PZ-460

is accepted by the Owner through action of its legally constituted contracting authorities and if the above-bounden Principal, its heirs, executors, administrators, successors and assigns shall duly enter into and execute a contract for such construction in strict accordance with the specifications and drawings on file at the office of the City Engineer, in the City Hall, Culver City, and shall execute and deliver the required Faithful Performance Bond and Payment Bond, and Insurance Certificates within ten (10) days after the date of notification by and from said Owner that said contract is ready for execution, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue.

IN WIT	NESS WHEREOF, we hereunto set our hands and seals this	S
day of	, 20	

Signature

Surety

Title

Ву:_____

Company

7 BID GUARANTY

BID GUARANTY

Note: The following statement shall be used if other than a bid surety bond accompanies bid.

"Accompanying this proposal is a money order*, certified check*, cashier's check*, cash*, payable to the order of the Owner in the amount of Dollars (\$ ______) which is ten percent (10%) of the total amount of this bid. The proceeds of this bid guaranty shall become the property of said Owner provided this bid is accepted by said Owner, through action of its legally constituted contracting authorities, and the undersigned fails to execute a contract and furnish the required bonds within the stipulated time. Otherwise, the proceeds of this bid guaranty shall be returned to the undersigned."

Signature

Title

Company

(*Delete the inapplicable words)

8 NONCOLLUSION DECLARATION

NONCOLLUSION DECLARATION

(To Be Executed by Bidder and Submitted with Bid)

The undersigned declares:

I am the ______ of _____, the party making the foregoing

bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. 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 or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. 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, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

	l de	clare unc	ler pei	nalty of	perju	ry under the	laws	of the St	tate of	^c California	that the	foregoing	is
true	and	correct	and	that	this	declaration	is	execute	ed or	ו		[date],	at
				_[city],				[st	tate].				

Name: _____

Title:

Signature of Bidder

9 SUPPLEMENTARY BID FORMS, NO. 1

SUPPLEMENTARY BID FORM NO. 1

LISTING OF PROPOSED SUBCONTRACTORS

CULVER BOULEVARD FILTRATION AND RETENTION PROJECT PR-002 CULVER BOULEVARD REALIGNMENT PROJECT PZ-460

For portions of the Work equaling or exceeding 1/2 of one percent (0.5%) of the Base Bid, the undersigned Bidder proposes to use the subcontractors listed below. Except as otherwise approved by the Owner, the undersigned Bidder shall perform all other portions of the Work with his own forces.

Portion of the Work		Subcontractor Name,	Address, & License No. &
Bid Number & \$ amount of subcontract	ting work	California Public Works (Contractor Registration No:
-			
The signature must		Bidder:	
be identical to that		Dv <i>r</i>	
shown on the bld.		Бу	
If additional sheets		lts:	
are required, you must			
	תת	007	I
CITT OF CULVER CITT	PR-0	002	January 2019

PZ-460

SUPPLEMENTARY BID FORM NO. 2

LISTING OF PROPOSED SUPPLIERS

Pursuant to **INSTRUCTIONS TO BIDDERS** for the work titled:

CULVER BOULEVARD FILTRATION AND RETENTION PROJECT PR-002 CULVER BOULEVARD REALIGNMENT PROJECT

Portion of the Work		Supplier's Name and Address
	-	
	•	

-- End of Section --
SECTION D

AWARD AND EXECUTION OF CONTRACT

SECTION D - AWARD AND EXECUTION OF CONTRACT

1 SAMPLE AGREEMENT

CITY OF CULVER CITY AGREEMENT WITH

Contractor

This Agreement is made and entered into by and between the City of Culver City (City) and <u>Name</u> of <u>Contractor</u> (Contractor)

WHEREAS, Contractor submitted its total base bid the total lump sum for: <u>Amount of Bid</u> Dollars (\$<u>00.00</u>) for the completion of the <u>Culver Boulevard Filtration and Retention Project</u> PR-002 as further described in the Scope of Services; and

WHEREAS, Contractor represents it has that degree of specialized expertise and holds all licenses necessary to practice and perform the service contemplated; and

WHEREAS, after reviewing all bids submitted and declaring that the Contractor submitted the lowest responsible and responsive bid, City's City Council, at its meeting of <u>meeting date</u>, awarded the contract for the work to Contractor.

NOW, THEREFORE, THE PARTIES HERETO AGREE as follows:

SCOPE OF SERVICES

Contractor shall provide all services described in accordance with the Contract Documents, as defined below, relating to the <u>Culver Boulevard Filtration and Retention Project</u> PR-002 and follow the work schedules defined therein.

CONTRACT DOCUMENTS

The documents comprising the entire agreement between City and Contractor shall be collectively referred to as the "CONTRACT DOCUMENTS," and shall consist of and include the following:

This Agreement – including:

- Contract Documents and Specifications for <u>Culver Boulevard Filtration and Retention Project</u> PR-002, Culver Boulevard Realignment Project PZ-460, <u>Bid #____</u>;
- All addenda setting forth any modifications or interpretations of those documents, (Addenda by number and date: Addendum No. x dated xxx);
- Bid Proposal submitted by Contractor to City on or before <u>DATE</u>;
- All documents incorporated into the foregoing;
- Schedule of Values, if applicable;
- List of Subcontractors;
- Labor and Materials Payment Bond;
- Faithful Performance Bond (including agent's Power of Attorney for each Bond);
- Non-Collusion Declaration (General and Subcontractor);
- Certificates of Insurance;
- Change Orders;
- Notice to Proceed; and
- Notice of Completion

All the Contract Documents are intended to complement one another, so that any work called for in one and not mentioned in another is to be performed as if mentioned in all documents.

The terms of this Agreement shall prevail over any inconsistent provision of the other Contract Documents.

The Contract Documents constitute the entire agreement between the parties and supersede any and all other writings and oral negotiations.

NOTICE

All notices given or required to be given pursuant to this Agreement shall be in writing and may be given by personal delivery, facsimile, overnight delivery, or by U.S. Mail. All written notices or correspondence sent pursuant to this paragraph will be deemed given to a party on whichever date occurs first; the date of personal delivery; the date of transmission, if sent by facsimile (with proof of transmission); the next business day following deposit with an overnight mail carrier; the fifth day following deposit in the U.S. Mail, when sent by "first class mail."

Notices required to be given to City shall be addressed as follows:

Charles D. Herbertson Public Works Director/City Engineer Public Works Department City of Culver City 9770 Culver Blvd. Culver City, CA 90232

Notices required to be given to the Contractor shall be addressed as follows:

Contractor:

Address:

It shall be the duty of Contractor to notify all subcontractors of the above Notice provisions.

CONTRACT PRICE

For Contractor's satisfactory completion of the scope of services, City shall pay Contractor a total sum of (\$00.00).

EFFECTIVE DATE

The effective date of this agreement is the date it is signed on behalf of City. This Agreement shall remain in full force and effect until amended or terminated; provided, that the indemnification and hold harmless provisions shall survive the termination.

IN WITNESS WHEREOF, the parties hereto have caused their names to be hereunto subscribed.

CONTRACTOR

Dated: By:	
------------	--

Its

By:

Its_____

CITY OF CULVER CITY, CALIFORNIA

Dated:_____

Ву: ___

John Nachbar City Manager

APPROVED AS TO CONTENT:

APPROVED AS TO FORM:

Charles D. Herbertson Public Works Director/City Engineer Carol A. Schwab City Attorney

2 LABOR AND MATERIALS PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

WHEREAS, THE City of Culver City, County of Los Angeles, State of California, has awarded to:

hereinafter designated as the Principal, a contract for:

Culver Boulevard Filtration and Retention Project PR-002 Culver Boulevard Realignment Project PZ-460

in the City of Culver City, California, which contract is incorporated wherein by this reference; and

WHEREAS, said Principal is required to furnish a bond in connection with said contract, providing that if said Principal or any of his or its Subcontractors shall fail to pay for any materials, provisions, equipment or supplies used in, upon or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, the Surety on this bond will pay the same to extent hereinafter set forth;

NOW, THEREFORE, WE,		

as Principal and _____

as Surety, are held and firmly bound unto the City of Culver City, hereinafter called the Owner in the sum of: Dollars (\$)

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 and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT if said Principal, his or its heirs, executors, administrators, successors or assigns shall fail to pay for any materials, provisions or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, as required by the provisions of an act of the Legislature of the State of California entitled, "An Act to secure the payment of claims or persons employed by Contractors upon public works, and the claim of persons who furnish materials, supplies, teams, implements or machinery used or consumed by such Contractors in the performance of such work, and prescribing the duties of certain public officers with respect thereto," approved May 10, 1919, as amended, and provided that the persons, companies or corporations so furnishing said materials, provisions or other supplies, appliances or power used in, upon, for or about the performance of the work contracted to be executed or performed, or any person, company or corporation renting or hiring implements, machinery or power for or contributing to said work to be done, or any person who performs work or labor upon the same, or any person who supplies both work and material therefor, shall have

complied with the provision of said Act, then said Surety will pay the same in or to an amount not exceeding the amount herein above set forth, and also will pay in case suit is brought upon this bond, such reasonable attorneys' fees, as shall be fixed by the court, awarded and taxed as in aforementioned Statute provided. This bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under said Act, so as to give a right of action to them or their assigns in any suit brought upon this bond.

FURTHER, the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or modification of the contract documents or of the work to be performed thereunder shall in any way affect its obligations on this bond and it does hereby waive notice of any such change, extension of time, alteration or modifications of the contract documents or of work to be performed thereunder.

IN WITNESS WHEREOF, three (3) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety herein named, on the _____ day of _____, 200_. The name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

Principal

Ву:_____

Surety

Ву:_____

3 FAITHFUL PERFORMANCE BOND

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

WHEREAS, the City of Culver City, in the County of Los Angeles, State of California, has awarded

to:

herein designated as the Principal, a contract for the construction of

Culver Boulevard Filtration and Retention Project PR-002 Culver Boulevard Realignment Project PZ-460

in the City of Culver City, California, which contract is incorporated herein by this reference; and

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contract;

NOW, THEREFORE, WE_____

as Principal and

as Surety, are held and firmly bound unto the City of Culver City, hereinafter called the Owner in the sum of:

Dollars (\$____) lawful money of the United States of America for payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that, if the hereby bound Principal, his or its heirs, executors, administrators, successors or assigns shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions and agreements in the said contract and any alteration thereof, made as therein provided, all within the time and in the manner therein designated and in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

FURTHER, the said surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or modification of the contract documents or of the work to be performed thereunder, shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or modification of the contract documents or of work to be performed thereunder.

IN WITNESS WHEREOF, three (3) identical counterparts of this instrument, each of which shall for purposes be deemed an original thereof, have been duly executed by the Principal and Surety herein named on the _____ day of _____, 20___. The name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

Principal

Ву:_____

Surety

4 INSURANCE REQUIREMENTS

A. <u>Policy Requirements.</u>

Contractor/ Consultant shall submit duly executed certificates of insurance for the following:

1. An occurrence based Commercial General Liability ("CGL") policy, at least as broad as ISO Form CG 0001, in the minimum amount of One Million Dollars (\$1,000,000) each occurrence, with not less than Two Million Dollars (\$2,000,000) in annual aggregate coverage.

The CGL Policy shall have the following requirements:

- a. The policy shall provide coverage for personal injury, bodily injury, death, accident and property damage and advertising injury, as those terms are understood in the context of a CGL policy. The coverage shall not be excess or contributing with respect to City's self-insurance, commercial liability insurance, or any pooled risk arrangements;
- b. The policy shall provide \$1,000,000 combined single limit coverage for owned, hired and non-owned automobile liability;
- c. The policy shall include coverage for liability undertaken by contract covering, to the maximum extent permitted by law. Consultant's obligation to indemnify the Indemnitees as required under Paragraph 6 of this agreement;
- d. The Policy shall not exclude coverage for Completed Operations or Hazards; and
- e. <u>The City of Culver City, members of its City Council, its boards and</u> <u>commissions, officers, agents, and employees will be named as an</u> <u>additional insured</u> in an endorsement to the policy, which shall be provided to the City and approved by the City Attorney.

2. Business Automobile Liability Insurance coverage in the amount of One Million Dollars (\$1,000,000), providing coverage for use of mobile equipment (i.e. heavy mobile equipment or vehicles primarily for use in an off-road environment), to the extent that (1) such mobile equipment will be used within the City limits or on City business, and (2) coverage for mobile equipment is not otherwise covered by the CGL policy listed in subparagraph (a), above.

3. If the Agreement will have Contractor employees working within the City limits, Contractor shall maintain Workers' Compensation Insurance (Statutory Limits) and Employer's Liability Insurance (with limits of at least one million dollars [\$1,000,000] per accident.) Contractor shall submit to City, along with the certificate of insurance, a Waiver of Subrogation endorsement in favor of City, its officers, agents, employees and volunteers.

B. <u>Waiver by City</u>.

City may waive one or more of the coverage listed in Section A, above. This waiver must be express and in writing and will only be made upon a showing by the Consultant that its operations in and with respect to City are not such as to impose liability within the scope of that particular coverage.

C. Additional Insurance Requirements.

1. All insurance listed in Paragraph A shall be issued by companies licensed to do business in the State of California, with a claims paying ability rating of "BBB" or better by S&P (and the equivalent by any other Rating Agency) and a rating of A:VII or better in the current Best's Insurance Reports;

2. Consultant shall provide City with at least thirty (30) days prior written notice of any modification, reduction or cancellation of any of the Policies required in Paragraph A, or a minimum of ten (10) days notice for cancellation due to non-payment.

3. City may increase the scope or dollar amount of coverage required under any of the policies described above, or may require different or additional coverages, upon prior written notice Consultant.

SECTION E

SPECIAL PROVISIONS

SUPPLEMENTS AND MODIFICATIONS TO PART 1 (GENERAL PROVISIONS), PART 4 (EXISTING IMPROVEMENTS) AND PART 6 (TEMPORARY TRAFFIC CONTROL) OF THE THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 2018 EDITION

PART 1

GENERAL PROVISIONS

SECTION 1 -- TERMS, DEFINITIONS, ABBREVIATIONS & SYMBOLS

Except as modified by the Special Provisions, Technical Provisions, Standard Drawings and the Project Plans, all work shall be in accordance with the Provisions of the latest edition of the STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION (SSPWC), including all Supplemental Amendments, as published by Building News, Inc., Los Angeles, California, which Specifications are hereinafter referred to as the Standard Specifications.

The herein stated Special Provisions supplement and revise the aforementioned standard Specifications. Any reference to "Section" or "Subsection" in these Special Provisions shall refer to the aforementioned Standard Specifications unless noted otherwise.

1-2 TERMS AND DEFINITIONS

In this subsection, substitute where applicable, or add the following:

Δdency	The City o	of Culver City	for which the	work is heing	nerformed
Ageney		n ourver oity,	IOI WINCH LIC	work is being	periorneu.

Board The City Council of the City of Culver City.

City The City of Culver City.

Engineer (or)

City Engineer The City Engineer of the City of Culver City or other person designated by the City Engineer acting either directly or through authorized agents.

Calendar Day All days beginning with the date specified in the Notice to Proceed and ending with the date the City issues the Statement of Completion.

SECTION 2 -- SCOPE OF THE WORK

2-1 **WORK TO BE DONE** Add the following:

The Bidder is required to examine carefully the site of work, Bid Proposal forms and all other Contract documents for the work contemplated. The Submission of a Bidder's Proposal shall be considered conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of all the above documents.

2-2 PERMITS Add the following:

The Contractor shall secure all necessary permits from all governing agencies having authority over any portion of the work. The Contractor shall obtain and pay for all other permits.

The Contractor shall obtain, pay, and comply with all permits, including but not limited to the permits requirements as shown in the "Instruction to Bidders" part of this contract document, and give all notices necessary and incident to the due and lawful prosecution of the work and to the preservation of the public health and safety.

2-5 CONTRACTOR'S EQUIPMENT AND FACILITIES Add the following:

The routing of trucks with gross vehicle weight exceeding 6,000 pounds through Culver City shall be subject to the provision of City Code Section 7.02.210 and the Contract Documents. Contractor shall submit a proposed haul route plan to the Engineer for approval. Said plan shall be approved prior to mobilization. The Contractor is advised that any violation of the California Vehicle Code and Culver City Code (such as truck routing, overweight, improper licensing, etc.) will result in citation and fines by the Police Department. Contractor shall be responsible for the immediate cleanup of all spills of any nature resulting from his operation.

Parking of Contractor's employee's vehicles or any other vehicles not utilized in the construction activity will be restricted during construction and shall not take place in public parking areas outside of the construction zone, unless shown otherwise on the plan or unless by arrangement with the Engineer.

Any commercial vehicle, the laden or unladen weight of which exceeds six thousand (6,000) pounds, shall use the following streets designated as truck routes:

- A. Adams Boulevard.
- B. Centinela Avenue.
- C. Culver Boulevard, between west City boundary and Sepulveda Boulevard.
- D. Fairfax Avenue.
- E. Higuera Street, between Hayden Avenue/Place and Jefferson Boulevard.
- F. Jefferson Boulevard.
- G. La Cienega Boulevard.
- H. National Boulevard.
- I. Sawtelle Boulevard, between Culver/ Washington off-ramp of the San Diego Freeway and Braddock Drive.
- J. Sawtelle Boulevard, between Matteson Avenue and Venice Boulevard.
- K. Sepulveda Boulevard.
- L. Slauson Avenue, east of Jefferson Boulevard.
- M. Venice Boulevard.
- N. Washington Boulevard, east of La Cienega Boulevard.

Most direct route shall be used to and from the restricted street from the truck route.

2-5.2 **Temporary Utility Services** Add the following:

Contractor is responsible to obtain and pay for construction water. Any water drawn from fire hydrant shall be coordinated through Golden State Water Company (Contact telephone No. 310.838.1324) located at 10785 Washington Blvd in Culver City.

2-8 EXTRA WORK Add the following:

Changes Authorized in Writing

All authorized alterations affecting the requirements and information given on the approved plans shall be in writing. No changes shall be made on any original plan or drawing after the same has been approved by the Engineer. Deviations from the approved plans, as may be required by the exigencies of construction, will be determined in all cases by the Engineer and authorized in writing.

Protests

If the Contractor considers any work demanded of Contractor to be outside the requirements of the Contract, or if Contractor considers any instruction, ruling or decision of the Inspector or Engineer to be unfair, Contractor shall within three (3) calendar days after any such demand is made, or instruction, ruling or decision is given, state clearly and in detail the Contractor's objections and reasons therefore. Except for such protest and objections as are made of record, in the manner

and within the time above stated, the Contractor shall be deemed to have waived and does thereby waive all claims for extra work, damages and extensions of time on account of demands, instructions, rulings and decisions of the Public Works Director/City Engineer.

Upon receipt of any such protest from the Contractor, the Engineer shall review the demand, instruction, ruling or decision objected to and shall promptly advise the Contractor, in writing, of Public Works Director/City Engineer's final decision, which shall be binding on all parties, unless within the ten (10) calendar days thereafter the Contractor shall file with the Owner, a formal protest against said decision of the Public Works Director/City Engineer. The Owner shall consider and render a final decision on any such protest within thirty (30) calendar days of receipt of same.

2-10 DISPUTED WORK Add the following:

All claims which do not exceed the sum of three hundred seventy-five thousand dollars (\$375,000) shall be resolved pursuant to the provisions of Public Contract Code Section 20104 through 20104.6, "Resolution of Construction Claims".

<u>Notice</u> - The Contractor shall notify the Public Works Director/City Engineer, in writing, of its intention to make claim. Claims pertaining to decisions provided above for such other determinations by the Construction Manager shall be filed in writing to the Public Works Director/City Engineer <u>prior to</u> the commencement of such work. Written notice shall use the words "Notice of Potential Claim". Such Notice of Potential Claim shall state the circumstances and the reasons for the claim but need not state the amount.

Additionally, no claim for additional compensation or extension of time for a delay will be considered unless the above provisions are complied with. No claim filed after the date of final payment will be considered.

It is agreed that unless notice is properly given, the Contractor shall not recover costs incurred by it as a result of the alleged extra work, changed work or other situation which had proper notice been given would have given rise to right for additional compensation. The Contractor should understand that timely notice of potential claim is of great importance to the Public Works Director/City Engineer and Owner and is not merely a formality. Such notice allows the Owner to consider preventative action, to monitor the Contractor's increases costs resulting from the situation, to marshall facts, and to plan its affairs. Such notice by the Contractor, and the fact that the Public Works Director/City Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim.

<u>Records of Disputed Work</u> - In proceeding with a disputed portion of the Work, the Contractor shall keep accurate records of its costs and shall make available, to the Public Works Director/City Engineer, a daily summary of the hours and classification of equipment and labor utilized on the disputed work, as well as a summary of any materials or any specialized services which are used. Such information shall be submitted to the Public Works Director/City Engineer on a monthly basis, receipt of which shall not be construed as an authorization for or acceptance of the disputed work.

<u>Submission of Claim Costs</u> - Within 30 days after the last cost of work for which the Contractor contends it is due additional compensation is incurred, but if costs are incurred over a span of more than 30 days, then within 15 days after the thirtieth day and every month thereafter, the Contractor shall submit to the Public Works Director/City Engineer as best the Contractor is able its costs incurred for the claimed matter. Claims shall be made in itemized detail and should the Public Works Director/City Engineer be dissatisfied with format or detail of presentation, upon request for more or different information, the Contractor will promptly comply, to the satisfaction of the Public Works Director/City Engineer. If the additional costs are in any respect not quantifiable with certainty, they shall be estimated as best can be done. In case the claim is found to be just, it shall be allowed and paid for as provided in the Standard Specification.

SECTION 3 – CONTROL OF THE WORK

3-5 INSPECTION Add the following:

The City Engineer, or his authorized agent, shall at all times have access to work during construction, and shall be furnished with every reasonable facility for ascertaining full knowledge regarding the process, workmanship, and character or materials used and employed in the work. Whenever required, the Contractor shall furnish to the City for test, and free of charge, samples of any one of the materials proposed to be used in the work. Said samples shall be delivered by the Contractor at the place within the City of Culver City designated by the City Engineer. Rejected material must be immediately removed from the work by the Contractor and shall not again be brought back to the site of the improvement.

The Contractor shall be responsible to reimburse the City for its actual inspection services cost for any work that is outside the normal working days or working hours (as defined by Section 6-3 of this Special Provisions), if approved the by Engineer.

See permits and plans for work within Los Angeles County Flood Control District Right of Way for additional inspection requirements.

Twenty-Four Hour Notice

The Contractor shall give at least twenty-four (24) hours advance notice of the time when Contractor or Contractor's subcontractor will start or resume the various units of operations of the work as per the contract, or resume said units of operations when they have been suspended per the contract.

The above notice is to be directed to the City Engineer through the Construction Manager and is to be given during working hours (8 a.m. to 5 p.m.; closed alternate Fridays), exclusive of Saturday, Sunday or holidays for the purpose of permitting the Engineer to make necessary assignments of the Engineer's representative or inspector on the work.

Uncovering of Uninspected Work

Any work performed in conflict with said notice, without the presence or approval of the inspector, or work covered up without notice, approval or consent may be rejected or ordered to be uncovered for examination at Contractor's expense and shall be removed at Contractor's expense, if so ordered by the City Engineer or his/her representative or inspector on the work. Any unauthorized or defective work, defective material or workmanship or any deficient work that may be discovered shall be corrected immediately without extra charge even though it may have been overlooked in previous inspections and estimates.

3-6 THE CONTRACTOR'S REPRESENTATIVE Add the following:

When and as directed by the City Engineer, the Contractor shall attend all conferences and meetings which the City Engineer deems necessary for the proper progress of work under this contract.

3-7 CONTRACT DOCUMENTS

3-7.1. General Add the following:

Except as modified by the Special Provisions, Technical Provisions, Standard Drawings and the Project Plans, all work shall be in accordance with the Provisions of the latest edition of the STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION (SSPWC), including all Supplemental Amendments, as published by Building News, Inc., Los Angeles, California, which Specifications are hereinafter referred to as the Standard Specifications, and when applicable, the

California Department of Transportation (Caltrans) Standard Specifications, latest edition, except the following:

Traffic Signal, Lighting, Pavement Striping and Markers, Roadside Sign Work

For roadside sign, traffic striping and pavement marking, pavement markers, and traffic signal and lighting work, the technical provisions provided within Section 56-2, "Roadside Signs,", Section 84," Traffic Stripes and Pavement Markings", Section 85, "Pavement Markers", and Section 86, "Signals, Lighting and Electrical Systems," of the State of California Department of Transportation (Caltrans) Standard Specifications, latest edition, hereafter "State Specification" or "State Standard Specification," shall supersede related provisions of the SSPWC. Except as otherwise specified on the Plans or in these General or Technical Provisions, all work relating to traffic signals and street lighting, including all equipment, materials, components, and the installation thereof, shall be in accordance with the latest edition of the State Standard Plans and Section 86, of the latest edition of the State Standard Plans and Section 86, of the latest edition of the State Standard Plans and Plans but higher than that of the Standard Plans and Plans but higher than that of the Standard Plans and Specifications.

Work within Caltrans Right of Way

Shall conform to the approved plans and permit requirements.

Work within Los Angeles County Flood Control District

Shall conform to the approved plans and permit requirements.

If the contractor, in the course of the work, becomes aware of any claimed errors or omissions in the contract documents or in the City's field work, it shall immediately inform the City Engineer. The City Engineer shall promptly review the matter, and if he/she finds an error or omission has been made, he/she shall determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increase or decrease the amount of work called for in the Contract, the City shall issue an appropriate Change Order. After discovery of an error or omission by the Contractor, any related work performed by the Contractor shall be done at its risk unless authorized by the City Engineer.

Where applicable, the latest edition of the Uniform Building Code (UBC), and Amendments and the Culver City Municipal Code shall be adhered to.

Comply with the provisions for safety practices set forth in the "Manual of Accident Prevention on Construction", published by the Associated General Contractors of America (AGC) 213/263-1500, and to comply with the State of California Occupational Safety and Health Act (Cal-OSHA).

3-8 SUBMITTALS Add the following:

Within fourteen (14) calendar days after the Award of Contract, the Contractor shall, at his or her expense, transmit by letter to the Engineer for review and acceptance, shop drawings and/or other available instructive and descriptive information from the manufacturer, when and as required by the Plans or Special Provisions, or requested by the Engineer. Shop drawings will normally not be required for standard items in common use for which adequate manufacturers' literature is available.

The Contractor shall consecutively number, thoroughly check, approve and sign each Shop Drawing and transmit the Shop Drawings by letter to the Engineer for review. In the event that certain Shop Drawings are unacceptable to the City, they will be rejected by the Engineer. The Contractor shall thereafter, correct said drawings and resubmit same in quadruplicate within seven (7) calendar days.

In the event that in the process of development of the Shop Drawings, it is discovered that there are defects and/or errors on the Plans, resulting in conflict between said Plans and the Shop Drawings, or if the Shop Drawings show variation from the Plans and/or Contract requirements because of standard shop practice or other reasons, the Contractor shall thoroughly describe and explain said defects and/or conflicts in his transmittal letter to the Engineer.

The Engineer's review of the Shop Drawings will be for general design and arrangement only and shall not relieve the Contractor from responsibility for errors of any sort in the Shop Drawings or of the responsibility for executing the work in accordance with the Contract. The Contractor shall be solely responsible for the correctness of the drawings, for shop fits and field connections, and for the results obtained by use of such drawings. The Contractor shall verify and be fully responsible for all dimensions and job-site conditions affecting the work and shall be responsible for furnishing and installing the proper materials required by the Contract, whether or not indicated on the Shop Drawings when reviewed.

3-10 SURVEYING

3-10.1 General Revise the subsection and apply the following:

Unless specified otherwise in the Technical Provisions, the <u>Contractor</u> shall pay and provide usual and customary construction staking. The Contractor shall submit to the City for approval, the qualifications of the Licensed Land Surveyor prior to commencing the construction staking.

3-12 WORK SITE MAINTENANCE

3-12.1 General Add the following:

When and as often as required by the Engineer, the Contractor shall furnish and operate selfloading motor sweepers with spray nozzles, to keep paved areas affected by the work acceptably clean and dust free.

The Contractor shall remove graffiti from all work, materials, equipment, and signs within the project. Equipment, materials, or signs containing graffiti shall not be brought to the project. Any graffiti found on work, materials, equipment, or signs shall be cleaned or removed from the project within 24 hours from its discovery. The cost of graffiti removal shall be borne by the Contractor and shall be considered as being included in the various Contract items.

Upon project completion, the contractor shall remove all dig-alert utility markings.

The Contractor shall have sole responsibility for providing security for his materials and equipment on and about the work site against theft and vandalism at all times for the duration of the contract. Contractor shall immediately replace all furniture, equipment, supplies, etc., which is being used or owned by the Owner or his/her designee at or on the project site or other areas under the security of the Contractor that is stolen, lost or damaged through theft, vandalism, graffiti, Contractor's negligence or any similar activity.

3-12.2 Air Pollution Control Add the following:

The Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes which apply to any work performed pursuant to the Contract, including any air pollution control rules, regulations, ordinances and statutes, specified in Section 11017 of the Government Code.

In the absence of any applicable air pollution control rules, regulations, ordinances or statues governing solvents, all solvents, including but not limited to the solvent portions of paints, thinners, curing compounds, and liquid asphalt used on the Project shall comply with the applicable material requirements of the South Coast Air Quality Management District (SCAQMD). All containers of paint, thinner, curing compound or liquid asphalt shall be labeled to indicate that the contents fully comply with said requirements.

This project requires the use of Tier 4 Emission Standards or better for off-road diesel-powered construction equipment of 50 horsepower or greater. Compliance with Tier 4 Emission Standards shall be per South Coast Air Quality Management District (SCAQMD) requirements and in conformance with the Final Mitigated Negative Declaration (MND) prepared for this project. Contractor shall demonstrate the ability to supply the compliant construction equipment for use prior to any ground disturbing and construction activities. A copy of each unit's certified tier specification or model year specification and California Air Resources Board (CARB) or SCAQMD operating permit (if applicable) shall be available upon request at the time of mobilization of each applicable unit of equipment. Upon request, contractor shall provide periodic reporting of equipment fleet and operations to ensure compliance with this requirement.

This project requires the use of zero-emission or near-zero emission on-road haul trucks, if and when feasible. At a minimum, construction vendors, contractors, and/or haul truck operators shall commit to using 2010 model year and newer trucks. Operators shall maintain records of all trucks associated with project construction to document that each truck used meets these emission standards. Contractor shall make the records available for inspection upon request.

All on-site construction shall be temporarily suspended when wind speeds (as instantaneous gusts) exceed (25) twenty five miles per hour. Contractor shall monitor on-site winds speeds (as instantaneous gusts) by methods and equipment approved by the Engineer at the start of project and self-initiate temporary construction suspension when these conditions are met. The Engineer and/or City's Representative shall make final determination as to the start and stop of the temporary suspension.

All trucks hauling dirt, sand, soil, or other loose material shall be covered during hauling operations, unless maintaining minimum (2) two-feet of freeboard between the top of load and top of trailer, in accordance with California Vehicle Code Section 23114.

Idling time for onsite vehicles and equipment shall not exceed (5) five minutes in accordance with California Air Resources Board Policy (Written Idling Policy Guidelines).

3-12.3 Noise Control Add the following:

The Contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the contract.

The noise level requirements shall apply to all equipment on the job or related to the job, including, but not limited to, trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. Each internal combustion engine used for any purpose on the job shall be equipped with a muffler of a type recommended by the manufacturer. The noise level shall be in compliance with Chapter 9, Section 9.07 of the Culver City Municipal Code.

Residential Restrictions-

For residential zones, hours of work shall be limited, in accordance with the Culver City Municipal Code pertaining to Mechanical Noise or Construction Noise near Residential Zones, which prohibits:

- (a) The use or operation of any automobile, motorcycle, engine, machine or mechanical device, or other contrivance or facility, or the carrying on of any trade or business, causing between the hours of 8:00 p.m. and 6:00 a.m., any loud or unusual noise or sound, disturbing the peace of residents of a residentially zoned neighborhood.
- (b) The use of any of the foregoing in construction or excavation work between the hours of 8:00 p.m. and 8:00 a.m., on weekday, or between the hours of 7:00 p.m. and 9:00 a.m. on a Saturday, or between the hours of 7:00 p.m. and 10:00 a.m. on a Sunday, which cause any loud or unusual noise or sound disturbing the peace of residents of a residentially zoned neighborhood.

Interference with Business Prohibited

Contractor must comply with Section 9.04.020(D) of the Culver City Municipal Code pertaining to Mechanical Devices, etc., Interfering with Business or Industrial Operations, which prohibits: The operation of any automobile, motorcycle, engine, machine or mechanical device or other contrivance or facility, or the carrying on of any trade or business, any loud or unusual noise or sound from which interferes with the transaction or conduct of any business or industrial operation in the surrounding area, unless the making of such noise is incident to the construction or repair of buildings or equipment or is otherwise necessary to the protection or preservation of the property from which such noise or sound emanates.

3-12.4 Storage of Equipment and Materials Add the following:

It shall be the Contractor's responsibility to locate any storage sites for materials and equipment needed and such sites must be approved in advance by the City Engineer and must be free of objectionable material. The Contractor must submit to the City Engineer for approval any and all agreement(s) between the Contractor and the property owner(s) of said storage site(s) and/or construction site(s) for approval prior to the start of construction. Said agreement(s) must provide for the restoration of the site(s) by the Contractor prior to the filing of "Notice of Completion" by the City Engineer.

Stockpiling or storage of materials on any public right-of-way or parking areas will not be permitted without the approval of the Engineer. Materials spilled along or on said right-of-way or parking areas shall be removed completely and promptly. All stockpile and 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

Contractor shall only use a haul route approved in writing by the Engineer. The Contractor shall keep the work site as well as the route to and from the disposal site clean at all times. The Contractor shall immediately remove and haul away all materials included in the various items of removals.

3-12.6 Water Pollution Control Add the following:

The Contractor shall comply with the requirements of Subsection 3-12.6 of the Standard Specifications and shall conduct his operations so as to prevent Portland cement, mud, silt or other materials from entering the surface drainage structures of the adjoining street and any underground storm drainage system. Contractor shall prepare and submit Storm Water Pollution Prevention Plan (SWPPP) prepared by qualified SWPPP developer for City's approval. Once approved, the Contractor shall comply with the requirements of project specific Storm Water Pollution Plan (SWPPP).

In addition to complying with all applicable federal, state and local laws and regulations, the Contractor shall take note of the NPDES (National Pollution Discharge Elimination System) Requirements. The Contractor shall take all precautionary actions and implement all necessary

SECTION E

BMPs to prevent sewer discharges to any portion of the storm drain conveyance system including discharge of pollutants from activities such as paving operations, concrete waste washouts, cold-milling, vehicle and equipment fueling from entering storm drain systems. At the minimum, the following shall be implemented:

- 1. Handle, store, and dispose of materials properly.
- 2. Avoid excavation and grading activities during wet weather.
- 3. Construct diversion dikes and drainage swales around working sites.
- 4. Cover stockpiles and excavated soil with secured tarps or plastic sheeting.
- 5. Develop and implement erosion control plans (if applicable).
- 6. Check and repair leaking equipment away from construction sites.
- 7. Designate a location away from storm drains for refueling.

8. Cover and seal catch basins if work in their vicinity may allow debris or deleterious liquids to enter.

9. Use vacuum with all concrete sawing operations.

- 10. Never wash excess material from aggregate, concrete, or equipment onto a street.
- 11. Catch drips from paving equipment with drip pans or absorbent material.
- 12. Clean up all spills using dry methods.

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY

3-13.1 Completion Add the following:

Record drawings

At the beginning of the project, one print of each applicable drawing will be issued by the City for use in preparing record drawings.

Actual construction conditions shall be accurately and completely recorded on the prints as the project progresses. Contractor shall make complete, current, Record Drawings available for review by the City during the time the Contractor's Application for Payment is being reviewed. Incomplete Record Drawings may delay approval of said Application. Upon completion of the work, the Contractor shall sign the record drawings and shall submit same to the City's Inspector for checking and approval prior to the Notice of Completion is filed.

<u>Completion Date:</u> The project is considered complete and the counting of days for time of completion ends when the City's Project Manager confirms in writing that the Contractor has completed the Work in accordance with the Contract, including completion of all physical work and punch list items, and cleanup work including removal of construction materials/equipment/signage, and does not including warranties or maintenance. Any documentation required in the Contract and by Law does not necessarily need to be furnished by the Contractor by completion date but must be received prior to final payment.

Final Acceptance Date: The date on which the City Council accepts the Work as complete.

The guarantees and agreements set forth hereof shall be secured by a surety bond. Said bond the Contractor may, at his option, provide for the faithful performance bond furnished under the contract to remain in force and effect for said amount until the expiration of said one-year period.

Such repair and replacement shall be made promptly upon receipt of written notice from the Engineer. If the Contractor fails to make such repair and replacement promptly, the Engineer may cause the work to be done and the costs incurred thereby shall become the liability of the Contractor and his or her Surety.

If in the opinion of the Engineer, defective work creates a dangerous condition or requires immediate correction or 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 or provide such attention, and the costs of such correction or attention shall be charged against the Contractor.

This article does not in any way limit the warranty on any items for which a longer warranty 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 implied warranties, or assigned claims.

SECTION 4 - CONTROL OF MATERIALS

4-1 GENERAL Add the following:

No materials, supplies or equipment for the work under this Contract shall be purchased subject to any security agreement or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials, supplies and equipment installed and incorporated in the work, and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by Contractor, to the Owner free from any claims, liens, encumbrances or charges, and further agrees that neither Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by the Contract shall have <u>any right to a lien</u> upon the premises or any improvement or appurtenance thereon, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies the title of which is commonly retained by the utility company. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection of any right under any law permitting such persons to look to funds due the Contractor in the hands of the Owner.

The provisions of this Section shall be inserted in all subcontracts and material contracts, and notices of its provisions shall be given to all persons furnishing materials for the work when no formal contracts are entered into for such materials.

4-2 PROTECTION Add the following:

Until acceptance of the Work, the Contractor shall have the charge and care of the Work and Materials to be used therein and shall bear the risk of injury, loss, or damage, to any part thereof (regardless of whether partial payments have been made on such damaged portions of the Work) by the action of the elements or from any other cause, whether or not arising from the non-execution of the Work. The Contractor shall rebuild, repair and restore and make good all injuries, losses, or damages to any portions of the Work or materials occasioned by any cause before its completion and acceptance and shall bear the expense thereof, except for such injuries, losses or damages as are directly and proximately caused by the acts of the Owner.

4-4 TESTING Add the following:

Unless otherwise called for hereinafter in these Special Provisions, all testing during construction will be performed by the City in such number and at such locations as deemed necessary by the Engineer to insure compliance with the Plans and Specifications; the cost of all initial testing will be borne by the City; the cost of all retesting will be borne by the Contractor, and the amount due the City for said retesting will be deducted from the Contractor's progress payments.

4-6 TRADE NAMES Add the following:

Wherever catalog numbers and specific brands or trade names not preceded by designation "similar and equal" nor followed by the designation "or equal" are used in conjunction with a designated material, product thing, installation, or service mentioned in these Specifications, to ensure compatibility with existing facilities, no substitutions will be favorably reviewed.

Within ten (10) working days from the date of bid opening, the Contractor shall, at his expense, submit a written request to the Engineer for each desired substitution, accompanied by complete descriptive information from the manufacturer, samples as requested by the Engineer, complete detailed test results from a licensed independent testing laboratory of the City's choice if requested by the Engineer, and if requested by the Engineer, an evaluation report from a qualified licensed professional engineer, all for final evaluation by the Engineer. If in the Engineer's opinion, the requested substitution is of lesser quality or in variance with that specified, or if the information submitted is insufficient or incomplete, the requested substitution will be disallowed, and the specified materials or equipment shall be furnished. Except as hereafter provided, no request for substitutions submitted, after the 10-working -day deadline specified will be considered.

If alternative named or substitutions are proposed by the Contractor and favorably reviewed by the City, the Contractor is responsible for providing at no additional cost to the Owner, any engineering designs, any electrical, mechanical, structural, or other related changes or testing that may be required to accommodate or provide the particular material or equipment the Contractor desires to use. Any deviation from the Specifications or the Drawings resulting from the type of material or equipment to be used shall not be the basis for any "extra charges" above and in excess of the original bid price of the work.

In addition, the Contractor is responsible for all additional costs to the Owner, and its agents and representatives, for evaluation of data submitted by the Contractor for alternative named or substitutions and any redesign necessary. The Owner shall deduct said costs from the Contract monies due the Contractor.

In the event that a substitute is favorably reviewed, fifty percent (50%) of all savings shall be credited to the Owner.

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITIES

5-1 LAWS AND REGULATIONS

The Contractor shall keep fully informed of all existing and future State and Federal laws and county and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used 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. Contractor shall at all times observe and comply with, and shall cause all his or her agents and employees to observe and comply with, all such existing and future laws, ordinances, regulations, orders, and decrees of bodies or tribunals having any jurisdiction or authority over the work; and shall protect and indemnify the Owner, and all its officers and employees connected with the work, and including but not limited to the Public Works Director/City Engineer, against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by Contractor or Contractor's employees.

If any discrepancy or inconsistency is discovered in the Plans, Drawings, Specifications, or Contract for the work in relation to any such law, ordinance, regulation, order or decree the Contractor shall forthwith report the same to the Engineer in writing.

5-7 SAFETY

5-7.2 Safety Orders, Add the following:

Safety Orders and Safety Control

The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act, and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.

No provision of the Contract Documents shall act to make the Owner, the Engineer or any other party than the Contractor responsible for safety. The Engineer shall not have authority for safety on the project. The Contractor shall indemnify, defend and hold harmless the Owner, Engineer, or other authorized representatives of the Owner, from and against any and all actions, damages, fines, suits and losses arising from the Contractor's failure to meet all safety requirements and/or provide a safe work site.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the Work whether on, or adjacent to, the Site, giving full details and statements of witnesses. The Contractor shall make all reports as are, or may be, required by authority having jurisdiction, and permit all safety inspections of the work being performed under this Contract.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

Safety Program

The Contractor shall establish, implement, and maintain a written injury prevention program as required by Labor Code Section 6401.7. Before beginning the Work, the Contractor shall prepare and submit to the Engineer a Contractor Safety Program that provides for the implementation of all the Contractor's safety responsibilities in connection with the Work at the site and the coordination of that program and its associated procedures and precautions with the safety programs, precautions and procedures of each of its subcontractors and other prime Contractors performing work at the site. The Contractor shall be solely responsible for initiating, maintaining, monitoring, coordinating, and supervising all safety programs, precautions and procedures in connection with the Work and for coordinating its programs, precautions and procedures of the subcontractors and other prime contractors performing Work at the site. The Safety Program should contain all the necessary elements for the Contractor to administer its program on site.

The Contractor's compliance with requirements for safety and/or the Engineer's review of the Contractor's Safety Program shall not relieve or decrease the liability of the Contractor for safety. The Engineer's review of the Contractor's Safety Program is only to determine if the above listed elements are included in the program.

Safety Supervisor

The Contractor shall appoint an employee as safety supervisor who is qualified and authorized to supervise and enforce compliance with the Safety Program. The Contractor shall notify the Engineer in writing prior to the commencement of work of the name of the person who will act as the Contractor's safety supervisor and furnish the safety supervisor's resume to the Engineer.

The Contractor, will, through and with his Safety Supervisor, ensure that all of its employees and its subcontractors of any tier, fully comply with the Project Safety Policies. The Safety Supervisor shall be a full-time employee of the Contractor whose responsibility shall be for supervising compliance with applicable safety requirements on the work site and for developing and implementing safety training classes for all job personnel. The Owner shall have the authority to request removal of the Contractor's Safety Supervisor if that representative is judged to be improperly or inadequately performing the duties; however, this authority shall not in any way affect the Contractor's sole responsibility for performing this work safely, nor shall it impose any obligation upon the Owner to ensure the Contractor perform its work safely.

Safety and Protection

The Contractor shall take all necessary protection to prevent damage, injury and loss to:

All

employees on the Project, employees of all subcontractors, and other persons and organizations who may be affected thereby;

All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of underground facilities and utility owners when prosecution of the Work may affect them and shall cooperate with them in the protection, removal, relocation and replacement of their property. All injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor, supplier or any other person or organization part, by the Contractor, any subcontractor, supplier or any other person or organization directly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and the Owner has issued a notice of final completion to the Contractor.

Safety Emergencies

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Engineer prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract have been caused thereby.

Safety Violations

Should the Contractor fail to correct an unsafe condition, the Engineer shall immediately notify the Owner of the Contractor's failure to correct the unsafe condition. The Owner shall then notify the Contractor through the Engineer that the unsafe condition must be corrected or the work in question will be stopped until the condition is corrected to the satisfaction of the Owner. No extension of time or additional compensation will be granted as a result of any stop order so issued.

The Owner shall have the authority to require the removal from the project of the foreman and/or superintendent in responsible charge of the work where safety violations occur.

Equipment Safety Provisions

The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items, required by the State and Federal (OSHA) industrial

authorities and applicable local and national codes. Further, any features of the Work, including Owner-selected equipment subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. All equipment furnished shall be grounded and provided guards and protection as required by safety codes, and where vapor-tight or explosion-proof electrical installation is required by safety codes, this shall be provided. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. The Contractor shall notify all equipment suppliers and subcontractors of the provisions of this paragraph.

On-Site Copies Required

The Contractor shall have at the work site copies or suitable extracts of: Construction Safety Orders, and General Industrial Safety Orders issued by the State Division of Industrial Safety.

Compliance Required

Contractor shall comply with provision of these and all other applicable laws, ordinances, and regulations, including but not limited to the Occupational Safety and Health Act of 1970 and current amendments, if any, to which particular attention is directed.

Clearance from Power Lines

To help prevent injuries and electrical service interruptions, Contractors are reminded CAL/OSHA requires tools, machinery equipment, apparatus, materials, or supplies must be kept at least 10 feet from voltage lines energized at 50,000 volts or less and even greater distances for lines in excess of 50,000 volts. In addition, the Penal Code of the State of California, Section 385, makes it a misdemeanor to violate certain clearances from high voltage lines.

Prior to starting work in which, the aforementioned clearances will be impaired, it will be necessary to contact the Southern California Edison (SCE) Company Business Office nearest the proposed work location and request assistance. SCE will take appropriate action to assist in maintaining required clearances. Such action will be at Contractor's expense. Sufficient lead time to permit planning and scheduling of any necessary work will be required.

Special Hazardous Substance and Process

Contractor acknowledges that Contractor is aware of and in compliance with the provisions of the Hazard Communication Standards (California Administrative Code, Title 8, Section 4194). Contractor shall, at the request of the Owner, demonstrate that Contractor is in complete compliance with the Hazard Communication Standards.

In addition, Contractor shall, at the request of the Public Works Director/City Engineer, provide to the Owner a Material Safety Data Sheet for any product handled or used by the Contractor on Owner property or in an area where an Owner's employee is working.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1 **CONSTRUCTION SCHEDULE AND COMMENCEMENT OF WORK** Add the following:

The Contractor must provide to the Engineer's Representative within five (5) days after receiving the "Notice to Proceed", a Critical Path Method (CPM) construction schedule in the format of a Gantt Chart and revised schedules thereafter as required by the Engineer when the Contractor's activities differ or are expected to differ from the latest existing schedule.

In addition, if requested by the Engineer, the Contractor shall submit a detailed "two-week lookahead" schedule bi-weekly, including a brief narrative report, showing the activities or portions of activities completed and look ahead during the reporting period. The report shall state the percentage of the work completed and scheduled, the remaining duration, and the progress along the critical path in terms of days ahead or behind the allowable dates as of the report date. Any changes made by the Contractor to the schedule shall be listed.

If, in the opinion of the Construction Manager, the project is behind schedule, the Contractor shall also submit a narrative report with each updated analysis which shall include but not be limited to a description of current and anticipated problem areas, delaying factors and their impact, and an explanation of corrective actions taken or proposed.

If requested by the Contractor, Notice To Procure Equipment and Material may be issued prior to the Notice to Proceed with construction.

6-3 TIME OF COMPLETION

6-3.1 General add the following:

The following days have been designated as holidays by the City of Culver City:

New Year's Day	January 1
Martin Luther King, Jr. Day	3rd Monday in January
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	1st Monday in September
Thanksgiving	4th Thursday in November
Day after Thanksgiving	
Christmas Day	December 25

In addition, Culver City observes a "Holiday Slowdown" during which no work may take place within the public right-of –way. On arterial streets and commercial streets, Holiday slowdown will be observed during the Thanksgiving week, the Christmas week, and the New Year's week; On all other streets, Holiday slowdown will be observed during the Thanksgiving days(including the days before and after), the Christmas days(including the days before and after), and the New Year's Days(and the days before). During the slowdown, the Contractor shall maintain job site and public safety and schedule to perform work outside the public right-of–way. No time extension will be granted due to the failure of the Contractor to schedule the work appropriately.

Add the following subsection:

6-3.3 Work Hours

The Contractor's working hours shall be limited to the hours between 8:00 A.M. and 6:00 P.M. Monday through Friday, excluding recognized holidays. Workdays are defined in Section 6-7.2 of the Standard Specifications and as modified above.

Work hours other than normal work hours will not be allowed without prior consent of the City Engineer.

For work performed at night, the Contractor shall provide adequate lighting for proper prosecution of the work for the safety of the workers and the public, and for proper inspection.

Work in Caltrans Right of Way may have more restricted working/lane closure hours. The contractor shall adhere to all Caltrans encroachment permit requirements.

6-4 **DELAYS AND EXTENSION OF TIME** Add the following:

The Contractor shall retain the right to fully complete (include final completion, punch list and project close out) the Work in less days than established by the contract agreement. However, neither shall a reduction or increase to the Contract Sum be made, if the Work is so fully completed in less days than established by the contract agreement nor shall a Claim be made or granted for Compensable Delay, or any other increase in Contract Sum, if, for any reason, including but not limited to delay caused by owner, the Contractor does not so fully complete the Work in less days than established herein.

When the Contractor foresees a delay in the prosecution of the Work and, in any event, immediately upon the occurrence of a delay, the Contractor shall notify the Public Works Director/City Engineer in writing of the probability of the occurrence and the estimated extent of the delay, and its cause. The Contractor shall take immediate steps to prevent, if possible, the occurrence or continuance of the delay. The Contractor agrees that no claim shall be made for delays which are not called to the attention of the Public Works Director/City Engineer at the time of their occurrence.

Non-excusable delays in the prosecution of the Work shall include delays which could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers.

Only the physical shortage of material, caused by unusual circumstances, will be considered under these provisions as a cause for extension of time, and no consideration will be given to any claim that material could not be obtained at a reasonable, practical, or economical cost or price, unless it is shown to the satisfaction of the Public Works Director/City Engineer that such material could have been obtained only at exorbitant prices entirely out of line with current rates, taking into account the quantities involved and usual practices in obtaining such quantities. A time extension for shortage of material will not be considered for material ordered or delivered late or whose availability is affected by virtue of the mishandling of procurement. The above provisions apply equally to equipment to be installed in the work.

6-6 **SUSPENSION OF WORK** Add the following:

If the Contractor fails to correct defective or unauthorized work as required by the Contract Documents or fails to carry out the Work in accordance with the Contract Documents or any other applicable rules and regulations, the Owner, by a written order of the Owner's representative or signed personally by an agent specifically so empowered by the Owner, in writing, may order the Contractor to stop the work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. All delays in the Work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the Work or serve to extend the time for its completion. Any and all necessary corrective work done in order to comply with the Contract Documents shall be performed at no cost to the Owner.

In the event that a suspension of Work is ordered, as provided in this paragraph, the Contractor, at its expense, shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public, pedestrian, and vehicular traffic, during the period of such use by suspension. Should the Contractor fail to perform the Work as specified, the Owner may perform such work and the cost thereof may be deducted from monies due the Contractor under the Contract.

The Owner shall also have authority to suspend the Work wholly or in part, for such period as the Owner may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the Work. Such temporary suspension of the Work will be considered justification for time extensions to the Contract in an amount equal to

the period of such suspension if such suspended work includes the current critical activity on the latest favorably reviewed progress schedule.

6-7 **TERMINATION OF THE CONTRACT FOR DEFAULT** Add the following:

The Contract may be canceled by the Owner without liability for damage when, in the Owner's opinion, the Contractor is not complying in good faith, has become insolvent, or has assigned or subcontracted any part of the work without the Owner's consent. In the event of such cancellation, the Contractor will be paid the actual amount due based on the quantity of work satisfactorily completed at the time of cancellation, less damages caused to the Owner by acts of the Contractor causing the cancellation. The Contractor, in having tendered a bid, shall be deemed to have waived any and all claims for damages because of cancellation of the Contract for any such reason. If the Owner declares the Contract canceled, for any of the above reasons, written notice to that effect shall be served upon the Surety. The Surety shall, within five (5) working days, assume control and perform the work as successor to the Contractor.

If the Contractor fails to begin delivery of material and equipment, to commence work within the time specified, to maintain the rate of delivery of material, to execute the work in the manner and at such locations as specified, or fails to maintain a work program which will ensure the Owner's interest or, if the Contractor is not carrying out the intent of the Contract, the Public Works Director/City Engineer's written notice may be served upon Contractor, and the Surety on Contractor's faithful performance bond, demanding satisfactory compliance with the Contract.

If the Contractor or Contractor's Surety does not comply with such notice within five (5) working days after receiving it, or after starting to comply fails to continue, the Owner may exclude the Contractor from the premises and take possession of all material and equipment, and complete the work by Owner forces or by letting the unfinished work to another contractor, or by a combination of such methods. In any event, the cost of completing the work will be charged against the Contractor and Contractor's Surety and may be deducted from any money due or becoming due from the Owner. If the sums under the Contract are insufficient for completion, the Contractor or Surety shall pay to the Owner within five (5) working days after the completion, all costs in excess of the Contract price.

If the Surety assumes any part of the work, Surety shall take the Contractor's place in all respects for that part and shall be paid by the Owner for all work performed by Surety in accordance with the Contract. If the Surety assumes the entire Contract, all money due the Contractor at the time of Contractor's default shall be payable to the Surety as the work progresses subject to the terms of the Contract.

The provisions of this Section shall be in addition to all other rights and remedies available to the Owner under law.

6-8 TERMINATION OF THE CONTRACT FOR CONVENIENCE Add the following:

The Owner may terminate the Contract at its own discretion or when conditions encountered during the work make it impossible or impracticable to proceed, or when the Owner is prevented from proceeding with the Contract by law, or by official action of a public authority. The Contractor will be compensated for works satisfactorily completed up to the date of termination of the contract by the Owner.

If all or any part of the work shall be damaged or destroyed by war, or acts of foreign aggression, fire, storm, lighting, flood, earthquake, settlement of defective soil, expansion or contraction, cracking or deflection, tidal wave, water, oil (surface or subsurface), mob violence or other casualty before the final completion of the work, the Contractor, upon notice from the Owner, shall resume construction and proceed in accordance with the Plans and Specifications. Provided that such damage or destruction was not caused by any condition related to Contractor's non-conformance

with the provisions of these contract documents, the Owner will bear the total cost of removing and/or replacing all damaged and/or destroyed work. However, if the Owner exercises its option to abandon the project because of damage or destruction to the work by any of the abovementioned causes, Owner may terminate this Contract upon three days' notice to the Contractor. Within 30 days after the date of such termination, the Contractor shall be paid all actual costs of the work to the date of termination for which it had not been previously paid.

If the owner abandons the project, the owner shall have the right, at any time, to terminate this Contract by notice to the Contractor, in which event, the owner shall pay the contractor pro rata for all work actually provided up to the date of such notice, for which it had not been previously paid, and the Owner shall have no further liability or obligations under this contract.

6-9 LIQUIDATED DAMAGES. Delete the entire subsection and substitute the following:

Failure of the Contractor to complete the Work within the time allowed will result in damages being sustained by the Agency. Such damages are, and will continue to be, impracticable and extremely difficult to determine. For each consecutive calendar day in excess of the time specified for completion of the Work, as adjusted in accordance with 6-6, the Contractor shall pay to the Agency, or have withheld from moneys due it, the sum of **\$1000**. Execution of the contract under these Specifications shall constitute agreement by the Agency and Contractor that **\$1000** per calendar day is the minimum value of the costs and actual damage caused by failure of the Contractor to complete the Work within the allotted time. Such sum is liquidated damages and shall not be construed as a penalty and may be deducted from payments due the Contractor if such delay occurs.

In addition to the liquidated damages specified, if the Contractor fails to complete the work within the time specified for completion, plus any authorized time extensions, the Agency shall have the right to charge to the Contract all or any part, as it may deem proper, of the actual costs of inspection, supervision and other overhead expenses that are directly chargeable to the project and that accrue after the expiration of such specified time for completion plus authorized extensions. This charge will be addition to the payment of liquidated damages.

6-11 **LEGAL ACTIONS AGAINST THE CITY** Add the following subsection:

In the event litigation is brought against the City concerning compliance by the City with State or Federal laws, rules or regulations applicable to highway work, the provisions of this section shall apply.

a. If, pursuant to court order, the City prohibits the Contractor from performing all or any portion of the work, the delay will be considered a right of way delay within the meaning of Subsection 6-6 of the Standard Specification unless the contract is terminated as hereinafter provided, in which event compensation payable to the Contractor shall be determined in accordance with said termination provisions.

b. If, pursuant to court order (other than an order to show cause) the City is prohibited from requiring the Contractor to perform all or any portion of the work, the City may, if it so elects, eliminate the enjoined work pursuant to Section 3 of the Standard Specifications or terminate the contact in accordance with Subsections 6-3 and 6-5 of the Standard Specifications.

c. If the final judgment in the action prohibits the City from requiring the Contractor to perform all or any portion of the work, the City will either eliminate the enjoined work pursuant to Sections 3 of the Standard Specifications or terminate the Contract in accordance with Subsections 6-3 and 6-5 of the Standard Specifications.

d. Termination of the Contract and the total compensation payable to the Contractor in the event of termination shall be governed by the following:

- (1) The Engineer will issue the Contractor a written notice specifying that the Contract is to be terminated. Upon receipt of said written notice and, except as otherwise directed in writing by the Engineer, the Contractor shall:
 - a. Stop all work under the contract, except that specifically directed to be completed prior to acceptance.
 - b. Perform work the Engineer deems necessary to secure the project for termination.
 - c. Remove equipment and plan from the site of the work.
 - d. Take such action as is necessary to protect materials from damage.
 - e. Notify all Subcontractors and suppliers that the contract is being terminated and that their contracts of orders are not to be further performed unless otherwise authorized in writing by the Engineer.
 - f. Provide the Engineer with an inventory list of all materials previously produced, purchased or ordered from suppliers for use in the work and not yet used in the work, including its storage location and such other information as the Engineer may request.
 - g. Dispose of materials not yet used in the work as directed by Engineer. It shall be the Contractor's responsibility to provide the City with good title to all materials purchased by the City hereunder, including materials for which partial payment has been made as provided in Subsection 9-3.2 of the Standard Specifications, and with bills of sale or other documents of title for such materials.
 - h. Subject to the prior written approval of the Engineer, settle all outstanding liabilities and all claims arising out of subcontracts or orders for materials terminated hereunder. To the extent directed by the Engineer, the Contractor shall assign to the City all the right title and interest of the Contractor under subcontracts or orders for materials terminated hereunder.
 - i. Furnish the Engineer with the documentation required to be furnished by the Contractor under the provisions of the contract including, on projects as to which Federal funds are involved, all documentation required under the Federal requirements included in the contract.
 - j. Take such other actions as the Engineer may direct.
- (2) Acceptance of the Contract as hereinafter specified shall not relieve the Contractor of responsibility for damage to materials except as follows:
 - A. The Contractor's responsibility for damage to materials for which partial payment has been made as provided in Subsection 9-3.2 of the Standard Specifications, and for materials furnished by the City for use in the work and unused, shall terminate when the Engineer certifies that such materials have been stored in the manner and at the locations he has directed.
 - B. The Contractor's responsibility for damage to materials purchased by the City subsequent to the issuance of the notice that the contract is to be terminated shall terminate when title and delivery of the materials has been taken by the City.
 - C. When the Engineer determines that the Contractor has completed the work under the contract directed to be completed prior to termination and such other work as may have been ordered to secure the project for termination, he will recommend that the Engineer formally accept the Contract, and immediately upon and after such acceptance by the Engineer, the Contractor will not be required to perform any further work thereon and shall be relieved of his contractual responsibilities for injury to persons or property which occurs after the formal acceptance of the project by the Engineer.

- (3) The total compensation to be paid to the Contractor shall be determined by the Engineer on the basis of the following:
 - a. The reasonable cost to the Contractor, without profit, for all work performed under the contract, including mobilization, demobilization and work done to secure the project for termination. Reasonable cost will include a reasonable allowance for project overhead and general administrative overhead not to exceed a total of seven percent (7%) of direct costs of such work.

When in the opinion of the Engineer, the cost of a contract item of work is excessively high due to costs incurred to remedy or replace defective or rejected work, the reasonable cost to be allowed will be the estimated reasonable cost of performing such work in compliance with the requirements of the Plans and Specifications and the excessive actual cost shall be disallowed.

- b. A reasonable allowance for profit on the cost of the work performed as determined under Subsection (a), provided the Contractor establishes to the satisfaction of the Engineer that it is reasonably probable that he would have made a profit had the contract been completed and provided further that the profit allowed shall in no event exceed four percent (4%) of said cost.
- c. The reasonable cost to the Contractor of handling material returned to the vendor, delivered to the City or otherwise disposed of as directed by the Engineer.
- d. A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the contract.

All records of the Contractor and his Subcontractors, necessary to determine compensation in accordance with the provisions of this section, shall be open to inspection or audit by representatives of the City at all times after issuance of the notice that the contract is to be terminated and for a period of three years, and such records shall be retained for that period.

After acceptance of the work by the Engineer, the Engineer may make payments on the basis of interim estimates pending issuance of the Final Estimate when in his opinion the amount thus paid, together with all amounts previously paid allowed, will not result in total compensation in excess of that to which the Contractor will be entitled. All payments, including payment upon the Final Estimate shall be subject to deduction for prior payments and amounts, if any, to be kept or retained under the provisions of the contract.

The provisions of this section shall be included in all subcontracts.

SECTION 7 -- MEASUREMENT AND PAYMENT

7-3 PAYMENT

7-3.1 General. Add the following:

Payment for cost of work to comply with the General Provisions of the Standard Specification for Public Works Construction and as modified by this Contract shall be included in the various bid items, and no additional payment will be made.

Bid prices provided on the appropriate Bid Form will remain in force as Unit Prices under the Contract Documents until the Contract has been fully performed. No cost escalation is allowed due to material price increase for the term of the project.

When an item of work is not listed in the "bid schedule" in the bid proposal, the cost of such work shall be considered to be included in the cost of the other Work that is listed. The Contractor is to provide all labor, material, and equipment necessary to complete the Project in accordance with the plans and specifications including, but not limited to the following:

- a. All "Special Provisions" work required to complete the Project in a safe and orderly manner including, but without being limited to, safety measures, hoists, flagmen, clean-up, barricades, fences, temporary utilities, utility fees and charges, parking for the Contractor's and Subcontractor's personnel, and temporary facilities as may apply to this Work;
- b. All insurance in accordance with the insurance requirements of the Contract;
- c. Maintain and update current record drawings on-site. Upon project completion provide the Owner a legible set of record drawings, operation and maintenance manuals, warranties, and guarantees;
- d. All permits required;
- e. Construction schedule indicating material lead times, shop drawings, order dates, start and end dates, milestone dates. The schedule shall be updated monthly;
- f. Monthly project status report; Attend weekly project meetings;
- g. All engineering, testing and inspection costs for defective work, and work performed outside of the work hours set forth in Section 6-7 of the Special Provisions;
- h. Repair or replace all existing improvements (public or private) damaged by the Contractor. The Contractor is responsible to provide evidence of pre-existing conditions;
- i. All scheduling of utility connections turn on/off including but not limited to electrical services (for street lighting, traffic signals, and irrigation controllers) and water meters.
- j. All construction survey/staking necessary to set grade for all improvements. The survey provider shall be appropriately licensed by the State of California and is subject to approval by the Owner;
- k. Watchman or security service, as necessary;
- I. Perimeter fencing of work zones and staging area as necessary for public safety and protection of equipment and materials;
- m. Dust control, street cleaning, and protection and/or replacement of existing surfaces or properties;
- n. Submittal Log of all submittals required to the Owner including but not limited to SWPPP, material, products, concrete testing data, batch plant testing data, shop drawings and traffic control and phasing plans. Said log shall be updated for each weekly project meeting.

All costs for the preceding shall be included in the other items for which bids are entered.

The City may keep any monies which would otherwise be payable at any time hereunder and apply the same, or so much as may be necessary therefore, to the payment of any expense, losses or

damages, as determined by the Engineer, incurred by the City, for which the Contractor is liable under the Contract.

Other Withholds

In addition to the amount which the Owner may otherwise retain under the Contract, the Owner may withhold a sufficient amount or amounts of any payment or payments otherwise due the Contractor, as in its judgment may be necessary to cover:

- a. Payments which may be past due and payable for just claims against the Contractor or any subcontractor for labor or materials furnished for the performance of this Contract.
- b. Defective work not remedied.
- c. Failure of the Contractor to make proper payments to its subcontractors or suppliers.
- d. A reasonable doubt that the Contract can be completed for the balance remaining.
- e. Damage to another Contractor or third party, or to private or City property.
- f. Failure of the Contractor to keep its work progressing in accordance with its progress schedule or maintaining current Record Drawings.
- g. The Owner's costs for the Contractor's failure to complete work within the allowed time.
- h. Cost of insurance arranged by the Owner due to cancellation or reduction of the Contractor's insurance.
- i. Failure of the Contractor to make proper submissions, as herein specified.
- j. Failure to submit, revise, resubmit, or otherwise conform to the requirements herein for preparing and maintaining a construction schedule.
- k. Payments due the Owner from the Contractor.
- I. Provisions of law that enable or require the Owner to withhold such payments in whole or in part.

The Owner in its discretion may apply any withheld amount or amounts to the payment of valid claims. In so doing, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor, and the Owner shall not be liable to the Contractor for such payment made in good faith. Such payments may be made without prior judicial determination of the claim or claims. The Owner will render to the Contractor a proper accounting of such funds disbursed in behalf of the Contractor.

Pursuant to Public Contract Code Section 22300, for monies earned by the Contractor and withheld by the Owner to ensure the performance of the Contract, the Contractor, may, at its option, choose to substitute securities meeting the requirements of said Public Contract Code Section 22300. There would be an associated administrative charge of \$75 per each Contractor's Progress Invoice.

7-3.2 Partial and Final Pay Quantities. Add the following:

When the estimated quantities for a specific portion of the work are designated as a final payment quantities, said estimated quantities shall be the final quantities for which payment for such specific

portion of the work will be made unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If such dimensions are revised and such revisions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the changes in the dimensions. The estimated quantities for such specified portion of the work shall be considered as approximate only, and no guarantee is made that the quantities which can be determined by computations made based on the details and dimensions shown on the plans will equal the estimated quantities. No allowance will be made in the event that the quantities based on computations do not equal the estimated quantities.

7-3.3 **Delivered Materials** Add the following:

Unless included in the Bid Schedule, or unless otherwise called for in Technical Provisions, no payment will be made for materials or equipment delivered but not yet incorporated in the work.

7-4 PAYMENT OF EXTRA WORK

7-4.1 General Add the following:

The Contractor shall not perform any extra work prior to written authorization from the Engineer.

7-4.3 Markup Delete the entire paragraph and substitute the following:

Work by Contractor When extra work is to be paid for on a force account basis, the labor, materials, equipment rental and other items of expenditures, the percentage of markup applied to the Contractor's direct cost for all overhead and profit shall be as follows:

(1)	Labor	12
(2)	Materials	12
(3)	Equipment Rental	12
(4)	Other Items and Expenditure	12

Work by Subcontractor. When all or any part of the extra work is performed by a Subcontractor, the markup established above in this section 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 work added in excess of \$5,000 of the subcontracted portion of the extra work may be added by the Contractor.

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

7-4.4 Daily Reports By Contractor Add the following:

Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily extra work reports, or if not available, they shall be submitted with subsequent daily extra work reports. When these daily extra work reports are agreed upon and signed by both parties, said reports shall become the basis of payment for the work performed.

SECTION 8 -- FACILITIES FOR AGENCY PERSONNEL

Facilities for Agency Personnel is not required on this project unless specified otherwise in the Technical Provisions.

PART 4

EXISTING IMPROVEMENTS

SECTION 400 PROTECTION AND RESTORATION

400-1 General Add the following subsection:

The Contractor shall examine all adjoining premises (including for the purposes hereof, streets and sidewalks) and buildings, and ascertain, before beginning work, the depth of cellars, materials and construction of buildings and all existing conditions of such premises and the buildings thereon, and shall be governed thereby for the necessary, thorough, safe and satisfactory execution of all work called for herein, whether indicated on Plans and/or specified, or not, and all work and protective measures necessary to keep and leave the said premises and buildings in the same condition as they were before commencing work shall be done without any addition to the Contract Price. Wherever any parts of the existing adjoining buildings interfere with or are interfered with by the work to be performed hereunder, the Contractor shall make whatever changes necessary thereby, whether shown on the Plans, called for in the Specifications, or not shown or not called for. The Contractor, before commencing work on the premises, shall, if he sees fit, make a written report of the conditions as found at that time, noting particularly any defects in evidence, taking photographs of the exteriors, and, if necessary, photographs of interiors, and shall deliver to the Owner a copy of the written report of the examination and copies of photographs with the date of taking thereon. The Contractor shall invite the Owner and the owners of the respective properties and buildings to join with them in the examination of the premises and buildings. The Owner may, at its option, be present during the examination. If the Contractor fails to make the examination and report as herein specified, it will be deemed that the adjoining buildings and premises are in good condition, and all claims for damages, repairs and replacements must be treated by the Contractor on the basis that the buildings and premises were in good condition before work began.

The Contractor shall shore up, brace, underpin, secure, and protect all foundations, improvements, and other parts of existing structures adjacent to the work site, which may in any way be affected by excavation or other operations in connection with the work to be performed under this contract. The Contractor shall be responsible for giving all required notices to any joining property owner or other party before commencement of work.

SECTION 402 – UTILITIES

402-1 LOCATION

402-1.1 General Add the following:

Prior to performing any excavation, the Contractor shall determine, by potholing, the location and depth of all utilities, including service connections, which have been marked by the respective owners and which may affect or be affected by its operations. The Contractor shall pothole all utility crossings on public streets. The Contractor shall verify depth of all service utility crossings under sidewalk. Contractor shall locate all existing utilities, including storm and sewer main and laterals, within the project vicinity and shall exercise due care to ensure that existing utility facilities are not damaged during his operations. The existence of sewer mains or storm drains is evidenced by the manhole structures and catch basins. When in doubt, the Contractor shall contact the utility operator concerned before proceeding further.

Pipelines, conduits and other facilities may be buried within the limits of the work or adjacent thereto and may or may not be shown or indicated on the Plans. The Public Works Director/City Engineer possesses records of certain utility facilities located within the public right-of-way. These records are available for inspection by the Contractor at the Engineer's Office. In making these records

SECTION E

available, the Owner does not warrant or guarantee the accuracy or completeness of the information contained therein and does not represent that the facilities shown on said records actually exist at the locations shown or elsewhere or that the Contractor may not encounter facilities not identified in said records. The sewer service laterals are owned by the property owners and will not be marked by the City. Sewer system atlas sheet is available upon request for contractor's reference. However, the City shall not guarantee the accuracy of the information. It shall be the Contractor's responsibility to locate and pothole all laterals. The Contractor at its expense shall repair sewer laterals that are damaged as the result of contractor's activities.

At signalized intersections with Red Light Enforcement Camera Systems, the Contractor shall coordinate with the Red-Light Enforcement Camera manufacture and/or maintenance company to identify the substructure (e.g. conduit runs) and for notification of work prior to construction.

The Contractor shall immediately notify the Engineer of any potential conflict with the proposed improvements. The cost of repair to any utility damaged by the contractor due to failure to determine location and depth as required herein shall be borne by the Contractor. Full compensation for determining location and depth of utilities shall be considered as included in the prices bid for other items of work, and no additional compensation will be allowed.

402-2 PROTECTION Add the following:

The contractor shall protect in place all existing sewer, storm drain, and other utility manhole lids and covers, water meter boxes and covers, gas meter boxes and covers, valve covers, etc. to grade unless specifically designated for adjustment by others on the Plans. Payment for adjustment of said items to grade shall be considered as part of related bid items for which payment is made and no separate payment will be made therefore.

PART 6

TEMPORARY TRAFFIC CONTROL

SECTION 600 ACCESS

600-1 General Add the following:

Traffic and access, 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, including all its subsequent amendments; the latest edition of the Work Area Traffic Control Handbook ("WATCH") as published by the Building News, Inc., 990 Park Center Drive, Suite E, Vista, California 92081, and the following Special Provisions. In the event of conflict, the Special Provisions shall take precedence over the Work Area Traffic Control Handbook ("WATCH") and the Standard Specifications, and the Work Area Traffic Control Handbook ("WATCH") shall take precedence over the Standard Specifications.

The Contractor is solely responsible for the traffic control safety of pedestrians and vehicles on the public right-of-way within the Contractor's work area. The Contractor shall hold harmless and indemnify the Owner, and each of its officers and employees, for any and all damages to persons and property due to the Contractor's failure to maintain adequate traffic control and safety. It is the affirmative duty of the Contractor to maintain all of his traffic control devices on the project at all times, including night and/or weekends.

The Contractor shall notify by printed notice, the occupants of all properties within the construction zone of any access, parking and circulation restrictions and limitations that will be created by the construction at least 7 calendar days in advance of the commencement of construction. This notice shall be prepared by the City of Culver City but be distributed by the Contractor.

No closure of any street shall be allowed unless prior written permission is obtained from the City Engineer. If permission to close a street is granted, then the Contractor is required to notify in writing at least five (5) working days in advance of street closures, all emergency services, and school bus services shall be notified by the contractor in writing of the locations, time, and date of the closures. In case of schedule changes, the emergency services, etc., shall be notified by telephone at least two (2) days in advance of the street closure.

Business Access

Pedestrian and vehicular access shall be maintained to businesses fronting the Work except when construction of areas immediately fronting a business entrance precludes such access. Contractor shall notify affected business three (3) business days in advance of construction.

Contractor shall make provisions for deliveries to business including temporary loading zones

Convenient and safe pedestrian access to occupied residential and business property shall be maintained at all times. Access to mailboxes must be maintained at all times such that the postal delivery service is not- interrupted. Trash pick-up service shall not be interrupted. Access to vacant and unused property may be restricted when approved by the Engineer. Both vehicular and pedestrian access shall be maintained at all times to all other property except as otherwise specifically authorized in writing by the City's Engineer.

Temporary No Parking

The Contractor shall notify in writing residents of property adjoining the location of the work at least forty-eight (48) hours before the start of construction on that street. The Contractor is responsible for posting "temporary no-parking" signs at least forty-eight (48) hours before
using the parking lane for construction purposes. The Contractor shall be responsible for furnishing, posting, and removing temporary "No Parking" and "No Driving" signs (as applicable) along project streets. Signs shall be posted on each side of the street with a maximum of 200 feet between signs. When necessary, the Contractor shall furnish posts. Pursuant to City requirements, "Temporary No Parking" signs must be posted and verified by the Culver City Police Department 48 hours prior to beginning of construction.

The Contractor shall coordinate with postal authorities for the temporary relocation of mailboxes. Contractor shall provide signage directing pedestrian and vehicular traffic to temporary mailbox locations.

In the case of work requiring excavation of the roadway which may interfere with the use by residents or businesses of their driveways, suitable provisions shall be made by the Contractor at such time as the exigencies of construction may demand a temporary blocking of said driveways. Efforts shall be made by the Contractor to minimize the duration of said blocking and to notify the residents of this need well in advance. Further, the Contractor shall provide access to each residential or commercial establishment each evening. Any trench or excavation in the street or alley which remains open after work hours shall be covered by steel plates.

SECTION 601 TEMPORARY TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES

601-1 General

601-2 Traffic Control Plans (TCP) Add the following:

On all Arterial streets or other streets as required in the Technical Provisions, The Contractor shall submit detailed Traffic Control Plans (TCP) on 24" x 36" sheet which shall clearly show and describe all proposed lights, warning signs, barricades, delineators, temporary lane markings, temporary traffic signals or signs, and any and all other facilities proposed to be installed. TCP shall be prepared by a Registered Civil or Traffic Engineer and shall show all lane closures, restrictions, tapers, and other disruptions of normal traffic flow, including pedestrian and vehicular detours. A schedule shall be included. TCP shall be submitted to the Engineer for approval no later than two (2) weeks after the award of contract. It shall be the Contractor's responsibility to immediately revise the TCP at the direction of the Engineer, and the Contractor hereby agrees that such Plan shall be strictly adhered to, and the Contractor hereby understands and agrees that its failure to provide any facility or device as shown on the TCP, or its deviation from said Plan, shall constitute a breach of contract. Traffic control set up in the field shall be inspected and approved by the City Engineer's Representative prior to commencement of any construction activity.

SECTION F

TECHNICAL SPECIFICATIONS

Culver Boulevard between Sepulveda Boulevard and Elenda Street

PART 1: MEASUREMENT AND PAYMENT

1 WORK TO BE DONE

The work to be performed pursuant to these specifications consist primarily of roadway resurfacing, reconstruction of concrete curb ramps, sidewalks, curb, gutter, and median at the following general location:

Culver Boulevard between Sepulveda Boulevard and Elenda Street

Work also includes re-striping and pavement marking to incorporate new traffic lanes and pedestrian crossing on Culver Boulevard between Sepulveda Boulevard and Elenda Street.

2

1 BID ITEM NO. 1A – MOBILIZATION

1.1 GENERAL

This contract bid item for MOBILIZATION shall conform to the provisions of Sections 9-3.4 of the Standard Specifications. The maximum price for this bid item shall not exceed 5 percent of the sub-total for each bid schedule in the contract price at the time of award.

1.2 PAYMENT

Payment for BID ITEM NO. 1A - MOBILIZATION shall be at the contract lump sum bid price and shall be payable as follows for each payment upon approval of the Public Works Director/City Engineer or City Representative.

a. Payment of up to 50 percent of the contract lump sum bid price for mobilization at the first progress payment.

b. Payment to 75 percent of the contract lump sum bid price for mobilization when the monthly partial payment estimate of the total amount earned to date, not including the amount earned for mobilization, is 30 percent or more of the original contract amount.

c. Payment to 100 percent of the contract lump sum bid price for mobilization when the monthly partial payment estimate of the total amount earned to date, not including the amount earned for mobilization, is 50 percent or more of the original contract amount.

2 BID ITEM NO. 2A - TRAFFIC CONTROL

2.1 GENERAL

This contract bid item for TRAFFIC CONTROL shall provide all traffic controls necessary to provide for the safe and expeditious movement of traffic, motorized and non-motorized (including pedestrian traffic) through the construction zones, as well as those necessary to provide for the safety of the work force performing the construction, including two flagmen to direct traffic if deemed necessary by the Public Works Director/City Engineer.

The Contractor shall provide adequate pedestrian and vehicular traffic controls for the duration of the work in accordance with the Contract Documents including Subsection 7-10 of the SSPWC, the Work Area Traffic Control Handbook (WATCH), Manual on Uniform Traffic Control Devices (MUTCD), and the

City of Culver City.

The Contractor shall include any temporary pavement necessary for the safe and expeditious movement of traffic.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair said component to its original condition or replace said component and shall restore the component to its appropriate location.

2.2 TRAFFIC CONTROL PLAN PREPARATION

Culver Boulevard between Sepulveda Boulevard and Elenda Street

This contract bid item shall include the preparation of Traffic Control Plans, to include a Phasing Plan, for the work proposed along Culver Boulevard between Sepulveda Boulevard and Elenda Street and shall be prepared by licensed professional traffic engineering in the State of California and prepared per MUTCD.

The proposed work along Culver Boulevard shall be phased to allow one (1) lane on the westbound and eastbound directions of Culver Boulevard between Sepulveda Boulevard and Elenda Street shall be open to traffic at all times.

Three (3) full size (24" x 36") sets of the Traffic Control Plans stamped and signed by licensed professional traffic engineering shall be submitted to the City's Traffic Engineer for review and approval. The Traffic Control Plans must be approved prior to start of any work.

2.3 SIGNS.

All excavations required for the purpose of installing traffic control signs, including construction area signs, shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed holes. Contractor shall notify Underground Service Alert - Southern California (USA) at 800/422-4133 at least 2 working days, but no more than 14 calendar days, prior to commencing any excavation for said signposts.

All signage conflicting with required traffic control signage should be removed or suitably covered. Said signs shall be replaced unless designated for removal or relocation on the Plans.

This item shall include the temporary relocation of existing signs as necessary. Additionally, signs shall be posted directing pedestrians to detour safely around construction work.

Contractor shall furnish and install six (6) "Businesses Are Open for During Construction" Signs at locations directed the by City Engineer of his/her designee at least seven (7) calendar days prior to start of any work.

2.4 CHANGEABLE MESSAGE SIGNS

The contract bid item for Changeable Message Sign (CMS) shall include all delivery, labor, installation, message set-up, all materials necessary to install the CMS.

Contractor will be responsible to provide four (4) small (3' x 5') Changeable Message Signs (CMS) to be installed at a location approved by the City Engineer or his/her designee. The CMS shall be installed no later than seven (7) calendar days prior to start of work and shall remain in operation throughout the duration of the construction project. Contractor shall be responsible set up message board per approved "text" provided by City Engineer of his/her designee.

CMS must be in operation at all time, unless the City Engineer or his/her designee has instructed the Contractor to temporarily turn off the CMS. Contractor shall be responsible to replace the CMS if they are not operational. Credit shall be given to the City each day the CMS is not operational.

2.5 TEMPORARY NO PARKING SIGNAGE

Temporary "No Parking" signage shall be furnished by the Contractor. A sample will be provided to the Contractor for ordering purposes only and a format on how to prepare the signs for posting.

Contractor will be required to provide the Police Department notice of "No Parking" signage at least 48 hours in advance of posting and enforcement of TEMPORARY NO PARKING signs.

2.6 PAYMENT

Payment for BID ITEM NO. 2A – TRAFFIC CONTROL shall be at the contract bid lump sum (LS) price and shall include full compensation for all labor, materials, tools, equipment, transportation, and incidentals necessary to do all the work thereof. Because traffic control will be required throughout the life of the project, payment of the lump sum (LS) bid amount shall be made with each progress payment in direct proportion to the number of days past in the contract.

3 BID ITEM NO. 1C - CLEARING AND GRUBBING

3.1 GENERAL

This contract bid item for STREET REMOVAL AND DISPOSAL shall comply with Section 300-1 "Clearing and Grubbing", of the Standard Specifications and these Special Provisions. Clearing and grubbing shall include, but not be limited to the following items as shown on the Plans or as specified in the Special Provisions. The following items shall be classified as clearing and grubbing:

Trees, tree roots, landscape, irrigation, bike path, and pedestrian path removal as required. Removal of existing improvements not separately called for in the bid.

All roots and unsuitable material shall be removed at minimum depth of three (3) feet and within limits of the area as shown on the Improvement Plans and backfilled with clean imported soil.

Nothing in these Special Provisions shall relieve the Contractor from his responsibilities as provided in Section 7-10, "Public Convenience and Safety", of the Standard Specifications.

All removed materials shall become property of the Contractor and shall be disposed of outside of the right-of-way in accordance with 300-2.2, "Unsuitable Materials", and Section 300-2.6, "Surplus Material", of the Standard Specifications.

3.2 PAYMENT

Payment for BID ITEM NO. 1C – CLEARING AND GRUBBING shall be at the contract bid lump sum (LS) price and shall include full compensation for all labor, materials, tools, equipment, and incidentals necessary to do all the work thereof.

4 BID ITEM NO. 35C – DEMOLITION

4.1 GENERAL

This contract bid item for DEMOLITION shall conform to the provisions of Section 300-1.3, "Removal and Disposal of Materials," and Section 300-2, "Unclassified Excavation," of the Standard Specification, and these Special Provisions.

The Contractor shall provide all necessary unclassified excavation for asphalt paving, base, and sub grade as indicated on the Plans, and Standard Drawings, and as directed in these Special Provisions.

Excavation, excess, and unsuitable material shall become the property of the contractor and shall be disposed of outside of the right-of-way in accordance with 300-2.2, "Unsuitable Materials", and Section 300-2.6, "Surplus Material", of the Standard Specifications.

No excavation shall remain open longer than is necessary to perform work. At the end of each working day, if a difference in excess of 0.33 foot exists between the elevation of the existing pavement and the elevation of any excavation within five feet of traveled way, material shall be placed up and compacted against the vertical cuts adjacent to the traveled way. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 5:1 or flatter to the bottom of the excavation.

Existing pavement shall be sawcut to the limits as shown on plans, or as instructed by the ENGINEER. All joins to existing conditions shall be constructed to provide a smooth transition between the new pavement and existing pavement.

Nothing in these Special Provisions shall relieve the Contractor from his responsibilities as provided in Section 7-10, "Public Convenience and Safety", of the Standard Specifications.

The contractor shall protect existing utilities, trees, fences, walls, signs and other facilities within the construction zone, except those directed to be removed or relocated. The contractor shall reference the Civil Drawings in order to determine the removal and replacement of trees in the work limits.

GRADING

Section 301-1, Subgrade Preparation of the Standard Specifications and these Special Provisions for crushed miscellaneous base. This contract bid item shall include for preparation and compaction of subgrade to relative compaction of 90%;

4.2 PAYMENT

Payment for BID ITEM NO. 35C – DEMOLITION shall be contract lump sum (LS) price and shall include full compensation for all labor, tools, equipment, incidentals, disposal, and materials necessary to do all the work thereof.

5 BID ITEM NO. 3C AND 20C – CONSTRUCT ASPHALT CONCRETE (AC)

5.1 GENERAL

After cold milling (grinding), the contractor shall meet with the City's representative in the field to designate local soft areas and areas where the pavement condition is deteriorated for complete removal and replacement with full depth asphalt. The replacement of the removed areas shall be performed prior to opening the impacted area to traffic.

All materials to be removed shall be disposed of outside the right-of-way as specified in subsection 300-1.3.1 of SSPWC. Asphalt Concrete and Concrete pavements shall be removed to neatly sawed edges as specified in subsection 300-1.3-2 of SSPWC. Subgrade shall be compacted to 95% relative compaction. All removed sections shall be replaced with asphalt concrete material consisting of B-PG 64-10 class and grade and shall conform to the provisions of Section 203 and Section 302 of SSPWC.

5.2 PAYMENT

Payment for BID ITEM NO. 3C AND 20C – CONSTRUCT ASPHALT CONCRETE shall be at the contract bid item price per ton (TON) and shall include full compensation for all labor, materials, tools, equipment, transportation, and incidentals necessary to do all the work involved thereof, complete, in place, and accepted.

6 BID ITEM NO. 6C, 7C AND 8C – CONSTRUCT CRUSHED MISCELLANEOUS BASE

6.1 GENERAL

The contract bid item for CRUSHED MISCELLANEOUS BASE shall comply with requirements of Section 200-2, "Untreated Base Materials", Section 301-2, "Untreated Base", and Section 301-1, Subgrade Preparation of the Standard Specifications and these Special Provisions for crushed miscellaneous base.

The contract bid item for Crushed Miscellaneous Base (CMB) shall include all labor, work and materials necessary to construct CMB complete in place. The work shall include subgrade preparation, base rock placement, grading, compaction, and all other work necessary to construct CMB complete in place. Crushed Miscellaneous Base shall conform to the provisions of Section 200-2 and Section 301 of the Standard Specifications.

This contract bid item shall include for preparation and compaction of subgrade to relative compaction of 90%; and placement, grading and compaction of the CMB to 95% of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

The quantities for this bid item does not include Crush Miscellaneous Base required under the driveway approaches, curb and gutter, cross gutter, sidewalks, curb ramps, and slot patches.

6.2 PAYMENT

Payment for BID ITEM NO. 6C, 7C AND 8C – CRUSHED MISCELLANEOUS BASE shall be per contract bid price per square foot (SF) and shall include full compensation for conforming to the requirements of CRUSHED MISCELLANEOUS BASE including grading, compaction, all labor, tools, equipment and materials necessary for accomplishing the work complete and in place, and no additional compensation will be allowed therefore.

7 BID ITEM NO. 5C, 17C & 18C – CONSTRUCT PORTLAND CEMENT CONCRETE (PCC)

7.1 GENERAL

This contract bid items to CONSTRUCT 6-INCH PORTLAND CEMENT CONCRETE (PCC) shall conform to the requirements of Section 201-1, "Portland Cement Concrete", and Section 302-6, "Portland Cement Concrete Pavement", of the Standard Specifications and these Special Provisions.

7.2 CONCRETE MIX

Portland Cement Concrete shall be Class 520-A-2500. 5C – 4000 psi , 17C – 4000 psi, and 18C – 4000 psi. Comply with higher strength requirement.

7.3 PAYMENT

Payment for CONSTRUCT PORTLAND CEMENT CONCRETE (PCC) shall be per square foot (SF) and shall include full compensation for removal and disposal of existing concrete pavement, furnishing all labor, materials, tools, equipment, saw cutting, demolition, removal, disposal, and incidentals necessary to do all the work thereof.

8 BID ITEM NO. 4C - 2-INCH ASPHALT RUBBER HOT MIX (ARHM) OVERLAY

8.1 GENERAL

Asphalt Rubber shall consist of a mixture of asphalt and rubber and shall be consistent with the requirement specified in SSPWC 203-11 and 302-9.

Asphalt rubber hot mix shall be ARHM PG 64-16.

Proportioning shall be performed using an automatic batching system and the proportioning device shall be automatic to the extent that only manual operation required for proportioning all materials shall be a single operation of a switch or starter.

8.2 MISCELLANEOUS REQUIREMENTS

Construction of ARHM Overlay shall include adjustment of utility covers, lids, and boxes to grade per Section E-9 and no additional payment will be made therefore.

Subsection 302-9.2 of the SSPWC shall be modified as follows:

Asphalt rubber binder shall be at a temperature not less than 375° F or more than 425°F when added to the aggregate. The temperature of the aggregate shall not be less than 375° F at the time of adding the asphalt rubber binder.

8.3 ROCK DUST BLOTTER

Subsection 302-9.6 shall be modified as follows.

Rock dust blotter per this section shall be required and applied at the rate of 3 pounds per SY regardless of the pavement temperature.

8.4 PAYMENT

Payment for BID ITEM NO. 4C - 2-INCH ASPHALT RUBBER HOT MIX (ARHM) OVERLAY shall be at the contract bid item price per Ton and shall include full compensation for all labor, materials, tools, equipment, transportation, and incidentals necessary to do all the work involved thereof, including adjustment of utility covers, lids, and boxes to grade, complete, in place, and accepted.

9 BID ITEM NO. 21C – REMOVE AND RECONSTRUCT PCC CURB RAMP OVER 4-INCH CMB WITH TRUNCATED DOMES

9.1 GENERAL

This contract bid item to REMOVE AND RECONSTRUCT PCC CURB RAMP shall conform to the APWA Standard Plan 111-4, Type per plan, and to the provisions in Subsection 303-5, "Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps, Sidewalks, and Driveways" of the Standard Specifications for Public Works Construction. Limits of construction shall be shown on the plans and as directed by the ENGINEER.

This contract bid item shall include all sidewalks, variable height retaining curb, curb, gutter, and slot patch within the limits indicated on the improvement plans required to construct the PCC CURB RAMP. No additional compensation will be provided.

9.2 REMOVAL

This contract bid item includes removal of concrete curb ramps, sidewalks, curb, and gutters as noted per the limits of removal shown on the Improvement Plans and shall conform to provisions in Subsection 300-1.3, "Removal and Disposal of Materials," and "Unclassified Excavation" of the Standard Specifications, and these Special Provisions.

9.3 CRUSH MISCELLANEOUS BASE

This contract bid item shall include 4-inch Crush Miscellaneous Base and shall comply with requirements of Section 200-2, "Untreated Base Materials", and Section 301-2, "Untreated Base", of the Standard Specifications and these Special Provisions for crushed miscellaneous base.

The contract bid item for shall include all labor, work and materials necessary to construct CMB complete in place. The work shall include subgrade preparation, base rock placement, grading, compaction, and all other work necessary to construct CMB complete in place. Crushed Miscellaneous Base shall conform to the provisions of Section 200-2 and Section 301 of the Standard Specifications.

This item shall include for placement, grading and compaction of the CMB to 95% of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

9.4 ADJUSTMENT OF PULL BOXES

This contract bid item shall include minor adjustments for depths, 0" to 6", required for all pull boxes to new grade that are affected by the reconstruction of the curb ramp and no additional compensation will be allowed.

9.5 SLOT PATCH

This contract bid item shall include AC slot patch 24" wide with an AC thickness of 6" minimum full depth.

9.6 TRUNCATED DOMES

This contract bid item include furnishing and installing detectable warning surface (truncated domes) and shall be Armorcast and color "Brick Red" and conform to Armorcast and SPPWC specifications. The required number of detectable warning surface (truncated domes) panels per location shall be included in this bid item per improvement plans and detail. No additional compensation will be allowed.

9.7 CONCRETE MIX

Portland Cement Concrete shall be Class 520-C-3250.

9.8 PAYMENT

Payment for BID ITEM NO. 21C – REMOVE AND RECONSTRUCT PCC CURB RAMP OVER 4-INCH CMB WITH TRUNCATED DOMES shall be per contract bid price per each (EA) and shall include full compensation for furnishing all labor, materials, tools, equipment, saw cutting, demolition, removal, disposal, pull box adjustment, and incidentals necessary to do all the work thereof.

10 BID ITEM NO. 11C, 12C, 13C, & 14C – REMOVE AND RECONSTRUCT CONCRETE CURB & GUTTER AND CURB ONLY OVER 6-INCH CMB

10.1 GENERAL

This contract bid items to REMOVE AND RECONSTRUCT PCC CURB & GUTTER AND CURB ONLY shall conform to the provisions in Subsection 303-5, "Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps, Sidewalks, and Driveways," these Special Provisions, and as directed by the ENGINEER. Limits of construction shall be shown on the plans and as directed by the ENGINEER.

10.2 REMOVAL

Removal of concrete curbs and gutters as noted on the plans shall conform to provisions in Subsection 300-1.3, "Removal and Disposal of Materials," and "Unclassified Excavation" of the Standard Specifications, and these Special Provisions.

This contract bid item also includes removal of existing curbs and gutters, and portion of the roadway pavement as indicated in the Improvement Plans.

10.3 CRUSHED MISCELLANEOUS BASE

This contract bid item includes 6-inch Crush Miscellaneous Base and shall comply with requirements of Section 200-2, "Untreated Base Materials", and Section 301-2, "Untreated Base", of the Standard Specifications and these Special Provisions for crushed miscellaneous base.

The contract bid item for shall include all labor, work and materials necessary to construct CMB complete in place. The work shall include subgrade preparation, base rock placement, grading, compaction, and all other work necessary to construct CMB complete in place. Crushed Miscellaneous Base shall conform to the provisions of Section 200-2 and Section 301 of the Standard Specifications.

This item shall include for placement, grading and compaction of the CMB to 95% of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

10.4 SLOT PATCH

This contract bid item shall include AC slot patch 24" wide with an AC thickness of 6" minimum full depth.

10.5 CONCRETE MIX

Portland Cement Concrete shall be Class 520-C-3250.

10.6 PAYMENT

Payment for BID ITEM NO. 11C, 12C, 13C, & 14C - REMOVE AND RECONSTRUCT CONCRETE CURB & GUTTER AND CURB ONLY OVER 6-INCH CMB shall be per linear foot (LF) and shall include full compensation for all curbs, gutters, depressed curbs and gutters, and curb transitions including furnishing all labor, materials, tools, equipment, saw cutting, demolition, removal, disposal, and incidentals necessary to do all the work thereof.

11 BID ITEM NO. 19C – REMOVE AND RECONSTRUCT PCC SIDEWALK OVER 4-INCH CMB

11.1 GENERAL

This contract bid item to REMOVE AND RECONSTRUCT PCC SIDEWALK shall conform to the provisions in Subsection 303-5, "Concrete Curbs, Walks, Gutters, Cross Gutters, Alley Intersections, Access Ramps, sidewalks, and Driveways," these Special Provisions, per APWA standard plans, and as directed by the ENGINEER. Limits of construction shall be shown on the plans and as directed by the ENGINEER.

11.2 REMOVAL

Removal of concrete sidewalks as noted on the plans shall conform to provisions in Subsection 300-1.3, "Removal and Disposal of Materials," and "Unclassified Excavation" of the Standard Specifications, and these Special Provisions.

11.3 CRUSHED MISCELLANEOUS BASE

This contract bid item includes 4-inch Crushed Miscellaneous Base and shall comply with requirements of Section 200-2, "Untreated Base Materials", and Section 301-2, "Untreated Base", of the Standard Specifications and these Special Provisions for crushed miscellaneous base.

The contract bid item for shall include all labor, work and materials necessary to construct CMB complete in place. The work shall include subgrade preparation, base rock placement, grading, compaction, and all other work necessary to construct CMB complete in place. Crushed Miscellaneous Base shall conform to the provisions of Section 200-2 and Section 301 of the Standard Specifications.

This item shall include for placement, grading and compaction of the CMB to 95% of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

11.4 CONCRETE MIX

Portland Cement Concrete shall be Class 520-C-3250.

11.5 PAYMENT

Payment for BID ITEM NO. 19C - REMOVE AND RECONSTRUCT PCC SIDEWALK OVER 4-INCH CMB shall be per square foot (SF) and shall include full compensation for removal and disposal of existing concrete sidewalk, furnishing all labor, materials, tools, equipment, saw cutting, demolition, removal, disposal, and incidentals necessary to do all the work thereof.

12 BID ITEM NO. 28C – INSTALL TRAFFIC STRIPING, PAVEMENT MARKINGS, PAVEMENT MARKERS, AND SIGNAGE

12.1 GENERAL

Striping shall conform to Section 314-2, "Removal of Traffic Striping and Curb and Pavement Markings", Section 314-3, "Removal of Pavement Markers", Section 314-4.4, "Thermoplastic Traffic Striping", and Section 314-5, "Pavement Markers", of the Standard Specifications, the current State of California Manual on Uniform Traffic Control Devices (MUTCD) and these Special Provisions.

12.2 REMOVAL

This contract bid item shall include removal of all conflicting striping and pavement markings.

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The Contractor shall remove markers, markings, and striping where necessary to adjust the configuration of existing striping to new striping. The Contractor shall remove markers flush with existing pavement. The Contractor shall remove markings and striping by using wet sandblasting.

12.3 PAVEMENT STRIPING & MARKINGS

Pavement striping and markings shall be accomplished utilizing a lead-free reflectorized pavement striping material of the type that is applied to the road surface in a molten state by SCREED/EXTRUSION" or "RIBBON/EXTRUSION" means with a surface application of glass beads at a specified rate. Upon cooling to normal pavement temperature, the material produces an adherent reflectorized stripe of specified thickness and width capable of resisting deformation by traffic.

12.3.1 MATERIALS

The thermoplastic material shall be available in white and yellow.

The thermoplastic material shall be homogeneously composed of pigment, filler, resins and glass reflecting spheres. The vendors have the option of formulating the material according to his own specifications. However, the solid resin shall be "maleic-modified glycerol ester resin" (alkyd binder). The physical and chemical properties as specified below shall apply regardless of the type of formulation.

Glass beads (Pre-Mix) - The beads shall be uncoated and conform to AASHTO M247-81 Type 1.

The thermoplastic material shall not deteriorate on contract with sodium chloride, calcium chloride or other de-icing chemicals or because of oil content of paving materials or oil droppings.

12.3.2 APPLICATION PROPERTIES

The thermoplastic material shall readily apply to the pavement at temperatures of 400-440F from approved equipment to produce an extruded line which shall be continuous and uniform in shape having clear and sharp dimensions 0.125" for screen extrusion or 0.090" for ribbon extrusion.

The thermoplastic material shall be suitable for application during a paving operation immediately after compaction of the final lift of asphaltic concrete. The material shall be neither permanently discolored nor softened by contact with tracked asphalt cement. Thermoplastic application in conjunction with a paving operation shall be as directed in the project proposal and/or plans and allow for permanent markings on the final lift prior to the completed roadway being open to traffic.

The material shall exude fumes that are toxic, obnoxious or injurious to persons or property when it is heated during applications. The manufacturer shall provide product safety date sheets for their product.

The application of additional glass beads by drop-on or pressure spray methods shall be at an approximate uniform rate of 10 pounds of glass spheres every 100-sq. ft. of line. The glass spheres shall conform to AASHTO M 247-81 (1986) type 1 except that the beads must be moisture resistant coated as meet the requirement of 4.4.2 (AASHTO M247-41) and a maximum of 5 percent shall pass the number 80 screen; glass spheres shall have a minimum of 70 percent true spheres on each sieve.

12.3.3 MATERIAL SUPPLIER QUALIFICATION

At the time of bid, the supplier of thermoplastic must furnish evidence of three years successful service for Alkyd-based materials in transverse and/or symbol applications. Successful service shall be evidenced by color stability, retention of retroreflective properties, crack resistance and lack of softening and permanent discoloration due to exposure to oil and grease drippings for the required three-year period. The documentation must be from a project within this state or from three projects in areas of similar environmental conditions within the United States.

12.4 PERMANENT ROADWAY SIGNING

Signs shall conform to the provisions in Section 56, "Signs," of the State Standard Specifications, the State Specifications for Reflective Sheeting on Aluminum Signs, the State Specifications for Aluminum Single-Sheet and Laminated-Panel Signs and these Special Provisions and as directed by the City Engineer.

The Work to be done hereunder consists of furnishing and installing signs, sign posts, re-posting existing signs, and replacing existing sidewalks removed for sign post installation.

Signs shall be installed per Improvement Plans and in accordance with City of Culver City requirements.

12.5 PAYMENT

Payment for 28C – INSTALL TRAFFIC STRIPING, PAVEMENT MARKINGS, PAVEMENT MARKERS, AND SIGNAGE shall be contract bid price per lump sum (LS) and shall include full compensation for conforming to the requirements of Traffic Striping, Pavement markings, and pavement markers including all labor, tools, removal of conflicting striping and pavement markings, equipment and materials necessary for accomplishing the work complete and in place, and no additional compensation will be allowed thereof.

13 BID ITEM 25C – ADJUST MANHOLE FRAME AND COVER

13.1 GENERAL

Adjusting pull boxes to grade after completion of concrete paving shall be in accordance with subsection 301-1.6, "Adjustment of Manhole Frame and Cover Sets to Grade", of the Standard Specifications and these Special Provisions.

The CONTRACTOR shall note and reference the location of pull boxes prior to placing concrete pavement in order to locate and raise them following the work. The CONTRACTOR shall exercise care so that construction materials and surface materials such as rocks, dirt and debris do not enter the pull boxes.

13.2 PAYMENT

Payment for BID ITEM 25C – ADJUST MANHOLE FRAME AND COVER shall be per each (EA) and shall include full compensation for doing all the work involved in adjusting the pull box as shown on the Plans, and as directed by the Engineer, and no additional compensation will be allowed therefore.

14 BID ITEM 26C & 27C – FURNISH AND INSTALL PEDESTRIAN PUSH BUTTON AND POST

14.1 GENERAL

The contract bid item to FURNISH AND INSTALL PEDESTRIAN PUSH BUTTON AND POST shall be ADA compliant and shall be "Bulldog" Type Model Item #BDL3-Y by Polara. Contact Western Pacific Signal at (510) 276-6400.

Contractor shall remove 2 detector card slots in the controller rack and replace them with a new PBCU Controller by Polara. Push button shall operate in "Latching Mode" per the manufacturer's specifications.

Post shall be 2 ½ NPS (nominal pipe size) standard galvanized steel post with base plate, anchor bolts, and weather-proof cap. Location of post shall be determined by City Engineer or his/her designee.

14.2 PAYMENT

Payment for BID ITEM 26C & 27C – FURNISH AND INSTALL PEDESTRIAN PUSH BUTTON AND POST shall be contract bid price per each (EA) and shall include full compensation for conforming to the requirements including all labor, tools, equipment and materials necessary for accomplishing the work complete and in place, and no additional compensation will be allowed thereof.

15 BID ITEM NO. 22C – CONSTRUCT NEW 7.0' CATCH BASIN ON NORTH OF MEDIAN AT HARTER

15.1 GENERAL

The contract bid item for CONSTRUCT NEW 7.0' CATCH BASIN ON NORTH OF MEDIAN AT HARTER shall include all labor, equipment, materials, incidentals, and work necessary to construct the catch basin. The location will be determined in the field by the Engineer. The work shall include excavation, material, connection, and all other work necessary to construct curb drain.

Catch basin shall be constructed per Standard Plans for Public Works, 300-3 and Greenbook.

15.2 PAYMENT

Payment for BID ITEM NO. 22C – CONSTRUCT NEW 7.0' CATCH BASIN ON NORTH OF MEDIAN AT HARTER shall be at the contract bid item price per linear feet (EA) and shall include full compensation for all labor, materials, tools equipment, transportation and incidentals necessary to do all the work involved thereof, complete, in place, and accepted.

PART 2: CONSTRUCTION MATERIALS

Unless otherwise noted, the provisions below shall supplement those provisions in Part 2 of the Standard Specifications.

SECTION 200 UNTREATED BASE MATERIAL

200-2 UNTREATED BASE MATERIALS

Aggregate base shall be constructed as directed by the Engineer in the event of wet soil conditions.

The gradation shall be $\frac{3}{4}$ " (20 mm) maximum. Changes from one grading to another shall not be made during progress of the work, unless permitted by the Engineer.

The subgrade shall be compacted to 95% with moisture contents within 2% of optimum. The finished subgrade shall not deviate more than 0.03 feet from the design grade. Lightweight compaction equipment shall be used to avoid subgrade pumping.

No crushed miscellaneous base (CMB) is allowed.

SECTION 201 CONCRETE, MORTAR, AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

Concrete to be used for curb and gutter, sidewalk, drive approaches, and parkway culverts shall be designated Class 560-C-3250 mix with maximum slump of 4" (100 mm). Cross gutters, longitudinal gutters, spandrels, concrete band, colored concrete, catch basin local depression shall be 4,500 psi concrete mix with a maximum slump of 4" (100 mm). Contractor may use fly ash with an exclusive written

approval of the Engineer. Cross gutters shall be constructed per City of Culver City Standard Plan105 and as shown of the plans, 4,500 psi concrete. Longitudinal gutters shall be constructed per Green Book Standard Plan 122-2 as modified as shown in the plans, 4,500 psi concrete. The Contractor shall provide 1-1/2" thick steel traffic plates to bridge new cross gutters. Contractor shall remove a minimum of 25' of existing A.C. on both sides of the cross gutter/spandrel or as directed by the Engineer and replace to match existing.

Concrete mix design shall be submitted to the Engineer ten (10) working days prior to use.

201-3.7 Type "D" Joint Sealant (Hot-Poured Rubber-Asphalt Joint Sealant) (CRACK SEALING)

After cold milling and prior to the placing of new asphalt, concrete pavement cracks greater than 1/8" will be routed, cleaned and filled with hot asphalt rubber joint and crack sealant conforming to Standard Specifications Section 201-3.7 (Type "D" Joint Sealant (Hot-Poured Rubber-Asphalt Joint sealant)). Cracks less than 1/8" wide shall not be filled. Cracks greater than 1/8" up to and including 3/8" shall be routed to a width of 1/2" and a depth of 3/4". Cracks greater than 3/8" need not be routed.

All cracks shall be blown clean using not less than 175 cfm air compressor at 110 psi just prior to sealing. Loose material between cracks larger than 3/8" shall be removed by gouging or plowing and the crack shall be brushed and blown clean with compressed air just prior to sealing.

Sealant shall be topped off where settling occurs. Depressed areas adjacent to cracks shall be filled to road level by use of a straight squeegee. Excess material shall be leveled off at all cracks.

Sealant shall be applied according to manufacturer's specifications, using the manufacturer's recommended equipment. Manufacturer's specifications and equipment recommendations shall be furnished to the Engineer prior to construction.

SECTION 214 TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

All references to traffic striping and markings shall be "Thermoplastic".

Traffic Signs, Striping, Markers, and Markings, shall conform with Sections 84 and 85 of the Caltrans Standard Specifications and these Special Provisions.

Existing striping, pavement markings, legends, stop bars, crosswalks, parking stalls, red curb, etc., shall be replaced by the Contractor if damaged. It is the Contractor's responsibility to note and inventory such locations using a video recording system prior to removal and replacement of such, accordingly. In the event of a conflict as to the locations, placement of legends, markings, lines, etc., shall be as directed by the Engineer.

All existing markings which do not conform to the new striping shall be removed with a grinder. Existing markers which are partially removed or damaged shall be removed in total and replaced in kind. The Contractor shall re-stripe existing striping and curb markings obliterated by new construction, whether or not shown on the Plans for replacement.

Pavement Markers: Traffic striping will not commence sooner than seven to ten (7-10) working days after the surface course is placed. The Contractor shall furnish and install raised pavement markers as indicated on the plans and specifications to restore the roadway to its original state in accordance with the requirements of Section 85 of the Caltrans Standard Specifications.

Type A markers shall be ceramic type in accordance with Section 85-1.02B(3) of the Caltrans Standard Specifications.

Fire Hydrant Reflectors: All existing fire hydrants shall, at the completion of the project have Type D twoway blue reflectors placed in accordance with the 2014 California Manual of Uniform Traffic Control Devices (MUTCD) Section 3B.11.

Traffic Striping: In areas of new, or restoration of street striping, markings and legends, the Contractor shall provide and install traffic striping, thermoplastic paint and beads equal to State Standard Specifications, Section 84.

After the completion of surface course paving operations, and raising frames to grade, the Contractor shall allow seven to ten (7-10) working days before final striping. This does not include cat- tracking, which must be done within 24 hours or as directed by the Engineer.

The Contractor shall provide paint spots on centerline approximately 150 feet apart, to establish a reference line as shown on plans and as directed by the Engineer. The Contractor shall mark off all lane lines to match existing conditions.

Cat tracking shall be approved in writing by the Engineer before application.

Pavement Markings: Pavement marking work shall be limited to replacement of all legends, turn arrow legends, stop bars and crosswalks with 120 mils thick thermoplastic within the confines of the work area unless otherwise directed by the Engineer. All work shall match existing conditions. All materials shall conform to the State Standard Specifications.

Add Section 220 to the Standard Specifications:

SECTION 220 TRUNCATED DOME MAT

The detectable warning surface required for all curb ramps within the AC paving project limits shall consist of a Culver City light blue replaceable, cast-in-place polyurethane truncated dome mat, ARMOR-TILE, or approved equal. Contractor shall verify the color with the Engineer prior to installation of mat. The dimensions of the detectable warning surface shall be as specified on the Caltrans Standard Plans.

PART 3: CONSTRUCTION METHODS

Unless otherwise noted, the provisions below shall supplement those provisions in Part 3 of the Standard Specifications.

SECTION 300 EARTHWORK

300-1 CLEARING AND GRUBBING

300-1.3 Removal and Disposal of Materials

During construction and excavation, soft and unstable subgrade is expected to be encountered. The City's soils engineer shall determine the method of stabilizing these areas. The use of stompers will not be allowed for any portion of work on the project.

Light weight tracked type equipment shall be used to accomplish stabilization of unsuitable sub-grade.

Removals shall consist of the sawcut and removal of all materials, regardless of character, necessary for the construction of the project as shown or indicated on the plans and specifications and shall include but not be limited to: asphalt, aggregate base, and subgrade if required by the engineer.

All existing pavement joining new construction shall be sawcut in a straight line. Contractor shall exercise due caution to avoid any damage to the existing utilities and improvements to be protected in-place. Any damage caused by Contractor and/or his equipment shall be repaired or replaced as called out in Section

7-9 of the Standard Specifications at Contractor's expense.

Asphalt and subgrade removals shall be done with a grinder only. Grinding of the existing AC pavement shall be at a constant depth as called for in the plans. All temporary striping required after grinding operations shall be installed per City Standards.

The entire surface area of the pavement designated for removal shall be ground to the depths specified in the plans. Care shall be exercised not to damage adjacent improvements. Gutters or curbs damaged by the Contractor's operations shall be replaced at the Contractor's expense.

The contractor shall scan the work area using a metal detector of adequate strength prior to any saw cutting, excavation or grinding of the existing pavement. Contractor shall be responsible for locating and protecting manhole, water valve, utility access frames and covers or other metal appurtenances buried below the existing pavement surface whether shown on the plans or not.

Residue from grinding shall not be permitted to flow or travel into gutters, onto adjacent street surfaces or parkways. All residues shall be completely removed by a vacuum sweeper and properly disposed of. Sweeping is to take place immediately after the grinding has been completed and as directed by the Engineer. No washing of any residue into gutters and/or drainage structures shall be allowed. The Contractor shall cover and protect all storm drain inlets prior to the start of grinding operations.

Cold mix A.C. shall be placed and maintained at the interface between ground and non-ground areas to eliminate the hazard caused by sudden elevation differences, especially in pedestrian path of travel areas adjacent to wheelchair ramps.

The Contractor is to notify the Engineer at least two (2) working days prior to and immediately after the grinding operations so that observations and measurements may be made of areas before the placement of permanent asphalt.

Under no circumstances shall the period of time between removal of existing improvements (which create an obstruction or hazard to the public) and their replacement exceed three (3) calendar days at any one location unless approved otherwise by the Engineer or is necessary to facilitate or protect work. Should the Contractor fail to comply with this requirement, all other operations will be stopped until the hazard or obstruction is removed, and no additional days or other compensation will be given.

NOTE: Concrete removals are not allowed on Fridays or the day before a holiday and shall be replaced before the weekend or holiday.

Under no circumstances, shall the Contractor place concrete forms with the intent of leaving the forms in place for more than 24 hours, aside from curing freshly poured concrete.

The plans do not indicate any existing sprinkler systems. It is the Contractor's responsibility to examine the site, and determine what damage, if any, will be incurred within the areas described above, and consider this in the bid price for the various items of work.

The limits of removals will be marked by the Engineer, within forty-eight (48) hours from the Contractor's request, to have removal areas marked.

All patching and repair work for any removals shall be to the original condition unless directed otherwise by the City.

All removed material becomes the property of the Contractor and shall be hauled and properly disposed of outside of the project limits.

Add Section 300-1.5 to the Standard Specifications

300-1.5 Additional Considerations

In areas where roots are encountered, they shall be removed a minimum of 12 inches from the new work, or as directed by the Engineer.

In addition to removal of street, traffic, warning signs, or any other signs, Contractor shall reinstall and/or replace as shown on plans or as directed by the Engineer.

The Contractor shall, upon completion of the new improvements, repair, resod, replant, and replace landscape areas damaged or altered through the course of construction, including top dressing of the soil. All existing irrigation systems, which were affected as part of the project construction, shall be restored to their original condition and to the satisfaction of the Engineer. As required, irrigation system components shall be relocated and/or adjusted to grade within the limits of the landscaping.

This item shall also be interpreted to include the removal and disposal of any additional items not specifically mentioned herein which may be found with the work limits or are shown on plans to be removed.

Add Section 300-1.6 to the Standard Specifications

300-1.6 Site Demolition and Clearing

Following the asbestos and lead containing building materials removal and certification of the site, the building demolition and site clearing, and grubbing may begin. Site clearing, and grubbing shall be in accordance with Section 300-1 of the Standard Specifications and these Special Provisions and shall include the removal of all material from within the property boundary of each site unless specifically noted as "protect" or otherwise directed by the Engineer.

The Contractor shall be responsible for having a qualified pest control company spray all structures in order to prevent insects living within the structures from infesting adjacent properties. This spraying action will be done 48 hours prior to demolition of any structures. The cost of complying with all requirements specified in this section shall be borne by the Contractor and should be considered as included in the price bid.

Unless otherwise specified, all concrete floors, walks footings, porches, steps, slabs, signs, and foundation walls within the limits of the property shall be removed in their entirety with demolition operations, shall be removed from the site and disposed of by the Contractor. Likewise, all brick, plaster, lumber, wood scraps and all other loose or fixed debris shall be removed from the site and disposed of by the Contractor, unless otherwise noted on to protect. Asphalt within the project to remain.

The City reserved the right to order the Contractor to stop work at any time for purposes of conducting a structural and analysis of the building being demolished. The Contractor may be required to continue the work under supervision of a structural engineer at no cost to the City.

During demolition, the Contractor shall keep the site free and clean from all rubbish and debris and in a sanitary condition and shall promptly clean up the site after being notified by the City representative.

The Contractor shall backfill holes and voids created during his operations, the backfill shall consist of non-organic rubble-free portions of on-site materials or clean non-expansive imported dirt. Dirt shall be placed in horizontal layers not to exceed eight inches in depth, each layer being well moistened and thoroughly tamped or rolled until a relative compaction of not less than 90% is secured as determined by Test Method ASTM-D-1557-70. No puddling or flooding of backfill shall be done without specific authorization by the City. The Contractor shall make his own arrangements for securing fill materials. Cost of Backfill materials, grading, and related work shall be considered as included in the project bid and no additional compensation will be considered.

Compaction tests will be required on all fill areas exceeding 16 inches in depth. Tests will be done by a firm selected by the City and at locations requested by the Inspector. Results shall meet the compaction requirements as specified. Costs of such tests shall be borne by the City.

All areas shall be grubbed to a depth below the natural ground surface necessary to remove all stumps, roots, buried logs, broken concrete, broken asphalt and all other objectionable material larger than two inches.

The City reserves the right to search for buried debris after completion of the demolition operations. If debris is uncovered, the Contractor shall remove all uncovered material and pay to the City the cost of exploratory work.

300-2 UNCLASSIFIED EXCAVATION

Add Section 300-2-10 to the Standard Specifications:

300-2-10 Over-Excavation

During construction and excavation, soft and unstable sub-grade is expected to be encountered. The City's soils engineer shall determine the method of stabilizing these areas. If, in the opinion of the Engineer, the existing areas of materials beneath the regular excavation depth are unsuitable, and/or contaminated, the Contractor may be ordered to over-excavate those areas to a depth to be determined by the Engineer. A combination of stabilization fabric or aggregate base and asphalt concrete bridge mix shall be used to replace materials over-excavated as directed by the Engineer.

Light weight tracked type equipment shall be used to accomplish stabilization of unsuitable sub-grade.

Over optimum conditions are anticipated in isolated areas and will require over excavation and replacement with a thickened pavement section. The Engineer will determine the specific areas and limits of excavation during construction.

Operation of rubber-tired equipment on marginal or soft sub-grade will not be permitted. All trucks shall be directed as necessary to prevent loaded trucks from driving on sub-grade areas designated as soft or yielding. Areas designated for over excavation and replacement with thickened pavement sections shall utilize track excavators and/or loaders capable of operating on the exposed sub-grade. The Contractor shall be responsible for selection of the equipment necessary for excavation.

The Contractor shall submit a list of equipment to be used to the Engineer for approval prior to beginning stabilization work. The list of equipment shall provide a complete detailed description of each piece of equipment to include weight, type of drive (rubber, tire, track, steel drum, etc.)

Bottom dump (aka belly dump) trucks shall not be used on any portion of work on this contract.

300-4 UNCLASSIFIED FILL

Work shall be performed in accordance with Section 301 of the Standard Specifications. Disturbed subgrade and backfill materials shall be compacted to 95% relative compaction and optimum moisture content of 2%. Finished subgrade shall not deviate more than 0.05 foot (15 mm) from the theoretical grading plane and must be firm and unyielding.

All rocks, stones, debris and roots within 12 inches (300 mm) of the finished surface shall be removed and disposed of.

Backfill shall consist of placement of material necessary to fill voids adjacent to newly constructed curb and gutter, sidewalks drive approaches, etc.

Landscaping backfill material shall be topsoil and considered select material acquired from approved

sources for sustaining healthy plant life. No backfill material shall be placed until approved by the Engineer.

SECTION 301 SUBGRADE PREPARATION, TREATED MATERIALS, AND PLACEMENT OF BASE MATERIALS

301-1.6 Adjustment of Manhole Frame and Cover Sets to Grade

Water valves, manhole frames and covers, and sewer cleanouts shall be adjusted to grade including paving within ten (10) working days after completion of paving.

Failure to comply shall result in a penalty of two hundred fifty (\$250.00) dollars a day.

Existing frames shall be adjusted to grade with materials of the same kind or quality as those in the original structures and in accordance with the Standard Specifications. After frames have been removed, the tops of each structure shall be carefully cleaned to provide a suitable foundation for the new material. The existing frames and covers shall remain the property of the City.

The Contractor should be made aware that there are some existing coated/lined sewer manholes in the project areas as called out in the plans. The Contractor, when adjusting these sewer manholes to grade, shall replace the existing coating/lining to the new grades.

Upon completion of the roadway resurfacing or construction, circular holes shall be cut where the water valves and sewer cleanouts or manholes exist and the valve cans and sewer manhole and cleanout frames and covers adjusted to the proper grade, and a 6" x 6" concrete collar shall be placed around outside of valve cans sewer cleanouts and manhole frames. The pavement shall then be replaced with a structural section equivalent to the adjacent areas. Any valve cans or sewer manholes and cleanouts found to be located within areas to receive concrete surfaces shall be adjusted to grade prior to placing the concrete. Any valve cans which may be located in areas which will be excavated prior to placing of the base material shall be removed during excavation, stored, and reinstalled to proper grade by one of the above methods. The Contractor shall furnish any valve can parts, sleeves, grade rings and/or top sections needed to complete the installations. These parts shall be in accordance with the City of Culver City Standard Plan Nos. 504, 505, 511, 518, and 530.

Contractor shall tie-out locations of all manholes and water valve covers to three permanent locations, prior to paving and supply the information to the Engineer.

If, when the frames are adjusted, it is determined that there will not be sufficient bearing in the opinion of the Engineer, between the ring and the remaining structure, two steel bars, not less than 1" by 3" shall be placed in such a way as to properly support the ring, after which the exterior of the ring will be covered with masonry in the normal fashion.

Frames shall be set to the grade of the new surface after the surfacing has been placed. The area around the frame and cover shall be filled with paving materials after the 6" x 6" concrete collar is placed, the surface of which shall conform to the grade of the finished surface. Manholes and lines must be cleaned if any debris is dropped into manhole.

After the completion of finish course paving operations and prior to raising frames to grade, the Contractor shall allow two (2) working days before final striping. This does not include cat-tracking, which shall be done within 24 hours after paving as directed by the Engineer.

SECTION 302 ROADWAY SURFACING

302-1 COLD MILLING OF EXISTING PAVEMENT

Existing asphalt concrete shall be milled at the locations and to the dimensions shown on the plans and in accordance with these Special Provisions. The milling of asphalt concrete will only be permitted to take place immediately prior to paving.

It is anticipated, due to the large amounts of milling to be performed, that traffic will be transferred onto milled surfaces for short intervals prior to placement of the asphalt concrete. The milled surfaces to receive traffic must have an approved satisfactory driving surface before traffic will be allowed to resume use. Abrupt changes in surface elevation of greater than 3/8 inch (10 mm) will not be allowed. Therefore, where milling depths as shown on the plans exceed 3/8-inch (10 mm) in depth, a tapered mill perpendicular to the direction of travel, at the rate of one 1-inch (25 mm) per five (5) feet (1500 mm), shall be required until the specified depth of mill is reached.

Abrupt changes in the pavement surface elevation in the longitudinal direction (parallel to the direction of travel) shall not be allowed. A minimum of three (3) foot (900 mm) transition is required for longitudinal grade differences over 3/8 inch (10 mm).

Upon completion of milling operations, the Contractor shall place hot mix AC to reduce the lip where wheelchair access ramps are located to assist use by handicapped persons. The hot mix will then be removed no sooner than 24 hours prior to paving.

Both the perpendicular and parallel temporary taper transition may be achieved by over milling outside of the specified full depth mill limits or by using a full depth mill inside the specified full depth mill limits followed by a temporary asphalt concrete ramp. The temporary asphalt concrete ramp must be removed just prior to the actual asphalt concrete base course placement. Adherence to all of the preceding temporary pavement surface maintenance requirements shall be absorbed into the unit costs for the various mills. No additional compensation will be allowed.

Milled asphalt concrete pavement will be measured by the square foot. The quantity to be paid for will be the actual area of surface milled irrespective of the number of passes required.

All milled material shall become the property of the Contractor. 302-5 ASPHALT CONCRETE PLACEMENT Placing sand on any asphalt surface will not be allowed.

The asphalt concrete mix design and material list and source shall be submitted to the Engineer for approval a minimum of ten (10) working days prior to use.

No paving materials shall be placed until authorized by the Engineer or required test reports indicate compaction is acceptable.

Prior to paving, all grass or vegetation growing through cracks in the pavement or adjacent to curb and gutter shall be removed and the areas sprayed with a soil sterilizer approved by the Engineer. Streets that get full depth AC removal shall be treated with weed killer (colored type) spectracide or approved equal.

Tack coat shall be placed on one lane at a time and no further than 200 feet ahead of paving operation. Unit price bid for asphalt shall include tack coat.

The surface shall be cleaned by use of a mobile sweeper and washed with water and allowed to dry prior to surface course applications.

At least 75%, by weight, of the material retained in the No. 4 sieve shall have at least one fractured face as determined by Test Method No. Calif. 205.

Asphalt Concrete Base Course shall be of the thickness as shown on the plans and TYPE III-B2 PG 64-

10 (3/4").

A single AC layer as indicated on the plans shall be placed with suitable equipment and rolled lightly for grade control purposes only. Contractor shall exercise caution in these areas to prevent pumping of subgrade. Relative compaction requirement is waived for this initial base layer in the wet sub-grade areas only. The completed base layer shall be allowed to cool for a minimum of 15 hours prior to placing next layer of asphalt. No truck shall be permitted to operate on the sub-grade or the asphalt until the suitable cooling period is expired per the direction of Engineer.

Asphalt Concrete Leveling Course shall be of thickness as shown on the plans and be TYPE III-C3 PG 64-10 (1/2"). All asphalt leveling courses shall conform to Section 203-6 of the Standard Specifications. Hot tack coat shall be Grade SS-1h emulsified asphalt.

Asphalt rubberized hot mix (ARHM) finish course for the street rehabilitation work shall be Class GG-C (1/2"). All asphalt concrete courses shall conform to Section 203-11 of the Standard Specifications. Hot tack coat shall be Grade SS-1h emulsified asphalt conforming to Section 203-3 of the Standard Specifications and shall be applied in accordance with Subsection 302-5.4 of the Standard Specifications to the perimeter of all asphalt concrete removal and replacement locations.

Asphalt Concrete Bridge Mix (Soft Areas) shall be used for backfilling in over-excavated soft areas encountered during work as directed by the Engineer. A one-ton batch shall contain:

Sand	(24%)	458 lbs.
3/8" (1 cm) Aggregate	. (35%)	667 lbs.
1/2" (1.5 cm) Aggregate	. (12%)	229 lbs.
³ / ₄ " (2 cm) Aggregate	. (29%)	553 lbs.
Asphalt viscosity grade PG 64-10	(4.9%)	93 lbs.

Sub-grade preparation shall conform to Section 301-1 of the Standard Specifications and these Special Provisions. Bridge mix shall be placed without compaction effort. Care shall be taken to keep bottom of sub grade flat.

If applicable, 1 ½" Asphalt Concrete Leveling Course shall be used at the direction of the Engineer as deemed necessary by field conditions. Leveling course shall be a minimum of 1 ½" in thickness and will be required when, in the opinion of the Engineer, the base paving is not suitable to provide adequate support for the finish course of paving.

Rolling equipment shall conform to the provisions of Subsection 302-5.6 of the Standard Specifications, except three-wheel rollers shall not be permitted and pneumatic rollers shall be used on base courses only. Rolling equipment on local roads shall be a minimum of one 8-ton, 2-axle tandem roller for each fifty (50) tons, or fraction thereof, of asphalt concrete placed per hour by each asphalt paver.

The Engineer will vary paving rates as necessary or require additional compaction equipment in order to insure adequate compaction of the hot mixture.

All locations where new asphalt concrete pavement is joining or overlaying existing asphalt pavement, Contractor shall saw cut existing pavement to provide straight, neat lines and feather the new pavement to form smooth transition with the existing pavement.

Prior to the feathering process, the Contractor shall cold mill the existing pavement a minimum of five (5) feet (1500 mm) in width from the edge of gutter or from join lines as designated by the Engineer. Contractor shall remove all loose materials from site after cold milling. Asphalt joints shall be sealed with approved bituminous material.

Note: Contractor shall water test all streets for drainage and drivability prior to final approval and payment for the work, at no cost to the City.

Temporary striping: Lane line delineation shall be accomplished using reflectorized slurry tabs and shall be placed after each paving operation. In accordance with the approved striping plan, twelve (12) inch wide reflectorized striping tape shall be used for stop bars and crosswalks. Said tape shall be removed from temporary surfaces prior to placement of additional asphalt. Temporary striping on cold milled surfaces shall be paint.

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS

The Contractor shall provide and maintain a walkway area with a minimum unobstructed width of four (4) feet (1,200 mm) for pedestrian traffic at all times, whenever possible. "SIDEWALK CLOSED AHEAD" signs shall be posted per the Engineer's direction whenever sidewalk is closed for construction.

Concrete driveway approaches shall be constructed per City of Culver City Standard Plan 213 and as modified if shown on the Plans. The Contractor shall provide secondary access to all businesses/residents during construction of driveway approaches. If not possible, the Contractor shall construct the approaches so as to maintain private property accessibility.

New wheelchair ramps shall be constructed per Caltrans Standard Plan A88A, unless otherwise noted on the project plans. All new ramps shall have a zero-inch (0") lip of gutter at the ramp opening and a cast-in-place detectable warning surface 3'x4' (blue in color). The PCC curb and gutter construction, which is related to the PCC wheelchair ramp construction, shall be considered as part of the wheelchair ramp.

Sidewalks, driveway approaches, curb ramps, and curb and gutter construction shall match existing adjacent improvements as nearly as possible.

Control joints for curb and gutter shall be 1/4" (6 mm) wide and shall be constructed 10' apart as directed by the Engineer.

Sub-grade preparation shall consist of cut or fill as is necessary to maintain specified concrete thickness at the grade established by the Engineer. Compaction of subgrade shall be as specified in Section 301 of the Standard Specifications.

Backfill material placed behind newly constructed curbs shall be topsoil in the upper twelve inches (12") (300 mm) to accommodate landscaping materials.

All concrete removal areas shall have new concrete improvements installed within three (3) calendar days from the date of the removal unless approved otherwise by the Engineer.

No paving materials shall be placed until authorized by the Engineer or required test reports indicate compaction is acceptable.

The Contractor is responsible for the protection of the concrete work for the duration of the project and shall replace all damaged or destroyed concrete to the satisfaction of the engineer at no additional cost to the City.

Add Section 320 to the Standard Specifications:

SECTION 320 TRUNCATED DOME MAT

The truncated dome mat shall be installed across the entire width of the bottom of the curb ramp and shall be installed per the manufacturer's installation recommendations and as directed by the Engineer.

At a minimum the Contractor shall adhere to the truncated dome mat manufacturer's installation requirements including proper surface preparation and protection of the work and surrounding area.

Add Section 330 to the Standard Specifications:

SECTION 330 ACCESSIBLE RAMPS

The truncated dome mat shall be installed across the entire width of the bottom of the curb ramp and shall be installed per the manufacturer's installation recommendations and as directed by the Engineer.

At a minimum the Contractor shall adhere to the truncated dome mat manufacturer's installation requirements including proper surface preparation and protection of the work and surrounding area.

All new accessible ramp construction shall be constructed to meet ADA and any applicable regulations, including transitioning beyond the accessible ramp limits to meet grade tolerance.

Contractor shall retrofit existing wheelchair ramps by grinding the concrete ramp flush with the gutter flowline.

PART 6: TEMPORARY TRAFFIC CONTROL

Unless otherwise noted, the provisions below shall supplement those provisions in Part 6 of the Standard Specifications.

SECTION 600 ACCESS

600-1 GENERAL

All construction work and traffic control shall be scheduled and constructed to provide for a minimum of inconvenience and a maximum of safety to the public vehicular and pedestrian traffic. The Contractor shall be responsible for the protection of all modes of transportation until the Work called for in the Contract Documents and as directed by the Engineer is complete.

Access to properties shall be maintained at all times during construction. Temporary drive approach ramps constructed of recycled materials or temporary asphalt (12" minimum width) shall be installed as approved by the Engineer.

SECTION 601 WORK AREA TRAFFIC CONTROL

601-2 TRAFFIC CONTROL PLAN

All Work shall require maintenance and control of traffic during the construction period. The Contractor shall provide a detailed Traffic Control Plan ("TCP") in accordance to Section 2-5.3 for all phases of construction for review and shall conform to the Standard Specifications, General Provisions, Special Provisions, the latest edition of the California Edition of the Manual on Uniform Traffic Control Devices ("MUTCD"), the latest edition of Caltrans Standard Specifications and the latest edition of Caltrans Standard Plans and must be approved by the Engineer before construction. The TCP shall be prepared under the supervision of and signed and stamped by a California-registered Professional Civil Engineer or a Traffic Engineer, as determined by the Engineer. The TCP shall be drawn to a 1-inch = 40 feet scale on 24 x 36 inches plan sheets as dictated by the length of the Work. The TCP shall cover signing, flagging, detour, geometric, delineation and channelization, barriers and barricades, separation of opposing traffic streams, and hours of flash operation at signalized intersection(s). The Contractor shall not commence

work before receiving an approved TCP. Any delay in acquiring TCP approval will be at the Contractor's expense and no additional Working Days will be granted.

Traffic control shall be provided by a qualified traffic control company specializing with a C-31 license during the construction of the Project. Traffic control shall address parking changes as well. Before the beginning of any Work or if there are changes to the proposed TCP and after approval by the City, the qualified traffic control company staff shall complete field checks of the installed traffic control by driving through the Work area at least two (2) times to ensure the adequacy of traffic control. Phase construction so that at least one half of all traffic lanes are open to traffic in each direction. During any period when two (2) way traffic is not provided, the Contractor shall employ properly trained flaggers to control traffic through the construction zone.

For construction in the vicinity of a school, the Contractor shall contact the School District, obtain a school schedule and school circulation plan, and incorporate information into the Project's schedule and traffic control, such that within one thousand (1,000) feet of the appropriate school district(s) on routes serving the school for student arrivals and departures are not impacted between one (1) hour before and one-half (1/2) hour after the school day start time and one (1) hour before or one-half 1/2) hour after school day end time.

Add Section 601-2.1 to the Standard Specifications:

601-2.1 Work Area Traffic Control:

Lane closures shall conform to the requirements of the Work Area Traffic Control Handbook (WATCH Manual) and the traffic control plans for the project. At the close of each working day access to private property and cross streets shall be provided. All signs shall conform to and be placed in accordance with current City, State Standards and approved traffic control plans and as directed by the Engineer. Delineators shall be single column 42" plastic type with reflective sleeves. Barricades shall have flashers.

Clearances from traffic lanes shall be five feet to the edge of any excavation and two feet to the face of any curb, pole, barricade, delineator, or other vertical obstruction.

When entering or leaving streets, the Contractor's equipment, whether empty or loaded, shall in all cases yield to traffic.

Flagmen and guards, while on duty and assigned to give warning to the public that an area 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 the Contractor's own expense. Signs, lights, flags, and other warning and safety devices shall conform to the requirements set forth in the current "Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways."

Contractor shall provide solar-powered battery, sequential arrow boards for all lane closures per the traffic control plan of this contract.

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. If any traffic control facilities are damaged, displaced or are not in an upright position from a cause, said cones or portable delineators shall immediately be replaced or restored to their original location, in an upright position, by the Contractor. The Contractor shall also post proper signs to notify the public regarding detours and the condition of the street, all in accordance with the provisions of the Vehicle Code and the current State of California Manual on Uniform Traffic Control Devices (MUTCD). Covering of signs and signal heads shall be accomplished by using burlap sacks only; no taping will be allowed. The base material of construction area signs shall not be plywood.

Portable delineators shall be spaced as necessary for proper delineation of the travel way. The length of taper for each lane width of closure shall be per the California Work Area Traffic Control Handbook (WATCH) manual.

Upon completing each phase, the Contractor shall immediately remove all temporary devices associated with the traffic control from the job site while restoring all pre-existing devices to their original condition.

The Engineer shall have the authority to order field changes for alleviating potentially hazardous and/or traffic congestion-causing conditions, at no cost to the City.

PART 7: STREET LIGHTING AND TRAFFIC SIGNAL SYSTEM

Unless otherwise noted, the provisions below shall supplement those provisions in Part 7 of the Standard Specifications.

SECTION 701 CONSTRUCTION

701-4 DAMAGE TO EXISTING SYSTEM

The Contractor is to take special note of existing traffic signal detectors, conduits, pull boxes and other electrical facilities that are located in the proposed construction areas.

The Contractor shall ascertain the exact location and depth of existing detectors, conduits, pull boxes and other electrical facilities before using any tools or equipment that may damage or interfere with such facilities. The Contractor will be held responsible for any damage to the facilities and claims related to damage caused by his operations. Said costs and/or claims will be deducted from any moneys due to or to become due to the Contractor.

The cost of any temporary systems, which becomes necessary due to damage of existing facilities or the convenience of the Contractor, shall be at the Contractor's expense and no compensation will be allowed therefore.

PART 8: LANDSCAPE AND IRRIGATION

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025639 – TEMPORARY TREE & PLANT PROTECTION

GENERAL SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work for Temporary Tree & Plant Protection, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Protecting and maintaining existing trees and vegetation not specifically designated for removal, to remain.

Protection shall be extended to trees and/or vegetation located within or directly adjacent to the Project Site, whether the tree trunk and/or vegetation are located within the designated Limits of Work. Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 328400 – Irrigation Systems. Section 329300 – Exterior Plants. Section 329400 – Landscape Planting Accessories.

DEFINITIONS AND APPLICABLE STANDARDS

References:

ANSI – American National Standards Institute. ASTM – American Society for Testing & Materials. ISA – International Society of Arboriculture. USDA – United States Department of Agriculture.

Definitions:

Tree – A woody perennial plant which usually has (but not limited to) a single dominant trunk and has a mature height of fifteen-feet (15') or more and has a trunk diameter (caliper) of three-inches (3") or more when measured at twenty-four-inches (24") above the finished grade.

Drip-line – The outermost extent of the tree's foliaged canopy, which encompasses the tree leaves or fronds, trunk, branches, roots, and soil. In no case shall a drip line encompass an area under a tree canopy, which is less than ten-feet (10') in diameter. Since each tree is unique in size, scale, and form, the delineated drip-line of each tree shall be refined at the discretion of the Landscape Architect. Injury – Bruising, scarring, tearing, gouging, or breaking of roots, branches, or trunk(s), soil compaction around the drip-line, or contamination around the drip-line which results in the decline to the health of the tree.

Root Zone– The soil volume surrounding a plant containing the roots.

Reference Standards:

American National Standard for Tree Care Operation, Tree, Shrub, and Other Woody Plant Maintenance (ANSI A300), American National Standards Institute, Latest Edition.

American National Standard for Tree Care Operations (ANSI Z133), American National Standards Institute, Latest Edition.

Tree Pruning Guidelines, International Society of Arboriculture, 1995 Edition.

Pruning Standards for Shade Trees, National Arborists Association, Latest Edition.

SUBMITTALS

Contractor shall provide site photographs or videotape, sufficiently detailed and described, of existing conditions of trees and vegetation, adjoining construction, and site improvements that might be

misconstrued as damage caused by site clearing, tree pruning, or tree protection. Submit photographs or videotape to the Landscape Architect prior to commencement of Work.

Product Data: Submit complete and legible materials list of items to be provided for Work described herein this Section.

Submit complete detailed schedule and description of Work to be done within drip-line, (if any), including list of equipment to be used.

Submit schedule and description of proposed pruning and/or other remedial work to existing plant materials. Submit qualifications describing years of experience and list of similar projects completed for the following:

A State of California licensed Pest Control Advisor shall propose application of all herbicides or pesticides.

A Certified Arborist shall propose pruning of trees or other vegetation. The Certified Arborist shall have a minimum of five (5) year's post-certification experience performing pruning and observation work for projects of comparable size with trees of similar size and nature.

Tree Pruning Company, and List of Certified Tree Workers, who will perform Work relating to requirements herein this Section. Tree Pruning Company shall have a minimum of five (5) years experience specializing in performing the work of this Section for projects of comparable size with trees of similar size and nature.

QUALITY ASSURANCE AND CONTROL

Pre-Installation Conference: Conduct conference at Project Site.

Pruning and remedial work shall be done under the direct supervision of an Arborist certified by the International Society of Arborists (ISA); or Arborist who is a member in good standing in the American Society of Consulting Arborists, in compliance with ISA and ANSI Standards. Arborist shall be on Site continuously while existing trees or roots are being pruned or remedial work is being performed.

PROJECT SITE CONDITIONS

Contractor shall become aquatinted with existing site conditions, verifying quantities and locations of all protected trees and vegetation, and other information as may be necessary. Notify the Landscape Architect of unsatisfactory conditions, in writing, prior to commencement of Work.

Tree Flagging: Prior to commencement of Work, Contractor shall flag existing trees and vegetation to remain and protected throughout the duration of Work. Adequately flag tree trunks with bright-colored tape (neon colors preferred). Verify flagged trees and vegetation with the Landscape Architect.

Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during tree-pruning or tree-protection operations.

Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.

Provide alternate routes around closed or obstructed traffic ways, if required, by authorities having jurisdiction.

Locate above utilities prior to any Work and perform Work in a manner which will avoid possible damage. Notify utility locator service for area where Project is located before site clearing where applicable. Notify the Landscape Architect if conflicts exist. Improvements on Adjoining Property: Authority for performing indicated removal and alteration Work on property adjoining Owner's property shall be obtained by the adjoining property Owner(s) prior to commencement of Work.

Protect existing Work and Work of other trades: Damage to existing construction caused by Work of this Section shall be promptly repaired and/or replaced at the expense of the Contractor.

Environmental Requirements: Perform actual pruning operations (if needed) during those seasons suitable for the specific tree type, in accordance with locally acceptable horticultural practices.

Pre-Tree Pruning/Tree Protection Conference: Contractor shall conduct a Pre-Tree Pruning/Tree Protection Conference at the Project Site with Certified Arborist (who will be on-site supervising the Work of the Project) and the Landscape Architect.

Contractor shall be responsible for notifying parties, in writing, at least seven (7) days in advance to schedule the Conference.

Contractor shall provide to parties in attendance within seven (7) days a written legible inventory of Work to be accomplished, including species (botanical and common name), location, size, specific pruning needs or tree protection needs as identified during the Conference, recommended pruning or tree protection methods to meet the identified needs, and any additional conditions noted.

SCHEDULE

Install Tree Protection Barricades prior to commencement of Work. Work shall be done according to approved Schedule.

GUARANTEE

Contractor shall Guarantee that plants covered under the Provisions of this Section shall be healthy and in a flourishing condition of active growth for two (2) years from the date of Final Acceptance. Requirements of the guarantee shall apply if failure of the Contractor to take specified precautions and Work within restrictions of this Section contributes to the destruction, decline, or injury to a tree to remain, in the judgment of the Landscape Architect.

If a tree designated to be protected accordingly is destroyed or injured so that in the judgment of the Landscape Architect it should be replaced, it shall be removed at the expense of the Contractor. Contract shall pay compensation to the Owner of the property where the tree was located at the rate as specified herein this Section (see Compensation).

COMPENSATION

Contractor shall replace existing plant material designated to remain that dies or sustained injury from the result of the Contractor's negligence to provide adequate required protection, pruning, or maintenance during the course of construction operations.

Trees: Contractor shall thoroughly remove damaged tree, including trunk, branches, and roots, at no cost to the Owner, and at the direction of the Landscape Architect.

Contractor shall furnish and install per requirements in Section 329300 – Exterior Plants, with an equal size tree (in height, spread, and caliper), and of the same form, species, and in the same quantity as those tree(s) that were damaged, at the direction of the Landscape Architect. Compensation shall include the actual cost of the item boxed out of the ground; transportation or delivery of boxed item to the site; unloading, planting and staking; maintenance, including watering, fertilizing, pruning, pest control, and other care to bring replacement to same general condition of the original item.

Other Plant Material (other than Trees): Contractor shall replace other vegetation (other than trees) that died or sustained injury from the result of the Contractor's negligence to provide adequate required vegetation protection, pruning, or maintenance during the course of construction operations. Compensation shall be awarded to the Owner as follows:

Contractor shall thoroughly remove damaged vegetation at no cost to the Owner, and at the direction of the Landscape Architect.

Contractor shall furnish and install per requirements in Section 329300 – Exterior Plants, with equal size plant material as those which damaged ((5) gallon container stock minimum (as applicable)) of the same form, species, and in the same quantity as vegetation that was damaged, at the direction of the Landscape Architect.

PRODUCTS TREE PROTECTION MATERIALS

Barricade for Protection of Existing Vegetation:

Fabric: Utility (snow) type fencing, minimum four-feet (4'-0") high, consisting of a vinyl meshed fabric in a bright orange color. Fabric shall be approved by the Landscape Architect.

Posts: Metal or wood, sufficient in gauge (as appropriate) and size to support the fabric material in a taut and plumb condition. Posts shall be subject to approval by the Landscape Architect. Signs: Posted plastic laminated signs, attached to fabric fencing, with words "WARNING-KEEP OUT-TREE PROTECTION ZONE".

Mulch: Where available, Contractor shall stockpile and reuse shredded wood chips produced from onsite tree removals and remedial work, if chips are disease free and acceptable to the Landscape Architect. Where on-site chips are not available, Contractor shall provide Shredded Wood Mulch as specified in Section 329400 – Landscape Planting Accessories.

EXECUTION PREPARATION

Provide erosion-control measures as needed to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Locate and clearly flag trees and vegetation to remain or to be relocated. Protect existing site improvements to remain from damage during construction.

TREE AND VEGETATION PROTECTION

Protect existing trees and other vegetation indicated to remain in place against the following: Storage or parking of automobiles or other vehicles.

Stockpiling of building materials, refuse, or excavated materials.

Use of trees as support posts, power posts, or sign posts, anchorage for ropes, guy wires, or power lines, or other similar functions.

Dumping of poisonous materials on or around plant roots, trunks, branches, or foliage. Such materials include, but are not limited to, paint, petroleum products, dirty water, or other deleterious materials.

Cutting, breaking, or shinning of roots caused by utility trenching, foundation digging, placement of curbs and trenches, and other miscellaneous excavation without prior written approval by the Landscape Architect.

Damage by skinning or bruising of bark on trunks or branches, caused by maneuvering vehicles or stacking material or equipment too close to the plant.

Compaction of the soil within the drip-line of the plants due to movement of trucks or grading machines, pedestrian or vehicular traffic, storage of equipment or materials. Excessive water or heat from equipment, utility line construction, or burning of trash under or near vegetation to remain.

Damage to root system from flooding, erosion, and excessive wetting and drying resulting from watering and other operations.

Prior to commencement of construction activities, the Contractor shall erect and maintain a temporary fenced barricade around the drip-line of individual trees, around perimeter drip-line of groups of trees, or

around other vegetation to remain.

Prevent damage to roots during installation of barricade posts. Space posts approximately 4'-0" on-center (O.C.) and securely attach fabric.

Barricades shall be installed plumb, taut, and sturdy to prevent unauthorized access around drip-line of trees and protected vegetation. Repair sagging or damaged barricades immediately.

Immediately after barricade fencing is installed, cover entire soil area inside of the fence area with a fourinch (4") layer of mulch. Keep mulch eighteen-inches (18") away from root crown. Irrigate protected trees and vegetation to a moist soil depth of eighteen-inches (18") deep.

During the course of construction, relocation of the barricade may be required to facilitate construction. Contractor shall relocate barricade as directed by the Landscape Architect at no additional expense to the Owner.

Remove barricade when construction operations are complete or when directed by the Landscape Architect.

Irrigation: Contractor shall supply fresh potable water in adequate amounts and rates of application as required to maintain the health of protected plant material throughout the duration of the construction operations. Contractor shall maintain a watering schedule and document dates and duration of irrigation applications.

Construct a temporary watering basin, as required, on the surface of the existing undisturbed grade, with imported soil, to aid in the retention of water around existing protected trees and planting.

Do not excavate within drip line of trees, unless approved, in writing, by the Landscape Architect. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

Cover exposed roots with burlap and water regularly. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

Coat cut faces of roots more than 1-1/2 inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

Protect root systems of existing trees and vegetation from damage due to chemically injurious materials in solution caused by run-off or spillage during mixing or placement of construction materials, and drainage of stored materials.

Protect root systems from flooding, erosion, excessive wetting or drying resulting from de-watering or other operations.

Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Landscape Architect.

Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified Arborist.

CLEARING AND GRUBBING

Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

Completely remove stumps, roots, obstructions, and debris extending to a depth of eighteen-inches (18") inches below exposed sub-grade.

Use only hand methods for grubbing within drip line of remaining trees.

Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

PRUNING AND REMEDIAL WORK

Pruning and remedial work shall be done under continuous supervision of the approved Arborist, according to approved submittals, and per ANSI A300 Pruning Standards.

Provide pruning, cabling and bracing, irrigation, pest and disease control and other remedial treatments as recommended by the approved Arborist, required to assure the long-term health of the trees and existing vegetation, and the safety of persons and property.

LANDSCAPE ESTABLISHMENT PERIOD

Keep areas within tree protection barricades free from weeds, trash, and debris. Do not use herbicides. Maintain mulch layer and protective devices throughout entire duration of Contract.

129300 – SITE AND STREET FURNISHINGS

GENERAL SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work for Site and Street Furnishings, as shown on the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Trash Receptacle (Unit).

Related Sections: The following Sections contain requirements of Work that relate to this Section: Section 321313 – Concrete Paving.

Section 321323 – Site Concrete (for cast-in-place concrete footings or sub-grade foundations).

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data: Submit available product/material literature, test reports, color charts, supplied by manufacturer's, indicating that their products comply with specified requirements. Provide manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each product/material type in this Section.

Shop Drawings to show component parts, fabrication, installation, and dimensions for items indicated herein this Section.

Material Samples:

Submit printed manufacturer's product data, including color charts or color chips of actual fabricated products, for material sample review.

Samples of complete Units or parts of Units of the items indicated herein this Section shall be furnished, as requested by Landscape Architect, for review and approval.

Submit manufacturer's written certification that each product complies with specified requirements noted herein.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work under this Section shall proceed until all information indicated herein this Article have been reviewed, accepted, and approved by the Landscape Architect, in writing.

QUALITY ASSURANCE AND CONTROL

All materials and Work shall be in accordance with the State Codes and Specifications and other criteria herein specified.

Single-Source Responsibility: Obtain furnishing Units from each respective single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Notify the Contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place.

Field Measurements: Contractor shall take field measurements as required. Report major discrepancies between the Contract Drawings and field dimensions to the Landscape Architect prior to commencing Work. Check adjoining finished surfaces, finished grades, and other Work by accurate field measurements before erection. Maintain required levels and grade elevations. Review installation procedures and coordinate Work herein this Section with other Work affected.

Perform installation operations only when weather is suitable in accordance with locally accepted practices:

Coordinating furnishing footings with utility locations. Note potential conflicts to the Landscape Architect. Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected materials immediately from Project site. Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

DELIVERY, STORAGE AND HANDLING

Furnishings shall be stored as necessary to prevent damage and shall be in new condition when ready for installation. It shall be the responsibility of the Contractor to install "factory condition" furnishings. Store materials off ground and under cover, away from damp surfaces and inclement weather. Deliver manufactured materials in original, unopened packages or containers with manufacturer's labels intact and legible. Deliver and install materials so as to not delay Work and install only after preparations for installation have been completed.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the

Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

PRODUCTS

TRASH RECEPTACLE (Unit)

Trash Receptacle Unit shall consist of the complete assembly, consisting of the reinforced pre-cast sealed concrete shell, galvanized steel internal liner, aluminum ash ring, silica sand, and mounting hardware.

Manufacturer: Refer to the Contract Drawings.

Model Number: Refer to the Contract Drawings.

Color/Finish:

Pre-cast Unit: Refer to the Contract Drawings.

Lid: Refer to the Contract Drawings.

Install in quantity as indicated on the Contract Drawings.

MISCELLANEOUS MATERIALS

Anchors, Fasteners, Fittings, and Hardware: Stainless steel, commercial quality, tamper-proof, vandal & theft resistant, concealed, recessed, and capped or plugged. Provide from manufacturer of site furnishing, as applicable.

Non-shrink, Non-metallic Setting Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous Setting Grout, suitable for exterior applications, complying with ASTM C1107.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Euco N-S Grout, Euclid Chemical Co.

Crystex, L&M Construction Chemicals, Inc.

Masterflow 713, BASF Building Systems, Inc.

Conspec Enduro 50, CONSPEC Marketing and Manufacturing Co.

Rapidset Grout, Rapidset Products.

SikaGrout 212, Sika Corporation.

Quikcrete Commercial Grade Fast Set Non-Shrink Grout, Quikcrete Companies.

588 Grout, W.R. Meadows.

Certi-Grout #1000, Vexcon Chemicals.

Or equal, as approved by the Landscape Architect.

Erosion-resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pour-able anchoring, patching, and grouting compound, resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, recommended in writing by manufacturer of site furnishings, for exterior applications.

EXECUTION EXAMINATION

General: Examine areas and conditions under which site furnishing units are to be installed with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

Remedy any conditions detrimental to the proper and timely completion of the Work.

Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Landscape Architect.

Verification:

Verify that substrates are stable and capable of supporting the weight of items covered under this Section.

Verify that substrates have been adequately prepared to securely anchor those items that will be surface mounted.

INSTALLATION

Trash Receptacle (Unit):

Trash Receptacle Unit shall be furnished and located as shown on the Contract Drawings, and as directed by the Contract Specifications. Verify exact locations (both at ground level and on-structure) with the Landscape Architect prior to installation.

Use actual Unit(s) to establish all dimensions for installation.

Erect and install Unit(s) in accordance with the Manufacturer's instructions and recommendations. Install unit(s) plumb, accurately, and in the correct orientation and relationship with other site furnishings, elements and/or paving as shown on the Contract Drawings.

Install all anchorage and mounting hardware, as applicable, in strict accordance with Manufacturer's instructions, and as directed by the Landscape Architect.

PROTECTION

Protect installed furnishings against damage throughout the duration of the construction period, complying with Manufacturer's directions.

Remove and replace damaged furnishings as required to deliver factory-condition units at Final Acceptance of Work.

CLEANING

After completing site furnishing installation, inspect components. Remove protective packaging and dispose properly. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

Touch-up Painting: Where directed by the Landscape Architect, clean field welds, bolted connections, and abraded areas of the Work. Paint exposed areas with paint or other material as supplied by the Manufacturer of the damaged Unit. Apply by brush, to thickness recommended by paint manufacturer.
312219 – LANDSCAPE GRADING

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work for Finished Grading in Landscape Planting Areas, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Finish Grading of Landscape Planting Areas.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 328400 - Irrigation Systems.

Section 329113 – Soil Preparation.

Section 329300 - Exterior Plants.

Section 329400 – Landscape Planting Accessories.

Section 329813 – Landscape Establishment Period.

Section 334300 - Landscape Drainage.

SITE CONDITIONS

Dust Nuisance: Contractor shall assume full responsibility for alleviation or prevention of dust as a result of Work under this Section.

Excessive rock, dead or declining vegetation, trash, debris, or other items that has accumulated shall be removed from the Project Site by the Contractor, and as directed by the Landscape Architect, prior to completion of Finish Grading operations.

Work under this Section shall be performed only during the period when beneficial and optimum Landscape Grading results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure or cause compaction. Landscape Grading operations shall be suspended until, in the opinion of the Landscape Architect, the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

Soil moisture level prior to Landscape Grading shall be no less than 75% of field capacity. The determination of adequate soil moisture for Landscape Grading shall be in the sole judgment of the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications:

Valid California C-27 (Landscaping Contractor) License.

Engage an experienced, licensed Contractor who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

Installer's Field Supervision: Contractor shall maintain an experienced, full-time landscape supervisor/superintendent at the Project Site during times that landscaping operations identified herein the Contract are in progress.

COORDINATION, SCHEDULING:, AND OBSERVATIONS

Sequencing: Complete Finish Grading after general Soil Preparation (refer to Section 329113) and prior to installation of Irrigation System (Refer to Section 328400) in each area graded.

Re-grade, as required, to acceptable Landscape Grades established by Landscape Architect once irrigation system is installed.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to adequate Finish Grading operations are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease operations and notify Landscape Architect for further direction.

Perform Finish Grading operations only when weather and soil conditions are suitable in accordance with locally accepted practices.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective work under this Section at any time during progress of Work. Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

PRODUCTS (NOT APPLICABLE)

EXECUTION

EXAMINATION

Verification of Conditions: Verify that the following soil preparation items (per Section 329113) have been completed prior to commencement of Landscape Grading:

Installation of (stockpiled) topsoil and soil preparation, including debris removal.

Incorporation of soil amendments.

INSTALLATION

Subsoil Preparation:

Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc. Remove sub-soil that has been contaminated with petroleum products.

Cut out areas to subgrade elevation which are to receive stabilizing base for paving and sidewalks.

Bring sub soil to required levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.

Cultivate subgrade to a depth of three-inches (3") where topsoil is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted sub-soil.

Finish Grading:

In all planting areas, a layer of soil amendments and fertilizers shall be uniformly spread and thoroughly cultivated by means of mechanical tiller as recommended by the approved Agronomic Soil Fertility Report (per Section 329113 – Soil Preparation). Planting areas shall be free of all weeds, construction debris, trash, debris, and rocks 1" in diameter or larger for a minimum depth of two-inches (2").

Provide Finish Grades for natural runoff of water without low spots or pockets. Accurately set flow line grades at a two-percent (2%) minimum positive gradient, unless otherwise noted in the Contract Drawings.

Finish Grades shall be smooth, even, and on a uniform plane with no abrupt changes, pits, or undulations of the surface. Slope grades uniformly between given spot elevations.

Finish Grades not otherwise indicated shall be uniform levels or slopes between points where elevations are given, or between points established by walks, paving, curbs or catch basins.

Tops and toes of slopes shall be gently rounded or feathered to produce a gradual and natural-appearing

transition between relatively level areas and slopes, per the satisfaction of the Landscape Architect.

Slope grade away from buildings a minimum two-inches (2") in ten-feet (10') unless otherwise indicated on Contract Drawings.

Tolerances:

Planting areas, including areas planted with turf grasses, shall be true to grade within one-inch (1") when tested with a ten-foot (10') straightedge.

Hold Finish Grades in landscape planting areas below top of adjacent pavement, headers, curbs, or walls (where applicable), as follows:

Shrub, Annual and Groundcover Areas: One and one-half inches (1-1/2").

321216 – ASPHALT PAVING

GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes bituminous concrete paving work complete, as shown, and as specified.

Products Installed But Not Furnished Under This Section: Division 2 – Section 'Irrigation System', Sleeves and Conduits.

Note: some jobs will include concrete in scope of AC work

Unit Prices: Cost of all components and accessories shall be included in the unit price of the work.

Item	Unit Price
Asphalt Concrete Paving	Square Foot
Asphalt Concrete Curb	Lineal Foot

REFERENCES

Standard Specifications - Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.

ASTM - American Society for Testing and Materials

AASHO - American Association of State Highway Officials

AIM - Asphalt Institute Manual: Construction Specifications for Asphalt Concrete and Other Plant Mix Types

FS - Federal Specifications

DEFINITIONS

Percent Compaction: Modified Proctor ASTM D1557-78 and ASTM D1556-64, percentage of the laboratory maximum in-place dry density.

SUBMITTALS

Product Data: Manufacturers' current catalog cuts and specifications of the following:

Herbicide

Traffic paint

Test Reports: Manufacturer's laboratory tests and reports of asphalt concrete mixes.

Supplier: Name, address and phone number of proposed supplier of asphalt concrete mix.

QUALITY ASSURANCE

Labor: Provide written verification of at least five [5] years experience in bituminous concrete paving of the type specified. Employ qualified personnel, experienced in the work at all times.

Equipment: Use only pieces of equipment [acceptable to the project engineer and] applicable to the work being performed and designed to generate the compaction densities specified.

Bituminous Concrete Mix: Use only materials furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.

PROJECT/SITE CONDITIONS

Environmental Requirements:

Condition of Base Surface: Do not execute the work when the base surface is wet or when it contains an excess of moisture which would prevent uniform distribution and required penetration of primer and tack coat.

Primer Coats: Apply only when the ambient temperature in the shade is 50 degrees F. for 12 hours immediately prior to application.

Base Course: Place when air temperature is not below 30 degrees F. and rising, when acceptable to the Landscape Architect.

Bituminous Concrete Surface Course: Construct only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.

Existing Conditions: For protection of existing plants to remain, see Division 2 - Section 'Tree Protection and Trimming. Section 'Site Clearing'

SEQUENCING AND SCHEDULING

Vehicular and Pedestrian Traffic: Maintain during paving operations, as required for other construction activities.

Flagmen, Barricades, Warning Lights and Signs: Provide as necessary for movement of traffic and safety and to cause the least interruption of work.

Coordination: Coordinate with the work of other sections to insure the following sequence of events.

Irrigation, Electrical and Other Sleeves: Place all sleeves prior to commencing bituminous concrete work.

Drainage: Provide ample notice for drainage contractor to set all pipes for area drains in bituminous concrete work.

Fill in as needed

Tree Wells in Paving:

PRODUCTS

ACCESSORIES

Aggregate Base Course: Class 2 aggregate base [3/4 in.] [1-1/2 in.] maximum aggregate size, conforming to Section 26 of the Standard Specifications.

Herbicide: "Treflan 5G" by Elanco Products Co., [317] 261-3868 "Chipco Ronstar G" by Rhone-Poulenc, Inc., [201] 297-0100.

Wood Headers: Construction heart grade redwood header and stake [or pressure-treated Douglas fir stake]. No sapwood.

Paints for Traffic Marking:

Type: Factory-mixed, quick-drying and non-bleeding [Federal Specifications] FS TT-P-115C, Type III.

Finish: Two [2] coats, non-reflective .

Film Thickness: [1.5 mil.] [3.0 mil.]

Product:

White Paint: #112-8065, by Hawkins Traffic Safety Supply Co. [510] 525-4040, #V10-31 by DuPont [800] 441-7515, or equal.

Yellow Paint: DuPont #112-8049, Hawkins Traffic Safety Supply Co. #V10-32 or equal.

MIXES

Asphalt Concrete: Type "B" [1/4 in.] [3/8 in.] [1/2 in.] maximum aggregate size, conforming to Section 39 of the Standard Specifications.

Use smaller size aggregate for AC walks.

Prime Coat: Liquid asphalt, Grade MC-70 or SC-70 conforming to Section 93 of the Standard Specifications.

Applied to an existing asphalt concrete surface]

Tack Coat: [SS-1] [SS-1h] emulsified asphalt conforming to Section 37 of the Standard Specifications.

Used to renew old asphalt surfaces & seal small cracks & surface voids

Fog Seal: [SS-1] [SS-1h] emulsified asphalt conforming to Sections 37 and 39 of the Standard Specifications.

EXECUTION

EXAMINATION

Inspect the area to be paved and verify that subgrades have been established and accepted under another section.

Report all discrepancies from the plans, as well as all conditions such as poor drainage which would result in hidden cause of failure of the work.

PREPARATION

Embedded Items: Protect embedded items in asphalt concrete so that they will not be displaced during installation of asphalt concrete.

Irrigation Conduit and Other Sleeving: Locate so as to maintain strength of asphalt concrete at maximum. Verify size, length and location of conduits from irrigation drawings.

Aggregate Base Course:

Thickness: Install base course to thickness shown on the Drawings.

Compaction: Compact base course by rolling or other approved method to 95% compaction. Maintain proper slope during compaction.

Weed Control: Apply herbicide over base course of entire area to be paved in accordance with the manufacturer's latest printed instructions.

Concrete Headers: Install per details shown on the Drawings.

Select one

Prime Coat: Apply coat at an approximate total rate of 0.25 gal./sq.yd. over compacted and cleaned base course. Conform to Section 39 of the Standard Specifications.

Or

Prime Coat:

NOT FOR CONSTRUCTION

Application:

Uniformly apply at rate of [0.25 to 0.50] gal. per sq. yd. over compacted and cleaned base course.

Apply enough material to penetrate and seal, but not flood the surface.

Protection: Protect all adjacent site improvements from overspray or spillage. Do not permit planting areas to become contaminated with solution. Remove all overspray prior to curing.

Curing: Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours.

Removal of Excess Solution: After 24 hours, when the liquid asphalt shall have penetrated to surface, blot excess asphalt with just enough sand or binder material to prevent pick-up under traffic.

Select one

Tack Coat: Apply a "tack coat" to all vertical faces, against which asphalt concrete is to be placed. Apply at a rate of from 0.02 gal. to 0.10 gal./sq. yd. Conform to Section 39 of the Standard Specifications.

Or

Tack Coat:

Application Rate: 0.05 to 0.15 gal./sq. yd. of surface.

Composition: Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete [or Portland cement concrete] and similar surfaces.

Tack Coat: Apply tack coat by brush to contact surfaces of curbs, gutters, [manholes] and other structures projecting into or abutting asphalt concrete pavement.

Control: Confine tack coat application accurately within limits of succeeding asphalt pour. Immediately clean up all overspills.

Drying: Allow surfaces to dry until material is at condition of "tackiness" to receive pavement.

INSTALLATION

Bituminous Concrete Paving:

Place initial course within 24 hours of priming base surfaces. Before laying of asphalt concrete, thoroughly clean surface of base course of oil, dirt, loose materials, by means of power brooms supplemented by hand brooming if necessary.

Note: If pedestrian paving only, use only single 2 in. course.

Spread and compact bituminous concrete on the prepared base [in two [2] in. lifts] in conformance with the lines, grades and dimensions shown on the drawings [and as specified in Section 39 of the Standard Specifications.] [Place topping course within two [2] hours of placing and compacting initial course.]

Or

Steam refined paving asphalt to be mixed with aggregate conforming to AASHO Standards, with a penetration range of 60-70.

Immediately remove all excess asphalt which has spilled beyond the limit of the work.

Asphalt Concrete Curb:

Positioning: Place curbs over all in-place and compacted pavement surfaces.

Tack Coat: Apply a light tack coat unless pavement surface is still tacky and free from dust.

Placement: Place curb materials to cross section shown using machine-laying methods unless otherwise acceptable to Landscape Architect.

Rate of Placement: Adjust rate of placement to ensure bonding and compaction of mixture as it is placed.

Hand Placement: Material may be placed by hand in wood or metal forms when permitted by Landscape

Architect. Tamp hand-placed materials and screed to a smooth finish.

Forms: Remove forms as soon as material has cooled to air temperature.

Fog Seal:

Preparation of Surface: Free the surface of dust and loose material prior to application.

Application Rate: After completion of the surfacing, apply a seal coat at the rate of 0.10 gal. of the diluted emulsion per sq. yd. of surface.

TOLERANCES

Flatness: Surfaces shall not vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes.

Variation from True Elevation: Not to exceed 1/2 in.

Irregularities: No "birdbaths" or other surface irregularities will be permitted.

Correction: Correct irregularities to the satisfaction of Landscape Architect.

PAINT APPLICATION

Cleaning:

Sweeping: Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.

Marking: Do not begin marking asphalt concrete pavement until acceptable to Landscape Architect.

Application:

Apply paint with mechanical equipment. Finished markings shall have uniform straight edges, crisp and sharp without spray or spattering.

Not less than 2 separate coats in accordance with manufacturer's latest printed specifications.

Mistakes, if any, must be completely removed by sandblasting, using methods approved under air pollution control statutes. Hiding with slurry coat or other paints not acceptable.

FIELD QUALITY CONTROL

Testing: The Landscape Architect [Owner] will select a qualified Testing Laboratory to take samples for testing during the course of the work for conformance to specifications.

Cost of Testing: Initial testing paid for by the Owner. Contractor to pay all retesting of failed materials.

Cost of Removal and Replacement: Pay costs of removal of rejected materials not meeting specifications. Pay cost of replacement with asphalt concrete of specified strength.

CLEANING

Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials and debris.

PROTECTION

After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than 6 hours.

Provide barricades and warning devices as required to protect pavement and the general public.

Cover openings of structures in the area of paving until permanent coverings are placed.

321219 - PAVEMENT MARKINGS AND ACCESSORIES

GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes furnishing and installing of pavement markings and accessories, complete, as shown and as specified.

REFERENCES

California Department of Transportation [CDT]:

Maintenance Manual.

Standard Specification: Sections 82, 84, 85, 90, 91, 94 and 95.

Traffic Manual: Chapters 4, 6, and 7.

PROJECT CONDITIONS

Specifications, standards, tests and recommended methods cited in the above referenced specifications shall determine quantity and quality of materials and methods unless specifically designated otherwise.

Reference to makers, brands, models, etc. is to establish type and quality desired; substitution of equals will be permitted upon approval by the Engineer.

Contractor shall guarantee that all traffic lane pavement markers be in place and adhered to the pavement for a period of not less than ninety [90] days from the date of acceptance of the work by the City.

Existing traffic signs shall remain in place until the new traffic signs have been erected.

MANUFACTURER'S Drawings and installation data

The bollard system drawings and installation maintenance and operating manuals shall be sent to purchaser within 4 weeks of order. Two additional copies shall be supplied.

PRODUCTS

TRAFFIC PAINT

Traffic paint shall conform to or exceed the standards set forth of the State of California Materials and Research Department. Common brands are Kelly Moore No. 2130, Crown Products, DeSoto and Bauer.

All paint shall be thoroughly mixed prior to placing in painting equipment.

SIGNS

Sign Posts:

Unless otherwise indicated, new sign posts shall be 2" I.D. standard wall steel galvanized pipe with one end finished to receive mounting cap and fittings.

Concrete for sign post footings shall be Class B conforming to applicable requirements for Section 90 of the CDT Standard Specifications.

Hardware shall conform to applicable portions of Section 20.09 of the Maintenance Manual.

Sign panels, unless noted otherwise shall be of reflectorized porcelain enamel. They shall be of the size noted on the plans or when not specified they shall be the smallest available size. Contractor shall submit shop drawings to the Engineer for approval prior to ordering signs.

PAVEMENT MARKERS AND ADHESIVES

Pavement markers shall conform to the provisions of Section 85 "Pavement Markers" and adhesives shall conform to the provisions of Section 95-2.05. "Standard Set Epoxy Adhesive for Pavement Markers" of the CDT Standard Specifications.

EXECUTION

TRAFFIC PAINT AND GLASS BEADS

Types of Traffic Paint:

White:

Solid 4" line; edgelines, regular parking stalls, and compact parking stalls.

Yellow:

Solid 4" wide lines: island markings and centerline striping.

Blue:

Solid 4" line: handicapped parking stalls.

Blue curb: handicapped; parking stalls.

Pavement Markings: international handicapped symbol.

Red:

Red curb: no parking.

Rate of Application:

All new surfaces shall have the traffic paint applied in two applications. The first or priming coat shall be in light applications without glass beads to seal the pavement. The second heavier coat of paint is the wearing surface and the rate of application are shown in Table 1.

Restriping where indicated on the drawings, shall coincide with the original painted and shall be applied in one application at the rate indicated in Table 1.

All surfaces to be painted shall be clean and dry prior to painting. There shall be a minimum drying time between paint applications of approximately 20 minutes.

Glass beads shall be placed on all traffic stripes and pavement markings except for the first or priming coat on new asphalt surfaces. Rates of application are shown in Table 1. All glass beads shall be applied directly to the wet traffic paint with a method that provides uniform distribution.

Rates of Application:

Broken Stripe [4" wide]

New surface [1st coat]: 4 - 5 gallons per mile or 1 gallons per 130-165 SF in line.

2nd coat or restriping 7 - 7.4 gallons per mile or 1 gallon per 90-100 SF of line

Glass beads with 2nd coat: 42 lbs/mile or 6 lbs/gallon of paint

Solid Stripe [4" wide]

New surface [1st coat]: 12 - 14 gallons per mile or 1 gallon per 125-150 SF of line

2nd coat or restriping: 16 - 18 gallons per mile or 1 gallon per 100-110 SF of line

Glass beads with 2nd coat: 110 lbs./mile or 6 lbs./gallon of paint

Black Traffic Paint

This quantity pertains to black line painted between parallel, solid yellow lines, not for painting out

8 gallons per mile existing striping or 1 gallon per 220 SF of line

Pavement Markings

New surface [1st coat]: 1 gallon per 200 SF of area

2nd coat or restriping: 1 gallon per 100 SF of area

Glass beads with 2nd coat: 6 lbs/gallon paint

The Contractor shall provide sufficient evidence to the City's representative that the quantity of paint specified has been applied to the job. Such evidence can be invoice tickets made out to the specific job, counting empty paint cans, or a method acceptable to the City's representative.

Striping shall not be applied at temperatures below 40° F or if pavement surfaces are wet.

The alignment of all striping shall be accurately laid out. Lines which do not conform to the alignment as set forth in the plans, or which have a wavy appearance, shall be removed and replaced by the Contractor at his expense.

THERMOPLASTIC MATERIAL AND GLASS BEADS

Types of Thermoplastic:

White:

Solid 12" line: stop bars and crosswalks.

Pavement Markings: Word markings [e.g. "STOP", "BIKE LANE", "ONLY", 'NO PARKING"] and symbolic markings [e.g. turn arrows, directional arrows].

Thermoplastic material and glass beads shall be applied in accordance with CDT Standard Specifications Section 84-2.04. Minimum application thickness shall be 0.100-inch for traffic stripes and 0.150-inch for pavements markings.

REMOVAL OF STRIPES

All stripes and pavement markings not in conformance with the proposed striping plan shall be removed by sandblasting. Painting-out black point will not be allowed unless specifically indicated on the drawings. In slurry seal and asphalt concrete overlay areas, painted stripes and markings need not be removed prior to sealing or overlay operations; all thermoplastic material and raised pavement markers shall be removed prior to slurry seal or overlay application.

After removal of paint, apply fog seal coat of SS-1h emulsified asphalt per Section 94 of CDT Standard Specifications to all asphalt surfaces affected by the removal operations. The fog seal coat must be given ample time to dry prior to the initial painting application.

TRAFFIC CONTROL SIGNS

Posts, attachments, and sign backs shall be given a prime coat before erection, priming of conform to Section 91 of the CDT Standard Specifications. After erection, surfaces shall be touched up with primer as needed and subsequently each sign shall be painted with two coats of paint.

321313 - CONCRETE PAVING

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work for Cast-in-Place Site Concrete Paving, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Cast-in-Place Concrete Steps.

NOT FOR CONSTRUCTION

Cast-in-Place Concrete Ramps.

Cast-in-Place Concrete Curbs and Gutters.

Cast-in-Place Concrete Walkways, Patios, Courtyards, and/or Plazas.

Cast-in-Place Concrete Sidewalks.

Jointing (Expansion Joints, Contraction Joints, Isolation Joints, Keyway/Construction Joints and/or Architectural Score Joints).

Joint Sealants.

Steel Reinforcement (Bars and/or Welded Wire Fabric).

Steel Dowels and Sleeves.

Compacted Sub-Surface Materials.

Concrete Pavement Finishes.

Concrete Paving Surface Sealants.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 321323 – Site Concrete (misc. footings, headers, foundations, etc.)

See Division 1 Section "LEED Requirements Summary" for recommendations and requirements for recycled content, regional materials, FSC certified formwork, low-emitting concrete finishes and LEED submittal requirements for all concrete materials.

DEFINITIONS AND APPLICABLE STANDARDS

References:

AASHTO – American Association of State Highway and Transportation Officials.

ADAAG – American with Disabilities Act Accessibility Guidelines.

ACI – American Concrete Institute.

ANSI – American National Standards Institute.

ASTM – American Society for Testing and Materials.

CRSI – Concrete Reinforcing Steel Institute.

NRMCA - National Ready Mix Concrete Association.

PCA – Portland Cement Association.

SWRI – Sealant, Waterproofing & Restoration Institute.

IBC – International Building Code.

Standard Specifications – Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS, latest edition.

CBC – California Building Code, Title 24 Disabled Access Regulations.

Definitions:

Cementitious Materials: Portland Cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

Percent Compaction: Per ASTM D1557, percentage of the maximum in-place dry density of the same material, as determined by Geotechnical Engineer.

Standards of Construction:

ACI 214 – Recommended Practice for Evaluation of Strength Tests Results of Concrete.

ACI 301 – Details and Detailing of Concrete Reinforcement.

ACI 303.1 – Standard Specification for Cast-in-Place Architectural Concrete.

ACI 304 – Recommended Practices for Measuring, Mixing, Transporting, and Placing of Concrete.

ACI 305 – Recommended Practices for Cold Weather Concreting.

ACI 306 – Recommended Practices for Hot Weather Concreting.

ACI 308 – Standard Practice for Curing Concrete.

ACI 347 – Recommended Practice for Concrete Formwork.

ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

ASTM A615 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM C33 – Standard Specification for Concrete Aggregates.

ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.

ASTM C94 – Standard Specification for Ready-Mix Concrete.

ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregate.

ASTM C143 – Test Method for Slump of Portland Concrete Cement.

ASTM C150 – Standard Specification for Portland Cement.

ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

ASTM D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).

National Ready Mix Concrete Association, latest revision: "Certificate of Conformance for Concrete Production Facilities".

Measurements:

PSI: Measurement, in pounds per square inch.

CU/FT: Measurement, in cubic-foot.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data: Submit available product/material literature supplied by manufacturer's, indicating that their products comply with specified requirements. Provide manufacturing source (name, address,

and telephone number), and distributor source (name, address, and telephone number) for each type of product/material:

Reinforcement and Forming Accessories.

Cementitious Materials.

Integral Aggregates (Coarse and Fine).

Chemical Admixtures.

Jointing Materials and Systems, including Joint Sealants.

Curing Compounds.

Finishing Materials (top-seeding materials, color hardeners, surface retarders, etc.)

Paving Surface Sealants.

Statement of Mix Design: Prepared by the batch plant servicing the Project, submit for each type or load delivered to Project. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Each Statement of Mix Design shall include the following:

Name, address, and telephone number of batch plant preparing Statement of Mix Design.

Date of Mix Design.

Project location.

Contractor requesting load delivery.

Mix Design Number.

Admixtures (as required).

Integral Color Admixtures (as required).

Gradations for sand and aggregate.

Material weights, specific gravity, and absolute volumes.

Basis of testing, i.e. IBC 2605 D4 and CBC Title 24 2604 D4.

Water/Cementitious Materials Ratio (W/CM Ratio).

Slump.

PSI Rating.

Material Test Reports: Signed and stamped laboratory test reports for evaluation of concrete materials and mix design tests.

Material Certificates: Submit, in lieu of material laboratory test reports, when permitted by the Landscape Architect. Material certificates shall be signed by the Manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.

Scaled Shop Drawings: Submit Scaled Shop Drawings for form work, indicating fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, pour sequencing, dimensioned locations of all construction, control and expansion joints, and other items that affect exposed concrete visually.

Review with the Landscape Architect for general architectural applications and features only. Designing form work for structural stability and efficiency shall be the Contractor's responsibility.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Concrete Paving installations. Include lists of completed projects with project names and addresses, names and addresses of

Architects/Landscape Architects, Artists and Owners, and other information specified.

Minutes of Pre-Installation Conference, distributed and approved in writing as to the content of the conference by concerned parties in attendance.

Material Samples: Submit four (4) sets of physical Material Samples for review of kind, color, pattern, size, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed. Include the full range of exposed color and texture expected in the completed Work. Provide Material Samples bound and individually wrapped in re-sealable labeled 1-gallon plastic bags (as applicable):

One (1) 2-pound sample of each seeded Aggregate.

One-foot (1'-0") section of each Joint Sealant material.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work under this Section shall proceed until all information indicated herein this Article have been reviewed, accepted, and approved by the Landscape Architect, in writing.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications: Engage an experienced Installer who has completed in the last two (2) years at least three (3) concrete paving installations similar in material, design, and extent to that indicated for this Project, and whose work has resulted in construction with a record of successful in-service performance.

Requirement: Valid California C-8 (Concrete Contractor) License.

Applicable Standards of Work:

Applicable specifications and recommended practices of American Concrete Institute (ACI), American Society for Testing and Materials (ASTM), The Uniform Building Code, with their individual designations, are to be considered part of this Specification. Refer to "Standards of Construction" under "Definitions & Applicable Standards" Article herein this Section.

Design and Control of Concrete Mixture, Thirteenth Edition, Portland Cement Association.

Manual of Standard Practice, Concrete Reinforcing Steel Institute (CRSI).

Sealants: The Professional's Guide, Sealant, Waterproofing & Restoration Institute (SWRI).

Field-Constructed Mock-up Samples:

General: Prior to the installation of Work under this Section, Contractor shall erect Field-Constructed Mock-up Samples for each type and pattern of Concrete Paving required for review and approval by the Landscape Architect, to verify selections made under the referee samples obtained by the Landscape Architect.

Build Field-Constructed Mock-up Samples to comply with the following requirements, using materials and same base construction including special features for form work, jointing, surface finishes, textures, color(s), and contiguous Work as indicated for the final unit of Work.

Locate Field-Constructed Mock-up Samples on the Project Site in location(s) as directed by the Owner.

Notify the Landscape Architect, in writing, at least one (1) week in advance of the dates and times when Field-Constructed Mock-up Samples will be erected.

Demonstrate quality and range of aesthetic effects and workmanship in the Field-Constructed Mock-up Samples that will be produced in final unit of Work.

Obtain the Landscape Architect's acceptance of Field-Constructed Mock-up Samples, in writing, before start of installation of Work.

Retain and maintain Field-Constructed Mock-up Samples during construction in an undisturbed condition

as a standard for judging the completed unit of Work.

When directed by the Owner, Contractor shall demolish and remove Field-Constructed Mock-up Samples from Project Site.

Size: Each Field-Constructed Mock-up Sample within this Section shall measure a minimum of three-feet (3'-0") wide x six-feet (6'-0") long to compare the aesthetics of material colors, textures, and finishes.

When the Landscape Architect determines that a Field-Constructed Mock-up Sample does not meet acceptable requirements, retain it for reference and cast another Field-Constructed Mock-up Sample (as required) until the Sample is accepted.

Accepted Field-Constructed Mock-up Samples will be the standard by which Work under this Section will be evaluated for technical and aesthetic merit. Accepted Field-Constructed Mock-up Samples are the prerequisite to the commencement of Work.

Single-Source Responsibility: Obtain each color, type, and variety of cementitious materials, aggregates (coarse and fine), chemical admixtures, water source, jointing materials, and other materials, from a single source, with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

Manufacturer shall be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.

Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.

Permits, Fees, Bonds, Tests, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, tests, and inspections necessary to perform and complete Work under this Section.

Pre-installation Conference: Before installing Work as indicated herein this Section, conduct a Preinstallation Conference at the Project Site with the Landscape Architect to review requirements and design objectives, including a review of concrete textures, colors, finishes, layouts, and other design intents of the Work. Conference shall be held prior to erecting the Field-Constructed Mock-up Samples.

Notify participants in writing at least five (5) working days prior to Conference.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in a timely manner to ensure un-interrupted progress of the Work.

Store materials in a dry and protected location. Protect reinforcing steel and dowels from rusting, deformation, staining, and moisture damage.

Store materials by methods that prevent damage and permit ready access for inspection and identification. Package cement delivered to the Project Site shall be in strong paper or jute bags with brand name and manufacturer's name stamped thereon. Store cement under cover. Remove packaged cement immediately from the Project Site should it become wet or show any signs of caking or deterioration.

Keep surface seeded/finishing materials dry prior to installation, as required.

PROJECT SITE CONDITIONS

Traffic Control: Maintain access for vehicular, bicycle, and pedestrian traffic as required for other construction activities. Access to the surrounding buildings shall also be unobstructed and maintained at all times to allow for entry and exit of emergency vehicles.

Do not place concrete during rain or adverse weather conditions without means to prevent damage. Conform to requirements specified hereinafter whenever concrete placement is required during cold or hot weather.

Dust Nuisance and Control: Contractor shall assume full responsibility for alleviation or prevention of dust as a result of Work under this Section. Maintain control of Concrete Paving dust during duration of Contract. Do not permit adjacent planting areas to be contaminated. Clean up debris resulting from this work at the end of each day's Work.

Grades and Levels: Establish and maintain required levels and grade elevations. Review installation procedures and coordinate Work in this Section with other Work affected.

Lines and Levels to be established by a licensed Surveyor or registered Civil Engineer.

Keep Work area clean, and in a safe and workmanlike condition so that rubbish, waste, and debris does not interfere with Work of other trades.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Sequence and Scheduling: Notify Contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place, such as:

Irrigation Pipe Sleeves under paving. Refer to Section 328400 – Irrigation Systems.

Accessories embedded in the concrete, and for the provision of holes, openings, etc., necessary to the execution of the Work of the trades.

Field Measurements: Contractor shall take field measurements as required. Report major discrepancies between the Contract Drawings and field dimensions to the Landscape Architect prior to commencing Work.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to adequate installation operations are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease operations and notify Landscape Architect for further direction.

Environmental Conditions: Perform installation operations only when weather and soil conditions are suitable in accordance with locally-accepted practices.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected materials immediately from Project site. Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape

Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

PRODUCTS

FORMS

Form Materials: Plywood, wood, MDO plywood, metal, metal-framed plywood, or other approved paneltype materials, of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

Provide Forms that are full-depth, continuous, straight and free of distortions and defects, and level or sloping along exposed surfaces.

Provide Forms of sufficient strength and durability to hold concrete properly in place and prevent leakage of water from Forms.

Use flexible spring forms, laminated boards, or foam forms to form radius bends, as required.

No wood-textured finish from Forms will be permitted on exposed concrete unless specified as such.

Textured Form Facings: Refer to Contract Drawings or requirements indicated herein this Section, as required.

Form Release Agent: Premium, Volatile Organic Compound (VOC)-compliant (low to no VOC), 100% biodegradable liquid-based (either natural emulsified vegetable oil-based, soy-based, or water-based), colorless, non-staining Form Release Agent. Agent shall not bond with, leave no residual matter on concrete surfaces, nor adversely affect the bond or performance of subsequent treatments to the concrete surfaces.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Atlas Bio-Guard 2000, Atlas Tech Products.

Bio Release Agent, Burke, Edoco.

Enviroform, Conspec, Dayton Superior Company.

Bio-Release EF, Conspec, Dayton Superior Company.

Bio-Form, Leahy-Wolf Company.

Crete-Lease 20-VOC, Cresset Chemical Company.

Duogard II, W.R. Meadows, Inc.

FORMSHIELD WB, Tamms Industries.

Greenplus Form Release Agent ES, Greenland Corporation.

Soy Form Release and Natural Form Oil, Natural Soy, LLC.

SOYsolv Concrete Form Release Agent, SOYsolv.

Or equal, as approved by the Landscape Architect.

STEEL REINFORCEMENT

Plain (Smooth) Steel Welded Wire Reinforcement (to 65,000psi): Meet ASTM A185, fabricated from asdrawn steel wire into flat sheets. Rolls are not acceptable.

Deformed-Steel Welded Wire Reinforcement (to 70,000psi): Meet ASTM A497, flat sheet. Rolls are not acceptable.

Steel Reinforcement Bars: Meet ASTM A615, Grade 60 deformed, clean and free of rust, dirt, grease or oils.

Steel Bar Mats: Meet ASTM A184 with ASTM A615, Grade 60 deformed bars; assembled with clips.

Steel Tie Wire: 16-gauge minimum, black annealed, plain cold-drawn steel conforming to ASTM A82, clean, and free of rust, dirt, grease or oils.

Construction/Expansion Joint Dowel Bars & Slip Dowel Sleeves:

Steel Joint Dowel Bars: Meet ASTM A615, Grade 40 smooth, billet-steel, shop painted with iron-oxide zinc-chromate primer, free of rust, dirt, grease, and oils. Cut Bars true to length with ends square and free of burrs.

Length and Size: As indicated on the Contract Drawings.

Slip Dowel Sleeve System: A reusable base and plastic sleeve, manufactured from polypropylene plastic. Encase fifty percent (50%) of each dowel in a plastic sleeve to allow parallel lateral movement of each Dowel. Size of Sleeve to match size of Dowel.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Speed Dowel, Greenstreak.

Or equal (no known equal).

Snap Ties: Snap-off metal of fixed length capable of leaving no metal within 1 1/2 in. of surface or causing fractures, spall, or other defects larger than one (1) in. diameter.

Hook Bolts: ASTM A307, Grade A internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

Supports for Reinforcement: Lightweight, strong, non-corrosive, durable, and impervious to water. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place, as manufactured from 100% recycled-content plastic or engineered resins from recycled ABS plastic, polycarbonates, and fiberglass.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Rebar Supports, Eclipse Plastics Inc.

Concrete Casting Plastic Rebar Supports, Build Global, Inc.

Reinforcing Bar Supports, Shin Hwa Industrial Co.

Plastic Rebar Supports, Plasticon International, Inc.

Bar Lift Plastic Support, New Century Northwest.

Aztec Composite Plastic Rebar Supports, Dayton Superior.

Or equal, as approved by the Landscape Architect.

CONCRETE MATERIALS

Portland Cement: Meet ASTM C150. Use one (1) brand of cement (single source) throughout the Project, unless otherwise acceptable to the Landscape Architect. Contractor shall verify the cement color with the Landscape Architect. Cement Type as follows:

Cement Type: Type II.

(Note to SWA Specifier: Type I Cement is a general purpose and widely available cement, used when there are no extenuating conditions. Cement is on the warm-gray side in color).

(Note to SWA Specifier: Type III Cement is normally used when high-early strength is required (when forms need to be removed quickly or during cold-weather concreting. Type III is ground finer than Type I Cement is on the warm-gray side in color).

Normal-Weight Aggregates: Meet ASTM C33, Class 1N, and as follows:

Fine Aggregates: Meet ASTM C33, clean, hard, non-reactive, and durable sand, in accordance with SSPWC Section 200-1.5.3

Grading Requirements:

Sieve Size	Percent Passing
3/8"	100%
No. 4	95-100%
No. 8	75-95%
No. 16	55-75%
No. 30	30-50%
No. 50	10-25%
No. 100	2-10%

Coarse Aggregates: Meet ASTM C33, hard, durable, non-reactive, un-coated, graded, cleaned, and screened crushed rock or gravel aggregate for regular weight concrete.

Grading: Gradation in accordance with SSPWC-Table 200-1.4(B).

Local aggregates not complying with ASTM C33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to the Landscape Architect.

Water: Per ASTM C1602, from potable domestic source, free from deleterious materials such as oils, acids, and organic matter.

Pozzolans:

Fly Ash: Meet ASTM C618, Type C or F.

(Note to SWA Specifier: Fly Ash affects the plastic properties of concrete by increasing strength, improving workability, reducing water demand, reducing permeability. reducing segregation and bleeding and lowering heat of hydration. It also reduces corrosion of reinforcing steel, increases sulphate resistance, and reduces alkali-aggregate reaction. It also reaches its maximum strength more slowly than concrete made with only Portland cement. Especially useful in pre-stressed concrete and other applications where high early strengths are required.)

Ground Granulated Iron Blast-Furnace Slag: Meet ASTM C989, Grade 100 or 120.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Boral Material Technologies Inc.

Full Circle Solutions Inc.

Headwater Resources, Inc.

Holcim US, Inc.

Lafarge North America.

Mineral Resource Technologies, LLC.

Mineral Solutions, Inc.

The SEFA Group.

CHEMICAL ADMIXTURES FOR CONCRETE

General: Admixtures shall be certified by the Manufacturer to contain no more than 0.1 percent water-

soluble chloride ions by mass of cement and to be compatible with other Admixtures. Use of Admixtures shall not relieve the Contractor of the designated concrete requirements, including strength.

Air-Entraining Admixture: Meet ASTM C260.

(Note to SWA Specifier: Air Entraining Admixture is normally used in the concrete mix design where installations are subject to freeze/thaw conditions, or where Class F Fly Ash is used).

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Daravair 1000, Grace Construction Products, 800-433-0020.

Micro-Air, Master Builders, Inc., 800-628-9990.

Catexol[™] A.E. 360, Axim Italcementi Group, 800-899-8795.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Water-Reducing Admixture: Meet ASTM C494, Type A.

(Note to SWA Specifier: Water Reducing Admixture is normally used to decrease water in the concrete mix; increases workability; reduces cement).

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

WRDA, Grace Construction Products, 800-433-0020.

Micro-Air, Master Builders, Inc., 800-628-9990.

Eucon NW, Euclid Chemical Co., 800-321-7628.

Catexol[™] 3000 GP, Axim Italcementi Group, 800-899-8795.

Plastocrete® 161, Sika Corporation, 800-933-sika.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Water-Reducing and Set Retarding Admixture: Meet ASTM C494, Type B and D.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Daratard 17 Set Retarder, Grace Construction Products, 800-433-0020.

Pozzolith Retarder, Master Builders, Inc., 800-628-9990.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Shrinkage-Reducing Admixture: Meet ASTM C157. Provide at dosage of 2% by weight of cement.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Eclipse, Grace Construction Products, 800-433-0020.

Tetraguard, Master Builders, Inc., 800-628-9990.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Damp proofing Admixture: Hydrophobic, Meeting ASTM C836-81, fluid-V single component, bitumen-modified, moisture-curing polyurethane, added at time of batching.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Darapel, Grace Construction Products, 800-433-0020.

Rheomix 235, Master Builders, Inc., 800-628-9990.

Tremproof 60, Tremco, 800-321-7906.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Integral Concrete Coloring Admixture: Provide materials specifically designed for use in ready-mix concrete, from a single source, and shall be like in color and visual appearance. Meet ASTM C979.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Refer to the Cast-in-Place Concrete Pavement Schedule as indicated on Construction Drawings for requirements.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

CURING MATERIALS

Absorptive Cover: Burlap cloth, made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.

Moisture-Retaining Cover: One (1) of the following, complying with ASTM C171.

Polyethylene film.

Clear Water-Borne Membrane-Forming Curing Compound: Spray-applied, ready-to-use, meeting ASTM C309, Type I, Class A. Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

AH Curing Compound #2 DR WB, Anti-Hydro International, Inc.

Spartan-Cote, Burke Group, LLC.

Safe-Cure Clear, ChemMasters.

W.B. Resin Cure, Conspec Marketing & Manufacturing Co., Inc.

Day Chem Rez Cure (J-11-W), Dayton Superior Corporation.

Cure & Seal 30 EF, Conspec, Dayton Superior Corporation.

Nitocure S, Fosroc.

Aqua Kure-Clear, Lambert Corporation.

L&M Cure R, L&M Construction Chemicals, Inc.

1100 Clear, W. R. Meadows, Inc.

Resin Cure E, Nox-Crete Products Group, Kinsman Corporation.

Rich Cure E, Richmond Screw Anchor Co.

Resi-Chem Clear Cure, Symons Corporation.

Horncure 100, Tamms Industries Co., Div. of LaPorte Construction Chemicals N.A., Inc.

NOT FOR CONSTRUCTION

Hydro Cure, Unitex.

Certi-Vex Enviocure, Vexcon Chemicals, Inc.

Clear-Seal 150, A.C. Horn.

Master Seal, Master Builders.

Kure-N-Seal, Sonneborn.

Atlas Quantum – Cure, Atlas Tech Poducts.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Evaporation Retarder: Waterborne, spray-applied, ready-to-use, mono-molecular film-forming compound, formulated to be applied to fresh concrete surfaces, for temporary protection from rapid moisture loss. Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Cimfilm, Axim Concrete Technologies.

Finishing Aid Concentrate, Burke Group, LLC.

Spray-Film, ChemMasters.

Aquafilm, Conspec Marketing & Manufacturing Co., Inc.

Sure Film, Dayton Superior Corporation.

Eucobar, Euclid Chemical Co.

Vapor Aid, Kaufman Products, Inc.

Lambco Skin, Lambert Corporation.

E-Con, L&M Construction Chemicals, Inc.

Confilm, Master Builders, Inc.

Waterhold, Metalcrete Industries.

Rich Film, Richmond Screw Anchor Co.

SikaFilm, Sika Corporation.

Finishing Aid, Symons Corporation.

Certi-Vex EnvioAssist, Vexcon Chemicals, Inc.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Surface Set-Retarder: Spray-applied, ready-to-use, water-based solution with color dye, non-staining, non-corrosive, non-flammable, non-toxic, specifically formulated to retard the set of fresh concrete surfaces, temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (to expose the surface aggregates). Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Top-Cast[™], Grace Construction Products, Inc.

TK6000 Concrete Surface Retarder, TK Products.

Top-Etch Surface Retarder, Unitex Chemicals.

R-30 Surface Retarder, Specco Industries.

Certi-Vex Envio Set, Vexcon Chemicals, Inc.

True Etch Surface Retarder, Burke Group, LLC.

Exposee, ChemMasters.

Delay S, Conspec Marketing & Manufacturing Co., Inc.

Concrete Surface Retarders, Euclid Chemical Co.

Expose, Kaufman Products, Inc.

Surftard, Metalcrete Industries.

Crete-Nox TA, Nox-Crete Products Group, Kinsman Corporation.

Lithotex, L. M. Scofield Co.

Rugasol-S, Sika Corporation.

Certi-Vex Envioset, Vexcon Chemicals, Inc.

Atlas Top Etch, Atlas Tech Products.

or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Spray applied, film forming protective coating, for surfaces adjacent to Set-Retarded finish surfaces.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Face Off, Grace Construction Products, Inc.

Or equal, as approved by the Landscape Architect.

RELATED MATERIALS

Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.

Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

Sand for covering Vapor Barrier: Clean, hard, durable, natural Sand, conforming to ASTM C33.

Expansion Joint Materials:

Expansion Joint-Filler Strips:

Asphalt-Saturated Cellulosic Fiber, meeting ASTM D1751, with "guide strip" removable depth gauge cap. Expansion Joint-Filler Strip shall be versatile, resilient, flexible and non-extruding. When compressed to half of its original thickness, it shall recover to a minimum of 70% of its original thickness.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sealtight Fibre with Snap Cap, WR Meadows.

Fiber Board, APS Supply.

or equal, as approved by the Landscape Architect.

Thickness/Width: As indicated on the Contract Drawings.

Joint Sealant Backing:

General: Provide Joint Sealant Backings which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved by sealant manufacturer.

Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of closed cell plastic foam, of size, shape and density to control sealant depth.

Bond Breaker: Pressure-sensitive tape, as recommended by Joint Sealant manufacturer, to suit application.

Miscellaneous Joint Sealant Materials:

Primer: As recommended by joint sealant Manufacturer for adhesion of sealant to joint substrates.

Cleaners for Nonporous Surfaces: Non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

Masking Tape: Non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

Joint Sealant:

Horizontal Applications: Meet ASTM C920, Type S (single-component), Grade P (pourable/self-leveling) Class 25 (withstands increase/decrease of 25% of joint width), Use T (pedestrian & vehicular traffic areas), Low-VOC, cold-applied, elastomeric polyurethane Joint Sealant for exterior applications. Color to match adjacent paving color finish.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sika Corporation.

Tremco, Inc.

Sonneborn.

Pecora Corporation.

or equal, as approved by the Landscape Architect.

CONCRETE MIXES AND PROPORTIONING

Proportion and mix of cement, aggregate, admixture and water to attain required plasticity and strength for each type of normal-weight concrete in accordance with current edition of ACI's "Manual of Concrete Practice" and the PCA's "Design and Control of Concrete Mixtures."

Use transit mixer trucks equipped with automatic devices for recording number of revolution of drum.

Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method, using approved materials to obtain specified minimum compressive strength.

Do not use the Owner's field quality-control testing agency as the independent testing agency.

Slump: Adjust quantity of water so concrete at point and time of discharge does not exceed the aforementioned slumps when tested per ASTM C143. Use the minimum water necessary for workability required by part of item being cast.

Proportion Concrete Mixes to provide Concrete with the following properties:

Vehicular Use Areas:

Compressive Strength (at 28 Days): Minimum 4,000 PSI.

Maximum Slump Limit: Four-inches (4") at point of discharge, with a 1/2-inch slump differential between successive batches. Obtain approval from the Landscape Architect if slump is outside these parameters.

Maximum Water/Cementitious Materials Ratio: .50.

Cement Content: Minimum seven (7) - sack mix (658 lbs. cement per cubic yard).

Pedestrian Use Areas:

Compressive Strength (at 28 Days): Minimum 3,000 PSI.

Maximum Slump Limit: Four inches (4") at point of discharge, with a 1/2-inch slump differential between successive batches. Obtain approval from the Landscape Architect if slump is outside these parameters.

Maximum Water/Cementitious Materials Ratio: .50.

Cement Content: Minimum six (6) - sack mix (564 lbs. cement per cubic yard).

Cementitious Materials: Limit percentage, by weight, of cementitious materials (other than Portland Cement) in concrete as follows:

Fly Ash: Provide twenty-percent (20%) maximum content.

Add Air-Entraining Admixture at the Manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

Coloring Agent: Add coloring agent to mix according to Manufacturer's written instructions.

Non-Chloride Accelerators: Do not use corrosive accelerators such as calcium chloride.

Concrete Delivery: Use of concrete loads exceeding ninety (90) minutes from time of batch plant must be approved by the Landscape Architect.

Ensure that the batch plant guarantees a single-source supply for cementitious materials and aggregates (coarse and fine) for the entire project.

CONCRETE MIXING

Ready-Mixed Concrete: Comply with requirements and with ASTM C94.

When air temperature is between 85 deg. F. (30 deg. C.) and 90 deg. F. (32 deg. C.), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg. F. (32 deg. C.), reduce mixing and delivery time to 60 minutes.

CONCRETE SEALANTS

Penetrating Concrete Sealer:

Applications: Refer to the Cast-in-Place Concrete Paving Schedule as indicated on Construction Drawings for requirements.

General: Penetrating Concrete Sealer shall be an invisible, water-based penetrating Sealer, used to protect exterior cast-in-place concrete pavement installations. Sealer shall be a clear, non-flammable, UV-stabilized, non-yellowing solution which cures to reduce staining, soiling, discoloration, efflorescence, and acts as a dense, insoluble, invisible water-repellant coating, formulated to impart water repellence and dirt reduction to concrete surfaces with no change in the surface appearance. Sealer shall react with carbon dioxide, and atmospheric moisture to form a penetrating water, dirt and mildew repellent barrier within 24 hours. Moisture absorption rate shall be low to reduce visible surface changes for up to ten (10) years. As recommended for ACI 302 Class 1 through 4 concrete floors.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sinak Sealer S-102, Sinak Corporation.

Natural Look Penetrating Sealer, Glaze 'N Seal.

Cementone, L.M. Scofield Company.

Sure Klean Weather Seal SL100, Prosoco Inc.

Sealhard, L&M Construction Chemicals.

White Mountain Ultrapel[™], Triangle Coatings, Inc.

Thoroclear® Water-Based Sealer, Thoro/ChemRex, Inc.

HydraSeal, Endur-O-Seal.

or equal, as approved by the Landscape Architect.

EXECUTION

EXAMINATION

Proof-roll prepared sub-base surface for foundations to check for unstable areas and verify need for additional compaction. Verify that sub-grade preparation for concrete paving has been completed including base course prior to commencement of Work.

Surface Drainage:

Report in writing conflicts discovered on the site or prior Work done by others, which would prevent positive drainage.

Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes.

No "birdbaths" or other surface irregularities shall be permitted. Properly correct irregularities.

PREPARATION

Templates: Use templates for anchor plates, bolts, inserts and/or other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.

Aggregate Base Course: Compact base course to thicknesses as shown on Contract Drawings or as indicated per the Geotechnical Report, to the relative compaction density as required per the Geotechnical Report. Aggregate Base Course shall be graded to the lines and levels indicated; no ruts or depressions shall be allowed.

Gravel Fill or Sand Beds: Re-compact disturbed gravel fill or sand beds and bring to correct elevation.

FORMWORK

Design, construct, erect, shore, brace, and maintain Formwork according to ACI 347 "Guide to Formwork for Concrete."

Formwork shall be consistent with the orientation and pattern indicated on the Contract Drawings. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install Formwork to allow continuous progress of Work and so that Formwork can remain in place at least twenty-four (24)-hours after concrete placement.

Coordinate locations of drainage piping requirements, irrigation piping stub-outs, electrical conduits, or other items scheduled to be embedded into cast concrete.

Check completed Formwork and screeds for grade and alignment to following tolerances:

Top of Forms: Not more than 1/8 inch in ten- (10) feet.

Vertical Face on Longitudinal Axis: Not more than 1/4 inch in ten-(10) feet.

Coat Formwork with Form Release Agent, as required, to ensure Formwork separates from cast concrete without damage to concrete.

Formwork surfaces shall be clean, dry, and free from contaminants (dirt, dust, rust, build-up, and existing form agents) prior to each use of Formwork

Prior to each use, Formwork that comes into direct contact with concrete shall be coated with Form Release Agent in accordance with the Manufacturer's written instructions.

Apply Form Release Agent in a uniform and even manner by low pressure spray, roller, or clean cloth, in accordance with the Manufacturer's written instructions.

Prior to coating new Formwork, apply one (1) or two (2) heavy coats to edges for waterproofing protection.

Excess Form Release Agent or dense form surfaces should be removed with a clean cloth.

Do not apply Form Release Agent to reinforcing steel.

Screeds:

Set screeds at maximum 8'-0" centers between. Set to provide at grades per Contract Drawings. Check with an instrument level, transit, or laser during placing operations to maintain desired grades.

STEEL REINFORCEMENT

General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

Clean Reinforcement of loose rust and mill scale, earth, or other bond-reducing materials.

Arrange, space, and securely Tie Bars and Bar Supports to firmly hold and support the Steel Reinforcement in position during concrete placement and to prevent displacement before or during casting. Maintain a minimum of two inches (2") cover to the Reinforcement.

Install Steel Reinforcement Bars in sizes as indicated on the Contract Drawings, in lengths as long as practicable. Lap adjoining Bars at a minimum of fifty (50) bar diameters. Lace splices accordingly with Tie Wire. Offset laps of adjoining widths to prevent continuous laps in either direction. Erect and maintain Reinforcement Bars on chairs, secured firmly in position, in the middle of the concrete during casting operations. Do not extend Reinforcement Bars through expansion joints.

Install Construction Joint Dowel Bars & Sleeves per the Manufacturer's recommendation. Reinforcing dowels, or sleeves for the reinforcing dowels, shall be secured in place prior to placing concrete. Align dowels in straight, even alignments in the middle of the concrete profile during casting operations. Dowels and sleeves shall not be pressed into the concrete during casting and after the concrete has been placed.

CONCRETE PLACEMENT

Preparation: Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior surfaces of forms, exposed reinforcing, and from surfaces of mixing and conveying equipment.

Sub-Base: Sub-Base shall be free of ruts, holes, ridges, etc. Smooth and compact sub-base to an even plane.

Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce absorption and to help maintain concrete workability. Dampen earth sub-grade twenty-four (24) hours before placing concrete, but do not muddy. Re-roll where necessary for smoothness and remove loose material from compacted sub-base surface prior to placing concrete.

Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, dowels/sleeves, and items to be embedded or cast in. Notify other trades to permit installation of their Work.

Reinforcement and Forms shall be secured firmly in position such that they will not be displaced during the placement of concrete.

Reinforcement Bars, Ties, and Welded Wire Reinforcement <<<VERIFY>>>shall be completely encased

in concrete, at a maximum of two-inches (2") from the edge of the concrete.

Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments

When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained eighty-five-percent (85%) of its fully hydrated compressive strength.

Cold-Weather Placement: Comply with ACI 306.1, and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When air temperature has fallen to or is expected to fall below 40 deg. F. (4.4 deg. C.), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F. (10 deg. C.) and not more than 80 deg. F. (27 deg. C.) at point of placement.

Do not use calcium chloride, salt, or other materials containing anti-freeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg. F. (32 deg. C.). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

Fog-spray forms, reinforcement steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without standing water, soft spots, or dry areas.

JOINTS

General: Refer to ACI 302 "Guide for Concrete Floor and Slab Construction" for work under this Article. Construct construction, isolation, expansion, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

When joining existing paving, place transverse joints to align with previously placed joints, unless otherwise indicated.

Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half (1/2) hour, unless paving terminates at isolation joints.

Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated on the Contract Drawings.

Provide tie bars at sides of paving strips where indicated.

Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, buildings, foundations, walls, other fixed objects, and in other locations as indicated on the Contract Drawings. Provide Expansion Joints at full depth of concrete paving where paving meets the vertical faces of buildings, structures, foundations, walls, etc.

Locate expansion joints at maximum intervals of twenty (20) feet, unless otherwise indicated on the Contract Drawings.

Extend joint fillers full width and depth of joint.

Provide Construction Joint Dowel Bars at the spacing distances indicated in the Contract Drawings.

Terminate Joint Filler less than 1/2 inch or more than one-inch (1") below finished surface if joint sealant is indicated.

Place top of Joint Filler flush with finished concrete surface if joint sealant is not indicated.

Furnish joint fillers in one (1)-piece lengths. Where more than one (1) length is required, lace or clip joint-filler sections together.

Protect top edge of joint filler during concrete placement with metal, plastic, or another temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

Contraction Joints and Isolation Joints: Form weakened-plane contraction joints and isolation joints, sectioning concrete into areas as indicated on the Construction Drawings, or at spacing intervals as recommended by the PCA.

General Methodology: Contraction Joints shall be placed in Concrete Paving to minimize the occurrence of random cracking on the surface due to drying shrinkage or stress loading and to reduce the width of concrete cracks should they occur. When not indicated on the Contract Drawings, Contraction Joints shall be placed at 24x the thickness of the concrete paving.

Saw-Cut Contraction Joints:

Construct Saw-Cut Contraction Joints with a circular power saw, equipped with a new, shatterproof abrasive or diamond-tipped blade. Cut 3/16-inch-wide joints (maximum width of saw-blade) into concrete surface. Cutting action shall not tear, abrade, spall, shatter, or otherwise damage the surface.

Saw-cut concrete surface when successful jointing results can be achieved and prior to uncontrolled random contraction cracking of concrete occurs.

Early-entry Sawcut: When used, provide sawcut into fresh concrete at 1" to 1-1/4" depth, or as indicated on the Contract Drawings.

Perform saw-cut joints cleanly and smoothly, to a constant and equal depth, in a continuous consistent line, with no over-cutting.

Depth:

Contraction Joints: Construct depth equal to a minimum of one-fourth (1/4) of the concrete slab thickness.

Isolation Joints: Construct depth equal to the full depth of the concrete thickness.

Perform in as continuous an operation as possible, to avoid misalignment of joints. Use chalk lines, forms, or templates as required, to achieve consistent lines)

Use a hand grinder with a 4-inch diamond blade to saw-cut up to vertical edges such as walls, steps, curbs and columns. Do not over-cut into vertical surfaces or adjacent concrete surfaces.

Edging: Tool edges of pavements, gutters, headers, curbs, joints in concrete, and other locations, as required, after initial floating, with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

Radius: 1/4 inch (aka "Carpet Edger")

CONCRETE FINISHES

General:

Finished pavement surfaces indicated herein this Section shall be "slip-resistant", per the requirements outlined in CBC, Section 1124B.1, and ADAAG 4.5.1.

The minimum coefficient of friction shall meet or exceed 0.8 on exterior and 0.6 on interior surfaces.

Pavement surfaces shall have the following finish on all surfaces less than six percent (6%) slope:

Medium Broom Textured Finish, or a textured finish as specified, which is equivalent to the finished texture of a Medium Broom Textured Finish for slip resistance.

Pavement surfaces shall have the following finish on all surfaces greater than six percent (6%) slope:

Heavy Broom Textured Finish, or a textured finish as specified, which is equivalent to the finished texture of a Heavy Broom Textured Finish for slip resistance.

Color(s) and finish(es) specified herein shall match referee samples and field-constructed mock-up samples as approved by the Landscape Architect.

Wetting of concrete surfaces during screeding, initial floating, or finishing operations is strictly prohibited.

Top Cast/Retarded Sand Textured Finish: Match Referee Sample, as acquired by the Landscape Architect, and the approved Field Constructed Mock-up, to compare for color, texture, finish, and other characteristics relating to aesthetic effects.

Applications: Refer to the Cast-in-Place Concrete Paving Schedule as indicated on Contract Drawings.

Once concrete has been floated, bleed-water sheen has disappeared, and the concrete surface has stiffened sufficiently, evenly spray-apply apply the Top Cast Chemical Surface Retarder to the concrete surface. Apply the Top Cast Chemical Surface Retarder according to the Manufacturer's written instructions for applying the chemical. Do not use curing compounds.

Handle the chemical Top Cast Chemical Surface Retarder with care to avoid spillage and staining. Protect areas adjacent to the Work from over-spray of the chemical. Provide neutralizing solution(s) to the chemical solution, as needed, to prevent chemicals from damaging or contaminating adjoining planting areas.

Immediately after applying the Top Cast Chemical Surface Retarder, damp-cure the sprayed concrete surface accordingly to the manufacturer's written instructions.

After the Top Cast Chemical Surface Retarder has adequately etched into the surface and the concrete has hardened sufficiently (generally overnight, or when the concrete has hardened adequately to support the weight of a person), check a small area to determine if the proper retarded depth has been achieved. If the depth appears too shallow wait a few hours to check again.

With a hose, lightly spray the top surface of the concrete surface with water. Remove the Top Cast Chemical Surface Retarder matrix through a process of gently brushing surface with a stiff, nylon bristle broom and flushing with water to remove the surface paste, exposing the fine aggregates integral to the concrete mix. Repeat the water flushing and brushing cycle, as needed, until the retarded matrix has been removed and the surface texture is acceptable. DO NOT USE A HIGH-PRESSURE WASHER TO APPLY WATER OR TO REMOVE THE CHEMICAL SOLUTION FROM THE SURFACE.

After concrete is sufficiently hydrated, provide jointing in the locations indicated in the Contract Drawings. Early-entry jointing of concrete may be required to prevent premature cracking of finished surfaces. After concrete is fully hydrated (approx. 30-days), seal the Top Cast Chemical Surface Retarded (Sand) texture finished concrete surface with two (2) coats of Sealer as specified herein this Section, per the

Manufacturer's latest printed instructions.

Refer to the Cast-in-Place Concrete Pavement Schedule as indicated on Construction Drawings for Sealer requirements.

CONCRETE PROTECTION AND CURING

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hotweather protection during curing.

Evaporation Retarder: Apply Evaporation Retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float-finishing.

Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these, as follows:

Moisture Curing: Keep surfaces continuously moist for not less than seven (7) days with the following materials:

Water.

Continuous water-fog spray.

Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

Moisture-Retaining-Cover Curing: Cover concrete surfaces with Moisture-Retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least twelve inches (12") and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Curing Compound: Apply uniformly in continuous operation by power spray or roller according to Manufacturer's written instructions. Re-coat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

INSTALLATION OF JOINT SEALANTS

Provide a Joint Sealant that is compatible with the substrate material(s) to which it is being applied. Do not use a Joint Sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the application tool.

Ambient Temperature Criteria: The ambient temperature shall be within the limits of 40d. F. and 90d. F. when the Joint Sealant is being applied.

Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of Joint Sealants as applicable to materials, applications and conditions indicated.

Surface Preparation of Joints:

Remove foreign material from joint substrates which could interfere with adhesion of Joint Sealant, including dust, surface dirt, dirt, moisture, water repellents, grease, oil, wax, lacquer, paint, waterproofing, or other foreign matter that would tend to destroy or impair adhesion.

Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths.

Clean porous surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or acid washing to produce a clean, sound substrate. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints.

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials

by sandblasting or wire brushing.

Clean non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of Joint Sealants.

Sealant Preparation: Do not add liquids, solvents, or powders to the Joint Sealant material (for singlecomponent materials). Where specified, mix multi-component elastomeric Joint Sealants in accordance with manufacturer's instructions.

Primer: Immediately prior to application of the Joint Sealant, clean out loose particles from joints. Where recommended by the sealant manufacturer, apply Primer to joints in accordance with sealant manufacturer's instructions. Do not apply Primer to exposed finish surfaces. Do not allow spillage or migration of Primer onto adjoining surfaces.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install Joint Fillers to provide sealant support for optimum performance cross-sectional shapes and depths.

Do not leave gaps between ends of Joint Fillers.

Do not stretch, twist, puncture or tear Joint Fillers.

Remove absorbent Joint Fillers which have become wet prior to sealant application and replace with dry material.

Install Bond Breaker to the back or bottom of the joint cavity (between sealants and joint-fillers, compression seals or back of joints where required), as recommended by the Joint Sealant manufacturer, for each type of joint and sealant used, to prevent "third-side" adhesion of the Joint Sealant to the back of the joint. Carefully apply the Bond Breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the Bond Breaker.

Installation of Joint Sealants:

Install Joint Sealant after concrete substrate material has been cast and allowed to cure. Remove protective cap from preformed Joint Filler. Remove any excess Joint Filler material that will inhibit an adequate depth and bond of the Joint Sealant material.

Place masking tape where required along the joint cavity to prevent contact of the Joint Sealant with adjoining surfaces. Remove masking tape within ten (10) minutes after joint has been filled and tooled.

Apply the Joint Sealant in accordance with the manufacturer's printed instructions with an application tool having a nozzle that fits the width of the joint cavity. Install Joint Sealant by proven techniques to contact and solidly full wet joint substrates, completely filling the recesses provided for each joint configuration, providing uniform, optimum performance cross-sectional shapes and depths. Do not allow spillage or migration of Joint Sealant onto adjoining surfaces.

Tooling of Non-Sag Joint Sealants: Tool Non-Sag Joint Sealants to form smooth, uniform beads of configuration indicated, free of wrinkles, streaks, gouges, boils, air holes, etc. and to ensure contact and adhesion of the Joint Sealant with the sides of the joint. Remove excess Joint Sealants from surfaces adjacent to joint. Do not use tooling agents which discolor Joint Sealants or adjacent surfaces or are not approved by Sealant Manufacturer.

Sanding of Joint Sealant: Lightly apply dry sand to cover freshly-poured elastic Joint Sealant material. When Joint Sealant has hardened, remove excess sand that has not bonded to Joint Sealant.

Protection and Curing:

Protect installed Joint Sealants during and after curing period from contact with contaminating substances or from damage.

Cut out and remove damaged or deteriorated Joint Sealers and reseal joints with matching new materials.

Clean off excess Joint Sealants or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved by the Sealant Manufacturer.

APPLICATION OF CONCRETE SEALANTS

Penetrating Concrete Sealer:

After cast-in-place concrete is fully hydrated (approx. 30-days), seal concrete paving surfaces with two (2) coats of approved Penetrating Concrete Sealer. Apply in accordance with Manufacturer's written directions. Finished surfaces shall be uniform in appearance and not mottled.

PAVEMENT TOLERANCES

Comply with tolerances of ACI 117, and as follows:

Elevation: 1/4 inch.

Thickness: Plus 3/8 inch, minus 1/4 inch.

Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch. Variation from the Level or from the Grades shown, per Civil Engineer Drawings:

In pavements:

In any ten-feet (10'): 1/4 inch.

In twenty-feet (20'): maximum 3/8 inch.

In forty-feet (40') or more: 3/4 inch.

Variation in Radii:

In radii of less than ten-feet (10'):

In any five-feet (5'): 1/8 inch.

In any ten-feet (10'): 1/4 inch.

In radii of twenty feet (20'):

In any ten-feet (10'): 1/4 inch.

In any twenty-feet (20'): 3/8 inch.

In radii of thirty-feet (30'), or more:

In any twenty-feet(20'): 1/2 inch.

In any thirty-feet (30'): 1 inch.

Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.

Vertical Alignment of Tie Bars and Dowels: 1/4 inch.

Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch.

Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: Length of dowel 1/4 inch per 12 inches.

Joint Spacing: Three inches (3").

Contraction Joint Depth: Plus 1/4 inch, no minus.

Joint Width: Plus 1/8 inch, no minus.

FIELD QUALITY CONTROL

Testing Agency:

Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Section.

Testing Services: Testing shall be performed according to the following requirements:

Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to

ASTM C172, except modified for slump to comply with ASTM C94.

Slump: Per ASTM C143; one (1) test at point of placement for each compressive-strength test, but not less than one (1) test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

Air Content: Per ASTM C231, pressure method; one (1) test for each compressive-strength test, but not less than one (1) test for each day's pour of each type of air-entrained concrete.

Concrete Temperature: Per ASTM C1064; one (1) test hourly when air temperature is 40 deg F. and below and when 80 deg. F. and above, and one (1) test for each set of compressive-strength specimens.

Compression Test Specimens: Per ASTM C31; one (1) set of four (4) standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.

Compressive-Strength Tests: Per ASTM C39; one (1) set for each day's pour of each concrete class exceeding five (5) cu. yd. but less than 25 cu. yd., plus one (1) set for each additional 50 cu. Yd. One (1) specimen shall be tested at seven (7) days and two (2) specimens at twenty-eight (28) days; one (1) specimen shall be retained in reserve for later testing, if required.

When frequency of testing will provide fewer than five (5) compressive-strength tests for a given class of concrete, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

When total quantity of a given class of concrete is less than 50 cu. yd., the Landscape Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.

When strength of field-cured cylinders is less than eighty-five-percent (85%) of companion laboratorycured cylinders, current operations shall be evaluated, and corrective procedures shall be provided for protecting and curing in-place concrete.

Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 PSI.

Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 24hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28-days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as the sole basis for approval or rejection.

Additional Tests: Testing Agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by the Owner. Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed.

REPAIRS AND PROTECTION

Remove in its entirety (from joint to joint) and replace concrete pavement that is broken, cracked, damaged, or defective, or concrete which does not meet requirements of this Section.

Drill test cores where directed by the Landscape Architect, when necessary, to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

Protect concrete from damage. Exclude traffic from pavement for at least fourteen (14) days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two (2) days before date scheduled for Substantial Completion inspections.

321323 – SITE CONCRETE

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work for Reinforced Cast-in-Place Site Concrete, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Cast-in-Place Site Concrete for site walls, seat walls, pilasters, columns, etc.

Cast-in-Place Site Concrete for miscellaneous footings or sub-grade foundations.

Cast-in-Place Site Concrete for sub-surface slabs (Veneer pavements).

Installation of anchor bolts, hangers, anchors, plates, inserts, and miscellaneous metal or other materials embedded in Cast-in-Place Site Concrete and which are furnished by other trades or Sections.

Cast-in-Place Concrete for Work specified in Electrical Sections unless specifically included therein.

Concrete Formwork.

Jointing (Expansion Joints, Contraction Joints, Isolation Joints, Keyway/Construction Joints and/or Architectural Score Joints).

Concrete Curing.

Concrete Joint Sealants.

Reinforcement, Tie Wire, and Bar Supports.

Steel Dowels and Sleeves.

Compacted Sub-Surface Materials.

Site Concrete Finishes.

Site Concrete Surface Sealants.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 129300 – Site and Street Furnishings.

Section 321313 – Concrete Paving.

Section 321413 – Unit Paving

DEFINITIONS AND APPLICABLE STANDARDS

References:

AASHTO – American Association of State Highway and Transportation Officials.

ACI – American Concrete Institute.

ADAAG – American with Disabilities Act Accessibility Guidelines.

ANSI – American National Standards Institute.

ASTM – American Society for Testing and Materials.

CBC – California Building Code, Title 24 Disabled Access Regulations.

CRSI – Concrete Reinforcing Steel Institute.

NRMCA – National Ready Mix Concrete Association.

PCA – Portland Cement Association.

SSPWC – Standard Specifications for Public Works Construction.

SWRI – Sealant, Waterproofing & Restoration Institute.

IBC – International Building Code.

Definitions:

Cementitious Materials: Portland Cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

Percent Compaction: Per ASTM D1557, percentage of the maximum in-place dry density of the same material, as determined by Geotechnical Engineer.

Standards of Construction:

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 214 – Recommended Practice for Evaluation of Strength Tests Results of Concrete.

- ACI 301 Details and Detailing of Concrete Reinforcement.
- ACI 303.1 Standard Specification for Cast-in-Place Architectural Concrete.
- ACI 304 Recommended Practices for Measuring, Mixing, Transporting, and Placing of Concrete.
- ACI 305 Recommended Practices for Cold Weather Concreting.
- ACI 306 Recommended Practices for Hot Weather Concreting.
- ACI 308 Standard Practice for Curing Concrete.
- ACI 347 Recommended Practice for Concrete Formwork.
- ASTM A185 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- ASTM A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- ASTM C33 Standard Specification for Concrete Aggregates.
- ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- ASTM C94 Standard Specification for Ready-Mix Concrete.
- ASTM C136 Method for Sieve Analysis of Fine and Coarse Aggregate.
- ASTM C143 Test Method for Slump of Portland Concrete Cement.
- ASTM C150 Standard Specification for Portland Cement.
- ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
- ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete.
- ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete.
- ASTM C494 Standard Specification for Chemical Admixtures for Concrete.
- ASTM C920 Standard Specification for Elastomeric Joint Sealants.
- ASTM C979 Standard Specification for Pigments for Integrally Colored Concrete.
- ASTM C1193 Standard Guide for Use of Joint Sealants.
ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

ASTM D1751 – Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).

National Ready Mix Concrete Association, latest revision: "Certificate of Conformance for Concrete Production Facilities".

Measurements.

PSI: Measurement, in pounds per square foot.

CU/FT: Measurement, in cubic-foot.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data: Submit available product/material literature supplied by manufacturer's, indicating that their products comply with specified requirements. Provide manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of product/material:

Reinforcement and Forming Accessories.

Steel Dowels and Sleeves.

Cementitious Materials.

Integral Aggregates (Coarse and Fine).

Chemical Admixtures.

Jointing Materials and Systems, including Joint Sealants.

Concrete Curing Materials.

Finishing Materials.

Site Concrete Surface Sealants.

Statement of Mix Design: Prepared by the batch plant servicing the Project, submit for each type or load delivered to Project. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Each Statement of Mix Design shall include following information:

Name, address, and telephone number of batch plant preparing Statement of Mix Design.

Date of Mix Design.

Project location.

Contractor requesting load delivery.

Mix Design Number.

Admixtures (as required).

Integral Color Admixtures (as required).

Gradations for sand and aggregate.

Material weights, specific gravity, and absolute volumes.

Basis of testing, i.e. UBC 2605 D4 and CBC Title 24 2604 D4.

Water/Cementitious Materials Ratio (W/CM Ratio).

Slump.

PSI Rating.

Material Test Reports: Signed and stamped laboratory test reports for evaluation of concrete materials and mix design tests.

Material Certificates: Material certificates, in lieu of material laboratory test reports, when permitted by the Landscape Architect. Material certificates shall be signed by the Manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.

Scaled Shop Drawings: Submit Scaled Shop Drawings for form work, indicating fabrication and erection of forms for specific finished site concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, pour sequencing, dimensioned locations of all construction, control and expansion joints, and other items that affect exposed concrete visually.

Review with the Landscape Architect for general architectural applications and features only. Designing form work for structural stability and efficiency shall be the Contractor's responsibility.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Site Concrete installations. Include lists of completed projects with project names and addresses, names and addresses of Architects/Landscape Architects, Artists and Owners, and other information specified.

Minutes of Pre-Installation Conference, distributed and approved in writing as to the content of the conference by concerned parties in attendance.

Material Samples: Submit four (4) sets of physical Material Samples for review of kind, color, pattern, size, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed. Include the full range of exposed color and texture expected in the completed Work. Provide Material Samples bound and individually wrapped in re-sealable labeled 1-gallon plastic bags (as applicable):

One-foot (1'-0") section of each Concrete Joint Sealant material.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work under this Section shall proceed until all information indicated herein this Article have been reviewed, accepted, and approved by the Landscape Architect, in writing.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications: Engage an experienced Installer who has completed in the last two (2) years at least three (3) concrete installations similar in material, design, and extent to that indicated for this Project, and whose work has resulted in construction with a record of successful in-service performance.

Requirement: Valid California C-8 (Concrete) Contractor License.

Applicable Standards of Work:

Applicable specifications and recommended practices of American Concrete Institute (ACI), American Society for Testing and Materials (ASTM), The Uniform Building Code, with their individual designations, are to be considered part of this Specification. Refer to "Standards of Construction" under "Definitions & Applicable Standards" Article herein this Section.

Design and Control of Concrete Mixture, Thirteenth Edition, Portland Cement Association.

Manual of Standard Practice, Concrete Reinforcing Steel Institute (CRSI).

Sealants: The Professional's Guide, Sealant, Waterproofing & Restoration Institute (SWRI).

Field-Constructed Mock-up Samples:

General: Prior to the installation of Work under this Section, Contractor shall erect Field-Constructed Mock-up Samples for each type and pattern of Concrete Paving required for review and approval by the Landscape Architect, to verify selections made under the referee samples obtained by the Landscape Architect.

Build Field-Constructed Mock-up Samples to comply with the following requirements, using materials and same base construction including special features for form work, jointing, surface finishes, textures, color(s), and contiguous Work as indicated for the final unit of Work.

Locate Field-Constructed Mock-up Samples on the Project Site in location(s) as directed by the Owner.

Notify the Landscape Architect, in writing, at least one (1) week in advance of the dates and times when Field-Constructed Mock-up Samples will be erected.

Demonstrate quality and range of aesthetic effects and workmanship in the Field-Constructed Mock-up Samples that will be produced in final unit of Work.

Obtain the Landscape Architect's acceptance of Field-Constructed Mock-up Samples, in writing, before start of installation of Work.

Retain and maintain Field-Constructed Mock-up Samples during construction in an undisturbed condition as a standard for judging the completed unit of Work.

When directed by the Owner, Contractor shall demolish and remove Field-Constructed Mock-up Samples from Project Site.

Size: Each Field-Constructed Mock-up Sample within this Section shall measure a minimum of six-feet (6'-0") long to compare the aesthetics of material colors, textures, and finishes.

When the Landscape Architect determines that a Field-Constructed Mock-up Sample does not meet acceptable requirements, retain it for reference and cast another Field-Constructed Mock-up Sample (as required) until the Sample is accepted.

Accepted Field-Constructed Mock-up Samples will be the standard by which Work under this Section will be evaluated for technical and aesthetic merit. Accepted Field-Constructed Mock-up Samples are the prerequisite to the commencement of Work.

Single-Source Responsibility: Obtain each color, type, and variety of cementitious materials, aggregates (coarse and fine), chemical admixtures, water source, jointing materials, and other materials, from a single source, with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

Manufacturer shall be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.

Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.

Permits, Fees, Bonds, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, and inspections necessary to perform and complete Work under this Section.

Pre-installation Conference: Before installing Work as indicated herein this Section, conduct a Preinstallation Conference at the Project Site with the Landscape Architect to review requirements and design objectives, including a review of concrete textures, colors, finishes, layouts, and other design intents of the Work. Conference shall be held prior to erecting the Field-Constructed Mock-up Samples.

Notify participants in writing at least five (5) working days prior to Conference.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in a timely manner to ensure un-interrupted progress of the Work.

Store materials in a dry and protected location. Protect reinforcing steel and dowels from rusting, deformation, staining, and moisture damage.

Store materials by methods that prevent damage and permit ready access for inspection and identification. Package cement delivered to the Project Site shall be in strong paper or jute bags with brand name and manufacturer's name stamped thereon. Store cement under cover. Remove packaged cement immediately from the Project Site should it become wet or show any signs of caking or deterioration.

PROJECT SITE CONDITIONS

Traffic Control: Maintain access for vehicular, bicycle, and pedestrian traffic as required for other construction activities. Access to the surrounding buildings shall also be unobstructed and maintained at all times to allow for entry and exit of emergency vehicles.

Do not place Site Concrete during rain or adverse weather conditions without means to prevent damage. Conform to requirements specified hereinafter whenever concrete placement is required during cold or hot weather.

Dust Nuisance and Control: Contractor shall assume full responsibility for alleviation or prevention of dust as a result of Work under this Section. Maintain control of Site Concrete dust during duration of Contract. Do not permit adjacent planting areas to be contaminated. Clean up debris resulting from this work at the end of each day's Work.

Grades and Levels: Establish and maintain required levels and grade elevations. Review installation procedures and coordinate Work in this Section with other Work affected.

Lines and Levels to be established by a licensed Surveyor or registered Civil Engineer.

Keep Work area clean, and in a safe and workmanlike condition so that rubbish, waste, and debris does not interfere with Work of other trades.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Sequence and Scheduling: Notify contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place, such as:

Accessories embedded in Site Concrete, and for the provision of holes, openings, etc., necessary to the execution of the Work of the trades.

Irrigation Pipe Sleeves through Walls. Refer to Section 328400 – Irrigation Systems.

Field Measurements: Contractor shall take field measurements as required. Report major discrepancies between the Contract Drawings and field dimensions to the Landscape Architect prior to commencing Work.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to adequate installation operations are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease operations and notify Landscape Architect for further direction.

Environmental Conditions: Perform installation operations only when weather and soil conditions are suitable in accordance with locally-accepted practices.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected materials immediately from Project site. Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

PRODUCTS

FORMS

Form Materials: Plywood, wood, MDO plywood, metal, metal-framed plywood, or other approved paneltype materials, of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

Provide Forms that are full-depth, continuous, straight and free of distortions and defects, and level or sloping along exposed surfaces.

Provide Forms of sufficient strength and durability to hold concrete properly in place and prevent leakage of water from Forms.

Use flexible spring forms, laminated boards, or foam forms to form radius bends, as required.

No wood-textured finish from Forms will be permitted on exposed Site Concrete surfaces unless specified as such.

Textured Form Facings: Refer to Contract Drawings or requirements indicated herein this Section, as required.

Form Release Agent: Premium, Volatile Organic Compound (VOC)-compliant (low to no VOC), 100% biodegradable liquid-based (either natural emulsified vegetable oil-based, soy-based, or water-based), colorless, non-staining Form Release Agent. Agent shall not bond with, leave no residual matter on concrete surfaces, nor adversely affect the bond or performance of subsequent treatments to the

concrete surfaces.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Atlas Bio-Guard 2000, Atlas Tech Products.

Bio Release Agent, Burke, Edoco.

Enviroform, Conspec, Dayton Superior Company.

Bio-Form, Leahy-Wolf Company.

Crete-Lease 20-VOC, Cresset Chemical Company.

Duogard II, W.R. Meadows, Inc.

FORMSHIELD WB, Tamms Industries.

Greenplus Form Release Agent ES, Greenland Corporation.

Soy Form Release and Natural Form Oil, Natural Soy, LLC.

SOYsolv Concrete Form Release Agent, SOYsolv.

Or equal, as approved by the Landscape Architect.

STEEL REINFORCEMENT

Steel Reinforcement Bars:

Meet ASTM A615, Grade 60 deformed, clean and free of rust, dirt, grease or oils.

Steel Tie Wire:

16-gauge minimum, black annealed, plain cold-drawn steel conforming to ASTM A82, clean, and free of rust, dirt, grease or oils.

Construction/Expansion Joint Dowel Bars & Slip Dowel Sleeves:

Steel Joint Dowel Bars: Meet ASTM A615, Grade 40 smooth, billet-steel, shop painted with iron-oxide zinc-chromate primer, free of rust, dirt, grease, and oils. Cut Bars true to length with ends square and free of burrs.

Length and Size: As indicated on the Contract Drawings.

Slip Dowel Sleeve System: A reusable base and plastic sleeve, manufactured from polypropylene plastic. Encase fifty percent (50%) of each dowel in a plastic sleeve to allow parallel lateral movement of each Dowel. Size of Sleeve to match size of Dowel.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Speed Dowel, Greenstreak.

Or equal (no known equal).

Snap Ties: Snap-off type of fixed length, capable of leaving no ties within 1 1/2 in. of surface or causing fractures, spall, or other defects larger than one (1) in. diameter.

Steel Snap Ties.

Hook Bolts: Meet ASTM A307, Grade A internally and externally threaded. Design hook-bolt joint assembly to hold coupling against site concrete form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

Supports for Reinforcement: Lightweight, strong, non-corrosive, durable, and impervious to water. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place, as manufactured from 100% recycled-content plastic or engineered resins from recycled ABS plastic, polycarbonates, and fiberglass. Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Rebar Supports, Eclipse Plastics Inc.

Concrete Casting Plastic Rebar Supports, Build Global, Inc.

Reinforcing Bar Supports, Shin Hwa Industrial Co.

Plastic Rebar Supports, Plasticon International, Inc.

Bar Lift Plastic Support, New Century Northwest.

Aztec Composite Plastic Rebar Supports, Dayton Superior.

Or equal, as approved by the Landscape Architect.

CONCRETE MATERIALS

Portland Cement: Meet ASTM C150. Use one (1) brand of cement (single source) throughout the Project, unless otherwise acceptable to the Landscape Architect. Contractor shall verify the cement color with the Landscape Architect. Cement Type as follows:

(Note that Type I Cement is a general purpose and widely available cement, used when there are no extenuating conditions. Cement is on the warm-gray side in color).Cement Type: Type II. (Note that Type II Cement is widely available and aids in providing moderate resistance to sulfate attack. Type II is best when lower rate of heat generation is needed (i.e. reduces cracking of thicker slabs in warm weather). Cement is on the cool-gray side in color).

Normal-Weight Aggregates: Meet ASTM C33, Class 1N, and as follows:

Fine Aggregates: Meet ASTM C33, clean, hard, non-reactive, and durable sand. Do use sand coated with injurious amounts of silt, loam, clay or other deleterious matter.

Grading Requirements:

Sieve Size	Percent Passing
3/8"	100%
No. 4	95-100%
No. 8	75-95%
No. 16	55-75%
No. 30	30-50%
No. 50	10-25%
No. 100	2-10%

Coarse Aggregates: Meet ASTM C33, hard, durable, non-reactive, un-coated, graded, cleaned, and screened crushed rock or gravel aggregate for regular weight concrete. Do not use crusher-run stone or bank-run gravel. Aggregate shall be from a single source and shall be like in visual appearance.

Grading: Gradation in accordance with SSPWC-Table 200-1.4(B). Do not use coarse aggregates that contain substances that cause spalling.

Local aggregates not complying with ASTM C33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to the Landscape Architect.

Water: Per ASTM C1602, from potable domestic source, free from deleterious materials such as oils, acids, and organic matter.

Pozzolans:

Fly Ash: Meet ASTM C618, Type C or F.

(Note to SWA Specifier: Fly Ash affects the plastic properties of site concrete by increasing strength, improving workability, reducing water demand, reducing permeability. reducing segregation and bleeding and lowering heat of hydration. It also reduces corrosion of reinforcing steel, increases sulphate resistance, and reduces alkali-aggregate reaction. It also reaches its maximum strength more slowly than concrete made with only Portland cement. Especially useful in pre-stressed concrete and other applications where high early strengths are required.)

Ground Granulated Iron Blast-Furnace Slag: Meet ASTM C989, Grade 100 or 120.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Boral Material Technologies Inc.

Full Circle Solutions Inc.

Headwater Resources, Inc.

Holcim US, Inc.

Lafarge North America.

Mineral Resource Technologies, LLC.

Mineral Solutions, Inc.

The SEFA Group.

CHEMICAL ADMIXTURES FOR CONCRETE

General: Admixtures shall be certified by the Manufacturer to contain no more than 0.1 percent watersoluble chloride ions by mass of cement and to be compatible with other Admixtures. Use of Admixtures shall not relieve the Contractor of the designated concrete requirements, including strength.

Air-Entraining Admixture: Meet ASTM C260.(Note to SWA Specifier: Normally used in the concrete mix design where installations are subject to freeze/thaw conditions, or where Class F Fly Ash is used)

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Daravair 1000, Grace Construction Products, 800-433-0020.

Micro-Air, Master Builders, Inc., 800-628-9990.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Water-Reducing Admixture: Meet ASTM C494, Type A.(Note to SWA Specifier: Normally used to decrease water in the concrete mix; increases workability; reduces cement).

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

WRDA, Grace Construction Products, 800-433-0020.

Micro-Air, Master Builders, Inc., 800-628-9990.

Eucon NW, Euclid Chemical Co., 800-321-7628.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Water-Reducing and Set Retarding Admixture: Meet ASTM C494, Type B and D.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Daratard 17 Set Retarder, Grace Construction Products, 800-433-0020.

Pozzolith Retarder, Master Builders, Inc., 800-628-9990.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Shrinkage-Reducing Admixture: Meet ASTM C157. Provide at dosage of 2% by weight of cement.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Eclipse, Grace Construction Products, 800-433-0020.

Tetraguard, Master Builders, Inc., 800-628-9990.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Damp-proofing Admixture: Hydrophobic, Meeting ASTM C836-81, fluid-V single component, bitumenmodified, moisture-curing polyurethane, added at time of batching.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Darapel, Grace Construction Products, 800-433-0020.

Rheomix 235, Master Builders, Inc., 800-628-9990.

Tremproof 60, Tremco, 800-321-7906.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Integral Concrete Coloring Admixture: Provide materials specifically designed for use in ready-mix concrete, from a single source, and shall be like in color and visual appearance. Meet ASTM C979.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Refer to the Cast-in-Place Site Concrete Schedule as indicated in Construction Drawings.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

CURING MATERIALS

(Note to SWA Specifier: If Site Concrete is to have a Protective Surface Sealer, DO NOT use a Membrane-Forming Curing Compound).

Absorptive Cover: Provide one (1) of the following:

Curing Blanket: Single-use, non-woven synthetic (inorganic) fabric, specifically manufactured to provide a continuous supply of moisture for a gradual and controlled freshly-casted concrete curing environment.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

HydraCure S16, PNA Construction Technologies, Inc.

UltraCure, McTech Group.

Or equal, as approved by the Landscape Architect.

Moisture-Retaining Cover: Provide one (1) of the following, as complying with ASTM C171. Refer to Applicable Standards Article in this Spec Section and edit accordingly for using either ASTM C171

Polyethylene Film (Clear or White Opaque).

Liquid Membrane-Forming Concrete Curing Compound: Refer to Applicable Standards Article in this Spec Section and edit accordingly for using either ASTM C309 (Concrete Curing Compound) or ASTM C1315 (Concrete Curing and Sealing Compound). Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Clear Water-Borne Membrane-Forming Curing Compound: Spray-applied, ready-to-use, meeting ASTM C309, Type I, Class A.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

AH Curing Compound #2 DR WB, Anti-Hydro International, Inc.

Spartan-Cote, Burke Group, LLC.

Safe-Cure Clear, ChemMasters.

W.B. Resin Cure, Conspec Marketing & Manufacturing Co., Inc.

Day Chem Rez Cure (J-11-W), Dayton Superior Corporation.

Cure & Seal 30 EF, Conspec, Dayton Superior Corporation.

Nitocure S, Fosroc.

Aqua Kure-Clear, Lambert Corporation.

L&M Cure R, L&M Construction Chemicals, Inc.

1100 Clear, W. R. Meadows, Inc.

Resin Cure E, Nox-Crete Products Group, Kinsman Corporation.

Rich Cure E, Richmond Screw Anchor Co.

Resi-Chem Clear Cure, Symons Corporation.

Horncure 100, Tamms Industries Co., Div. of LaPorte Construction Chemicals N.A., Inc.

Hydro Cure, Unitex.

Certi-Vex Enviocure, Vexcon Chemicals, Inc.

Clear-Seal 150, A.C. Horn.

Master Seal, Master Builders.

Kure-N-Seal, Sonneborn.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Liquid Membrane-Forming Concrete Curing and Sealing Compound: Applied to fresh concrete immediately after the disappearance of the surface water sheen. Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Spray-applied, ready-to-use, meeting ASTM C1315, Type II(white-pigmented), Class A(non-yellowing), with maximum water loss .40kg/m2 in 72 hours when applied @300ft2/gal.; minimum solids content of 25%.

Evaporation Retarder: Waterborne, spray-applied, ready-to-use, mono-molecular film-forming compound,

formulated to be applied to fresh concrete surfaces, for temporary protection from rapid moisture loss. Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Cimfilm, Axim Concrete Technologies.

Finishing Aid Concentrate, Burke Group, LLC.

Spray-Film, ChemMasters.

Aquafilm, Conspec Marketing & Manufacturing Co., Inc.

Sure Film, Dayton Superior Corporation.

Eucobar, Euclid Chemical Co.

Vapor Aid, Kaufman Products, Inc.

Lambco Skin, Lambert Corporation.

E-Con, L&M Construction Chemicals, Inc.

Confilm, Master Builders, Inc.

Waterhold, Metalcrete Industries.

Rich Film, Richmond Screw Anchor Co.

SikaFilm, Sika Corporation.

Finishing Aid, Symons Corporation.

Certi-Vex EnvioAssist, Vexcon Chemicals, Inc.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Surface Set-Retarder: Spray-applied, ready-to-use, water-based solution with color dye, non-staining, non-corrosive, non-flammable, non-toxic, specifically formulated to retard the set of fresh concrete surfaces, temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (to expose the surface aggregates). Material shall meet the maximum Volatile Organic Compound (VOC) content of 350 g/L for concrete curing compounds as required by the U.S. EPA Architectural Coatings Rule and shall be VOC-compliant for the State of California Regulation 8, Organic Compounds, Rule 3, Architectural Coatings.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Top-Cast[™], Grace Construction Products, Inc.

TK6000 Concrete Surface Retarder, TK Products.

Top-Etch Surface Retarder, Unitex Chemicals.

R-30 Surface Retarder, Specco Industries.

Certi-Vex Envio Set, Vexcon Chemicals, Inc.

True Etch Surface Retarder, Burke Group, LLC.

Exposee, ChemMasters.

Delay S, Conspec Marketing & Manufacturing Co., Inc.

Concrete Surface Retarders, Euclid Chemical Co.

Expose, Kaufman Products, Inc.

Surftard, Metalcrete Industries.

Crete-Nox TA, Nox-Crete Products Group, Kinsman Corporation.

Lithotex, L. M. Scofield Co.

Rugasol-S, Sika Corporation.

Certi-Vex Envioset, Vexcon Chemicals, Inc.

Atlas Top Etch, Atlas Tech Products.

Or equal, as approved by the Landscape Architect.

Application Rate: Per selected Manufacturer's latest printed instructions.

Spray applied, film forming protective coating, for surfaces adjacent to Set-Retarded finish surfaces.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Face Off, Grace Construction Products, Inc.

Or equal, as approved by the Landscape Architect.

RELATED MATERIALS

Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

Expansion Joint Materials:

Expansion Joint-Filler Strips:

Asphalt-Saturated Cellulosic Fiber, meeting ASTM D1751, with "guide strip" removable depth gauge cap. Expansion Joint-Filler Strip shall be versatile, resilient, flexible and non-extruding. When compressed to half of its original thickness, it shall recover to a minimum of 70% of its original thickness.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sealtight Fibre with Snap Cap, WR Meadows.

Fiber Board, APS Supply.

Or equal, as approved by the Landscape Architect.

Thickness/Width: As indicated on the Contract Drawings.

Joint Sealant Backing:

General: Provide Joint Sealant Backings which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved by sealant manufacturer.

Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of closed cell plastic foam, of size, shape and density to control sealant depth.

Bond Breaker: Pressure-sensitive tape, as recommended by Joint Sealant manufacturer, to suit application.

Miscellaneous Joint Sealant Materials:

Primer: As recommended by joint sealant Manufacturer for adhesion of sealant to joint substrates.

Cleaners for Nonporous Surfaces: Non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

Masking Tape: Non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

Joint Sealant:

Vertical Applications: Meet ASTM C920, Type S(single-component), Grade P(pourable/self-leveling), Class 25(withstands increase/decrease of 25% of joint width), Use T(pedestrian & vehicular traffic areas), Low-VOC, cold-applied, elastomeric polyurethane Joint Sealant for exterior applications. Color to match adjacent color finish.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sika Corporation.

Tremco, Inc.

Sonneborn.

Pecora Corporation.

or equal, as approved by the Landscape Architect.

CONCRETE MIXES AND PROPORTIONING

Proportion and mix of cement, aggregate, admixture and water to attain required plasticity and strength for each type of normal-weight concrete in accordance with current edition of ACI's "Manual of Concrete Practice" and the PCA's "Design and Control of Concrete Mixtures."

Use transit mixer trucks equipped with automatic devices for recording number of revolution of drum.

Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method, using approved materials to obtain specified minimum compressive strength.

Do not use the Owner's field quality-control testing agency as the independent testing agency.

Slump: Adjust quantity of water so concrete at point and time of discharge does not exceed the aforementioned slumps when tested per ASTM C143. Use the minimum water necessary for workability required by part of item being cast.

Proportion Concrete Mixes to provide Concrete with the following properties:

Site Concrete:

Compressive Strength (at 28 Days): Minimum 3,000 PSI.

Maximum Slump Limit: Five-inches (5") at point of discharge, with a 1/2-inch slump differential between successive batches. Obtain approval from the Landscape Architect if slump is outside these parameters.

Maximum Water/Cementitious Materials Ratio: .50.

Cement Content: Minimum six (6)- sack mix (564 lbs. cement per cubic yard).

Cementitious Materials: Limit percentage, by weight, of cementitious materials (other than Portland Cement) in concrete as follows:

Fly Ash: Provide ten-percent (10%) maximum content.

Add Air-Entraining Admixture at the Manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

Coloring Agent: Add coloring agent to mix according to Manufacturer's written instructions.

Non-Chloride Accelerators: Do not use corrosive accelerators such as calcium chloride.

Concrete Delivery: Use of concrete loads exceeding ninety (90) minutes from time of batch plant must be approved by the Landscape Architect.

Ensure that the batch plant guarantees a single-source supply for cementitious materials and aggregates (coarse and fine) for the entire project.

CONCRETE MIXING

CITY OF CULVER CITY

Ready-Mixed Concrete: Comply with requirements and with ASTM C94.

When air temperature is between 85 deg. F. (30 deg. C) and 90 deg F (32 deg. C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

SITE CONCRETE SEALANTS

Penetrating Concrete Sealer:

Applications: Refer to the Site Concrete Schedule indicated as on Construction Drawings for requirements.

General: Penetrating Concrete Sealer shall be an invisible, water-based penetrating Sealer, used to protect exterior cast-in-place site concrete installations. Sealer shall be a clear, non-flammable, UV-stabilized, non-yellowing solution which cures to reduce staining, soiling, discoloration, efflorescence, and acts as an invisible water-repellant coating, formulated to impart water repellence and dirt reduction to concrete surfaces with no change in the surface appearance. Sealer shall react with carbon dioxide, and atmospheric moisture to form a penetrating water, dirt and mildew repellent barrier within 24 hours. Moisture absorption rate shall be low to reduce visible surface changes for up to ten (10) years.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Sinak Sealer S-102, Sinak Corporation.

Natural Look Penetrating Sealer, Glaze 'N Seal.

Sure Klean Weather Seal SL100, Prosoco Inc.

Repello, LM Scofield.

Or equal, as approved by the Landscape Architect.

EXECUTION

EXAMINATION

Proof-roll prepared sub-base surface for foundations to check for unstable areas and verify need for additional compaction. Verify that sub-grade preparation for site concrete has been completed including base course prior to commencement of Work.

Surface Drainage:

Report in writing conflicts discovered on the site or prior Work done by others, which would prevent positive drainage.

Do not permit finished site concrete surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes. Properly correct irregularities.

PREPARATION

Templates: Use templates for anchor plates, bolts, inserts and/or other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.

Aggregate Base Course: Compact base course to thicknesses as shown on Contract Drawings or as indicated per the Geotechnical Report, to the relative compaction density as required per the Geotechnical Report. Aggregate Base Course shall be graded to the lines and levels indicated; no ruts or depressions shall be allowed.

Gravel Fill or Sand Beds: Re-compact disturbed gravel fill or sand beds and bring to correct elevation.

FORMWORK

Design, construct, erect, shore, brace, and maintain Formwork according to ACI 347 "Guide to Formwork for Concrete."

Formwork shall be consistent with the orientation and pattern indicated on the Contract Drawings. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install Formwork to allow continuous progress of Work and so that Formwork can remain in place at least twenty-four (24)-hours after concrete placement.

Coordinate locations of drainage piping requirements, irrigation piping stub-outs, electrical conduits, or other items scheduled to be embedded into cast concrete.

Check completed Formwork and screeds for grade and alignment to following tolerances:

Top of Forms: Not more than 1/8 inch in ten- (10) feet.

Vertical Face on Longitudinal Axis: Not more than 1/4 inch in ten-(10) feet.

Coat Form Work with Form Release Agent, as required, to ensure Form Work separates from casted Site Concrete without damage to concrete's finished surface.

Formwork surfaces shall be clean, dry, and free from contaminants (dirt, dust, rust, build-up, and existing form agents) prior to each use of Formwork

Prior to each use, Formwork that comes into direct contact with concrete shall be coated with Form Release Agent in accordance with the Manufacturer's written instructions.

Apply Form Release Agent in a uniform and even manner by low pressure spray, roller, or clean cloth, in accordance with the Manufacturer's written instructions.

Prior to coating new Formwork, apply one (1) or two (2) heavy coats to edges for waterproofing protection.

Excess Form Release Agent or dense form surfaces should be removed with a clean cloth.

Do not apply Form Release Agent to Reinforcement.

Screeds:

Set screeds at maximum 8'-0: centers between. Set to provide at grades per Contract Drawings. Check with an instrument level, transit, or laser during placing operations to maintain desired grades.

STEEL REINFORCEMENT

General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

Clean Reinforcement of loose rust and mill scale, earth, or other bond-reducing materials.

Arrange, space, and securely Tie Bars and Bar Supports to firmly hold and support the Steel Reinforcement in position during concrete placement and to prevent displacement before or during casting. Maintain a minimum of two inches (2") cover to the Reinforcement.

Install Steel Reinforcement Bars in sizes as indicated on the Contract Drawings, in lengths as long as practicable. Lap adjoining Bars at a minimum of fifty (50) bar diameters. Lace splices accordingly with Tie Wire. Offset laps of adjoining widths to prevent continuous laps in either direction. Erect and maintain Reinforcement Bars on chairs, secured firmly in position, in the middle of the concrete during casting operations. Do not extend Reinforcement Bars through expansion joints.

Install Construction Joint Dowel Bars & Sleeves per the Manufacturer's recommendation. Reinforcing dowels, or sleeves for the reinforcing dowels, shall be secured in place prior to placing concrete. Align dowels in straight, even alignments in the middle of the concrete profile during casting operations. Dowels and sleeves shall not be pressed into the concrete during casting and after the concrete has been placed.

CONCRETE PLACEMENT

General: Comply with requirements and with recommendations in ACI 304R for measuring, mixing,

transporting, and placing concrete.

Preparation: Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior surfaces of forms, exposed reinforcing, and from surfaces of mixing and conveying equipment.

Sub-Base: Sub-Base shall be free of ruts, holes, ridges, etc. Smooth and compact sub-base to an even plane.

Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce absorption and to help maintain concrete workability. Dampen earth sub-grade twenty-four (24) hours before placing concrete, but do not muddy. Re-roll where necessary for smoothness and remove loose material from compacted sub-base surface prior to placing concrete.

Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, dowels/sleeves, and items to be embedded or cast in. Notify other trades to permit installation of their Work.

Reinforcement and Forms shall be secured firmly in position such that they will not be displaced during the placement of concrete.

Reinforcement Bars, Ties shall be completely encased in concrete, at a minimum of two-inches (2") from any edge of the concrete.

Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

Reinforcement shall be secured firmly in position on chairs in the middle of the site concrete during casting operations. Should reinforcement come loose from the chairs, pull reinforcement into position as the concrete is placed by means of hooks. Concrete shall be worked under the steel to ensure that it is at the proper distance in the middle of the site concrete.

Consolidate site concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

Screed surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations.

When adjoining concrete lanes are placed in separate pours, do not operate equipment on concrete until concrete has attained eighty-five-percent (85%) of its fully hydrated compressive strength.

Cold-Weather Placement: Comply with ACI 306.1, and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When air temperature has fallen to or is expected to fall below 40 deg. F. (4.4 deg. C.), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F. (10 deg. C.) and not more than 80 deg. F. (27 deg. C.) at point of placement.

Do not use calcium chloride, salt, or other materials containing anti-freeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg. F.

(32 deg. C.). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

Fog-spray forms, reinforcement steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without standing water, soft spots, or dry areas.

JOINTS

General: Refer to ACI 302 "Guide for Concrete Floor and Slab Construction" for work under this Article. Construct construction, isolation, expansion, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

When joining existing paving, place transverse joints to align with previously placed joints, unless otherwise indicated.

Construction Joints: Set construction joints at side and end terminations of site concrete and at locations where site concrete operations are stopped for more than one-half (1/2) hour, unless site concrete terminates at isolation joints.

Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of site concrete strips, unless otherwise indicated on the Contract Drawings.

Provide tie bars at sides of site concrete strips where indicated.

Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, buildings, foundations, walls, other fixed objects, and in other locations as indicated on the Contract Drawings. Provide Expansion Joints at full depth of Site Concrete where Site Concrete meets vertical faces of buildings, structures, foundations, walls, etc.

Locate expansion joints at maximum intervals of twenty (20) feet, unless otherwise indicated on the Contract Drawings.

Extend joint fillers full width and depth of joint.

Provide Construction Joint Dowel Bars at the spacing distances indicated in the Contract Drawings.

Terminate Joint Filler less than 1/2 inch or more than one-inch (1") below finished surface if joint sealant is indicated.

Place top of Joint Filler flush with finished concrete surface if joint sealant is not indicated.

Furnish joint fillers in one (1)-piece lengths. Where more than one (1) length is required, lace or clip joint-filler sections together.

Protect top edge of joint filler during concrete placement with metal, plastic, or another temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

Contraction Joints and Isolation Joints: Form weakened-plane contraction joints and isolation joints, sectioning concrete into areas as indicated on the Construction Drawings, or at spacing intervals as recommended by the PCA.

General Methodology: Contraction Joints shall be placed in Site Concrete to minimize the occurrence of random cracking on the surface due to drying shrinkage or stress loading and to reduce the width of concrete cracks should they occur. When not indicated on the Contract Drawings, Contraction Joints shall be placed at 24x the thickness of the site concrete.

Saw-Cut Contraction Joints:

Construct Saw-Cut Contraction Joints with a circular power saw, equipped with a new, shatterproof abrasive or diamond-tipped blade. Cut 3/16-inch-wide joints (maximum width of saw-blade) into concrete surface. Cutting action shall not tear, abrade, spall, shatter, or otherwise damage the surface.

Saw-cut concrete surface when successful jointing results can be achieved and prior to uncontrolled random contraction cracking of concrete occurs.

Early-entry Saw cuts: When used, provide saw cuts into fresh concrete at 1" to 1-1/4" depth, or as indicated on the Contract Drawings.

Perform saw-cut joints cleanly and smoothly, to a constant and equal depth, in a continuous consistent line, with no over-cutting.

Depth:

Contraction Joints: Construct depth equal to a minimum of one-fourth (1/4) of the concrete slab thickness.

Isolation Joints: Construct depth equal to the full depth of the concrete thickness.

Perform in as continuous an operation as possible, to avoid misalignment of joints. Use chalk lines, forms, or templates as required, to achieve consistent lines)

Use a hand grinder with a four-inch (4") diamond blade to saw-cut up to vertical edges such as walls, steps, curbs and columns. Do not over-cut into vertical surfaces or adjacent concrete surfaces.

Edging: Tool edges of site concrete, as required, after initial floating, with an edging tool to the following radius or chamfer. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on Site Concrete surfaces.

Radius: 1/4 inch (aka "Carpet Edger").

Chamfer: 1/2" inch.

CONCRETE FINISHES

General:

Any exposed Site Concrete surfaces that are subject to pedestrian traffic shall be "slip-resistant", per the requirements outlined in CBC, Section 1124B.1, and per ADAAG 4.5.1.

The minimum coefficient of friction shall meet or exceed 0.8 on exterior and 0.6 on interior surfaces.

Exposed Site Concrete surfaces shall have the following finish on all surfaces less than six percent (6%) slope:

Medium Broom Textured Finish, or a textured finish as specified which is equivalent to the finished texture of a Medium Broom Textured Finish.

Exposed Site Concrete surfaces shall have the following finish on all surfaces greater than six percent (6%) slope:

Heavy Broom Textured Finish, or a textured finish as specified which is equivalent to the finished texture of a Heavy Broom Textured Finish.

Color(s) and finish(es) specified herein shall match referee samples and field-constructed mock-up samples as approved by the Landscape Architect.

Wetting of concrete surfaces during screeding, initial floating, or finishing operations is strictly prohibited.

Top Cast/Retarded Sand Textured Finish: Match Referee Sample, as acquired by the Landscape Architect, and the approved Field Constructed Mock-up, to compare for color, texture, finish, and other characteristics relating to aesthetic effects.

Applications: Refer to the Cast-in-Place Concrete Paving Schedule as indicated on Contract Drawings.

Once concrete has been floated, bleed-water sheen has disappeared, and the concrete surface has stiffened sufficiently, evenly spray-apply apply the Top Cast Chemical Surface Retarder to the concrete

surface. Apply the Top Cast Chemical Surface Retarder according to the Manufacturer's written instructions for applying the chemical. Do not use curing compounds.

Handle the chemical Top Cast Chemical Surface Retarder with care to avoid spillage and staining. Protect areas adjacent to the Work from over-spray of the chemical. Provide neutralizing solution(s) to the chemical solution, as needed, to prevent chemicals from damaging or contaminating adjoining planting areas.

Immediately after applying the Top Cast Chemical Surface Retarder, damp-cure the sprayed concrete surface accordingly to the manufacturer's written instructions.

After the Top Cast Chemical Surface Retarder has adequately etched into the surface and the concrete has hardened sufficiently (generally overnight, or when the concrete has hardened adequately to support the weight of a person), check a small area to determine if the proper retarded depth has been achieved. If the depth appears too shallow wait a few hours to check again.

With a hose, lightly spray the top surface of the concrete surface with water. Remove the Top Cast Chemical Surface Retarder matrix through a process of gently brushing surface with a stiff, nylon bristle broom and flushing with water to remove the surface paste, exposing the fine aggregates integral to the concrete mix. Repeat the water flushing and brushing cycle, as needed, until the retarded matrix has been removed and the surface texture is acceptable. DO NOT USE A HIGH-PRESSURE WASHER TO APPLY WATER OR TO REMOVE THE CHEMICAL SOLUTION FROM THE SURFACE.

After concrete is sufficiently hydrated, provide jointing in the locations indicated in the Contract Drawings. Early-entry jointing of concrete may be required to prevent premature cracking of finished surfaces. After concrete is fully hydrated (approx. 30-days), seal the Top Cast Chemical Surface Retarded (Sand) texture finished concrete surface with two (2) coats of Sealer as specified herein this Section, per the Manufacturer's latest printed instructions.

Refer to the Cast-in-Place Concrete Pavement Schedule as indicated on Construction Drawings for Sealer requirements.

SITE CONCRETE PROTECTION AND CURING

General: Protect freshly placed Site Concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

Evaporation Retarder: Apply Evaporation Retarder to Site Concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

Concrete Curing:

General: Meet ACI Standard ACI 308R. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

Method: Cure concrete by Direct Moisture Curing, Absorptive Cover Curing, Moisture-Retaining-Cover Curing, Curing Compound application, Curing and Sealing Compound application, or a combination of these, as follows:

Direct Moisture Curing: Keep surfaces continuously moist for not less than seven (7) days with the following materials:

Water.

Continuous water-fog spray.

Absorptive Cover Curing: Cover concrete surfaces with water saturated Absorptive Cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least twelve inches (12"). Immediately repair any holes or tears during curing period using cover material and tape. Keep Cover continuously moist for not less than seven (7) days.

Moisture-Retaining-Cover Curing: Cover concrete surfaces with Moisture-Retaining cover for curing

SECTION F

concrete, placed in widest practicable width, with sides and ends lapped at least twelve inches (12") and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Keep Moisture-Retaining-Cover continuously moist for not less than seven (7) days.

Curing Compound: Apply uniformly in continuous operation by power spray or roller according to Manufacturer's written instructions. Re-coat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to Manufacturer's written instructions. Re-coat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

INSTALLATION OF JOINT SEALANTS

Provide a Joint Sealant that is compatible with the substrate material(s) to which it is being applied. Do not use a Joint Sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the application tool.

Ambient Temperature Criteria: The ambient temperature shall be within the limits of 40d. F. and 90d. F. when the Joint Sealant is being applied.

Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of Joint Sealants as applicable to materials, applications, and conditions indicated.

Surface Preparation of Joints:

Remove foreign material from joint substrates which could interfere with adhesion of Joint Sealant, including dust, surface dirt, dirt, moisture, water repellents, grease, oil, wax, lacquer, paint, waterproofing, or other foreign matter that would tend to destroy or impair adhesion.

Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths.

Clean porous surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or acid washing to produce a clean, sound substrate. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints.

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing.

Clean non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of Joint Sealants.

Sealant Preparation: Do not add liquids, solvents, or powders to the Joint Sealant material (for singlecomponent materials). Where specified, mix multi-component elastomeric Joint Sealants in accordance with manufacturer's instructions.

Primer: Immediately prior to application of the Joint Sealant, clean out loose particles from joints. Where recommended by the sealant manufacturer, apply Primer to joints in accordance with sealant manufacturer's instructions. Do not apply Primer to exposed finish surfaces. Do not allow spillage or migration of Primer onto adjoining surfaces.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install Joint Fillers to provide sealant support for optimum performance cross-sectional shapes and depths.

Do not leave gaps between ends of Joint Fillers.

Do not stretch, twist, puncture or tear Joint Fillers.

Remove absorbent Joint Fillers which have become wet prior to sealant application and replace with dry material.

Install Bond Breaker to the back or bottom of the joint cavity (between sealants and joint-fillers, compression seals or back of joints where required), as recommended by the Joint Sealant manufacturer,

for each type of joint and sealant used, to prevent "third-side" adhesion of the Joint Sealant to the back of the joint. Carefully apply the Bond Breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the Bond Breaker.

Installation of Joint Sealants:

Install Joint Sealant after concrete substrate material has been cast and allowed to cure. Remove protective cap from preformed Joint Filler. Remove any excess Joint Filler material that will inhibit an adequate depth and bond of the Joint Sealant material.

Place masking tape where required along the joint cavity to prevent contact of the Joint Sealant with adjoining surfaces. Remove masking tape within ten (10) minutes after joint has been filled and tooled.

Apply the Joint Sealant in accordance with the manufacturer's printed instructions with an application tool having a nozzle that fits the width of the joint cavity. Install Joint Sealant by proven techniques to contact and solidly full wet joint substrates, completely filling the recesses provided for each joint configuration, providing uniform, optimum performance cross-sectional shapes and depths. Do not allow spillage or migration of Joint Sealant onto adjoining surfaces.

Tooling of Non-Sag Joint Sealants: Tool Non-Sag Joint Sealants to form smooth, uniform beads of configuration indicated, free of wrinkles, streaks, gouges, boils, air holes, etc. and to ensure contact and adhesion of the Joint Sealant with the sides of the joint. Remove excess Joint Sealants from surfaces adjacent to joint. Do not use tooling agents which discolor Joint Sealants or adjacent surfaces or are not approved by Sealant Manufacturer.

Sanding of Joint Sealant: Lightly apply dry sand to cover freshly-poured elastic Joint Sealant material. When Joint Sealant has hardened, remove excess sand that has not bonded to Joint Sealant.

Protection and Curing:

Protect installed Joint Sealants during and after curing period from contact with contaminating substances or from damage.

Cut out and remove damaged or deteriorated Joint Sealers and reseal joints with matching new materials.

Clean off excess Joint Sealants or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved by the Sealant Manufacturer.

APPLICATION OF CONCRETE SEALANTS

Penetrating Concrete Sealer:

After cast-in-place concrete is fully hydrated (approx. 30-days), seal exposed site concrete surfaces with two (2) coats of approved Penetrating Concrete Sealer. Apply in accordance with Manufacturer's written directions. Finished surfaces shall be uniform in appearance and not mottled.

SITE CONCRETE TOLERANCES

General: Comply with ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials, and as follows:

Elevation: 1/4 inch.

Thickness: Plus 3/8 inch, minus 1/4 inch.

Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch. Variation from the Level or from the Grades shown, per Civil Engineer Drawings:

In pavements:

In any ten-feet (10'): 1/4 inch.

In twenty-feet (20'): maximum 3/8 inch.

In forty-feet (40') or more: 3/4 inch.

Variation in Radii:

In radii of less than ten-feet (10'):

In any five-feet (5'): 1/8 inch.

In any ten-feet (10'): 1/4 inch.

In radii of twenty feet (20'):

In any ten-feet (10'): 1/4 inch.

In any twenty-feet (20'): 3/8 inch.

In radii of thirty-feet (30'), or more:

In any twenty-feet(20'): 1/2 inch.

In any thirty-feet (30'): 1 inch.

Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.

Vertical Alignment of Tie Bars and Dowels: 1/4 inch.

Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch.

Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: Length of dowel 1/4 inch per 12 inches.

Joint Spacing: Three inches (3").

Contraction Joint Depth: Plus 1/4 inch, no minus.

Joint Width: Plus 1/8 inch, no minus.

FIELD QUALITY CONTROL

Testing Agency:

Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Section.

Testing Services: Testing shall be performed according to the following requirements:

Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C172, except modified for slump to comply with ASTM C94.

Slump: Per ASTM C143; one (1) test at point of placement for each compressive-strength test, but not less than one (1) test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

Air Content: Per ASTM C231, pressure method; one (1) test for each compressive-strength test, but not less than one (1) test for each day's pour of each type of air-entrained concrete.

Concrete Temperature: Per ASTM C1064; one (1) test hourly when air temperature is 40 deg F. and below and when 80 deg. F. and above, and one (1) test for each set of compressive-strength specimens.

Compression Test Specimens: Per ASTM C31; one (1) set of four (4) standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.

Compressive-Strength Tests: Per ASTM C39; one (1) set for each day's pour of each concrete class exceeding five (5) cu. yd. but less than 25 cu. yd., plus one (1) set for each additional 50 cu. Yd. One (1) specimen shall be tested at seven (7) days and two (2) specimens at twenty-eight (28) days; one (1) specimen shall be retained in reserve for later testing, if required.

When frequency of testing will provide fewer than five (5) compressive-strength tests for a given class of concrete, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

When total quantity of a given class of concrete is less than 50 cu. yd., the Landscape Architect may

waive compressive-strength testing if adequate evidence of satisfactory strength is provided.

When strength of field-cured cylinders is less than eighty-five-percent (85%) of companion laboratorycured cylinders, current operations shall be evaluated, and corrective procedures shall be provided for protecting and curing in-place concrete.

Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 PSI.

Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 24hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in site concrete, design compressive strength at 28-days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as the sole basis for approval or rejection.

Additional Tests: Testing Agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by the Owner. Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed.

REPAIRS AND PROTECTION

Remove in its entirety (from joint to joint) and replace site concrete that is broken, cracked, damaged, or defective, or concrete which does not meet requirements of this Section.

Repair Standards: Repair of surface defects shall conform with applicable requirements of ACI 301. When using epoxy mortar, conform with requirements of ACI 503.4.

Surface Defects:

Repair of surface defects shall begin immediately after form removal. For repair with epoxy mortar, concrete shall be dry.

Surface defects are defined to include: form-tir holes, air pockets or voids, bug holes, honeycombed areas, rock pockets, visible construction joints, fins and burrs.

Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent like surfaces, and free of shrinkage cracks.

Drill test cores where directed by the Landscape Architect, when necessary, to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory Site Concrete areas with Portland cement concrete bonded with epoxy adhesive.

Protect Site Concrete from damage. Exclude traffic from Site Concrete for at least fourteen (14) days after placement. When construction traffic is permitted, maintain Site Concrete as clean as possible by removing surface stains and spillage of materials as they occur.

Maintain exposed Site Concrete free of stains, discoloration, dirt, and other foreign material. Clean Site Concrete not more than two (2) days before date scheduled for Substantial Completion inspection.

321400 – UNIT PAVING

GENERAL

THIS SPECIFICATION IS FOR UNIT PAVING THAT IS SET ON A SAND BASE WITH SANDED JOINTS.

USE SPEC SECTION 321413 (UNIT PAVING VENEER) FOR UNIT PAVING THAT IS MORTAR SET

ON CIP CONCRETE BASE WITH GROUTED JOINTS.

USE SPEC SECTION 321410 (PEDESTAL SUPPORT UNIT PAVING) FOR UNIT PAVING THAT IS SET ON SUPPORT PEDESTALS (ON STRUCTURE APPLICATIONS).

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required, to make a complete, universally-accessible Unit Paving installation, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Precast Concrete Unit Paving Modules.

Compaction of Soil Sub-Grade.

Graded Aggregate Sub-Base Material.

Sand Bedding Material (Sand for Leveling/Bedding Course).

Joint Filler Material (Polymer-Modified (Polymeric) Finishing Sand for Paving Joints).

Accessories (Geotextile Filter Fabric, Soil Sterilant).

Unit Paving Sealant.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 31 22 19 – Landscape Grading.

Section 32 13 13 – Concrete Paving, for cast-in-place concrete edge restraints.

DEFINITIONS AND APPLICABLE STANDARDS

References:

ASTM – American Society for Testing and Materials.

ANSI – American National Standards Institute.

AASHTO – American Association of State Highway and Transportation Officials.

NBGQA - National Building Granite Quarries Association.

ICPI – Interlocking Concrete Pavement Institute.

NSTC – National Slate Technology Center.

BIA – Brick Industry Association.

BSI – Building Stone Institute.

Standard Specifications – Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS, latest edition.

CBC – California Building Code, Title 24 Disabled Access Regulations.

ADAAG – American with Disabilities Act Accessibility Guidelines.

Material Specification Standards:

ANSI A118.4 – Standard Specification for Latex-Portland Cement Mortar.

ASTM C33 – Standard Specification for Concrete Aggregates.

ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.

ASTM C270 – Standard Specification for Mortar for Unit Masonry.

ASTM C902 – Standard Specification for Pedestrian and Light Traffic Paving Brick.

ASTM C1272 – Standard Specification for Heavy Vehicular Paving Brick.

Material Testing Standards:

ASTM C67 – Standard Method of Sampling and Testing Brick and Structural Clay Tile.

ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

ASTM C140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

ASTM C170 – Standard Test Method for Compressive Strength of Dimension Stone.

ASTM C199 – Standard Test Method for Pier Test for Refractory Mortars.

ASTM C241 - Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.

ASTM C780 – Standard Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

ASTM C880 – Standard Test Method for Flexural Strength of Dimension Stone.

ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

ASTM D1557 – Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.

Measurements:

PSI: Measurement, in pounds per square foot.

CU/FT: Measurement, in cubic-foot.

Percent Compaction: Per ASTM D1557, percentage of the maximum in-place dry density of the same material, as determined by the Geotechnical Engineer.

SUBMITTALS

General: Submit each item in this Article in four (4) bound Submittal Booklets and provide four (4) sets of Material Samples for review by the Landscape Architect.

Submittal Booklets: Each Submittal Booklet under this Section shall be tabbed into specific sections, containing clearly identified (through yellow highlighter or other specific identification methods) and legible information on the following information indicated in this Article.

Product/Material Data. Submit available Product/Material data, manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of material and product indicated:

Precast Concrete Unit Pavers.

Joint Filler Material.

Accessories (Geotextile Filter Fabric, Soil Sterilant).

Finished Surface Sealer.

Material Samples: Submit Material Sample sets as indicated to the Landscape Architect for verification:

In full-size Units, submit Sample sets of each type of Unit Paving indicated herein this Section. Provide Sample sets of each size and shape for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics:

12" x 12" square panel of Geotextile Filter Fabric.

One (1) pound sample of Graded Aggregate Sub-base material. Submit in re-sealable plastic bag, and label accordingly.

One (1) pound sample of Sand for Leveling/Bedding. Submit in re-sealable plastic bag, and label accordingly.

One (1) pound sample of Joint Filler Material (Polymer-Modified (Polymeric) Joint Sand). Submit in resealable plastic bag, and label accordingly.

Material Test Reports: Submit test results from an independent testing laboratory for compliance of each type of material specified, per associated ASTM standards. Cost of testing shall be borne by the Contractor.

Unit Paving Modules:

Test Units for compressive strength, water absorption, and dimensional tolerance per ASTM C140.

A minimum of five (5) full size Units per test are required for an average value.

Graded Aggregate Sub-base Material: Sieve analysis per ASTM D448, meeting ASTM D2940 gradation.

Sand Bedding Material (Sand for Leveling/Bedding Course): Sieve analysis per ASTM C136, meeting modified ASTM C33 gradation.

Joint Filler Material (Polymer-Modified (Polymeric) Joint Sand): Sieve analysis per ASTM C136, meeting modified ASTM C144 gradation.

Scaled Shop Drawings: Not Required.

Field-Constructed Mock-ups:

Provide complete Field-Constructed Mock-ups for all respective materials receiving finishing which is to be used as the basis for judging quality of workmanship throughout the project, as follows:

Size: Provide one (1) Field-Constructed Mock-up for each Unit Paving type indicated herein this Section. Each Mock-up shall measure 6'-0" wide x 8'-0" long and include the edge restraint material at the perimeter of the Mock-up as indicated per the Contract Drawings.

Prior to the installation of Work in this Section, erect Field-Constructed Mock-ups to verify selections made under the Submittals Article herein to demonstrate aesthetic effects as well as qualities of materials and execution. Build Field-Constructed Mock-ups to comply with the following requirements, using materials indicated for final Unit of Work, including same base construction, joints, and contiguous Work as indicated.

Locate Field-Constructed Mock-ups in the location and of the size indicated or, if not indicated, as directed by the Owner.

Notify the Landscape Architect at least one (1) week in advance of the dates and times when the Field-Constructed Mock-ups will be erected and ready for review.

Demonstrate the proposed range of aesthetic effects and workmanship in the Field-Constructed Mockups that will be produced in final Unit of Work.

When the Landscape Architect determines that Field-Constructed Mock-ups does not meet requirements, retain it for reference and construct additional Field-Constructed Mock-ups until it is accepted. Modify or correct Work as directed by Landscape Architect.

Obtain the Landscape Architect's acceptance of the Field-Constructed Mock-ups, in writing, prior to the start of the final Unit of Work. Accepted Mock-ups is a prerequisite to commencing Work under this Section.

Retain and maintain Field-Constructed Mock-ups during construction in an undisturbed condition. Accepted Field-Constructed Mock-ups shall be the standard for judging the completed Work under this Section.

Demolish and remove the Field-Constructed Mock-ups when directed by the Owner.

Accepted Field-Constructed Mock-ups may become part of the completed Work, if directed by the Landscape Architect.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Unit Paving installations.

Maintenance Program: Submit Manufacturer-recommended program for maintenance of each type of Unit Paving indicated herein.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work under this Section shall proceed until all information indicated herein this Article have been reviewed, accepted, and approved by the Landscape Architect, in writing.

QUALITY ASSURANCE AND CONTROL

Manufacturer Qualifications: Each Manufacturer shall specialize in the manufacturing of Unit Paving Materials for a minimum of five (5) years.

Acceptable Manufacturer shall be a standing member of the ICPI.

Installer Qualifications:

Requirement: Valid California C-61 (Limited Specialty D-06 "Concrete-Related Services") License.

Engage an experienced Installer who has completed Unit Paving installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance. Installation shall be by a Contractor and crew with at least two (2) years of experience in placing Unit Paving on projects of similar nature and dollar cost.

Single-Source Responsibility: Obtain each color, type, and variety of Unit Paving type, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

Manufacturer's Directions: Follow Manufacturer's directions and drawings in cases where the Manufacturers of articles used in this Section furnish directions covering points not shown in the Contract Drawings and Contract Specifications.

Permits, Fees, Bonds, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, and inspections necessary to perform and complete Work under this Section.

DELIVERY, STORAGE, AND HANDLING

Provide new, unused materials indicated under this Section. Store and secure properly to prevent theft or damage. It is the responsibility of the Contractor to install "factory condition" Units.

Deliver perishable materials in original, unopened packaging. Protect from dampness.

Deliver materials in a timely manner so as to not delay Work and install only after preparations for installation have been completed.

Protect Unit Pavers and other materials during storage and construction against soilage or contamination from earth and other materials.

Wrap pavers in plastic or use other packaging materials that will prevent rust marks from steel strapping used in shipping.

Deliver and unload materials at the Project Site in such a manner that no damage occurs to the products or materials.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Notify the Contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place.

Field Measurements: Contractor shall take field measurements as required. Report major discrepancies between the Contract Drawings and field dimensions to the Landscape Architect prior to commencing Work.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to installing Unit Paving is encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease installation operations and notify Landscape Architect for further direction.

Traffic Control: Maintain access for vehicular, bicycle, and pedestrian traffic as required for other construction activities during installation of Unit Paving. Access shall also be unobstructed and maintained at all times to allow for entry and exit of emergency vehicles.

Grades and Levels: Establish and maintain required levels and grade elevations. Review installation procedures and coordinate Work herein this Section with other Work affected.

Weather: Perform installation of Unit Paving only when weather and soil conditions are suitable in accordance with locally accepted practices. Do not install Unit Pavers during rain or while sub base is wet from rain. Do not apply Soil Sterilant when winds exceed ten (10) mph or during or immediately after rain.

Hot-Weather Requirements: Protect Unit Paving Work in hot weather by providing artificial shade, wind breaks and use cooled materials, as required.

Sequence and Scheduling: Do not install Work under this Section prior to acceptance of sub-grade preparation Work under another Section. Install edging/header materials prior to placement of Unit Paving. Coordinate with other trades to insure proper placement of irrigation sleeves (per Section 32 84 00) prior to installation of Unit Paving.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected materials immediately from Project site. The Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

EXTRA MATERIALS

Provide additional Unit Pavers to the Owner to be used for future repairs. Deliver surplus Unit Pavers on pallets, as required, per the requirements of the Delivery, Storage and Handling Article.

Quantity: Provide a minimum of one-percent (1%) of the total quantity installed of each Unit Paving in each respective Unit size as indicated herein this Section.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

PRODUCTS

PRECAST CONCRETE UNIT PAVING MODULES

General: Provide materials and products that result in consistent colors, styles, textures, and patterns of the Precast Concrete Unit Paving surfaces. Install in necessary quantity in areas as indicated on the Contract Drawings.

Type: Solid, interlocking Precast Concrete Unit Paving modules, manufactured to comply with ASTM C936, made from normal-weight aggregates in colors, texture, density, sizes, and shapes as indicated.

Dimensional sizes: (as expressed in the ratio of length x width):

(Note sizes indicated below are for an Ashlar Pattern; modify accordingly) (Note that most durable pattern for traffic conditions in a herringbone pattern)

As indicated in the Contract Drawings.

Thickness:

Vehicular Areas: Minimum 3-1/4" thick (80mm).

Testing and Physical Properties:

Test Units prior to delivery to the project in accordance with ASTM for average compressive strength, average water absorption, freeze/thaw resistance, and dimensional tolerance. A minimum of five (5) specimens per test are required for an average value. Compile tests using full size Units, meeting the following:

Average Compressive Strength: Meet or exceed 8,000 PSI, per ASTM C140, with no individual unit under 7,200 PSI.

Average Water Absorption: 5%, with no Unit greater than 7%, per ASTM C140.

Dimensional Tolerances:

Length or width: Units shall not differ by more than 1/16" from approved samples.

Height/Thickness: Units shall not differ by more than 1/8" from the specified standard dimensions.

Rejection: In the event the Units fail to conform to the specified testing requirements, the Manufacturer may sort it, and new test Units shall be selected at random by the Landscape Architect from the retained lot and tested at the expense of the Manufacturer. If the second test of test Units fails to conform to the specified requirements, the entire lot shall be rejected.

Colors: Pigments used in the manufacture of the Units shall conform to ASTM C979.

Styles:

As indicated in the Contract Drawings. Style to match the referee sample, as acquired by the Landscape Architect.

or equal, as approved by the Landscape Architect.

Textures: As indicated in the Contract Drawings. Finished Precast Concrete Unit Paving surfaces under this Article shall be "slip-resistant", per the requirements outlined in the California Building Code, Section 1124B.1 and ADAAG 4.5.1.

Provide Units as indicated in the Contract Drawings. Surface texture to match referee samples, as acquired by the Landscape Architect.

or equal, as approved by the Landscape Architect.

Pattern(s): Pattern(s) of finished surface shall be in accordance to the layout as indicated in the Contract Drawings. Butt joint and maintain continuity of alignment that minimizes the need to sawcut the Precast Concrete Unit Paving Modules to satisfactorily fit to the designated pattern(s) within the designated areas.

Products & Manufacturer's: Subject to compliance with requirements, provide products by the following:

Acker-Stone, Corona, CA.

or equal, as approved by the Landscape Architect.

GRADED AGGREGATE SUB-BASE MATERIAL

Graded Aggregate Sub-base: Quality-controlled, graded aggregate.

Conform to ASTM D448 Gradation.

Meet ASTM D2940.

SAND BEDDING MATERIALS

Sand for Leveling/Bedding Course:

General: Sand for Leveling/Bedding Course shall be clean, washed, fine-textured, sharp (angular), neutral pH, no salinity, free from deleterious or foreign matter.

Conform to ASTM Requirements for Concrete Sand.

Properties and Gradation: Conform to the grading requirements of ASTM C33 with modifications as follows:

Grading Requirements for Sand for Leveling/Bedding Course	
ASTM C33 Sieve Analysis	
Sieve Size	Percent (%) Passing
3/8"	100
No. 4	95-100
No. 8	85-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-1

Sieve accordingly per ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

Sand Bedding Material conforming to ASTM C144 (Mason's Sand) shall not be used.

JOINT FILLER MATERIALS

Polymer-Modified (Polymeric) Finishing Sand for Paving Joints:

General: Polymer-Modified (Polymeric) Finishing Sand for Paving Joints shall be a high-performance, pre-packaged, clean, washed, fine-textured, sharp (angular), neutral pH, no salinity or deleterious materials (to avoid staining or efflorescence), resistant to insect and inhibits weed growth, with formulated bonding polymers.

Properties and Gradation: Conform to the grading requirements of ASTM C144 with modifications as follows:

Grading Requirements for Finishing Sand for Paving Joints ASTM C144 Sieve Analysis

Sieve Size	Percent (%) Passing
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-100
No. 50	20-40
No. 100	10-25
No. 200	0-10

Sieve accordingly per ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

Color:

Tan. Final color selection of Joint Sand to be confirmed upon final color selection of Unit Paver Modules during Submittals.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

HP Polymeric Sand for Pavement Joints, Techni-Seal.

Joint-Lock[™] Sand, Package Pavement.

PowerLoc[™] Jointing Sand, Quikrete Products,

Bonsal® Polymeric Joint Sand, Bonsal American.

or equal, as approved by the Landscape Architect.

ACCESSORIES

Geotextile Filter Fabric: Permeable, lightweight, continuous, non-woven, geo-textile polypropylene filament material, UV resistant, engineered to allow water permeability and deter soil permittivity per ASTM D4491. Geotextile Filter Fabric shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids. Meet AASHTO M288-96, Class 1. Fabric shall have a permeability rating 10 times greater than that of soil on which paving is founded and an AOS (apparent opening size) small enough to prevent passage of fines from leveling course into graded aggregate of base course below.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Amoco 4553, Amoco Fabrics and Fibers Company.

FX-80HS, Carthage Mills.

C-80NW, Contech.

180 EX, Linq.

Geotex 801, Propex. Inc.

TerraTex N08, Webtec.

180N, TC Mirafi.

or equal, as approved by the Landscape Architect.

Soil Sterilant: Non-Selective Post-Emergent Herbicide: Spray-applied solution containing a minimum of 41% of the active ingredient "glyphosate" (full strength), with a surfactant, mixed with water accordingly per the Manufacturer's directions.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Roundup® PRO, (41% glyphosate), Monsanto Company, St. Louis, MO.

Roundup® PRO Concentrate (50% glyphosate), Monsanto Company, St. Louis, MO.

Honcho® Plus, (41% glyphosate), Monsanto Company, St. Louis, MO.

High Yield® Kill-Zall Weed & Grass Killer, (41% glyphosate), Voluntary Purchasing Groups, Boneham, TX.

or equal, as approved by the Landscape Architect.

UNIT PAVING SEALANT

Penetrating Sealant:

General: Penetrating Sealant shall be an invisible, water-based Penetrating Sealant, used to protect exterior Unit Paving installations. Sealant shall be a clear, non-flammable, UV-stabilized, non-yellowing solution which cures to reduce staining, soiling, discoloration, efflorescence, and acts as an invisible water-repellant coating, formulated to impart water repellence and dirt reduction to Unit Paving surfaces with no change in the surface appearance. Sealant shall react with carbon dioxide, and atmospheric moisture to form a penetrating water, dirt and mildew repellent barrier within 24 hours. Moisture absorption rate shall be low to reduce visible surface changes for up to ten (10) years.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Natural Look Penetrating Sealer, Glaze 'N Seal.

Sinak Sealer S-101, Sinak Corporation.

SLX100, Prosoco, Inc.

Thoroclear® Water-Based Sealer, Thoro/ChemRex, Inc.

HydraSeal, Endur-O-Seal.

Cementone, L.M. Scofield Company.

Sealhard, L&M Construction Chemicals.

White Mountain Ultrapel[™], Triangle Coatings, Inc.

or equal, as approved by the Landscape Architect.

EXECUTION

EXAMINATION

Examine surfaces indicated to receive Unit Paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Unit Paving. Do not proceed with installation until unsatisfactory conditions have been corrected.

Provide Cast-in-Place Concrete Edge Restraints as indicated on the Contract Drawings, under requirements of another Section. Install Edge Restraints prior to placing Unit Paving.

PREPARATION OF SOIL SUB-GRADE

Proof-roll prepared sub grade surface to check for unstable areas and areas requiring additional Soil Sub-Grade: Proof-roll prepared soil sub-grade surface to check for unstable areas and areas requiring compaction to meet the following:

Pedestrian Areas: Compact soil sub-grade uniformly to at least ninety-eight-percent (98%) Standard Proctor Density, per ASTM D698.

Vehicular Use Areas: Compact soil sub-grade uniformly to at least ninety-eight-percent (98%) Modified Proctor Density, per ASTM D1557.

Verify that sub-grade preparation, compacted density, and elevations conform to specified requirements.

Provide written density test results for soil sub-grade to the Owner. Do not proceed with Work until deficient sub-grades have been corrected.

PREPARATION OF GRADED AGGREGATE SUB-BASE

After acceptance of compacted soil Sub-grade, place Graded Aggregate Sub-base at required depth as indicated on the Contract Drawings. Set Graded Aggregate Sub-base in equal compacted layers, with each layer not exceeding four-inches (4") in thickness. Thickness of the layers shall also be consistent with the capabilities of the compaction equipment. Meet the following compaction densities:

Pedestrian Areas: Compact Graded Aggregate Sub-base uniformly to minimum ninety-eight-percent (98%) Proctor Density, in accordance with ASTM D698.

Vehicular Use Areas: Compact Graded Aggregate Sub-base uniformly to at least ninety-eight-percent (98%) Modified Proctor Density, per ASTM D1557.

Tolerances: It is essential that the intended surface profile is formed by the Compacted Graded Aggregate Sub-base so the Unit Paving Modules can be placed on a uniform thickness of Bedding Sand. Meet the following:

Sub-base surface tolerance should be +/- 3/8" over a 10'-0" straight edge.

Verify that Graded Aggregate Sub-base materials, thickness, compacted density, surface tolerances, and elevations conform to specified requirements.

Provide written density test results for Graded Aggregate Sub-base to the Owner. Do not proceed with Work until deficient Sub-base has been corrected.

Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage inlets.

PREPARATION

Verification of Base: Verify Sub-base is dry and accepted as meeting material, installation, and grade specifications.

Install Edge Restraints/Headers in locations as indicated on the Contract Drawings at the indicated elevations and set per manufacturer's recommendations (as required).

Geotextile Filter Fabric: Set Geotextile Filter Fabric onto the surface of the accepted Sub-base. Smooth out the Geotextile Filter Fabric, lapping the edges a minimum of 1'-0". Geotextile Filter Fabric shall be placed so that the material entirely covers the Sub-base and extends up the side of the areas that contain the Setting Bed material. Do not allow construction equipment on the Geotextile Filter Fabric.

INSTALLATION OF LEVELING/BEDDING COURSE

Spread Sand for Leveling/Bedding Course evenly over the Geotextile Filter Fabric and screed rails, using the rails and/or edge restraints to produce a uniform nominal thickness of one-inch (1"). The moisture content shall remain constant and the density is loose and constant until Unit Paving Modules are set and compacted.

The Leveling/Bedding Course is not meant to and shall not be used to fill in low spots nor its thickness adjusted to bring the paving to the correct grade. Any changes in thickness or undulations in the Leveling/Bedding Course will reflect on the paving surface and shall be subject to rejection by the Landscape Architect.

Do not disturb screeded surface.

Screeded areas shall not substantially exceed that which is covered by Unit Paving Modules in one (1) day's work.

Do not use Sand for Leveling/Bedding Course to fill depressions in the base surface.

Application of Soil Sterilant:

SECTION F

Mixing: Mix Soil Sterilant product in sprayer tank with clean water, according to Manufacturer's current printed instructions. Use sprayer, which will apply the solution uniformly, without disturbing the soil.

Spray Solution: Shake or stir prior to each application. Apply to dry surface only.

Over-spraying: Avoid spraying on walls, adjoining pavements, and areas to receive planting.

Depth: Apply to finished surface of Leveling/Bedding Course.

INSTALLATION OF UNIT PAVERS

Do not use Unit Paving Modules with chips, cracks, spalled edges, voids, discolorations, and other defects that might be visible or cause staining in finished Work. Remove and replace defective or broken Units at the direction of the Landscape Architect. Units shall be clean and free of dirt and foreign matter on all sides and shall be dry before setting.

Mix Unit Paving Modules obtained from several different pallets or cubes as they are placed to produce uniform blend of colors and textures.

Place Unit Paving in the desired pattern(s) as indicated in the Contract Drawings, laid with a 1/16" to 1/8" average joint width, being careful not to disturb Leveling/Bedding Course.

If Unit Paving have integral-cast spacer bars, place Units hand tight against spacer bars. Fill gaps between Units that exceed 3/8-inch with pieces cut to fit from full-size Unit Pavers.

Joint width shall not exceed 1/4".

String lines or chalk lines to maintain the aligned pattern(s). Units shall be set true to the required lines and grades. Joints shall be uniform in thickness. Set whole Units first, followed by Units that are cut to size. Cut Units, when necessary, with motor-driven masonry saw equipment to provide an accurate, clean, straight, sharp cut, with un-chipped or spalled edges. Cut Units to provide pattern indicated and to fit adjoining work neatly. Use full Units without cutting, where possible.

Hammer cutting is not acceptable.

For Precast Concrete Unit Paving Modules, a block splitter may be used.

Joint Pattern(s): Patterns as indicated on the Contract Drawings.

Tolerances: See Pavement Tolerances Article indicated herein this Section.

Where Unit Paving Modules meet the sides of edge restraints, or where special patterns are delineated in the overall layout plan, the Unit Paving Modules that meet the edges of these conditions shall be of whole units to the greatest extent possible. Units that are required to be cut or split to complete the layout composition shall not be smaller than $\frac{3}{4}$ the size of the smallest unit. Contractor shall be responsible to field-adjust the pattern of the Unit Paving Modules accordingly, per the direction of the Landscape Architect.

Keep heavy equipment off newly laid Unit Paving Modules that have not received initial compaction and sanded joints.

Once set, vibrate Unit Paving Modules into Leveling/Bedding Course with a low-amplitude plate vibrator capable of at least 5000-lbf compaction force at a frequency of 75 to 100 Hhz to vibrate the Unit Paving Modules into the Leveling/Bedding Course. Perform at least three (3) passes across the surface with the plate vibrator. Remove any cracked or damaged Unit Paving Modules and replace with new Units. Vibrate under the following conditions:

After edge pavers are installed and there is a completed surface or before surface is exposed to rain.

Before ending each day's Work, fully compact installed Unit Paving within thirty-six-inches (36") of the laying face. Cover the open layers with non-staining plastic sheets overlapped 48-inches on each side of the laying face to protect from rain.

APPLICATION OF SANDED JOINTS

General:

Follow manufacturer's directions for installation.

Prior to installation of Pre-Packaged Polymer-Modified (Polymeric) Joint Sand, the surface must be completely dry and the joints are free of dirt and debris. Any moisture that is evident on the surface will commence a premature bonding reaction of the polymers in the Joint Sand material.

Do not install if rain is forecasted.

Placement of Pre-Packaged Polymer-Modified (Polymeric) Joint Sand:

Spread Pre-Packaged Polymer-Modified (Polymeric) Joint Sand material over paved surfaces evenly and into joints between Unit Paving immediately after vibrating Unit Paving Modules into leveling course. Completely cover Unit Paving surface with thin layer, using push broom. Sweep the material into the joints with a slight pounding motion.

Once a substantial area of the surface has been swept, vibrate the Unit Paving surface with the plate compactor in overlapping passes. Continue procedure until all of the joints are completely full and joint sand material can no longer be swept or vibrated into the joints. Do not compact within six-feet (6') of an unrestrained edge.

Activation of Bonding:

Prior to activation of Bonding, carefully sweep entire Unit Paving area clean to remove excess Joint Sand material from the surface. Excess Joint Sand material, including chamfered areas, must be swept-off the paved surface and removed. Power broom or blowers are recommended for large areas.

The paving area, including the joints, shall be moistened with a wide, light spray, in a continuous manner, allowing water to gently flow into the Unit Paving joints. For optimal results, wetting the surfaces shall take place in sections of 500 square-feet at a time. Ensure that the wetting of one (1) section is finished before wetting of another section. Care shall be exercised to avoid flooding the surface and causing a runoff or displacing the Joint Sand from the joints. Do not use high pressure sprayers for flooding surfaces. Repeat water application 2-3 times at ten (10) minute intervals. Once the joints are moistened to their full depth, stop watering that section and move to the next section. Too much water will cause the polymer binders to run-off and prevent the sand from solidifying.

To insure optimal cohesion and long-term stability, the area shall be allowed to become completely dry and free from traffic before being exposed to water. Drying time will be prolonged in cold and damp weather and can be considerably less in dry climates. Protect the area from traffic until activation has occurred.

PAVEMENT TOLERANCES

The maximum variation from plane of the pavement surface shall be +/- 3/8" in 10'-0". The edges of any two adjacent Unit Paving Modules shall not differ by more than 1/16" in height.

Unit Paving Modules adjacent to drainage inlets and channels shall not be lower than the top of the drain, and not more than 3/16" above it.

APPLICATION OF UNIT PAVING SEALANT

Penetrating Sealant:

Following installation of Unit Paving, apply Sealant to exposed Unit Paving surfaces with two (2) coats of the Penetrating Sealant. Apply in accordance with Manufacturer's written directions. Finished surfaces shall be uniform in appearance and not mottled.

REPAIR, CLEANING, AND PROTECTION

Remove and replace Unit Paving materials that are loose, chipped, broken, stained, or otherwise damaged or if Units do not match adjoining units as intended. Provide new Units to match adjoining Units and install in same manner as original Units, with same joint treatment to eliminate evidence of replacement.

Provide final protection and maintain conditions in a manner that insures that Work is without damage or deterioration at the time of Substantial Completion.

Maintain finished surfaces free of stains, discoloration, dirt, and other foreign material until Final Acceptance of Work.

321513 – STABILIZED DECOMPOSED GRANITE PAVING

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required, to make a complete, universally-accessible, stabilized Decomposed Granite Paving Application on a prepared sub-grade, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Decomposed Granite Material.

Organic Binder (Stabilizer), where applicable in paving locations.

Accessories (Soil Sterliant (Herbicide)).

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 312219 – Landscape Grading.

Section 3284 00 – Irrigation Systems.

Section 329113 – Soil Preparation.

Section 329400 – Landscape Planting Accessories (Geotextile Filter Fabric; Steel Edging/Concrete Header, Soil Sterliant (Herbicide), etc.

Section 329813 – Landscape Establishment Period.

DEFINITIONS AND APPLICABLE STANDARDS

References:

ASTM – American Society for Testing and Materials.

AASHTO – American Association of State Highway and Transportation Officials.

ADAAG – American with Disabilities Act Accessibility Guidelines.

CBC – California Building Code, Title 24 Disabled Access Regulations.

Definitions:

Percent Compaction: Per ASTM D1557, percentage of the maximum in-place dry density of the same material, as determined by the Geotechnical Engineer.

Stabilized Decomposed Granite Paving: Shall consist of a thoroughly pre-blended mixture (before placement) of Decomposed Granite material (fines) and Organic Binder ("Stabilizer"), that is set in lifts, reacted with water, and compacted in place, creating a universally-accessible finished surface of Stabilized Decomposed Granite Paving.

Standards for Installation:

Standard Specifications: Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation (CALTRANS).

SUBMITTALS

General:
Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data: Submit available product/material literature supplied by manufacturer's, indicating that their products comply with specified requirements, technical data, and tested physical and performance properties. Provide manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of product/material:

Decomposed Granite Material.

Organic Binder.

Soil Sterilant (Herbicide).

Supplemental Data:

Sieve Analysis: Submit Sieve Analysis of each type of Decomposed Granite material to ensure it meets proper grading requirements.

Material Test Reports: Submit certified copies of the field tests performed (testing the compressive strengths) of the Stabilized Decomposed Granite Paving finished surface.

Recommendation: Submit written recommendation from the Manufacturer/Distributor of the Organic Binder, indicating the quantity (pounds) of Organic Binder required per ton of Decomposed Granite material (lbs./ton). Recommendation shall be specific to each type of Stabilized Decomposed Granite material specified herein.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Decomposed Granite installations.

Material Samples: Submit four (4) sets of physical Material Samples for review of kind, color, pattern, size, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed. Include the full range of exposed color and texture expected in the completed Work. Provide Material Samples bound and individually wrapped in re-sealable labeled 1-gallon plastic bags (as applicable):

Submit sample in sufficient quantity (one (1) pound minimum, per bag) of each Decomposed Granite material for review to ensure color will be compatible with the Project.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested.

No Work shall proceed under this Section until Submittal requirements indicated herein have been reviewed accordingly by the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications:

Requirement: Valid California C-27 (Landscaping Contractor) License.

Engage an experienced Installer who has completed in the last two (2) years at least three (3) Stabilized Decomposed Granite Paving installations similar in material, design, and extent to that indicated for this Project, and whose work has resulted in construction with a record of successful in-service performance.

Installer to be experienced in Asphalt installation procedures.

Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that installations under this Section are in progress.

Source Limitations: Obtain each type of Stabilized Decomposed Granite material from the same Manufacturer's plant.

Single-Source Responsibility: Obtain each color, type, and/or variety of Stabilized Decomposed Granite material from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

Manufacturer's Directions: Follow Manufacturer's directions and drawings in cases where the Manufacturers of articles used in this Section furnish directions covering points not shown in the Contract Drawings and Contract Specifications.

Field-Constructed Mock-ups: Prior to the installation of Work under this Section, Contractor shall erect Field-Constructed Mock-ups for each type of Stabilized Decomposed Granite Paving application to verify selections made under this Article and to demonstrate aesthetic effects as well as qualities of materials and execution. Build Field-Constructed Mock-ups to comply with the following requirements, using materials and same base construction including special features for surface finish, compaction within lifts, color(s), and contiguous work, as indicated for the final unit of Work.

Locate Field-Constructed Mock-ups in a location and of the size indicated or, if not indicated, as directed by the Owner's Representative.

Notify the Landscape Architect, in writing, at least one (1) week in advance of the dates and times when Field-Constructed Mock-ups will be erected.

Demonstrate quality and range of aesthetic effects and workmanship in the Field-Constructed Mock-ups that will be produced in the final unit of Work.

Obtain the Landscape Architect's acceptance of the Field-Constructed Mock-ups, in writing, before the start of Work. Accepted Mock-ups are a prerequisite to commencing Work under this Section.

Retain and maintain Field-Constructed Mock-ups during construction in an undisturbed condition. Accepted Field-Constructed Mock-ups shall be the standard for judging the completed Work under this Section.

When directed by the Landscape Architect, Contractor shall demolish and remove Field-Constructed Mock-up Samples from the Project Site.

Contractor shall provide a separate Field Constructed Mock-up for each type of Stabilized Decomposed Granite Paving application for review by the Landscape Architect.

Each Field-Constructed Mock-up shall measure four-feet (4') wide and six-feet (6') long, and at the specified respective depths of Decomposed Granite indicated in the Contract Drawings, to compare the aesthetics of material colors, textures, and finishes. Include the specified header/edging material around the perimeter of the Mock-up.

When the Landscape Architect determines that a Field-Constructed Mock-up does not meet requirements, retain it for reference and create another Field-Constructed Mock-up until the Field-Constructed Mock-up is accepted by the Landscape Architect.

Accepted Field-Constructed Mock-up(s) will be the standard by which remaining Work will be evaluated for technical and aesthetic merit, and re a prerequisite to commencing any Work under this Section.

DELIVERY, STORAGE, AND HANDLING

Protect Stabilized Decomposed Granite Paving material from contamination with foreign materials. Isolate stockpiles to prevent mixing of different aggregate grades prevent contamination with organic materials.

Deliver perishable material in original, unopened packaging. Protect from dampness.

Deliver and install Decomposed Granite materials so as to not delay Work and install only after preparations for installation have been completed.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Notify the Contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to installing Stabilized Decomposed Granite Paving is encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease installation operations and notify Landscape Architect for further direction.

Traffic Control: Maintain access for vehicular, bicycle, and pedestrian traffic as required for other construction activities during installation of Stabilized Decomposed Granite Paving. Access shall also be unobstructed and maintained at all times to allow for entry and exit of emergency vehicles.

Grades and Levels: Establish and maintain required levels and grade elevations. Review installation procedures and coordinate Work herein this Section with other Work affected.

Installation: Perform installation of Stabilized Decomposed Granite Paving only when weather and soil conditions during rain or while sub base is wet from rain. Do not apply Soil Sterilant when winds exceed 10 mph or during or immediately after rain.

Sequence and Scheduling: Do not install Work under this Section prior to acceptance of sub-grade preparation Work under another Section. Install edging/header materials prior to placement of Stabilized Decomposed Granite Paving, where applicable. Coordinate with other trades to insure proper placement of irrigation sleeves (per Section 328400) prior to installation of Decomposed Granite.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective Work under this Section at any time during progress of Work. The Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

LANDSCAPE ESTABLISHMENT PERIOD

Refer to Section 329813 - Landscape Establishment Period, for requirements under this Article.

During the duration of the Landscape Establishment Period, continuously maintain Stabilized Decomposed Granite Paving finishes until Final Acceptance of Work is granted. Immediately repair damage to the Work as the result of weather or traffic conditions. Report damage resulting from Work of other trades after installation of Stabilized Decomposed Granite Paving Work. Repair to match adjacent undisturbed Work.

PRODUCTS

DECOMPOSED GRANITE MATERIAL

Products & Manufacturers: Subject to compliance with requirements, provide products by the following:

Stabilized Decomposed Granite Paving:

Type: Organic Lock Decomposed Granite Paving

Supplier: Gail Materials, Corona, CA, 951-279-1095.

No known equal

EQUIPMENT

Mixing Equipment: Batch-type, using revolving blades or rotary drum.

Compaction Equipment: Power roller, weighing not less than five (5) tons.

ACCESSORIES

Soil Sterilant: Spray-applied, Non-Selective Post-Emergent Herbicide, for control of annual grasses and broadleaf weeds. Refer to Section 329400 – Landscape Planting Accessories. Apply in locations designated to receive Stabilized Decomposed Granite Paving only.

Aggregate Sub-Base: Class II, per "Standard Specifications", as required.

Water: Per ASTM C 94, from potable domestic source, and free from deleterious materials such as oils, acids, and organic matter. Transport as required.

Edging/Header Materials: Refer to Section 329400 – Landscape Planting Accessories.

Geotextile Filter Fabric: Refer to Section 329400 - Landscape Planting Accessories.

EXECUTION

EXAMINATION

Examine surfaces indicated to receive Stabilized Decomposed Granite Paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of surfacing.

Sub-grades shall have been rough graded to within 0.10 ft. of finish grades less depth in location to receive Stabilized Decomposed Granite Paving.

Insure edging materials and irrigation sleeving have been installed and are in place and secured. Do not proceed with installation Work until unsatisfactory conditions have been corrected.

PREPARATION

Application of Soil Sterilant:

Mixing: Mix Soil Sterilant product in sprayer tank with clean water, according to Manufacturer's current printed instructions. Use sprayer, which will apply the solution uniformly, without disturbing the soil.

Spray Solution: Shake or stir prior to each application. Apply to dry soil surface only.

Application: Provide Soil Sterilant only in locations designated to receive Stabilized Decomposed Granite Paving, as indicated on the Contract Drawings.

Over-spraying: Avoid spraying on walls, adjoining pavements, and all areas to receive landscape planting.

Depth: Immediately after application of spray solution, thoroughly incorporate the solution into the soil to a depth of two-inches (2") to four-inches (4"), per Manufacturer's current printed instructions.

Compaction: After completion of soil sterilization operations, compact sub-base to minimum 90% compaction, or as recommended by the Geotechnical Engineer.

INSTALLATION

Installing Edging/Headers: Install Edgings/Headers, as indicated on the Contract Drawings. Refer to Section 329400 – Landscape Planting Accessories for requirements. Edgings/Headers at the full depth of the perimeter of the Stabilized Decomposed Granite Paving, as indicated. Edgings/Headers shall be straight or curving as required, and securely in place, true to line and grade as required. Align header edges and set flush with adjacent paving where applicable.

Installing Geo-textile Filter Fabric: Geo-textile Filter Fabric shall be installed only in locations designated to receive Stabilized Decomposed Granite Paving. Install Fabric accordingly as indicated in the Contract Drawings to prevent weeds from growing up through the Stabilized Decomposed Granite Paving. Place the Geotextile Filter Fabric across the entire width of the Paving surface; overlap ends of Fabric rolls at a minimum of six inches (6").

Installing Aggregate Sub-Base (as applicable):

Verification: Do not place Aggregate Sub-Base prior to acceptance of sub grade preparation.

Placement: Spread Aggregate Sub-Base to thicknesses shown on the Contract Drawings and compact to a minimum of ninety-percent (90%) compaction, or as recommended by the Geotechnical Engineer.

Installing Stabilized Decomposed Granite Paving:

Verification: Verify locations to receive Stabilized Decomposed Granite Paving.

Lines and Levels:

Install Stabilized Decomposed Granite Paving true to grade, properly coinciding with adjacent Work and elevations.

Provide a finished Stabilized Decomposed Granite Paving surface uniform in texture and appearance. Do not permit finished Work to vary more than 1/8 inch in 10 feet from true profile and cross section. Finished Work shall be installed to fully comply as a universally-accessible pavement surface, per applicable Code requirements.

Mixing:

General: Organic Lock will arrive pre-mixed on-site. No material is to be delivered that is unable be installed in the same day. On-site storage is not permitted

Placement:

General: After pre-blending, place the Stabilized Decomposed Granite Paving material onto the compacted sub-surface material. Carefully place to avoid segregation in two (2) equal two-inch (2") lifts.

Grade, screed, and smooth the Stabilized Decomposed Granite Paving to desired finish grades. Allow for compaction of the material.

Compacting: While the Stabilized Decomposed Granite Paving material is still thoroughly moist, compact to a minimum 90% relative compaction, or as recommended by the Geotechnical Engineer. Compact each area with at least four (4) passes of the compacting equipment. After compacting, screed smooth.

Compaction should be done with a heavy lawn roller (minimum 225 pounds and maximum 30-inch width) to achieve finish grade and initial compaction. Hand-tamp edges around benches, signposts, trash receptacles, etc. Use a heavy (1-ton minimum) small rider, after having used the lawn roller, to obtain the desired final dense, smooth uniform texture. Do not use whackers, vibratory rollers or a vibrating plate tamper; the Stabilized Decomposed Granite Paving will not harden for weeks after vibration.

If the Decomposed Granite Paving surface is flaky or sticks to the roller drum, the Paving hydration level is deficient; cautiously add more water as required to achieve the Paving's proper hydration level.

If the roller creates a wash board effect or rills, additional time is required to allow the Paving to achieve the proper hydration level.

Contaminated Areas: Do not permit Stabilized Decomposed Granite Paving to contaminate adjoining planting areas or finishes. Clean up and remove all material spilled into adjacent planting areas.

Grading: When surface areas have been rolled and it becomes necessary to add a thin layer of Stabilized Decomposed Granite Paving material to bring the surface to grade, the previously rolled or compacted area shall be thoroughly scarified to a depth of two-inches (2") to provide a bond with the added Material.

Curing: Allow finished Stabilized Decomposed Granite Paving surface to dry completely. Set-up time varies, depending on weather conditions.

A hot, dry climate will set up sooner than a cool, moist climate.

FIELD QUALITY CONTROL

Tests: For each lift of Stabilized Decomposed Granite Paving, provide written verification as to the degree of compaction by a certified testing laboratory. Re-compact failed areas until specified

compaction is achieved.

Testing shall be the sole financial responsibility of the Contractor.

REVIEW OF COMPLETED INSTALLATION

Finished Stabilized Decomposed Granite Paving surfaces shall be smooth, uniform and solid, with no evidence of shipping or cracking. Dried, compacted material shall be firm through the entire depth, with no spongy areas. Loose material shall not be present on the surface initially. After the first year of use, a minor amount of loose material is expected on the surface of Stabilized Decomposed Granite Paving finishes.

Loose Decomposed Granite material on the surface or unconsolidated crushed aggregate screenings below the surface of Stabilized Decomposed Granite Paving finishes is evidence of improper bonding due to poor mixing or insufficient watering. Test the loose material for adequate Organic Binder by wetting, then tamping, and allowing it to dry. If the material still is unconsolidated, the Organic Binder did not get mixed adequately throughout the Stabilized Decomposed Granite Paving material. If the material now is solid, initial watering was insufficient. Cracking or sponginess is evidence of excessive Organic Binder in the mix.

Unconsolidated Paving areas shall be excavated and replaced accordingly with new Stabilized Decomposed Granite Paving material with a high proportion of fines meeting the grading requirements above, and pre-blended with Organic Binder per the procedures listed above. Patched areas shall be wetted thoroughly and rolled smooth. Patching shall be completed prior to any surface smoothing.

Smoothing of Stabilized Decomposed Granite Paving: Significant irregularities shall be smoothed out prior to final acceptance of Work. Smoothing shall be accomplished by rewetting/saturating rough areas thoroughly, and then rolling the material again with a heavy roller (1,000–1,500 lb. powered walk-behind roller, or small rider). Whackers are not recommended.

Tolerances of Stabilized Decomposed Granite Paving:

Depth: Final thickness of completed Stabilized Decomposed Granite Paving shall not vary more than 1/4inch from dimension indicated in the Contract Drawings. Measurements may be taken by means of test holes taken at random, finished surfaces. Correct any variations in the thickness beyond the allowable ½ inch by repeating the procedures listed above.

Width: Final width of completed Stabilized Decomposed Granite Paving shall not vary more than ½ inch from typical dimension width as indicated. Measurements may be taken at random cross sections along the finished surface.

Where installed, no edges of the Geotextile Filter Fabric shall be exposed.

REPAIRS AND PROTECTION

Damage or Defective Installation: Remove and replace Stabilized Decomposed Granite Paving that is damaged or defective, or does not meet the requirements indicated herein this Section.

Replacement of Stabilized Decomposed Granite Paving: If compression tests of cored samples fail to meet the specified compressive strengths as recommended by the Manufacturer, immediately remove and replace the Stabilized Decomposed Granite Paving with material conforming to the Contract Specifications.

Protection: Protect Stabilized Decomposed Granite Paving against traffic, injury, defacement or damage (by rain or other outside force during curing period) and subsequent construction operations until Substantial Completion. Exclude traffic from Stabilized Decomposed Granite Paving for a minimum of fourteen (14) days after placement. When construction traffic is permitted, it is the Contractor's responsibility to maintain Stabilized Decomposed Granite Paving as clean and level as possible by removing surface stains, spillage of materials as they occur, and traffic markings/grooves, etc., and to repair any damaged caused by said construction traffic.

Maintain Stabilized Decomposed Granite Paving finishes free of stains, discoloration, dirt, and other foreign material until Final Acceptance of Work.

CLEAN UP AND PROTECTION

For Work under this Section, keep Work area in a clean, orderly, and safe condition. Contractor shall remove trash caused from his Work on a weekly basis throughout the duration of the Work.

Protect Stabilized Decomposed Granite Paving from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and maintenance periods.

Upon completion of his Work under this Section, the Contractor shall remove rubbish, waste, debris, excess construction materials, and other items resulting from construction operations offsite as described herein this Section and directed by the Landscape Architect. Clean all adjoining pavements, edgings/headers free from excess Stabilized Decomposed Granite Paving material.

FINAL REVIEW

Final Review under this Section shall be performed upon completion of the Landscape Establishment Period. Refer to Section 329813 – Landscape Establishment Period, for requirements.

329113 – SOIL PREPARATION

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required to make a complete and thorough preparation of the planting soil, including soil amendment products, imported topsoil, as required, to make up deficiencies in quantity of soil available on site, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Agronomic Soil Fertility Testing and Soil Percolation Testing.

Topsoil.

Pre-Plant Weed Control.

Soil Conditioners, Amendments and Fertilizers (Organic & Chemical).

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 312219 – Landscape Grading.

Section 322800 – Irrigation Systems.

Section 329300 - Exterior Plants.

Section 329400 – Landscape Planting Accessories.

Section 329813 – Landscape Establishment Period.

DEFINITIONS AND APPLICABLE STANDARDS

References:

USDA – United States Department of Agriculture.

ASTM – American Society for Testing & Materials.

Definitions:

Topsoil - Shall be friable soil, providing sufficient structure in order to give good tilth and aeration to the soil. Topsoil shall be free of roots, clods, stones larger than one-inch (1") in the greatest dimension, pockets of coarse sand, noxious weeds, sticks, lumber, brush and other litter. It shall not be infested with nematodes or other undesirable disease-causing organisms such as insects and plant pathogens.

Gradation Limits - Soil shall be a sandy loam, loam, clay loam or clay. The definition of soil texture shall be per the USDA classification scheme. Gravel over 1/4-inch in diameter shall be less than 20% by weight.

Permeability Rate - Hydraulic conductivity rate shall be not less than one-inch (1") per hour, nor more than twenty-inches (20") per hour, when tested in accordance with the USDA Handbook Number 60, Method 34b, or other approved Methods.

Fertility - The range of the essential elemental concentration in soil shall be as follows:

Ammonium Bicarbonate/		
DTPA Extraction (PPM)		
Element	Concentration of elements for Soil Selection,	Concentration of Elements for Final

	measured as mg/kilogram dry weight basis	Acceptance (amended and conditioned soil) measured as mg/kilogram dry weight basis
Phosphorous	2 - 40	10 - 40
Potassium	40 - 220	100 - 220
Iron	2 - 35	24 - 35
Manganese	0.3 - 6	0.6 - 6
Zinc	0.6 - 8	1 - 8
Copper	0.1 - 5	0.3 – 5
Boron	0.2 - 1	0.2 – 1
Magnesium	50 - 150	50 – 150
Sodium	0 - 100	0 – 100
Sulfur	25 - 500	25 – 500
Molybdenum	0.1 – 2	0.1 - 2

Acidity - The soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 – 7.9.

Salinity - The salinity range measured in the saturation extract (Method 3a, USDA Hand Number 60) shall be 0.5 - 2.0 dS/m. If calcium and if sulfate ions both exceed 20 milli-equivalents per liter in the saturation extract, the maximum salinity shall be 4.0 dS/m.

Chloride - The maximum concentration of soluble chloride in the saturation extract (Medoth3a, USDA Handbook Number 60) shall be 150 mg/1 (parts per million).

Boron - The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/1 (parts per million).

Sodium Adsorption Ratio (SAR) - The maximum SAR shall be 3 measured per Method 20b, USDA Handbook Number 60.

Aluminum – Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than 3.0 parts per million.

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. The desirable range is 3% to 5%. The carbon: nitrogen ratio should be about 10. A high carbon: nitrogen ratio can indicate the presence of hydrocarbons or non-humified organic matter.

Calcium Carbonate Content - Free calcium carbonate (limestone) shall not be present in acid-loving plants.

Heavy Metals - The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

Ammonium Bicarbonate/DTPA Extraction (PPM)

ogram) ght basis
ght basis
-
-

If the soil pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50% to the above values. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75% of the above values. No more than three (3) metals shall be present at 50% or more of the above values.

Phytotoxic constituent, herbicides, hydrocarbons, etc. – Germination and growth of plants shall not be restricted more than 10% compared to the reference soil. Total petroleum hydrocarbons shall not exceed 50 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 0.5 mg/kg dry soil measured per EPA Method No. 8020.

Sub Grade - Soil level resulting from the rough grading work under another Section. Cultivation of sub grade areas prior to placement of Topsoil is included in this Section.

Stockpiled Topsoil - Soil stockpiled for spreading over prepared sub-grade.

Stockpiled Native Topsoil - Topsoil stripped from the site prior to rough grading Work (under another Section), to be spread and amended as Work under this Section.

Imported Topsoil - Off-site Topsoil, imported and stockpiled under this Section, to be spread and amended as Work under this Section.

Structural Soil – An air-entrained, load-bearing mixture of quality aggregate, heavy clay loam, and a non-toxic, non-phytotoxic tactifier, specifically-formulated to support various pavement types while allowing voids for air exchange, water movement, organic matter, and root growth, identified under U.S. Patent #5,849,069.

Measurements:

PPM: Measurement, in parts per million.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted. Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data. Submit available product/material literature supplied by manufacturer's, indicating that their products comply with specified requirements. Provide manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of product/material.

Planting Soil (Imported/Amended Topsoil).

Soil Amendments (for each type used, for Sand, Perlite, Peat Humus, Gypsum, Soil Sulfur, Iron, etc.).

Bulk Composted Organic Soil Amendment Material.

Granular Soil Conditioning Material.

Mycorrhizal Inoculum.

Fertilizers (for each type used).

Agronomic Soil Fertility Analysis and Recommendations: Submit a minimum of fourteen (14) days prior to amending of the soil and ordering soil amendments. The locations of where each of the soil test samples were derived from the Project Site shall be keyed to the site plan and shall be included with the results.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar installations.

Material Samples: Submit four (4) sets of physical Material Samples for review of kind, color, pattern, size, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed. Include the full range of exposed color and texture expected in the completed Work. Provide Material Samples bound and individually wrapped in re-sealable labeled 1-gallon plastic bags (as applicable):

Provide Material Sample sets for each item submitted under Product/Material Data.

Submittals under this Article will be rejected without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if the required information is missing or not presented in the format as requested.

No Work shall proceed under this Section until Submittal requirements indicated herein have been reviewed accordingly by the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications for requirements indicated herein this Section:

Licensed Landscape Contractor, C-27, in the State of California.

Engage an experienced, licensed Contractor who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

Installer's Field Supervision: Contractor shall maintain an experienced, full-time landscape supervisor/superintendent at the Project Site during times that landscaping operations identified herein the Contract are in progress.

Manufacturer's Directions: Follow Manufacturer's directions and drawings in cases where the Manufacturers of articles used in this Section furnish directions covering points not shown in the Contract Drawings or Contract Specifications.

Permits, Fees, Bonds, Testing, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, testing, and inspections necessary to perform and complete his portion of the Work.

Approved Testing Laboratory and Procedures for Agronomic Soil Fertility Analyses:

Agronomic Soil Fertility Analyses shall be conducted by a reputable, certified, agronomic soils laboratory. Laboratory shall be a member of the Council on Soil Testing and Plant Analysis. The same laboratory shall be used throughout the duration of the Contract:

Wallace Laboratories, El Segundo, CA. 310-615-0116.

Soil and Plant Laboratory, Orange, CA. 714-282-8777.

Fruit Growers Laboratory, Santa Paula, CA. 805-659-0910.

Contractor shall verify and confirm the selected Testing Laboratory and specific location(s) of soil sample(s) with the Landscape Architect prior to commencing soil sampling operations.

For each Soil type, submit the physical Soil Samples directly to the selected Laboratory for analysis, per the procedures outlined per Part III herein this Section.

In addition to the physical Soil Samples, Contractor shall also provide the Laboratory with a copy of the Soil Amendment and Fertilizer products indicated herein this Section.

Along with the testing data results, the Agronomic Soil Fertility Analysis shall also include written recommendations authored by the Laboratory conducting the Analyses for amending, treating, and/or correcting the sampled soils. Laboratory shall utilize the organic-based Soil Amendments and Fertilizers described herein this Section to the greatest extent possible to produce satisfactory planting soil(s) suitable for sustaining healthy viable plant growth.

The Analyses shall also include Maintenance and Post-Maintenance fertilization programs for planted areas within the Contract.

Agronomic Soil Fertility Analyses shall be performed on each Soil Type samples, and include testing results for the following:

pH;
Electro-conductivity (salinity) measurement – saturated extract.
Measurement of sodicity (Sodium Absorption Ratio);
Estimate of soil texture and soil organic matter;
Presence of lime;
Nutrients/Toxic Elements measurement of DPTA extract
Saturation extracts for nitrate, sulfate, sodium, calcium,
magnesium, potassium, soluble phosphate, and boron;
Parasitic nematodes;
Herbicide contamination;
(For Lightweight Soil Mixes): Test for physical and chemical
composition, and saturated weight per cu.ft.

Planting operations shall not commence until the results of the Agronomic Soil Fertility Analysis and Recommendations are reviewed accordingly by the Landscape Architect.

The quantity or type of amendments may be modified by the Landscape Architect within fourteen (14) days of receipt of the results. The Agronomic Soil Fertility Analysis and Recommendations shall take precedence over the amendment and fertilizer application rates specified herein or on the Contract Documents.

The Agronomic Soil Fertility Report/Recommendation shall take precedence over the amendment and fertilizer application rates specified herein or on the Contract Documents.

DELIVERY, STORAGE, AND HANDLING

General: Deliver and install materials so as to not delay Work, and install only after preparations for installation have been completed.

Packaged Materials: Deliver packaged materials in original, unopened packages or containers, with manufacturer's labels intact and legible, showing weight, analysis, and name of manufacturer. Store and secure properly to prevent theft or damage.

Store packaged materials off ground and under cover, away from damp surfaces and inclement weather.

Protect during storage and construction against soilage or contamination from earth and other materials.

Bulk Materials:

Deliver and store bulk materials so as not to impede Work of others.

Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas, or plants.

Protect during storage and construction against soilage or contamination from earth and other materials. Provide adequate separation between bulk materials so as not to cross-contaminate bulk materials.

Store under cover, away from inclement weather.

Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soilbearing water run-off, and airborne dust reaching adjacent properties, water conveyance systems, structures, or walkways.

Accompany each delivery of bulk materials (fertilizers, amendments, topsoil, etc.) with appropriate certificates. Furnish original certificates to Landscape Architect upon request.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Notify the Contractors performing Work related to installation of Work under this Section in ample time so as to allow sufficient time for them to perform their portion of Work and that progress of Work is not delayed. Verify conditions at the Project Site for Work that affects installation under this Section. Coordinate items of other trades to be furnished and set in place.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to adequate Soil Preparation operations are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease operations and notify Landscape Architect for further direction.

Installation: Perform Soil Preparation operations only when weather and soil conditions are suitable in accordance with locally accepted practices.

Construction Site Observations: Periodic site observations shall be made by the Landscape Architect during the installation of Work under this Section for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Work for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected materials immediately from Project site. The Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

SITE CONDITIONS

Project Site shall be free of weeds, native grasses, evasive grasses, (Bermuda Grass, Nut Grass, Kikiyu Grass, etc.) prior to Topsoil distribution or soil amendment placement.

Excessive rock, dead or declining vegetation, trash, debris, or other items that has accumulated throughout the duration of the Project shall be removed from the Project Site by the Contractor, and as directed by the Landscape Architect.

Grading and soil preparation Work shall be performed only during the period when beneficial and optimum horticultural results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure or cause compaction, spreading and grading operations shall be suspended until, in the opinion of the Landscape Architect, the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

Soil moisture level prior to planting shall be no less than 75% of field capacity. The determination of adequate soil moisture for planting shall be in the sole judgment of the Landscape Architect.

If the soil moisture level is found to be insufficient for planting, planting pits shall be filled with water and allowed to drain before commencing planting operations.

Planting areas which become compacted in excess of 85% relative compaction due to construction activities shall be tilled and thoroughly cross-ripped to a minimum depth of twelve-inches (12") to alleviate the condition, taking care to avoid all existing subsurface utilities, drainage, etc.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

PRODUCTS

SOIL MIXES/BLENDS

Soil Conditioner Blend, for amending on-site native soil planting surfaces, stockpiled, plant back fill or imported topsoil: Furnish a thoroughly blended composition of Bulk Composted Organic Soil Amendment Material and Granular Soil Conditioning Material & Fertilizer. Any substitution for the "Soil Conditioner Blend" listed herein must be requested by the Contractor and approved, in writing, by the Landscape Architect at least thirty (30) days prior to installation.

Bulk Composted Organic Soil Amendment Material:

Material Composition: Bulk Composted Organic Soil Amendment Material shall be thoroughly cured for a minimum of 100 days, and shall be free from any trash (glass, metal, plastic, etc.) deleterious materials, bio-solids, and/or toxic chemicals. The Material shall be non-hazardous, and conform to US Environmental Protection Agency 40 CFR503 criteria for "Class A" products. It shall also exceed standards and specifications for unrestricted application as a landscaping and agricultural soil amendment.

Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%. The organic matter content shall be at least 50% on a dry weight basis.

Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.

Composted wood products are conditionally acceptable [stable humus must be present]. Wood based products are not acceptable which are based on red wood or cedar.

Sludge-based materials are not acceptable.

Gradation/Screen Analysis: A minimum of 90% of the material by weight shall pass a $\frac{1}{2}$ " screen. Material passing the screen shall meet the following criteria:

Percent Passing	Sieve Designation
80 - 100%	6.35 mm (1/4")
50 - 80%	2.38 mm (No. 8)
0 – 40%	500 micron (No. 35)

Maturity: Physical characteristics suggestive of maturity include shall include:

Color: Dark brown to black.

Odor: Aerobic, without malodorous presence of decomposition products.

Particle characterization: Identifiable wood pieces are acceptable but the balance of Material should be soil-like without recognizable grass or leaves.

Analytical Properties: Contractor shall submit proof of the Bulk Composted Organic Soil Amendment Material by providing a sample as identified herein this Section, and a lab analysis that has been performed within 30 days of the installation of the planting. Soil mix shall have (at a minimum) the following properties:

Material	Minimum Targeted Property/Range
Total Nitrogen (N%)	.50-1.0%
Phosphorus (as P2O5)	2.0%
Potassium (as K2O)	0.2%
pH (units)	6.0 to 7.5, as determined in saturated paste.
Organic Content	Minimum 50% based on dry weight and determined by ash method. Minimum 205 lbs. organic matter per cubic yard of compost.
ECe (millimho/cm)	<5.0; based on pre-leaching with equal volume of water.
Carbon-to-Nitrogen Ratio	<25-to-1, nitrogen stabilized.
Bulk Density	1,000 to 1,100 pounds/cubic yard.
Sodium Absorption Ratio (SAR)	Under 20.0
Total Iron	1.5%3.
Moisture Content	35%-60%
Acid-soluable Ash content	No less than 6% and no greater than 20%.
Salt Content	<10millimho/cm @ 25d C. on a saturated

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	paste extract.
Boron Content	<1.0 parts per million on a saturated paste extract.
Silicon-Content (acid- insoluable ash)	<50%
Calcium Carbonate	No presence on alkaline soils.
Maximum Total	Arsenic: 1.0
Concentrations Parts per	Cadmium: 1.0
million (mg/kg dry-weight basis)	Chromium: 10.0
	Cobalt: 2.0
	Copper: 1.0
	Lead: 30.0
	Mercury: 1.0
	Molybdenum: 2.0
	Nickel: 5.0
	Selenium: 1.0
	Silver: 0.5
	Vanadium: 3.0
	Zinc: 2.0

Application Rate: As indicated herein this Section under "Planting Soil Amendments Schedule".

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Soil Conditioner, Synagro Professional Organic Soil Products.

Agromend, Agromin Horticultural Products.

Humic Compost ½", Greenway Compost.

Superior Blend Compost, Artesia Sawdust Products, Inc.

Compost, EarthWorks Soil Amendments, Inc.

Contractor's Blend, Recycled Wood Products (RWP).

#SSA-CST Supreme Organic Soil Amendment, Plants Choice, Inc.

Humic Compost 3/8", Agri Service, Inc.

Or equal, as approved by the Landscape Architect.

Granular Soil Conditioning Material & Fertilizer:

Material Composition and Analytical Properties: Granular Soil Conditioning Material & Fertilizer shall be a singular manufacturer-blended combination of soil conditioning material and fertilizer. It shall be granular in form, long-lasting, free flowing, and suitable for application with approved equipment. It shall not contain any sewage sludge or manure-based products, and shall contain the following guaranteed minimum available analysis range:

Element/Material	Targeted Property Range
Nitrogen (N)	5.0% to 6.0%
Phosphoric Acid (as P2O5)	2.0% to 3.0%
Potash (as K2O)	1.0% to 4.0%
Humic Acids	15.0 % to 20.0%
Calcium	7.0%
Sulfur	0.0% to 5.0%

Commercial-Grade Products, Manufacturers and Associated Rates of Application: Subject to compliance with requirements, provide products by one (1) of the following:

Tri-C 6-2-4, Tri-C Enterprises LLC, Chino, CA. 800-927-3311.

Application Rate at 70 lbs. per 1,000 square feet of planting area.

Gro-Power Plus 5-3-1, Gro-Power, Chino, CA. 909-393-3744.

Application Rate at 200 lbs. per 1,000 square feet of planting area.

or equal, as approved by the Landscape Architect.

NON-ORGANIC SOIL AMENDMENT COMPONENTS add #16 sand (usga sand)

Number 16 Sand: Medium sized conforming to the following sieve:

Sieve	Percent Passing
4 mesh	100 %
10 mesh	98 – 100%
16 mesh	68 - 82
32 mesh	0 – 20
60 mesh	0 - 1

Suppliers:

PW Gillibrand, Simi Valley, CA (805) 526-2195 www.pwgillibrand.com

Carmeuse Industrial Sands, San Juan Capistrano, CA (800) 345-0171

Washed Plaster Sand: Clean, washed, natural or manufactured sand, sharp, fine-textured, free of toxic materials. Sieve tested in accordance with ASTM C136, with 100% passing through a #4 screen, 0% passing through a #200 screen.

Chemical Properties: (by DPTA Saturation Extract Method):

Soluble Salts/Salinity: Maximum conductivity of 3.0 millimhos/cm at 25 degrees C.

Boron: Maximum concentration of 1.0 PPM.

Sodium Absorption Ratio (SAR): Maximum 6.0.

pH: 7.0.

Perlite: Horticultural Perlite, soil amendment grade, 6.5 to 7.5 pH.

Unacceptable Materials: Polystyrene beads shall not be used as a substitution for horticultural Perlite.

Vermiculite: Horticultural Vermiculite, gold-brown in color.

Size: 2-4mm, 5 mesh to 10 mesh sieve size.

Density: 4.5 to 5.5 lb./cuft.

Grade: #2, Medium Grade.

ORGANIC SOIL AMENDMENT COMPONENTS

Peat Humus:

Type: Canadian Sphagnum Peat, as derived from the genus Sphagnum, medium-divided, coarse fibrous texture, brown in color.

Measurement: Measure peat in air dry condition, containing not more than 35% moisture by weight on an "as-received" basis.

Physical Properties:

Percent Passing	Sieve Size
95 - 100%	9.51 mm (3/8 in.)
0 - 40%	500 micron (#35, 32 mesh)

Organic Content (dry weight basis): Minimum 95%.

Fiber Content: Greater than 66%.

Water Holding Capacity: 20x to 30x its dry weight in water.

Range in Ash Content (%): 1.0 to 5.0.

Chemical Properties:

Nitrogen (dry weight basis): 0.6-3.0%.

Salinity/Soluble Salts: Saturation extract conductivity 0.0-3.0 millimhos/cm @ 25 degrees C.

pH range: 3.0 to 4.0.

Unacceptable Materials:

Coir Dust.

Sedge Peat.

Reed Peat.

Hypnum Peat.

Mycorrhizal Inoculum:

Mycorrhizal Inoculum for Plant Material (not Palm Trees): Dual soil-conditioning biological inoculum system of endo-and ecto- Mycorrhizal, used to further aid the plants ability to efficiently uptake available soil nutrients and increase resistance to drought.

Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

7-gram Myco-Pak, Tri-C Enterprises LLC, Chino, CA, 800-927-3311.

4 oz. Packet - Roots 1 Step, Roots, Inc., Independence, MO, 800-342-6173.

Or equal, as approved by the Landscape Architect.

Provide at the prescribed application rate, per the Manufacturer's written recommendations.

CHEMICAL SOIL AMENDMENT COMPONENTS

General: Chemical Soil Amendment Components listed herein may or may not be used, depending on the results of the Agronomic Soil Fertility Report. Provide as required:

Gypsum: Commercially-processed and packaged agricultural-grade hydrated calcium sulfate product (CaSO4), 92.0% minimum, pH at 7.1.

NOTE TO SWA SPECIFIER: Gypsum is used as a soil amendment to help break up heavy clay soils by improving soil structure, decreasing compaction, increasing aeration. This allows for more water to be available for plants by reducing run-off and improving drainage. Gypsum also supplies essential calcium in the soil for the plant's cellular strength and vigor. Increases soil pH and used to correct sodic (high sodium) soils.

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Ben Franklin® No. 1 Agricultural Gypsum, U.S. Gypsum Company.

100% Good Stuff Gypsum™, Art Wilson Company.

CAL-SUL® Pelletized Agricultural Gypsum, North Pacific Group.

Bumper Harvest Agricultural Gypsum, Domtar Gypsum.

Premium 97 Solution-Grade Gypsum, Diamond K, Inc.

Or equal, as approved by the Landscape Architect.

Soil Sulfur: Elemental Sulfur (90% min.) commercially manufactured, water degradable, palletized.

NOTE TO SWA SPECIFIER: Elemental Sulfur is used as a soil amendment to reduce the pH (acidify) the soil.

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Disper-Sul, Martin Resources, Inc.

Soil Sulfur, Red Top.

Or equal, as approved by the Landscape Architect.

Iron: Non-staining, 40% Fe minimum, complete with micro-nutrients and 2% humic acids, as derived from iron oxide, manganese oxide, or zinc oxide.

NOTE TO SWA SPECIFIER: Iron sulfate is used as a soil amendment to reduce the pH (acidify) the soil. Reacts quicker in the soil than Elemental Sulfur. Iron is usually deficient in soils with a higher pH.

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Gro-Power Iron, Gro-Power, Chino, CA.

Iron 45 w/ Micronutrients, Tri-C Enterprises LLC, Chino, CA.

Or equal, as approved by the Landscape Architect.

Dolomite Lime: Agricultural-grade mineral soil conditioner containing 35% minimum magnesium carbonate, and 49% minimum calcium carbonate, 100% passing #65 sieve.

Potassium Sulfate (Sulfate of Potash K2O), (0-0-50 guaranteed analysis N-P2O5-K2O): Agriculturalgrade, containing minimum 50% of water-soluble potash and 18% Sulfur (S).

Single Superphosphate P2O5 (0-15-0 guaranteed analysis N-P2O5-K2O): Commercial product,

containing 15% available phosphoric acid and 14% Sulfur.

Triple Superphosphate P2O5, (0-45-0 guaranteed analysis N-P2O5-K2O): Commercial product, containing 45% available phosphate and 15% Calcium (Ca).

Ammonium Sulfate (NH4)2SO4, (21-0-0 guaranteed analysis N-P2O5-K2O): Commercial product containing approximately 21% ammonia.

Ammonium Nitrate NH4NO3, (34-0-0 guaranteed analysis N-P2O5-K2O): Commercial product containing approximately 34% ammonia.

Calcium Nitrate CaNO3, (15.5-0-0 guaranteed analysis N-P2O5-K2O): Agricultural grade containing 15-1/2% nitrogen.

Potassium Nitrate KNO3, (13-0-45 guaranteed analysis N-P2O5-K2O): Commercial product containing approximately 13% nitrogen and 45% potassium.

Ureaformaldehyde (38-0-0 guaranteed analysis N-P2O5-K2O): Granular commercial product containing approximately 38% nitrogen.

Urea CO(NH2)2, (46-0-0 guaranteed analysis N-P2O5-K2O): Granular commercial product containing 46% nitrogen.

I.B.D.U. (Iso Butyldiene Diurea): Commercial product containing 31% nitrogen.

FERTILIZERS

Composition: Nitrogen (N), phosphorous (P2O5), and potassium (K2O) content, plus other elements, as indicated.

Fertilizer Tablet:

General: Fertilizer Tablet shall be a 7-gram tablet, organic-based, tightly compressed chip-type commercial grade, 12-month slow-release planting tablets, and shall be composed of the following available percentages by weight of plant food:

Element/Material	Targeted Property Range
Nitrogen (N)	12.0% minimum
Phosphoric acid (as P2O5)	8.0% minimum
Potash (as K2O)	8.0% minimum
Humus	20.0% minimum
Humic Acids w/ micronutrients and soil enhancers	4.0% minimum

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Gro-Power 12-8-8 Planting Tablets, Gro-Power, Chino, CA 909-393-3744.

Application Rate: As indicated herein Part III this Section.

Or equal, as approved by the Landscape Architect.

ACCESSORIES

Drain Rock/Aggregate: Crushed Stone, conforming to ASTM C33, graded to ³/₄"-size, clean, hard, durable, free of materials toxic to plant growth, set in bottom of Planters, at depth indicated in Contract

Drawings. Provide Geotextile Filter Fabric between Drain Rock/Aggregate and amended planting backfill soil.

Wetting Agent/Water Storing Polymer: Non-biodegradable, granular, polyacrylamide polymer soil amendment.

Commercial-Grade Products & Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

Broadleaf P4, Broadleaf Industries, Inc. Chula Vista, CA (619)424-7880.

Or equal, as approved by the Landscape Architect.

Perforated Drain Pipe & Drain Sock (Tree Chimney): Refer to Section 329400 – Landscape Planting Accessories.

Landscape Mulch Material:

Organic Wood Mulch: Refer to Section 329400 - Landscape Planting Accessories.

EXECUTION

AGRONOMIC SOIL FERTILITY REPORT/RECOMMENDATION

Once rough grading has been accomplished, and prior to commencing Soil Preparation operations, (amendments, fertilizers, etc.), soil samples shall be taken from representative areas and below grade depths of the Project Site. Locations and depths to gather the representative soil samples shall be accomplished by the Contractor under the direction of the Landscape Architect.

Provide Four (4) Soil Samples.

Guidelines for Selecting the Soil Samples:

Select representative areas to sample. The area needs to be uniform in color, texture, depth, and drainage with the same fertilizing program and type of use. Planting areas to receive lawns, flowerbeds, trees, cut areas, fill areas, etc. should be tested separately. An area containing multiple trees and shrubs can be grouped into one area if the planting is the same.

Depths and process of soil sampling:

Sample as deep as the soil will be amended, generally six-inches (6") deep for groundcover/lawns, eighteen-inches (18") deep for shrub areas, twenty-four-inches (24") deep for small boxed trees, and three-feet (3') to four-feet (4') for large boxed trees.

Use a soil probe or soil auger to remove a core sample; otherwise, use a shovel to dig a hole to the desired depth. Sample the soil from the side of the excavated hole, scraping the side with a trowel. The tools used for digging shall be clean and not rusty. Avoid sampling when the soil is too wet.

In desired areas where multiple sub-samplings are taken from any one (1) area to create a combined sample, mix the sub-samples homogenously together in a clean plastic bucket prior to placing in the plastic bag.

Each Sample shall be sent directly to the laboratory in a separate, re-sealable, one (1)-gallon plastic bag. Provide a minimum of four (4) cups of soil within each respective sample to allow for adequate testing.

SOIL PERCOLATION TESTING

Type/Quantity: During operations of Agronomic Soil Fertility Testing and prior to installing Plant Material, Contractor shall perform Soil Percolation Tests, through the direction of the Landscape Architect, in selected representative areas of the Project Site, to verify acceptable natural drainage, soil structure, and soil composition. Contractor shall verify the locations of the Soil Percolation Tests with the Landscape Architect.

Required Number of Soil Percolation Tests: Four (4)

Procedure: Each Soil Percolation Test shall be performed as follows:

Dig a hole: 2'-0" wide x 2'-0" long x 2'-0" deep.

Fill the hole with water to top and cover with plywood and barricade. Allow hole to drain and fill again to top.

Make daily observations, noting the depth of water each day.

Report findings, in writing, to the Landscape Architect. Include the length of time the water takes to drain completely from each hole, date of test, location, and other information, which may be useful in providing further recommendations.

Results: Based on the combined results of the Agronomic Soil Fertility Testing and the Soil Percolation Tests, Contractor may be required to install additional tree drainage sumps or other drainage methods at each planting pit for trees larger than 15-gallon container stock. This does not relieve the Contractor's obligation within the Base Bid to provide the required Tree Root Aeration Units indicated in Section 329400 – Landscape Planting Accessories. Contractor shall include, as a line-item price within the Base Bid, the price per each additional tree drainage sump, should they be required (based on the testing). Should additional tree drainage sumps or other methods is required, compensation shall be awarded to the Contractor at the line-item price (each) as provided by the Contractor.

SOIL MOISTURE CONTENT

General: Do not work soil when moisture content is so great that excessive compaction occurs, or when it is so dry that dust will form in air, or that clods will not break readily. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and planting. Soil moisture level prior to planting shall be no less than 75% of field capacity. The determination of adequate soil moisture for planting shall be the judgment of the Landscape Architect. Range: Maintain within two-percent (2%) above or below optimum moisture content at times during Work.

SITE CONDITIONS

Contractor shall protect existing and new improvements and systems installed prior to planting installation. Maintain protection in place until completion of Work and contracted Landscape Establishment Period.

Protect concrete paving, headers, and drainage from staining due to contact with wet nitrogen stabilized mulch/sawdust, or contact with chelated iron. Correct any stained concrete.

CLEARING & CULTIVATION

Clearing: Clear planting areas free of stones two-inches (2") in diameter and larger, weeds, debris, and other extraneous materials prior to soil preparation Work.

Pre-Plant Weed Control:

Clear and remove existing weeds by spraying and grubbing to at least one-inch (1") below the soil surface.

Dead weeds shall be cleared and removed prior to planting.

Maintain a weed-free Project Site until final acceptance by the Owner, utilizing mechanical, chemical, or manual treatment.

Cultivation of Native Site Soil and/or Spreading Imported Topsoil, with Amendments/Fertilizers:

Verification: In planting areas where Imported Topsoil will be applied, verify that sub-grades prior to installation of Imported Topsoil have been established under rough grading. Do not spread Imported Topsoil prior to acceptance of sub-grade Work.

Cultivation: Following Pre-Plant Weed Control operations, rip or cultivate verified planting areas of Native Site Soil at the indicated depth, prior to applying Imported Topsoil (if required) and Soil Amendments/Fertilizers.

Depth of Cultivation: minimum Ten-inches (10").

Following initial cultivation of existing Native Site Soil, evenly spread Imported Topsoil (if required)

throughout all planting areas at the minimum indicated depth to meet finished landscape grades.

Depth of Imported Topsoil: Minimum six-inches (6").

Once Imported Topsoil has been spread, uniformly broadcast all required Soil Amendments and Fertilizers indicated in Planting Soil Amendments Schedule (below) as amended through the results of the Agronomic Soil Fertility Report.

Thoroughly cultivate/blend all materials to provide a homogenous planting soil mixture at the indicated depth:

Depth of Cultivation: Minimum Ten-inches (10").

Tamp/compact prepared Planting Soil as required to eliminate settlement, and complete finish grading operations per Section 312219 – Landscape Grading.

Planting Soil Amendment Schedule:

Soil Amendment/Fertilizer	Ratio
First Component of Soil Conditioner Blend: Bulk Composted Organic Soil Amendment	Four (4) cu. yds. / 1,000 square feet of planting area.
Second Component of Soil Conditioner Blend: Granular Soil Conditioning Material & Fertilizer	At indicated ratio, per selected Manufacturer.
Gypsum	200 pounds / 1,000 square feet.
Commercial Fertilizer	At indicated ratio, per selected Manufacturer.
Soil Sulfur	8 pounds / 1,000 square feet of planting area.
Iron (non-staining)	10 pounds / 1,000 square feet of planting area.

Modifications: The Planting Soil Amendment Schedule may be modified, based on the combined results of the Agronomic Soil Fertility Tests and Percolation Tests.

Contractor shall be provided with fair and adequate compensation by the Owner should additions or increases to the specified ratios are required to the Planting Soil Amendment Schedule due to the Agronomic Soil Fertility Test results and/or recommendations by the Landscape Architect.

Contractor shall provide the Owner fair and adequate credit should subtractions or decreases to the specified ratios are required to the Planting Soil Amendment Schedule due to the Agronomic Soil Fertility Test results and/or recommendations by the Landscape Architect.

Complete finish grading operations per Section 312219 – Landscape Grading.

APPLICATION RATES

Fertilizer Tablets shall be spread equidistantly around the perimeter within the Amended Planting Backfill Mixture, up to within three-inches (3") of the finished grade of the Mixture, and at the following rates:

Size of Plant Material	Total Quantity of 7-gram Fertilizer Tablets
Liner, Plug, Flat-Size Plant, or 4" Pot.	One (1) Tablet
One (1)-gallon Container stock.	Three (3) Tablets
Five (5)-gallon Container stock.	Nine (9) Tablets
Fifteen (15)-gallon container stock	Fifteen (15) Tablets
24" Box Container Stock	Sixteen (16) Tablets
30" Box Container Stock	Eighteen (18) Tablets
36" Box Container Stock	Twenty (20) Tablets
42" Box Container Stock	Twenty-two (22) Tablets
48" Box Container Stock	Twenty-four (24) Tablets
60" Box Container Stock	Thirty-six (36) Tablets
For Container Stock larger than 60" Box.	Six (6) Tablets for each ½" of tree caliper size.
For each 1'-0" of Palm Tree (apical meristem) height. (Example: a 25' Palm tree requires 50 tablets)	Two (2) Tablets.

Contractor shall not provide Fertilizer Tablets for designated native plant species, as indicated in the Contract Drawings or as directed by the Landscape Architect. Contractor shall verify with the Landscape Architect, in writing, as to which plants are subject to not receive the Fertilizer Tablets.

Mycorrhizal Inoculum Application Rate:

During application of Fertilizer/Planting Tablets, Mycorrhizal Inoculum shall be spread equidistantly around the perimeter within the Amended Planting Backfill Mixture, up to within three (3") inches of the finished grade of the Mixture, at the prescribed application rate per the Manufacturer's written

recommendations.

DRAINAGE OF PLANTING AREAS

Surface Drainage:

Discrepancies: Provide proper surface drainage of planted areas. Submit in writing all discrepancies in the Contract Drawings or Specifications, or prior Work done by others, which Contractor feels precludes establishing proper drainage.

Correction: Include description of work required for correction or relief of said condition.

Detrimental Drainage, Soils and Obstructions:

Notification: Submit in writing all soils or drainage conditions considered detrimental to growth of plant materials. State condition and submit proposal and cost estimate for correcting condition.

Correction: Submit for acceptance a written proposal and cost estimate for the correction before proceeding with Work.

Obstructions: If rock, underground construction Work, tree roots, or other obstructions are encountered in the performance of Work under this Section, submit cost required to remove the obstructions to a depth of not less than six-inches (6") below the required soil depth.

CLEAN UP AND PROTECTION

For Work under this Section, keep Work area in a clean, orderly, and safe condition. Contractor shall remove trash caused from his Work on a weekly basis throughout the duration of the Work.

Protect site from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged Soil Preparation areas as directed.

Upon completion of his Work under this Section, the Contractor shall remove rubbish, waste, debris, excess construction materials, and other items resulting from construction operations offsite as described herein this Section, as directed by the Landscape Architect.

329300 - EXTERIOR PLANTS

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required to make a complete Exterior Landscape Planting installation, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Trees.

Shrubs.

Ground Covers.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 025639 – Temporary Tree and Plant Protection.

Section 311000 – Site Clearing.

Section 312219 – Landscape Grading.

Section 328400 – Irrigation Systems.

Section 329113 – Soil Preparation.

Section 329400 – Landscape Planting Accessories.

Section 329813 – Landscape Establishment Period.

DEFINITIONS AND APPLICABLE STANDARDS

References:

ASTM – American Society for Testing Materials.

USDA – United States Department of Agriculture.

ANSI – American National Standards Institute.

Reference Standards:

An Annotated Checklist of Woody Ornamental Plants of California, Oregon, and Washington, (Number 4091), McClintock and Leiser, Division of Agricultural Sciences, University of California, 1979.

American National Standard for Nursery Stock (ANSI Z60.1). American National Standards Institute, and American Association of Nurserymen, Latest edition,

American Joint Committee on Horticultural Nomenclature, 1942 Edition of Standardized Plant Names.

Hortus III, 1976 Edition, Liberty Hyde Bailey Hortorium, Cornell University.

The Hillier Gardener's Guide to Trees and Shrubs, 4th Edition, 1978.

Manual of Cultivated Conifers, Den Ouden & Boon, 1978.

Datascape Guide to Commercial Nomenclature, American Nurserymen Publishing Co., Chicago, IL, 1994.

American National Standard for Tree Care Operation, Tree, Shrub, and Other Woody Plant Maintenance (ANSI A300), American National Standards Institute, Latest Edition.

Definitions:

Plant Material(s) – Refers to living plant species, inclusive of trees, shrubs, groundcovers, vines, ornamental grasses, cacti/succulents, espaliers, annuals, perennials, etc., as indicated in the Contract Drawings.

Planting Area (PA) – As denoted on the Contract Drawings, shall refer to areas to be installed with Plant Material(s), or areas where existing vegetation shall be protected.

Plant Height – Measurement of main body height, not measurement to branch tip.

Plant Spread – Measurement of main body diameter, not measurement from branch tip to branch tip.

Amended Planting Backfill Mixture – Refer to Section 329113 – Soil Preparation.

Balled and Burlapped Stock – Healthy, vigorous exterior plants with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.

Balled and Potted Stock – Healthy, vigorous exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of exterior plant required.

Bare-Root Stock – Healthy, vigorous exterior plants grown with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of exterior plant required.

Clump – Where three or more young trees were planted in a group and have grown together as a single

tree having three or more main stems or trunks.

Container-Grown Stock – Healthy, vigorous, well-rooted exterior plants grown in a container with wellestablished 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 exterior plant required.

Fabric Bag-Grown Stock – Healthy, vigorous, well-rooted exterior plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of exterior plant.

Finish Grade – Elevation of finished surface of planting soil.

Manufactured Topsoil – Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

Multi-Stem – Where three (3) or more main stems arise from the ground from a single root crown or at a point right above the root crown.

Sub-grade – Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

Subsoil – All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

Measurements:

sq/ft or SF: Measurement, in square-foot.

O.C.: Measurement used for On-Center spacing.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Alphabetized List of Plant Material.

Planting Installation Schedule:

Provide anticipated site area(s) and dates of installation for each type of planting.

Qualification Data, f or firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.

Meeting Notes from Pre-installation Conference.

Description of Plant Material, for each species indicated in the Contract Drawings, submitted in the following format:

(Provide Color Photograph of Plant Material here) (Note: Photograph shall include a person, tape measurer, or other scaled reference).	
Project Name:	
Botanical Name:	
Common Name:	
Form (Multi, Standard, etc.):	
Container Size (as applicable:)	
Overall Height (provide Apical Meristem Height for Palms):	
Spread:	
Caliper (as applicable):	
Quantity Required (per Contract Drawings):	
Quantity Available (at supplying Nursery):	
Supplying Nursery Name:	
Contact Name at Nursery:	
Nursery Address:	
Nursery Phone Number:	
Date of Nursery Photo:	

Comments/Remarks:

The Alphabetized List of Plant Material and Description of Plant Material shall not be construed as to acceptance of the Plant Material. All Plant Material shall be subject to review and approval by the Landscape Architect upon delivery to the Project Site.

Submittals under this Article will be rejected without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if the required information is missing or not presented in the format as requested.

No Work shall proceed under this Section until Submittal requirements indicated herein have been reviewed accordingly by the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications:

Requirement: Valid California C-27 (Landscaping Contractor) License.

Engage an experienced Installer who has demonstrated completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

Installer's Field Supervision: Installer shall maintain an experienced full-time supervisor on the Project site during times that landscaping installations under this Section are in progress.

Plant Material: Provide quality, size, genus, species, and variety of Plant Material indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."

Selection of Plant Material purchased under allowances will be made by the Owner, who has the option to tag Plant Material stock at their place of growth before they are prepared for transplanting.

At least one (1) plant of each Plant Material species delivered to the Project Site shall have an identification tag from supplying nursery showing botanical and common name of the plant as identified in the Contract Drawings. Landscape Architect shall be provided the opportunity for an on-site debriefing by the Contractor that identifies the size and specific type of Plant Material upon delivery.

Incorrect Planting Materials:

Replace, at no cost to Owner, Plant Material that is revealed during the course of the Contract as to being untrue to the species indicated in the Contract Drawings and reviewed accordingly under this Section.

Provide replacements equal to the size and quality to match the planted materials at the time the untrue species is discovered.

Replacement of Plant Material: Refer to the Guarantee Article indicated herein this Section.

Observation: Landscape Architect may observe Plant Materials at their place of growth (nursery), at the site before or after planting, or both, for compliance with requirements for genus, species, variety, size and quality. Landscape Architect also retains right to observe Plant Material further for size and condition of root balls, trunks, branches, and crowns; insects; pests; disease; weeds; injuries, and latent defects. Landscape Architect reserves the right to reject unsatisfactory and/or defective Plant Material at any time during progress of Work. Contractor shall remove rejected Plant Material immediately from Project site.

Regulatory Requirements:

Contractor shall meet the requirements of applicable laws, codes, and regulations as required by the authorities having jurisdiction over the Work.

Provide for inspections and permits by Federal, State, and Local authorities in furnishing, transporting, and installing materials.

Permits, Fees, Bonds, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, and inspections necessary to perform and complete Work under this Section.

Plant Material Review and Selection (Tagging):

At the discretion of the Landscape Architect, Plant Material will be subject to review, photographed, and selected/tagged by the Landscape Architect at the nursery, or other place of growth, prior to delivery to the Project Site. Contractor shall verify with the Landscape Architect if tagging operations are required.

Selecting/Tagging of Plant Materials at the nursery or place of growth does not cancel the right of the Landscape Architect to reject Plant Materials at the Project Site, if damaged or unacceptable conditions are found that were not detected at the nursery, place of growth, or in the submitted photographs.

Plant Material Delivery: Plant Material shall be delivered with original Plant Material tagging materials set in place, as selected and marked by the Landscape Architect at the nursery or place of growth. Contractor shall notify Landscape Architect upon delivery of Plant Material for review of stock and tagging materials. Plant Materials delivered without original tagging materials, or with broken, damaged, or altered tagging materials, shall be subject to rejection by the Landscape Architect. Rejected Plant Material shall be removed immediately.

Pre-installation Conference: Conduct conference at Project Site to comply with requirements of Division 1 Section "Project Meetings".

Protection of Existing Plant Material:

Refer to Requirements specified in Section 025639 – Temporary Tree and Plant Protection.

It is the intent of the Contract Documents that certain existing Plant Materials shall be retained. Prior to the removal of any Plant Materials, the Contractor shall confer with the Landscape Architect to determine which Plant Materials are to remain.

All existing Plant Materials which are to remain in the project shall be tagged and identified by the Contractor prior to start of Work.

Contractor shall be responsible for Plant Materials that are designated to remain. Damage to any Plant Materials which results in death or permanent disfiguration of said Materials shall result in compensation outlined in Section 025639 – Temporary Tree and Plant Protection. The Landscape Architect shall be the sole judge of the condition of the Plant Materials.

Existing Plant Materials designated to remain shall be protected at all times from damage by construction activity (tools, materials, equipment, personnel, etc.). Damage by the Contractor to existing Plant Materials shall be repaired at the Contractor's expense to the satisfaction of the Owner, as directed by the Landscape Architect.

Contractor shall insure that no foreign material and/or liquid, such as paint, concrete, cement, oil, turpentine, acid or the like, be deposited or allowed to be deposited on soil within the drip line (the outside edge of the foliage overhang) of any Plant Material. Do not store construction materials, debris, or excavated material within drip line of existing Plant Material. Should any such poisoning of the soil occur, the Contractor shall thoroughly remove said soil as directed by the Landscape Architect and replace with acceptable soil at no additional cost to the Owner.

Excavation adjacent to existing Plant Materials: Where it is necessary to excavate in close proximity to the drip lines of existing Plant Materials, all possible caution shall be exercised to avoid injury to roots and trunk. Excavation close to Plant Materials shall be done by hand, with narrow-tine spading forks or other approved tools to comb soil to expose roots. Tunnel under roots two-inches (2") and larger in diameter. Cutting of roots two-inches (2") and larger shall be only on the approval of the Landscape Architect.

Replacement of Damaged Plant Material: Replace existing Plant Material to remain as required, hat are damaged by Contractor during construction with accepted Plant Material of the same species, size, and quantity as those damaged, at no additional cost to Owner. Owner shall be the sole judge as to the extent of the damage and the value of said damaged Plant Material.

DELIVERY, STORAGE, AND HANDLING

General: Do not prune Plant Material before delivery, except as approved by the Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie Plant Material in such a manner as to destroy natural shape. Immediately after digging field-grown Plant Materials, pack root systems in wet straw, hay, burlap, or other suitable material to keep root system moist until final planting installation.

Deliver freshly dug field-grown Plant Materials with firm, natural balls of earth of sufficient depth to include fibrous and feeding roots, meeting or exceeding requirements of ANSI Z60.1 for root ball diameter.

Handling Plant Materials:

Handle balled and burlap Plant Material stock by the root ball.

Handle container-grown Plant Materials only by their containers.

DO NOT handle Plant Materials by their trunks or stems.

DO NOT drop any Plant Materials.

DO NOT bind or handle Plant Materials with wire or rope.

Pad trunk and branches of Plant Materials whenever using hoisting cables, chains, or straps.

Should the Contractor engage in handling any Plant Material(s) by any unacceptable method(s), the Landscape Architect shall reserve the right to reject any of the mishandled Plant Material(s). The Contractor shall replace rejected Plant Material(s) with approved Plant Material(s), at no additional cost to the Owner.

Delivery: Provide protective covering during delivery. Deliver Plant Material only after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set Plant Materials in shade, protect from weather and mechanical damage, and keep roots moist. Anchor plants to prevent damage from winds.

Heel-in bare-root Plant Material stock. Soak roots in water for two (2) hours prior to planting.

Set balled Plant Material stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

DO NOT remove container-grown Plant Material stock from containers before time of planting.

Water root systems of Plant Material stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Acceptance: Do not install Plant Materials prior to acceptance of finish grades and installation of irrigation system.

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease planting operations and notify Landscape Architect for further direction.

Construction Site Observations: Landscape Architect may observe installation Work herein this Section at Project Site for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe installation of products and materials for defects and to reject unsatisfactory or defective product, material, or installation at any time during progress of Work. Contractor shall remove rejected Work immediately from Project site. Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

PROJECT SITE CONDITIONS

General: Installation of Plant Materials shall be performed only during the time of day and during seasons when satisfactory results can be expected, unless authorized by the Landscape Architect.

Climate Restrictions: Do not install Plant Materials during rainy or inclement weather.

SUBSTITUTIONS

Consideration: Plant Materials to be considered equal to the Plant Materials indicated herein this Section shall be reviewed by the Landscape Architect. Plant Materials with equal performance characteristics may be considered, providing deviations in dimensional size, color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, or intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Substituted Plant Materials shall be true to species and variety and shall conform to measurements specified, except that plants larger than specified may be used if accepted. If larger Plant Materials are accepted, increase the ball of earth in proportion to the size of the plant, as required. Plant Materials overgrown for their container size will be rejected.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Plant Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Plant Materials under this Section shall not increase the Contract price.

WARRANTY

General: The Warranty indicated herein in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract, and shall be in addition to, and run concurrent with, other guarantees or warranties made by the Contractor under requirements of the Contract Documents.

Warranty: Contractor shall warrant living Plant Materials under this Section for a period of one (1) year after date of Substantial Completion. Warrant against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by the Owner; abnormal weather conditions unusual for the Warranty Period; or incidents which are beyond the Contractor's control.

Replacement of Plant Material:

Replace Plant Materials exhibiting conditions which are determined to be unacceptable due to workmanship by the Contractor, at no cost to the Owner, per the direction of the Landscape Architect.

Remove and replace dead or dying Plant Material immediately unless required to plant in the succeeding planting season.

Contractor shall be held responsible for a maximum of two (2) replacement of each failed Plant Material after Final Acceptance during the Warranty Period.

Closely match replacements to adjacent specimens of the same species. Apply requirements of this Specification to replacements.

FINAL ACCEPTANCE AND LANDSCAPE ESTABLISHMENT PERIOD

Refer to Section 329813 – Landscape Establishment Period.

PRODUCTS

GENERAL REQUIREMENTS FOR PLANT MATERIAL

Immediately upon award of Contract for Work in this Section, Contractor shall locate and purchase or hold for purchase plant material as required.

Contractor shall verify with Landscape Architect of Plant Material that has been nursery "contract grown" by the Owner for use of Work under this Contract.

Contractor shall review the condition of the Plant Material with Landscape Architect at the nursery maintaining the Plant Material prior to delivery, and when delivered to the Project Site.

Quality: Plant Materials shall have a growth habit typical for each variety and species indicated in the Plant List (as detailed on the Contract Drawings).

All Plant Materials specified shall be superior/premium-grade nursery stock, full, densely foliated, symmetrical, with tightly knit branching, so trained or favored in development and appearance in form, number of branches, compactness and symmetry, healthy, and vigorous in growth, as reviewed and determined by the Landscape Architect.

Plant Materials shall be free from insect pests, eggs and larvae, plant diseases, sun scalds, fresh bark abrasions, excessive abrasions, windburn, salt burn, weeds, or other disfigurements or conditions, as reviewed and determined by the Landscape Architect.

Plant Material shall be subject per the California State Department of Agriculture's Regulations for Nursery Inspections of Rules and Grading.

Growing Conditions: Plant Materials shall be nursery-grown in accordance with good horticultural practices under climatic conditions similar to those of project unless otherwise specifically authorized.

Container Stock (excluding annuals) shall be grown in boxes or containers in which delivered for at least one (1) growing season, but not over two (2) years. Plant Material grown in boxes or containers shall be cultivated during this time to permit full rooting within the specified box or container to bind the planting soil, but not so long as to create a "root-bound" condition.

Plant Material shall be completely free of circling, kinked or girdling trunk surface and center roots, and show no evidence of a pot-bound condition.

No boxed nor container Plant Material shall be planted which have cracked or broken balls of earth when separated from their boxes or containers.

No Plant Material shall be planted with damaged roots, broken root balls, or which are found to be "rootbound" when separated from their containers.

Pruning:

Do not prune Plant Materials unless directed by the Landscape Architect.

Pruning of Plant Material as grown at the nursery shall conform to ANSI A300 standards.

Consult with Landscape Architect for pruning Plant Materials after delivery and installation.

Measurements: Measure Plant Material according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes.

Take caliper measurement at a point on the trunk six-inches (6") above natural ground line for trees up to four-inches (4") in caliper (at a point twelve-inches (12") above the natural ground line for trees over four-inches (4") in caliper).

Measure foliage across mean foliage dimension when branches are in their normal upright position.

For trees to be supplied in "raised up" condition, foliage origin along main trunk shall be measured from soil line after installation.

Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Properly trimmed plants shall measure the same in any direction. If a plant is unevenly grown, it shall be classified in the size category of the smallest dimension.

Size Range: If a range of size is given, do not use Plant Materials less than the minimum size. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plant Materials that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.

Field Dug Stock: Prior to digging of field-grown Plant Materials, insure that excess loose fill resulting from cultivation around trunks/stems and over roots be removed down to natural finish grade at crown of Plant Materials. During digging, verify that size of tree spade or other equipment is adequate to encompass the actively growing root zone of all Plant Materials. Plant Materials which, after digging, show mostly large

fleshy roots and few fibrous roots, will be rejected.

Condition of Root Systems: Plant Materials must prove to be completely free of circling, kinked or girdling trunk surface and center roots and show no evidence of a root-bound condition. Upon inspection by Landscape Architect at the job site, if five-percent (5%) or more of the plants of each species are found to contain kinked, circling or girdling roots, all plants of that species shall be rejected.

Unacceptable Trees: Trees that have damaged, broken, pruned, or crooked leaders will be rejected. Trees having a main leader shall not have been headed back. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 3/4 in. which have not completely callused will be rejected.

SHADE AND FLOWERING TREES

Shade and Flowering Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required, subject to review and acceptance by the Landscape Architect. Container-grown trees will be acceptable and shall be subject to meeting ANSI Z60.1 limitations for container stock.

Branching Height: 1/2 of tree height, unless otherwise indicated on Contract Drawings.

Small Trees: Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height, and branching recommended by ANSI Z60.1, subject to review and acceptance by the Landscape Architect. Container-grown trees will be acceptable and shall be subject to meeting ANSI Z60.1 limitations for container stock.

Form: As indicated on the Contract Drawings for individual selected species.

SHRUBS

Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of Shrub, subject to review and acceptance by the Landscape Architect. Container-grown Shrubs will be acceptable in lieu of balled and burlapped.

Container-grown Shrubs shall be subject to meeting ANSI Z60.1 limitations for container stock, and other requirements as indicated on the Contract Drawings.

CONIFEROUS EVERGREENS

Form and Size: Normal-quality, well-balanced, well-rooted, coniferous evergreens, of type, height, spread, and shape required, subject to review and acceptance by the Landscape Architect.

Boxed or container-grown coniferous evergreens will subject to meeting ANSI Z60.1 limitations for container stock, and other requirements as indicated on the Contract Drawings.

BROADLEAF EVERGREENS

Form and Size: Normal-quality, well-balanced, well-rooted, broadleaf evergreens, of type, height, spread, and shape required, subject to review and acceptance by the Landscape Architect.

Container-grown broadleaf evergreens shall be subject to meeting ANSI Z60.1 limitations for container stock, and other requirements as indicated on the Contract Drawings.

GROUND COVERS

Provide ground covers full, established, and well-rooted in removable flats, containers, or integral peat pots, and with not less than the minimum number and length of runners required by ANSI Z60.1 for the container size indicated, and other requirements as indicated on the Contract Drawings, subject to review and acceptance by the Landscape Architect.

EXECUTION

EXAMINATION

NO WORK UNDER THIS SECTION SHALL COMMENCE UNTIL SUBMITTALS UNDER THIS SECTION HAVE BEEN REVIEWED ACCORDINGLY BY THE LANDSCAPE ARCHITECT.

CITY OF CULVER CITY

Prior to commencing Work under this Section, Contractor shall examine previously installed Work from other trades and verify that such Work is complete and to the point where Work herein may commence properly. Do not proceed with Work until unsatisfactory conditions have been corrected.

Installation practices of the Plant Materials shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted horticultural practices, as judged by the Landscape Architect.

Soil moisture levels prior to planting shall be no less than seventy-five-percent (75%) of field capacity. The determination of adequate soil moisture for planting shall be in the sole judgment of the Landscape Architect, and their decision shall be final.

If the soil moisture level is found to be insufficient for planting installation, planting pits shall be filled with water and allowed to drain before commencing planting operations.

Any planting area that may become compacted in excess of eighty-five-percent (85%) relative compaction (due to construction operations or other activities during the Contract) shall be tilled and thoroughly cross-ripped to a minimum depth of nine-inches (9") to alleviate the condition, taking care to avoid all existing subsurface utilities, drainage, etc.

Do not commence planting installation prior to acceptance of Section 329113 – Soil Preparation.

Contractor shall notify the Landscape Architect, in writing, on the anticipated commencement date and length of duration of the landscape installation.

Preparation of Planting Installation: Lay out individual Plant Material locations and areas for multiple plantings. Stake locations, outline areas, and gain the Landscape Architect's acceptance prior to commencing physical planting installation.

At the discretion of the Landscape Architect, Contractor shall make field adjustments to the planting layout, as required, per the direction of the Landscape Architect. Layout changes made accordingly shall be performed at no additional cost to the Owner.

No more Plant Materials shall be distributed in the planting area on any day than can be installed and watered on that day. Plant Materials shall be planted and watered immediately after the removal of their containers, as applicable.

Contractor shall protect existing and new improvements and systems installed prior to planting installation. Maintain protection in place until completion of Work and Landscape Establishment Period.

Finish Grades for planting areas shall have been established (per Section 312219 – Landscape Grading) prior to Work under this Section. Verify that grades are within one-inch plus or minus (1"+/-) of the required finish grade, and that all proper soil amendments and fertilizers have been furnished and installed accordingly as specified (per Section 329113 – Soil Preparation).

Maintain positive surface drainage of all planted areas throughout the duration of the Contract.

Pre-Planting: Where Plant Materials are to be pre-planted to permit site improvements to be installed around them, Contractor shall be responsible for the accurate layout and placement of those Plant Materials, as measured to their centerlines. Confirm designated pre-planting operations with Landscape Architect prior to commencing Work. Contractor shall also be responsible for the protection of pre-planted Plant Materials while other Work is taking place around them. Provide regular irrigation, as necessary, prior to installation and functioning of irrigation systems (per Section 328400 – Irrigation Systems).

EXCAVATION FOR PLANT MATERIAL

General: Upon completion of applicable pre-planting soil preparation requirements indicated in Section 329113 – Soil Preparation, excavate planting hole(s) for Plant Material with scarified vertical sides, with the bottom of the excavated hole slightly raised and compacted at the center to assist drainage and to minimize settlement of the Plant Material. Excavate holes according to the spacing alignment (i.e. hedge spacing, grid spacing, triangular spacing, etc.) and the on-center (O.C.) spacing intervals (i.e. 24" O.C. etc.) indicated on the Contract Drawings. Loosen any hard subsoil in the bottom of the excavation where evident, and remove all rocks greater than one-half-inch (1/2") in diameter, trash, debris, etc. Retain the excavated soil for use as part of the Amended Planting Backfill Mixture (as indicated in Section 329113 –

Soil Preparation).

Bare-Root Plant Material:

Excavate at least twenty-four-inches (24") wider than the perimeter of the bare root spread, and deep enough to allow setting of the roots on a compacted layer of native planting soil, where the top of the plant's root collar is one-inch (1") higher than finished grade or as further directed by the Landscape Architect:

Compacted Setting Layer: Provide a crown of a minimum six-inch (6") depth of native planting soil.

Where Tree Root Aeration Units are indicated (per Section 329400 – Landscape Planting Accessories), provide further excavation in the planting hole by auger to the required minimum depth allowing for installation of the Tree Root Aeration Unit assembly.

Balled and Burlap Plant Material:

Excavate the planting hole to the width and depth indicated in the Contract Drawings. Depth of the planting hole includes the depth indicated for the compacted setting layer at the bottom of the excavation, where the top of the plant's root collar is one-inch (1") higher than finished grade or as further directed by the Landscape Architect:

Compacted Setting Layer: Provide a crown of a minimum six-inch (6") depth of native planting soil.

Where Tree Root Aeration Unit(s) are indicated (per Section 329400 – Landscape Planting Accessories provide further excavation in the planting hole by auger to the required minimum depth allowing for installation of the Tree Root Aeration Unit assembly.

Container-Grown Plant Material:

Excavate the planting hole to the width and depth indicated on the Contract Drawings. Depth of the planting hole includes the depth indicated for the compacted setting layer at the bottom of the excavation, where the top of the plant's root collar is one-inch (1") higher than finished grade or as further directed by the Landscape Architect:

Compacted Setting Layer: Provide a crown of a minimum six-inch (6") depth of native planting soil.

Where Tree Root Aeration Unit(s) are indicated, (per Section 329400 – Landscape Planting Accessories), provide further excavation in the planting hole by auger to the required minimum depth for installation of the Tree Root Aeration Unit assembly.

Field Grown/Specimen Trees:

Excavate the planting hole to the width and depth indicated on the Contract Drawings. Depth of the planting hole includes the depth indicated for the compacted setting layer at the bottom of the excavation, where the top of the plant's root collar is one-inch (1") higher than finished grade or as further directed by the Landscape Architect:

Compacted Setting Layer: Provide a crown of a minimum six-inch (6") depth of native planting soil.

Where Tree Root Aeration Unit(s) are indicated (per Section 329400 – Landscape Planting Accessories), provide further excavation in the planting hole by auger to the required minimum depth for installation of the Tree Root Aeration Unit assembly.

In areas where special subsurface drainage for planting is indicated, tie drainage pipes, as required, into the drain system.

Excavate planting hole at 3x the diameter of the rootball.

Obstructions: Notify the Landscape Architect immediately if unexpected rock, debris, contaminants, obstructions, or other items that are detrimental to the healthy sustained growth of Plant Material is encountered in the excavation process.

Hardpan Layer: If encountered, drill six-inch (6") diameter holes into free-draining strata or to a depth of ten-feet (10'), whichever is less, and backfill with free-draining material.
Drainage: Notify the Landscape Architect if subsoil conditions show evidence of unexpected water seepage or retention in planting holes.

PLANTING PLANT MATERIAL

Bare Root Plant Material: Set Bare Root Plant Material plumb and in center of the excavated hole, with top of root ball set properly at the adjacent finish grade as indicated. Set Bare Root Plant Material in the proper spacing and/or alignment(s) as indicated on the Contract Documents, or as further directed at the Project Site by the Landscape Architect.

Thoroughly soak the roots of the Bare Root Plant Material in clean water for a minimum of twelve (12) hours but no more than twenty-four (24) hours to fully hydrate the root mass. Do not soak above the root crown.

Remove wood shavings or other material used to keep the exposed root mass in a moist condition.

Carefully place the Plant Material stock on the specified setting layer of compacted native soil, with the top of root mass set approximately one-inch (1") above the finished grade to allow for settlement of the Plant Material within the excavated planting hole. Provide an orientation of the Plant Material that is confirmed and acceptable by the Landscape Architect. During the process of determining an acceptable orientation of the Plant Material, carefully handle the Plant Material by its trunk.

Prepare the Amended Planting Backfill Mixture: Amend each cubic yard (cu/yd) of native soil excavated from the planting hole by incorporating and thoroughly mixing/blending the following:

1/4 yard of Bulk Composted Organic Soil Amendment Material (per Section 329113 – Soil Preparation).

¹/₂ pound of Granular Soil Conditioning Material & Fertilizer (per Section 329113 – Soil Preparation).

Add Mycorrhizal Inoculum to the excavated native soil, (per Section 329113 – Soil Preparation), per the Manufacturer's latest printed instructions.

Pending the results of the Agronomic Soil Fertility Report, the Amended Planting Backfill Mixture may be modified accordingly to include additional soil amendments or fertilizers (gypsum, iron, potash, etc.) or the ratios as indicated in the Mixture indicated above may be modified.

The cost of providing modifications to the Amended Planting Soil Backfill Mixture (as recommended through the Agronomic Soil Fertility Report and as directed by the Landscape Architect) shall be borne by the Contractor.

Install the Tree Root Aeration Unit(s) prior to backfilling operations, as required (per Section 329400 – Landscape Planting Accessories).

Backfilling the excavated planting hole:

Place the Amended Planting Backfill Mixture around the Plant Material root mass in the excavated planting hole. Place the Mixture in six-inch (6") lifts, tamping each lift accordingly to settle the Mixture and eliminate voids and air pockets.

Maintain the Plant Material plumb while working the Mixture around the root mass. When the planting hole is approximately half-backfilled, water thoroughly before placing the remainder of the Mixture.

Add the Fertilizer Tablets and other amendments, (per Section 329113 – Soil Preparation) as required, at the prescribed application rates (as indicated per Section 329113 – Soil Preparation) or if not indicated, per the Manufacturer's latest printed instructions.

Place the final layers of the Amended Planting Backfill Mixture, tamping accordingly, to the top of the root mass.

Dish and tamp top of the Mixture to form a three-inch (3") deep watering basin centered on the Plant Material's trunk to the rim width of the planting hole.

Thoroughly mix together water and Plant Vitamin/Hormone Stimulant in application ratio as recommended by Stimulant Manufacture (per Section 329400 – Landscape Planting Accessories). Apply liquid matrix in sufficient quantity to thoroughly saturate the basin to settle the Mixture, and to eliminate

voids and air pockets. Should any portions of the root mass be exposed, add additional Mixture as needed to thoroughly cover the root mass.

Mulching: Apply mulch in watering basins as indicated on the Contract Drawings. Refer to Section 329400) – Landscape Planting Accessories for type and requirements.

Container-Grown Plant Material: Set Container-Grown Plant Material plumb and in the center of the excavated planting hole, with top of the root ball raised above adjacent finish grade as indicated. Set Container-Grown Plant Material in the proper spacing and/or alignment(s) as indicated on the Contract Documents, or as further directed at the Project Site by the Landscape Architect.

For plastic container stock (4" pot, 1-gallon, 5-gallon, 15-gallon, etc.), carefully remove the plant container prior to setting the plant in the excavated hole so as not to damage root ball. Tip container to horizontal position and shake carefully to remove Plant Material. Support root ball during installation to prevent cracking or shedding of soil.

Set the Plant Material stock on the specified setting layer of compacted native soil, with the top of root ball set one-inch (1") above the finished grade to allow for settlement of the Plant Material within the excavated planting hole. Provide the orientation of the Plant Material that is confirmed and accepted by the Landscape Architect. During the process of determining an acceptable orientation of the plant material, carefully handle the Plant Material by its container; avoid handling the Plant Material by its trunk.

Plant Material with a damaged root ball upon removal of the container, or if the root ball fails to thoroughly hold the soil as it is removed from the container, or if the plant is mishandled or damaged during planting operations, shall be rejected.

For wooden boxed container stock, carefully set whole boxed container of the Plant Material stock on the specified setting layer of compacted native soil, with the top of root ball set one-inch (1") above the finished grade to allow for settlement of the Plant Material within the excavated planting hole. Provide the orientation of the Plant Material that is confirmed and accepted by the Landscape Architect. During the process of determining an acceptable orientation, carefully handle the Plant Material by its container; avoid handling the Plant Material by its trunk or branches. Once orientation is accepted, remove the steel strapping and the sides of the wooden container so as not to damage the root ball or any part of the plant. Do not remove the bottom of the wooden container. Discard sides.

Plant Material with a damaged root ball upon removal of the container, or if the root ball fails to thoroughly hold the soil as it is removed from the container, or if the plant is mishandled or damaged during planting operations, shall be rejected.

Scarification: After removing container from plant, scarify the sides of the root ball to a depth of one-inch (1") at four (4) to six (6) equally-spaced locations around the perimeter of the root ball or at twelve-inch (12") intervals on sides of wooden boxed container stock. Cut and remove circling roots over 3/8 in. diameter.

Prepare the Amended Planting Backfill Mixture: Amend each cubic yard (cu/yd) of native soil excavated from the planting hole by incorporating and thoroughly mixing/blending the following:

¹/₄ yard of Bulk Composted Organic Soil Amendment Material (per Section 329113 – Soil Preparation).

¹/₂ pound of Granular Soil Conditioning Material & Fertilizer (per Section 329113 – Soil Preparation).

Add Mycorrhizal Inoculum to the excavated native soil, (per Section 329113 – Soil Preparation), per the Manufacturer's latest printed instructions.

Pending the results of the Agronomic Soil Fertility Report, the Amended Planting Backfill Mixture may be modified accordingly to include additional soil amendments or fertilizers (gypsum, iron, potash, etc.) or the ratios as indicated in the Mixture indicated above may be modified.

The cost of providing modifications to the Amended Planting Soil Backfill Mixture (as recommended through the Agronomic Soil Fertility Report and as directed by the Landscape Architect) shall be borne by the Contractor.

Install the Tree Root Aeration Unit(s) prior to backfilling operations, as required (per Section 329400 – Landscape Planting Accessories).

In areas where indicated on the Contract Drawings, install the Deep Watering Bubblers as part of the irrigation system.

Backfilling the excavated planting hole:

Place the Amended Planting Backfill Mixture around the root ball in the excavated planting hole. Place the Mixture in six-inch (6") lifts, tamping each lift accordingly to settle the Mixture and eliminate voids and air pockets. Foot tamp the backfill, as required.

Maintain the plant plumb while working the Mixture around the root ball. When the planting hole is approximately half-backfilled, water thoroughly before placing the remainder of the Mixture.

Add the Fertilizer Tablets and other amendments (per Section 329113 – Soil Preparation) as required, at the prescribed application rates indicated herein this Article or if not indicated, per the Manufacturer's instructions.

Place the final layers of the Mixture, tamping accordingly, to the top of the root ball. Do not place the Mixture on top of the root ball.

Dish and tamp top of the Mixture to form a three-inch (3") deep watering basin centered on the Plant Material's trunk to the rim width of the planting hole. Do not cover the top of the root ball with the backfill mixture.

Thoroughly mix together water and Plant Vitamin/Hormone Stimulant in application ratio as recommended by Stimulant Manufacture (per Section 329400 – Landscape Planting Accessories). Apply liquid matrix in sufficient quantity to thoroughly saturate the basin to settle the Mixture, and to eliminate voids and air pockets. Should any portions of the root mass be exposed, add additional Mixture as needed to thoroughly cover the root mass.

Mulching: Apply mulch in watering basins as indicated on the Contract Drawings. Refer to Section 329400 – Landscape Planting Accessories for type and requirements.

Field-Dug Specimen Plant Material: Set Field-Dug Specimen Plant Material plumb and in the center of the excavated planting hole, with top of the root ball raised above adjacent finish grades as indicated. Set Field-Dug Specimen Plant Material in the proper spacing and/or alignment(s) as indicated on the Contract Documents, or as further directed at the Project Site by the Landscape Architect.

After excavation of the planting hole, provide subsurface piping drainage and/or Tree Root Aeration Units as indicated on the Contract Drawings. Tie subsurface drainage into storm drainage system, where required. Install the Tree Root Aeration Units, where required.

Carefully set the Field-Dug Specimen Plant Material stock on the specified setting layer of compacted native soil, with the top of root ball set one-inch (1") above the finished grade to allow for settlement of the Plant Material within the excavated planting hole. Provide the orientation of the Plant Material that is confirmed and accepted by the Landscape Architect. During the process of determining an acceptable orientation of the Plant Material, carefully handle the Plant Material by a cradle around its root ball mass or by its planting container; avoid handling the Plant Material by its trunk.

For Field-Dug Specimen Plant Material delivered in a wooden boxed container, do not remove sides or bottom of the container until the Specimen's orientation is accepted by the Landscape Architect. Once orientation is accepted, remove steel strapping and the sides of the wooden container so as not to damage the root ball or any part of the Specimen. Do not remove the bottom of the wooden container. Discard sides.

Any Specimen with a damaged root ball upon removal of the container, or if the root ball fails to thoroughly hold the soil as it is removed from the container, or if the plant is mishandled or damaged during planting operations, shall be rejected.

Scarification: After removing container from plant, scarify the sides of the root ball to a depth of one-inch (1") at four (4) to six (6) equally-spaced locations around the perimeter of the root ball or at twelve-inch (12") intervals on sides of wooden boxed container stock. Cut and remove circling roots over 3/8 in. diameter.

Prepare the Amended Planting Backfill Mixture: Amend each cubic yard (cu/yd) of native soil excavated

from the planting hole by incorporating and thoroughly mixing and blending in the following:

1/4 yard of Bulk Composted Organic Soil Amendment Material (per Section 329113 – Soil Preparation).

1/2 pound of Granular Soil Conditioning Material & Fertilizer (per Section 329113 – Soil Preparation).

Add Mycorrhizal Inoculum to the excavated native soil, (per Section 329113 – Soil Preparation), per the Manufacturer's latest printed instructions.

Pending the results of the Agronomic Soil Fertility Report, the Amended Planting Backfill Mixture may be modified accordingly to include additional soil amendments or fertilizers (gypsum, iron, potash, etc.) or the ratios as indicated in the Mixture indicated above may be modified.

The cost of providing modifications to the Amended Planting Soil Backfill Mixture (as recommended through the Agronomic Soil Fertility Report and as directed by the Landscape Architect) shall be borne by the Contractor.

In areas indicated on the Contract Drawings, install the Deep Watering Bubblers as part of the irrigation system (per Section 328400 – Irrigation Systems).

Install the Tree Root Aeration Unit(s) prior to backfilling operations, as required (per Section 329400 – Landscape Planting Accessories).

Backfilling the excavated planting hole:

Place the Amended Planting Backfill Mixture around the root ball in the excavated planting hole. Place the Mixture in six-inch (6") lifts, tamping each lift accordingly to settle the Mixture and eliminate voids and air pockets.

Maintain the plant plumb while working the Mixture around the root ball. When the planting hole is approximately half-backfilled, water thoroughly before placing the remainder of the Mixture.

Add the Fertilizer Tablets and other amendments, as required, at the prescribed application rates indicated herein this Article or if not indicated, per the Manufacturer's instructions.

Place the final layers of the Mixture, tamping accordingly, to the top of the root ball. Do not place the Mixture on top of the root ball.

Dish and tamp top of the Mixture to form a three-inch (3") deep watering basin centered on the Plant Material's trunk to the rim width of the planting hole.. Do not cover the top of the root ball with the backfill mixture.

Thoroughly mix together water and Plant Vitamin/Hormone Stimulant in application ratio as recommended by Stimulant Manufacture (per Section 329400 – Landscape Planting Accessories). Apply liquid matrix in sufficient quantity to thoroughly saturate the basin to settle the Mixture, and to eliminate voids and air pockets. Should any portions of the root mass be exposed, add additional Mixture as needed to thoroughly cover the root mass.

Mulching: Apply mulch in watering basins as indicated on the Contract Drawings. Refer to Section 329400 – Landscape Planting Accessories for type and requirements.

Plant Settling and Orientation: Plant Material that has settled deeper than the surrounding grade shall be excavated and raised to the correct level, to the satisfaction of the Landscape Architect. Plant Material installed without direction and/or approval as to its proper orientation shall be subject to excavation and acceptable orientation, to the satisfaction of the Landscape Architect.

Fertilizer Tablet(s) Application Rate: Refer to Section 329113 – Soil Preparation.

PLANTING GROUND COVERS

General: Upon completion of applicable pre-planting soil preparation requirements indicated in Section 329113 – Soil Preparation, excavate planting hole(s) for Ground Covers with scarified vertical sides, with the bottom of the excavated hole slightly raised and compacted at the center to assist drainage and to minimize settlement of the Plant Material. Refer to requirements indicated in Part III of this Section for Excavation.

Plant Settling: Plant Material that has settled deeper than the surrounding grade shall be raised to the correct level.

Excavate holes according to the spacing alignment (i.e. triangular spacing, etc.) and the on-center (O.C.) spacing intervals (i.e. 24" O.C. etc.) indicated on the Contract Drawings. Loosen any hard subsoil in the bottom of the excavation where evident, and remove all rocks greater than one-half-inch (1/2") in diameter, trash, debris, etc.

Obstructions: Notify the Landscape Architect immediately if unexpected rock, debris, contaminants, obstructions, or other items that are detrimental to the healthy sustained growth of Plant Material is encountered in the excavation process.

Ground Covers: Follow applicable planting requirements per Articles 3.02 and 3.03 indicated herein this Section.

Carefully set root mass into excavated hole, spreading roots, and backfill with planting soil.

Add Fertilizer Tablets and other amendments, as required, within backfill.

Work soil around roots to eliminate air pockets, and provide a slight saucer indentation around plants to retain surface water.

Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

PRUNING PLANT MATERIAL

At no time shall Plant Material be pruned, trimmed, thinned, shaped, or topped prior to delivery. Pruning, trimming, thinning, shaping, or topping of Plant Material shall be only conducted on the Project Site, and under the presence and direction of the Landscape Architect or approved Certified Arborist. Plant Material that has been pruned and delivered to the Project Site without prior approval by the Landscape Architect or an approved Certified Arborist will be rejected.

When directed by the Landscape Architect or an approved Certified Arborist, Contractor shall prune, thin, and shape plant material, according to standard horticultural practice, to preserve the natural character of the Plant Material.

Pruning and remedial work shall be done per ANSI A300.

Prune trees to retain required height and spread. Do not cut tree leaders; remove only injured or dead branches from trees.

Prune shrubs accordingly to retain natural character.

Provide pruning, cabling and bracing, irrigation, pest and disease control and other remedial treatments as recommended to assure the long-term health of the trees and existing vegetation, and the safety of persons and property.

Newly planted trees shall be pruned near the termination of the Landscape Establishment Period, per the direction of the Landscape Architect, as required.

CLEAN UP AND PROTECTION

During installation operations, keep Work area in an orderly and safe condition. Contractor shall remove trash caused from his Work on a weekly basis throughout the duration of the Work.

Protect landscaping from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

Upon completion of his Work under this Section, the Contractor shall remove rubbish, waste, debris, excess construction materials, surplus soil and other items resulting from construction operations and legally dispose of it off the Owner's property.

Scars, ruts, or other marks in the ground caused by the Contractor's Work shall be repaired.

Remove equipment and implements of service, and leave the entire Project Site area in a neat, clean,

and Owner-approved condition.

Labels: Remove all nursery-type labels, flags, and or identification markings from Plant Materials.

FINAL REVIEW

Final Review under this Section shall be performed upon completion of the Landscape Establishment Period. Refer to Section 329813 – Landscape Establishment Period, for requirements.

329400 - LANDSCAPE PLANTING ACCESSORIES

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required to make a complete exterior Landscape Planting Accessories installation, as shown in the Contract Drawings, and as specified herein this Section.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Mulches (wood products).

Tree Root Aeration Units (a.k.a. Tree Chimney's).

Root Control Barriers.

Stakes and Guys.

Erosion Control Materials.

Landscape Edgings (Headers/Edgings/Mowstrips).

Weed Control Barrier / Geotextile Filter Fabric.

Miscellaneous Materials (Herbicides, Vitamin Stimulant/Root Hormone, etc.).

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 312219 - Landscape Grading.

Section 321500 – Aggregate Surfacing.

Section 321513 – Stabilized Decomposed Granite Paving.

Section 321313 - Concrete Paving.

Section 321323 – Site Concrete.

Section 328400 - Irrigation Systems.

Section 329113 – Soil Preparation.

Section 329300 – Exterior Plants.

Section 329813 – Landscape Establishment Period.

DEFINITIONS AND APPLICABLE STANDARDS

References:

ASTM – American Society for Testing and Materials.

ANSI – American National Standards Institute.

Definitions: (Not Used).

Measurements:

PSI: Measurement, in pounds per square inch.

CU/FT: Measurement, in cubic-foot.

PPM: Measurement, in parts per million.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Product/Material Data. Submit available product/material literature supplied by manufacturer's, indicating that their products comply with specified requirements. Provide manufacturing source (name, address, and telephone number), and distributor source (name, address, and telephone number) for each type of product/material.

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Landscape Planting Accessories installations.

Material Samples: Submit four (4) sets of physical Material Samples for review of kind, color, pattern, size, and texture for a check of these characteristics with other elements, and for a comparison of these characteristics between Submittal and actual component as delivered and installed. Include the full range of exposed color and texture expected in the completed Work. Provide Material Samples bound and individually wrapped in re-sealable labeled 1-gallon plastic bags (as applicable):

0.50 cubic foot of Landscape Mulch Material (Shredded Wood Mulch).

One (1) two-foot (2'-0") long section of Tree Root Aeration Unit assembly.

One (1) two-foot (2'-0") long sample of Root Control Barrier.

One (1) set of Tree Tying/Staking Materials for each type used, as applicable.

One (1) set of Tree Guying Materials for each type used, as applicable.

One (1) two-foot (2'-0") square sample of Erosion Control Material for each type used, as applicable.

One (1) two-foot (2'-0") sample of Landscape Edging Materials and Accessories (stake, etc), to verify gauge, size, and color selected, as applicable.

One (1) two-foot (2'-0") square sample of Weed Control Barrier / Geotextile Filter Fabric for each type used, as applicable.

Scaled Shop Drawings: Not Required.

Field-Constructed Mock-ups: Not Required.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work shall proceed under this Section until Submittal requirements indicated herein have been reviewed accordingly by the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Installer Qualifications:

Requirement: Valid California C-27 (Landscaping Contractor) License.

Engage an experienced Installer who has completed Landscape Planting Accessories work similar in material, design, and extent to that indicated for this Project and with a record of successful installation.

Installer's Field Supervision: Installer shall maintain an experienced full-time supervisor on the Project site during times that installations under this Section are in progress.

Observation: Landscape Architect may observe installation of Landscape Planting Accessories at Project Site for compliance with requirements for type, size, and quality. Landscape Architect retains right to observe Landscape Planting Accessories for defects and to reject unsatisfactory or defective material at any time during progress of Work. Contractor shall remove rejected Accessories immediately from Project site.

Manufacturer's Directions: Follow Manufacturer's directions and drawings in cases where the Manufacturers of articles used in this Section furnish directions covering points not shown in the Contract Drawings and Contract Specifications.

Permits, Fees, Bonds, and Inspections: Contractor shall arrange and pay for permits, fees, bonds, testing services, and inspections necessary to perform and complete Work under this Section.

Single-Source Responsibility: Obtain each color, type, and variety of products/materials from a single source with resources to provide products/materials of consistent quality in appearance and physical properties without delaying Work.

DELIVERY, STORAGE, AND HANDLING

Provide new, unused materials indicated under this Section. Store and secure properly to prevent theft or damage. Deliver and store perishable material in original, unopened packaging. It is the responsibility of the Contractor to install "factory condition" Units.

Damaged Materials: Be responsible for all damage or disfiguration of Work until Final Acceptance. Remove off site and replace at no additional cost to Owner all damaged or rejected materials.

Deliver materials so as to not delay Work, and install only after preparations for installation have been completed.

COORDINATION, SCHEDULING, AND OBSERVATIONS

Utilities: Determine location of above grade and underground utilities and perform Work in a manner which will avoid damage to utilities. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to installing Landscape Planting Accessories are encountered, such as rubble fill, adverse drainage conditions, or obstructions, cease installation operations and notify Landscape Architect for further direction.

Field Measurements: Contractor shall take field measurements as required. Report major discrepancies between the Contract Drawings and field dimensions to the Landscape Architect prior to commencing Work.

Installation: Perform installation of Landscape Planting Accessories only when weather and soil conditions are suitable in accordance with locally accepted practices.

Construction Site Observations: Contractor shall request, in writing, at least one (1) week in advance of the time when mandatory site observation(s) by the Landscape Architect are required.

SUBSTITUTIONS

Consideration: Materials to be considered equal to the Materials indicated herein this Section shall be reviewed by the Landscape Architect. Materials with equal performance characteristics produced by other Manufacturer's and/or Distributors may be considered, providing deviations in dimensional size,

color, composition, operation, and/or other characteristics do not change the design concept, aesthetic appearance, nor intended performance, as solely judged by the Landscape Architect. The burden of proof on product equality is on the Contractor.

Specific reference to Manufacturer's names and products specified herein are used as standards of quality. This implies no right to the Contractor to substitute other materials without prior written approval by the Landscape Architect for Work under this Section.

Materials substituted and installed by the Contractor, without prior written approval by the Landscape Architect, may be rejected. Contractor shall not be entitled to be compensated by the Owner where the Contractor has installed rejected substitutions without receiving prior written approval.

Contract Price: Substituted Materials under this Section shall not increase the Contract price.

LANDSCAPE ESTABLISHMENT PERIOD

Refer to Section 329813 – Landscape Establishment Period, for requirements under this Article.

During the duration of the Landscape Establishment Period, continuously maintain Landscape Planting Accessories by tightening, holding plumb, and/or repairing Staking and/or Guying supports, providing adequate depths and coverage requirements of Landscape Mulching Materials, monitoring drainage within Tree Root Aeration Units, hold Edging Materials true and in proper alignments, and other requirements, as required, to establish healthy, viable landscape planting materials until Final Acceptance of Work is granted.

PRODUCTS

LANDSCAPE MULCH MATERIALS

Shredded Wood Mulch: Shredded Wood Mulch, free from deleterious materials, debris, and weed seed. Suitable as a top dressing of trees, shrubs and groundcovers, consisting of following:

Type: Shredded cedar, redwood, fir, or hardwood commercial wood bark products, composted with humus and leaf materials. Shredded Wood Mulch shall be graded and to average dimensions of one-inch (1") to three-inches (3") in length, and flat in cross-section.

Minimum organic matter content at 80%.

pH between 5.0 and 8.0.

Salt content shall be less than 4 millimho/cm @ 25 ° C. on a saturated paste extract.

Boron content of the saturated extract shall be less than 1.0 parts per million.

Calcium carbonate shall not be present.

Carbon:Nitrogen ratio is less than 100:1.

Compost shall be aerobic without malodorous presence of decomposition products.

Maximum particle size shall be 2 inches. A maximum of 5% shall pass a No. 2 screen.

Maximum Total Permissible Pollutant Concentrations (in parts per million (PPM)) on a dry weight basis:	
Arsenic	20 ppm
Molybdenum	30 ppm
Cadmium	15 ppm
Nickel	50 ppm
Chromium	150 ppm

Selenium	25 ppm
Cobalt	50 ppm
Silver	10 ppm
Copper	150 ppm
Vanadium	50 ppm
Lead	150 ppm
Zinc	150 ppm
Mercury	10 ppm

Coverage Depth:

Refer to Part III indicated herein this Section.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

ES-2 Mulch, Agromin Horticultural Products.

Pacific Mulch[™], Greenways Environmental.

Walk-On Chips, Earthworks Soil Amendments, Inc.

Landscape Mulch, Agri Service, Inc.

Red Fir Bark, Greenway Compost.

A-1 Oak Deco Chips, Hanson Aggregates/A-1 Soils.

#SBM 3, Special Mulch #3, Plants Choice, Inc.

Or equal, as approved by the Landscape Architect.

TREE ROOT AERATION UNITS (TREE CHIMNEY'S)

General: Tree Root Aeration Units are a complete assembly, consisting of a perforated Aeration Pipe Tube, wrapped in Geo-textile Filter Fabric sleeving, and topped with a Grate.

Aeration Pipe Tube: Manufactured from high-density polyethylene (HDPE) resin, meeting ASTM F810. Pipe shall be perforated with machine-drilled holes, set either with 3/8" holes on 4" centers at 120 degrees, or on-half-inch ($\frac{1}{2}$ ") holes on five-inch (5") centers at one-hundred-twenty (120) degrees.

Length: As required, per Contract Drawings.

Size (Diameter):

4" diameter Pipe.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

3000 Triple Wall Drainage Pipe, ADS.

Perforated SDR35 Solvent Weld Underdrain Pipe, P.W. Eagle.

COEX, PSP.

Big "O" Drainage Tubing, Armtec.

Or equal, as approved by the Landscape Architect.

Geo-textile Filter Fabric Sleeving for Aeration Pipe Tube: Meet ASTM D6707. Permeable, lightweight, continuous, non-woven, UV resistant, synthetic geo-textile (nylon or polyester) filament material,

engineered to allow water permeability and deter soil permittivity, per ASTM D4491. Fabric shall be nonbiodegradable, resistant to acids and alkalis, and sized accordingly.

Length: As required, per length of Aeration Pipe.

Size: As required, to sleeve (snugly fit) over the diameter of the specified Aeration Pipe tube.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Drain Sock, ADS.

Drain-Sleeve Filter Fabric, Carriff Corporation.

Filter Fabric, Zodiac Fabrics, Inc.

Big "O" Sock Filter, Armtec.

Drain-Eez, Christy's.

Or equal, as approved by the Landscape Architect.

Aeration Pipe Grates (sized accordingly to fit snugly to the specified Aeration Pipe Tube).

Shrub and Groundcover Areas: Atrium-type Grate.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

4" Atrium Grate #78S (black color), National Diversified Sales (NDS), Camarillo, CA.

Or equal, as approved by the Landscape Architect.

ROOT CONTROL BARRIERS

Plastic Root Control Barrier:

General: Plastic Root Control Barrier shall be a long-term root control system for trees, fully permeable to oxygen and water to sustain and direct plant growth. Plastic Root Control Barrier shall be manufactured of an extruded, high-impact black homo-polymer (polyethylene or polyolefin) plastic, with minimum 50% post-consumer recycled material, and UV inhibitors. Plastic Root Control Barrier shall be composed of a system consisting of a series of integrally-molded, self-interlocking Barrier Panels. Polystyrene- based plastic is unacceptable.

Size: Each panel shall be a minimum of twenty-four-inches (24") in width and thirty-six-inches (36") in depth, extruded to a mean thickness of minimum .08 inches, with $\frac{1}{2}$ " to $\frac{3}{4}$ " raised vertical ribs running perpendicular to the panel and spaced six-inches (6") on-center. Provide quantity as required of integrated interlocking joint panels, in lengths as required.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

UB-36-2 Deep Root, Deep Root Partners, San Francisco, CA, 800-458-7668.

Root Solutions, Vespro, Inc., San Rafael, CA, 800-554-0914.

Dual Purpose Panels, .085 Thickness, Villa Root Barrier, Inc. Lake Elsinore, CA, 800-654-4067.

RP Series Root Barrier Panel, NDS, 800-726-1994.

CP Series Root Barrier Panel, Century Products USA, 714-632-7083.

Or equal, as approved by the Landscape Architect.

SWA Note: Do not specify nor accept submitted products that are manufactured with polypropylene plastic. Products of this nature are manufactured as "EP-Series Root Barrier Panels by NDS"

STAKES AND GUYS

Tree Staking Assembly:

Wooden Stake Tree Staking Assembly: Complete tree staking Unit, consisting of Lodge Pole Pine Tree Stakes with (choose one: Tree Ties/Tree Straps/Twist Braces)

Tree Stakes: Lodge Pole Pine Wooden Tree Stake, straight shaft, shaved and cut, cleaned and bare of branches and stubs, free of loose knots, bends, splits, or bows, of uniform thickness, with a minimum diameter of either two-inches (2") or two-one-half (2-1/2") to three-inches (3"). Lengths shall be eight-feet (8'), ten-feet (10') or twelve-feet (12'), as required, to adequately and firmly penetrate the sub grade and support the tree. Stake shall have a minimum ten-inch (10") long tapered/conical driving point, and chamfered top to minimize splitting when driven. Stake shall be pressure treated (per Federal Specification TT-W-00571-J-Table 2) with an EPA-registered pesticide containing inorganic arsenic (copper chromium arsenate, meeting Federal Specification TT-W-550-Type 1) to protect it from insect attack and decay.

Quantity, Size, and Length per tree:

#5 container stock: One (1), two-inch (2") diameter, eight-foot (8') long or ten-foot (10') long (as required) Wooden Tree Stake per tree,

#15 container stock: One (1), two-inch (2") diameter, 10'-0 long or 12'-0" long (as required) Wooden Tree Stake per tree.

24" box container stock: Two (2) Two-inch (2") diameter, ten-foot (10') long or twelve-foot (12') long (as required) Wooden Tree Stakes per tree.

>24" box container stock: Minimum two (2) two-one-half-inches (2-1/2") or three-inches (3") diameter, ten-foot (10') or twelve-foot (12') long (as required) Wooden Tree Stakes per tree.

Special Circumstances: Should lengths of Wooden Tree Stakes be inadequate to satisfactorily support the tree being staked in an upright, plumb condition, Contractor shall provide Metal Stake Tree Staking Assembly.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Sullivan & Mann Lumber Company, Tustin, CA.

BVC Tree Stakes.

TruStakes, 4Seasons Wood Products.

Or equal, as approved by the Landscape Architect.

EROSION CONTROL MATERIALS

Open Weave Jute Fiber Mesh: Biodegradable, woven, 100% natural jute fiber yarn, +/- 0.25" thick, undyed and unbleached, 0.92 lbs. per sq. yd. minimum, with 50% to 65% open area. Provide "U"-shaped, 11-gauge steel wire staples, six-inches (6") to eight-inches (8") long, 2" crown, to anchor Jute Fiber Mesh to soil surface.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Anti-Wash/Geojute, Belton Industries, Inc.

Or equal, as approved by the Landscape Architect.

Provide on slope gradients 4:1 and greater

LANDSCAPE EDGINGS/HEADERS

Steel Edging/Header:

General: Steel Edging/Header shall be in the location and size as shown on the Contract Drawings. Comply with ASTM A569, hot-rolled, standard flexible carbon steel edging, fabricated in sections with stake pockets stamped, punched, or welded to face of sections approximately thirty inches (30") apart to receive stakes. Steel Edging/Header shall be double-staked at overlap joints, and designed to receive

tapered steel stakes.

Size: 1/4" thick, 5" wide, by 16'-0" length, with seven (7) stakes per 16' section.

Color/Finish: Factory-applied Sherwin Williams H68GT85 powder coat paint, electrostatically applied and oven baked. Minimum thickness to be 1.5 mils.

Color: Black.

Color/Finish: Factory-applied dipped galvanized finish, applied after steel landscape edging is cut to length and stake pockets are stamped, punched or welded. Galvanization shall comply with ASTM A123. Zinc coverage shall be to a standard thickness of 3.3 mil (2.0 oz/ft2).

Steel Edging/Header Stakes: Steel, tapered, 15-16" minimum length, finish to match specified Steel Edging/Header. Stakes designed specifically to anchor Steel Edging/Header in place, and manufactured by manufacturer of the Steel Edging/Header for which they will be used.

Accessories: Standard tapered ends, corners, and splices, as required.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Ryerson & Son, Emeryville, CA.

DuraEdge®, J.D. Russell Co., Tucson, AZ.

Border King[™], Border Concepts, Inc., Charlotte, NC.

Or equal, as approved by the Landscape Architect.

Cast-in-Place Concrete Edging/Header:

General: Cast-in-Place Concrete Edging/Header shall be in the location and size as shown on the Contract Drawings.

Refer to Section 321323 – Site Concrete for additional requirements for concrete type, formwork and reinforcement.

WEED CONTROL BARRIER/GEO-TEXTILE FILTER FABRIC

Type: Permeable, lightweight, continuous, non-woven, geo-textile polypropylene filament material, UVresistant, engineered to allow water permeability and deter soil permittivity, per ASTM D4491. Geo-Textile Filter Fabric shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids. Meet AASHTO M288-96, Class 1.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Amoco 4553, Amoco Fabrics and Fibers Company.

FX-80HS, Carthage Mills.

C-80NW, Contech.

180 EX, Linq.

Geotex 801, Propex, Inc.

TerraTex N08, Webtec.

180N, TC Mirafi.

3301, Typar Landscape Products.

Or equal, as approved by the Landscape Architect.

MISCELLANEOUS MATERIALS

Water: Per ASTM C94, from potable domestic source, and free from deleterious materials such as oils, acids, and organic matter. Transport as required.

Stress Reducing Agent: 100% natural organic root and plant stimulator solution, used to eliminate transplant shock and provide better establishment of plants. Solution shall contain a natural wetting agent, designed to improve nutrient release, water-holding capacity, cation exchange capacity in soil, and stimulate fertilizer and micronutrient uptake.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Roots NoBurn®, Novozymes Biologicals, Inc., Salem, VA.

Essential® Plus 1-0-1, Growth Products, White Plains, NY.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations.

Wetting Agent and Soil Penetrant (Surfactant): Highly-concentrated liquid solution. Provide in a diluted liquid solution, mixed with water, at the time of watering-in recently planted plant species.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Roots NoBurn®, Novozymes Biologicals, Inc., Salem, VA.

LESCO-Wet[™] Plus, Lesco, Inc., Cleveland, OH.

Naiad Liquid Wetting Agent, Naiad Company, Inc., Stockton, CA.

Aqua-Gro L, Scotts Company, Marysville, OH.

Sixteen-90, Aquatrols, Cherry Hills, NJ.

Or equal, as approved by the Landscape Architect.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations, per one-hundred (100) gallons of water.

Plant Vitamin/Hormone Stimulant: Highly-concentrated liquid vitamin solution. Provide in a diluted liquid solution, mixed with water, at the time of watering-in recently planted plant species.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

SUPERthrive, Vitamin Institute.

Roots Concentrate Rooting Stimulant, Novozymes Biologicals, Inc.

Root-Maxx Plus, Bio-Plex.

Or equal, as approved by the Landscape Architect.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations, per one-hundred (100) gallons of water.

Herbicides: EPA registered and approved, from the following:

Non-Selective Post-Emergent Herbicide: Spray-applied solution containing a minimum of 41% of the active ingredient "glyphosate" (full strength), with a surfactant, mixed with water accordingly per the Manufacturer's directions.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Roundup® PRO, (41% glyphosate), Monsanto Company.

Roundup® PROmax (concentrate, 50% glyphosate), Monsanto Company.

Honcho® Plus, (41% glyphosate), Monsanto Company.

Prosecutor (41% glyphosate), LESCO, Inc.

High Yield® Kill-Zall Weed & Grass Killer, (41% glyphosate), Voluntary Purchasing Groups.

Or equal, as approved by the Landscape Architect.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations, per one-hundred (100) gallons of water.

Selective Pre-Emergent Herbicide (Packaged dry material application): Pre-emergent control of annual grasses and broadleaf weeds in turf grass areas, and woody ornamental trees, shrubs, vines, and groundcover areas.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Ronstar® 2G, (granular), Aventis Environmental Science USA.

Snapshot® 2.5 GT (granular), (2% trifluralin), Dow AgroSciences LLC.

XL*2G, SETRE Chemical Company.

Casoron 4G, Chemtura.

Treflan® HFP (43% trifluralin), Dow AgroSciences LLC.

Treflan® TR-10, (10% Granular trifluralin), Dow AgroSciences LLC.

Surflan®, Dow AgroSciences, LLC.

Or equal, as approved by the Landscape Architect.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations, per one-hundred (100) gallons of water.

Selective Post-Emergent Herbicide: Pre-mixed, flow-able formulation designed for product stability, uniformity in the spray solution and ease of handling. Post-emergent control of annual grasses, nutsedge, and broadleaf weeds in turf, generally with one (1) application.

Products & Manufacturer's: Subject to compliance with requirements, provide products by one (1) of the following:

Trimec® Plus, PBI/Gordon Corporation.

Three-Way, LESCO, Inc.

Or equal, as approved by the Landscape Architect.

Application Rate: Provide at prescribed rate and application per Manufacturer's written recommendations, per one-hundred (100) gallons of water.

EXECUTION

GENERAL

Installation practices of the Landscape Planting Accessories shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted horticultural practice, as approved by the Landscape Architect. Contractor shall notify the Landscape Architect, in writing, on the anticipated commencement date and length of duration of the landscape installation.

Examination: Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of Work of this Section. NO WORK UNDER THIS SECTION SHALL COMMENCE UNTIL ALL SUBMITTALS UNDER THIS SECTION HAVE BEEN REVIEWED AND APPROVED, IN WRITING. DO NOT PROCEED WITH INSTALLATION UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

Prior to Work in this Section, Contractor shall examine previously installed Work from other trades and verify that such Work is complete and as required, to the point where the installation of the Landscape Planting Accessories may commence properly.

PROTECTION OF SITE

Contractor shall protect existing and new improvements and systems installed prior to installation of Landscape Planting Accessories. Maintain protection in place until completion of Work and Landscape Establishment Period.

INSTALLATION OF TREE ROOT AERATION UNITS (TREE CHIMNEY'S)

General: Tree Root Aeration Unit(s) shall be installed after excavation of planting hole and prior to placement of Amended Planting Backfill Mixture.

Upon completion of excavation of planting hole, auger a twelve-inch (12") diameter hole at the edge of the excavation. Depth shall extend two-feet (2') beyond the compacted setting layer crown of native planting soil. Remove excess soil.

Pipe Installation: Slide Geo-Textile Filter Fabric Sleeve over full length of Perforated Aeration Pipe Tube. Secure open end (as set in bottom of hole) of Filter Fabric Sleeve with a knot or pipe wrap tape. Place assembly Unit plumb, in vertical position, in the bottom of the augered hole. Set the top of the Unit ½" above the finished surface elevation of the mulch layer.

Set Plant Material accordingly, and backfill the planting hole with Amended Planting Backfill Mixture, being careful not to provide backfill within the inside of the Tree Root Aeration Unit assembly.

Attach Aeration Pipe Grate to top end of the sleeved Aeration Pipe Tube extending above grade. Provide appropriate Pipe Grate indicated for the application.

Quantity Schedule:

Provide one (1) Tree Root Aeration Unit assembly for each tree up to but not including a 24"-box container size.

Provide two (2) Tree Root Aeration Unit assemblies located at opposing sides of the root ball and at opposite ends of the Tree Stakes and/or Deep Watering Bubblers, for each tree sized at 24"-box container and up to but not including a 48"-box container size.

Provide three (3) Tree Root Aeration Unit assemblies, located equidistant along the sides of the root ball, for each tree sized at 48"-box container and larger.

Location: Coordinate location of Tree Root Aeration Units to be set equally and in between locations designated to receive deep watering irrigation bubblers, where applicable.

INSTALLATION OF ROOT CONTROL BARRIERS

Plastic Root Control Barrier Panels:

Verify the location of underground utilities prior to placement of Root Control Barrier Panels.

Excavate sub grade to the required depth of the Panel, and install Panels as an interconnected, linear system, with the ribs of the Panels vertically aligned and facing towards the Plant Material's root mass.

Install Root Control Barrier Panels along the entire perimeter edge for trees located in raised planters (as required).

Install Root Control Barrier Panels along the entire perimeter edge of the planting area for trees located in parking lots (as required).

Install Root Control Barrier Panels for trees where the tree trunk is located within a minimum of five-feet (5') of paved surfaces (sidewalks, curbs, plazas, etc).

Root Control Barrier Panels shall extend a minimum of ten-feet (10') from either side of the tree trunk, and follow along the profile of the paved surface being protected. Install Panels at a maximum of four-inches (4") to six-inches (6") from the edge of the paved surface.

Install Root Control Barrier Panels in specific locations as indicated on the Contract Drawings.

Install Root Control Barrier Panels plumb, or if conditions allow, with the top of the Panel slightly inclined towards the root mass. DO NOT install with the top inclined away from the root mass.

DO NOT install Root Control Barrier Panels in a circular pattern that encloses the root mass, thus restricting future growth of the Plant Material's root system.

Set top of the Root Control Barrier Panels at the finish graded surface, just below the mulch layer. Install per the requirements of the Manufacturer.

STAKING AND GUYING

General: Tree Staking and Tree Guying shall be per the direction of the Landscape Architect. Staking and/or guying of trees shall be completed immediately following tree planting operations.

Contactor shall provide new Tree Stake or Tree Guy assemblies; reconditioned or previously-used Tree Stake or Tree Guy assemblies shall not be permitted. Provide one (1) set of Tree Staking materials or Tree Guying materials per tree, as required. Trees shall remain plumb and straight from installation through the Contractor Warranty period. Staking and Guying assemblies shall remain the property of the Owner.

Staking/Guying Methodology: Unless otherwise directed on the Contract Drawings or as directed by the Landscape Architect based on field conditions, provide the following Staking/Guying Assemblies, as measured by the size of the tree being supported:

5-gallon size Container Stock to 36"-Box Tree, or for trees up to 3" caliper: Provide Staking Method. Number of stakes per tree shall be as directed herein this Section.

For trees larger than 36"-Box size or over 3" caliper: Provide Staking or Guying Method, or as directed by the Landscape Architect.

Tree Staking Method:

Single Tree Stake :

Locate Stake at the closest point to the main trunk as possible, yet outside of the root ball and tree branch canopy.

Firmly drive the tapered end of the Stake plumb into the undisturbed native sub-grade, perpendicular to the side of the prevailing wind, at the minimum depth indicated in the Contract Drawings, or deeper, as required, to firmly support the Stake and minimize any movement of the Stake. Do not damage the tree trunk nor branch canopy, nor penetrate the root ball with the Stake. Do not damage or splinter the Stake. Stake shall not touch the trunk nor branch canopy of the tree.

Double Tree Stakes:

Locate Stakes at the closest point to the main trunk as possible, yet outside of the root ball and tree branch canopy.

Firmly drive the tapered end of one (1) of the Stakes plumb into the undisturbed native sub-grade, perpendicular to the side of the prevailing wind, at the minimum depth indicated in the Contract Drawings, or deeper, as required, to firmly support the Stake and minimize any movement of the Stake. Do not damage the tree trunk or branch canopy, nor penetrate the root ball with the Stake. Do not damage or splinter the Stake.

Install the other Stake in similar fashion, directly opposite from the first Stake (180 degrees), and equidistant from the tree trunk.

Installed Stakes shall not touch the trunk nor branch canopy of the tree.

Tying to Tree Stakes:

Tree Straps: Wrap and twist the Tree Strap around the tree trunk, at the lowest point where the tree gains the highest support, per the direction of the Landscape Architect. Secure the Strap with wire; thread the wire through the grommet ends of the Strap and twist wire to secure. Wrap other end of wire around the Stake, twist, and secure it to the Stake. Repeat for another Stake(s), as required. For trees requiring multiple tree straps, locate additional straps as required along the tree trunk to provide additional vertical support. Cut off and bend back excessive wire beyond the twists to the Stake(s) to provide a safe condition. The tree shall be supported accordingly to assure a straight, firm position of the

tree canopy, yet to allow enough slack to avoid rigid restraint of the tree.

Once the tree is thoroughly staked, carefully remove the nursery stake(s). Backfill and tamp the nursery stake void(s) with planting soil.

INSTALLATION OF EROSION CONTROL MATERIALS

Clear away trash, large stones, and other debris. Prepare sub grade; fine grade area to receive Erosion Control Material, eliminating footprints, tracks, and ruts.

Unroll Material as close as possible to its intended final position to minimize the need to drag the Material which would dislocate underlying materials or disturb the prepared sub grade or planting. Install Material flush and completely in contact with the ground. Confirm that there is no tension on the Material to minimize soil contact.

Overlap Material at a minimum of four-inches (4") on the sides and eighteen-inches (18") on the ends. Staples shall be inserted at intervals no greater than three-feet (3') on-center along overlaps and down the center of each roll length.

Joining rolls of the Material shall be installed at the down-channel end of the installed roll, which should overlap the up-channel end of the roll being installed. Overlap should be a minimum of eighteen-inches (18"). Equally set staples on twelve-inch (12") on-center spacing.

Anchor slot at top of slope shall be installed by burying up-channel end in a six-inch (6") minimum deep trench. Equally set staples on twelve-inch (12") on-center spacing.

On slopes less than six-feet (6') in height, Material may be installed with roll perpendicular to the contours.

The terminal fold shall be installed by bringing the Material down to the level area before terminating. Turn the end under a minimum of six-inches (6"). Equally set staples across the fold at twelve-inch (12") on-center spacing.

INSTALLATION OF LANDSCAPE EDGINGS (HEADERS/EDGINGS)

General: Install in location(s) in solid undisturbed soil, or in soil set at ninety-percent (90%) relative compaction, at areas as indicated on the Contract Drawings.

Horizontal Alignments:

Straight Alignments: Where indicated on the Contract Drawings, install Landscape Edgings in straight/angular sections, true to the alignments as indicated, free of "wiggles" or bends, using strings as guides.

Curved Alignments: Where indicated on the Contract Drawings, install Landscape Edgings in curved,/radial sections, true to the alignments as indicated, free of "wiggles" or bends, following marked alignments as reviewed in the field by the Landscape Architect.

Vertical Alignments: Install parallel to and following along the contoured finished grade.

Refer to Section 321323 – Site Concrete, for Edging/Header installation requirements constructed with concrete-based materials.

Refer to the Manufacturer's latest printed instructions and Contract Drawings for requirements of Landscape Edgings/Headers fabricated from metal materials.

MULCHING

General: Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.

Shredded Wood Mulch:

General: Verify locations to receive Shredded Wood Mulch.

Apply the following average thickness of Shredded Wood Mulch, and finish level with adjacent finished surfaces. Do not place Shredded Wood Mulch directly against trunks or stems of Plant Materials. Remove Shredded Wood Mulch that is placed against the growing bases or within the basal nodes of

plants.

Thickness/Depth: Three-inches (3"), minimum.

While settlement and/or decomposition of the Shredded Wood may occur during the duration of the Contract, the Shredded Wood Mulch thickness as indicated shall be consistent throughout the duration of the Contract. The Contractor shall provide additional Shredded Wood Mulch, as needed, and as directed by the Landscape Architect, to maintain the specified constant thickness of the Shredded Wood Mulch, until Acceptance of Work is granted.

INSTALLATION OF MISCELLANEOUS MATERIALS

Anti-Dessicant: Apply using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.

When deciduous trees or shrubs are moved in full-leaf, spray with anti-desiccant at nursery before moving and again two (2) weeks after planting.

Stress Reducing Agent: Apply, as required and directed by the Landscape Architect, per Manufacturer's latest printed instructions.

Wetting Agent & Soil Penetrant: Apply, as required and directed by the Landscape Architect, per Manufacturer's latest printed instructions.

Herbicides: Apply, as required and directed by the Landscape Architect, per Manufacturer's latest printed instructions.

Plant Vitamin/Root Stimulant: Apply, per the Manufacturer's latest printed instructions. Refer to application requirements per Section 329300 – Exterior Plants.

CLEAN UP AND PROTECTION

For Work under this Section, keep Work area in a clean, orderly, and safe condition. Contractor shall remove trash caused from his Work on a weekly basis throughout the duration of the Work.

Protect landscaping from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and landscape establishment periods. Treat, repair, or replace damaged Landscape Planting Accessories as directed.

Upon completion of his Work under this Section, the Contractor shall remove rubbish, waste, debris, excess construction materials, and other items resulting from construction operations offsite as described herein this Section and directed by the Landscape Architect.

FINAL REVIEW

Final Review under this Section shall be performed upon completion of the Landscape Establishment Period. (Refer to Section 329813 – Landscape Establishment Period for requirements).

329813 – LANDSCAPE ESTABLISHMENT PERIOD

GENERAL

SUMMARY

This Section includes materials, labor, apparatus, tools, equipment, temporary construction, transportation, and services necessary for and incidental to performing the proper completion of Work, as required to make a complete Landscape Establishment Period ("Service"), as specified during progress of the Work, after installation, for a designated period after Preliminary Acceptance, as shown in the Contract Drawings, and as specified herein this Section.

Contractor acknowledges that the Services specified under this Section are not intended to express every detail of the Services to be provided by Contractor, and Contractor hereby represents that it is experienced and competent in providing Services that meets or exceeds generally accepted practices commensurate with those provided by other companies that provide such Service.

Work under this Section consists of, but is not necessarily limited to, furnishing and installing the following:

Establishment of Landscape Installation, for a given frequency and duration as specified herein this Section. Work includes the following:

Litter Control.

Weed Control.

Pest Control.

Plant Care.

Fertilization of Plant Materials.

Plant Replacement.

Plant Pruning.

Plant Staking and Adjustments.

Temporary Plant Protection.

Operation, Adjustment, and Maintenance of Irrigation Controller and Irrigation System.

Cleaning of Paving Surfaces.

Reapplication of Mulching Materials.

Erosion Control and Drainage.

Removal of Green Waste.

Related Sections: The following Sections contain requirements that relate to Work in this Section:

Section 312219 - Landscape Grading.

Section 328400 – Irrigation Systems.

Section 329113 – Soil Preparation.

Section 329300 - Exterior Plants.

Section 329400 – Landscape Planting Accessories.

DEFINITIONS AND APPLICABLE STANDARDS

References:

USDA – United States Department of Agriculture.

ASTM – American Society for Testing & Materials.

ANSI – American National Standards Institute.

ISA – International Society of Arboriculture.

Standards:

American National Standard for Tree Care Operation, Tree, Shrub, and Other Woody Plant Maintenance (ANSI A300), American National Standards Institute, Latest Edition.

American National Standard for Tree Care Operations (ANSI Z133), American National Standards Institute, Latest Edition.

Tree Pruning Guidelines, International Society of Arboriculture, 1995 Edition.

Pruning Standards for Shade Trees, National Arborists Association, Latest Edition.

SUBMITTALS

General:

Collect information into a single Submittal for each element of construction and type of product or equipment identified under this Section for review.

To expedite review, Submittal shall be organized and presented into specific sections or headings. Furnish neat, concise, legible, and clearly identifiable information, and sufficiently explicit detail, to enable proper evaluation for Contract compliance. Highlight catalog, product data, or brochures containing various products, sizes, and materials to show particular item submitted.

Submittal Format: As applicable, furnish Submittal as a single electronic digital PDF (Portable Document Format) file.

Digital Submittal Information:

Quality Control Submittal:

Qualification Data: Submit names for firms and persons specified in the "Quality Assurance and Control" Article to demonstrate their capabilities and experience on similar Landscape Planting Accessories installations.

Schedule of maintenance operations and monthly status report, including list of equipment, materials proposed for the job, and watering schedule(s).

Licenses, permits and insurance required by the local jurisdiction, the State, or Federal government, pertaining to Work under this Section.

Pesticide Applicator: Valid California Qualified Applicator Certificate (QAC), with "B – Landscape Maintenance" Category, as administered by the California Department of Pesticide Regulation (DPR).

Employer of the California Qualified Applicator Certificate (QAC), with "B – Landscape Maintenance" Category:

The company which employs the person holding the QAC must possess a Maintenance Gardener Pest Control Business License, as administered by the California Department of Pesticide Regulation (DPR).

Monthly record of herbicides, insecticides and disease control chemicals used for the Project.

Written application recommendation by a licensed agricultural pest control advisor for weed, pest and disease controls restricted by the Director of Agriculture proposed for this Work.

Project Closeout Submittal:

Include in a single 3-ring binder a Landscape Maintenance Manual for use by the Owner, containing an indexed collection of all schedules, records and permits listed above, including documentation of accepted condition of planting and irrigation at Final Acceptance.

Material Samples: Not required.

Scaled Shop Drawings: Not required.

Field-Constructed Mock-ups: Not required.

Submittals under this Article will be rejected and returned without the benefit of review by the Landscape Architect if they are difficult to read due to insufficient scale, poor image quality, or poor drafting quality; or if all of the required information is missing or not presented in the format as requested. Partial Submittals will not be accepted.

No Work shall proceed under this Section until Submittal requirements indicated herein have been reviewed accordingly by the Landscape Architect.

QUALITY ASSURANCE AND CONTROL

Qualifications:

Valid California C-27 (Landscaping Contractor) License.

Experience: Contractor or sub-contractor performing Work under this Section shall have a full-time employee assigned to the Project as foreman for the duration of the Contract. Employee shall have a minimum of four (4) years experience in landscape maintenance supervision, with experience or training in entomology, pest control, soils, fertilizers and plant identification. Employee shall speak English fluently.

Labor Force: Landscape maintenance labor force shall be thoroughly familiar with, and trained in, the Work to be accomplished, and shall perform the task in a competent, efficient manner acceptable to the Owner.

Requirements:

Supervision: Landscape Maintenance Foreman shall directly supervise the Work force during duration indicated herein this Section. Notify Owner of changes in supervision.

Identification: Provide proper identification during duration for landscape maintenance firm's vehicles and labor force. Be uniformly dressed in a manner satisfactory to the Owner.

PROJECT/SITE CONDITIONS

Site Visit: At beginning of the designated Landscape Establishment Period, visit and tour the site with the Owner's Representative, Landscape Architect, and other interested parties, to clarify the scope of Work, and understand existing project/site conditions.

Documentation of Conditions: Document the general condition of installed plant materials, recording those which are healthy and thriving, and unacceptable materials which are damaged, dead, and/or dying and in need of replacement.

Irrigation System: Document general condition of existing irrigation system, making sure that faulty, improper, and/or non-functioning irrigation materials or equipment are reported.

SEQUENCING AND SCHEDULING

Perform Work under Landscape Establishment Period during hours mutually agreed upon between Owner and Contractor.

Work force shall be present at the Project Site at a minimum duration indicated in this Section, and at other times as necessary, to perform specified Work, in accordance with the approved schedule under the Landscape Establishment Period.

WARRANTY

Specific Requirements: Refer to the following Sections:

Section 328400 – Irrigation Systems.

Section 329300 - Exterior Plants.

Section 329400 – Landscape Planting Accessories.

PRODUCTS

MATERIALS

General: Materials and equipment as required to perform Work under this Section shall be provided by Contractor.

Water: Clean, potable and fresh, as available from Owner.

Fertilizers:

Fertilizer Tablets: Tightly compressed, slow-release and long-lasting complete fertilizer tablets, bearing manufacturer's label of guaranteed analysis of chemicals present. Refer to Section 329113 – Soil Preparation, for requirements.

Balanced, once-a-season application, controlled-release Fertilizer(s), with a blend of coated prills which supply controlled-release nitrogen, phosphorus and potassium, and uncoated, rapidly soluble prills containing nitrogen and phosphorus.

Herbicides, Insecticides, and Fungicides:

Provide materials with original manufacturers' containers, properly labeled with guaranteed analysis.

Use non-staining materials.

Replacement Tree Guys, Stakes, Ties and Wires: Match originally accepted existing materials installed on the Project.

EQUIPMENT

General: Use only the proper tool(s) required for each task under this Section.

Maintain tools in sharp, properly-functioning condition.

Clean and sterilize all pruning tools prior to usage.

Insect/Disease Prevention: Provide measures to prevent introduction of insect or disease-laden materials onto the Site. Refer to Section 329300 – Exterior Plants.

EXECUTION

FREQUENCY AND DURATION OF LANDSCAPE ESTABLISHEMENT PERIOD

Following satisfactory completion of all items included on the Landscape Punch List, the contracted Landscape Establishment Period shall commence and progress.

Frequency and Duration:

Work performed under this Section shall be executed by Contractor at a minimum of once per week, for a duration of a minimum of 90 calendar days.

COMMENCING THE LANDSCAPE ESTABLISHMENT PERIOD

Preliminary Review: As soon as landscape installation is substantially completed per the Contract Documents, Contractor shall arrange to hold a preliminary review on-site with the Landscape Architect, Owner, and other interested parties to evaluate the condition and execution of the completed Work. Evaluation of the Work shall be executed by the Landscape Architect through a "Landscape Punch List".

Date of Review: Notify Landscape Architect at least five (5) working days prior to anticipated Date of Review.

Commencing the Landscape Establishment Period: The date on which the Landscape Architect determines that the landscape installation is substantially-complete, whereas outstanding Work included on the Landscape Punch List is addressed and satisfactorily completed to the satisfaction of the Landscape Architect.

PREPARATION

Protection:

Protect new landscape planting areas from damage during duration of Landscape Establishment Period,

until Final Acceptance.

Provide temporary protection fences, barriers and signs, as required, for protection.

Replacements:

Immediately treat or replace plant materials as directed, which become damaged or injured as a result of Contractor's operations or negligence, per the Landscape Architect, at no additional cost to Owner.

Replacement plant materials shall match size and variety of plant material being replaced.

PLANTING ESTABLISHMENT

Watering Basins:

Maintain watering basins around the perimeter of the installed plant materials so that enough water can be applied to establish and maintain adequate soil moisture through the root zone of the plant materials. Re-dish and tamp basins accordingly which have become damaged or have failed since installation.

For supplemental hand watering of watering basins, use a water wand to break the water force. Do not permit use of "jet" type watering equipment. Do not permit crown roots to become exposed to air through dislodging of soil and mulch.

Mulch: Maintain originally specified thickness of mulch material to reduce evaporation and frequency of watering.

During rainy season, open basins to allow surface drainage away from the root crown where excess water may accumulate. Restore watering basins at end of rainy season.

At the end of the rainy season, re-dish and tamp watering basin at trees and shrubs.

Settlement of Plant Materials: Reset/replant sunken or settled plant materials to proper grades and in upright position.

Weed Control:

Planting areas throughout site shall be weed-free at all times, including areas between plants and along watering basins.

Use only recommended and legally-approved herbicides to control and maintain weed growth.

Avoid frequent soil cultivation that destroys shallow roots and breaks the seal of pre-emergent herbicides.

Pruning:

Prune trees to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached, and which have vertical spacing of eighteen-inches (18") to forty-eight-inches (48") and radial orientation so as not to overlay each another.

Prune trees to eliminate diseased or damaged growth, and narrow "V-shaped" branch forks that lack strength. Reduce toppling and wind damage by thinning-out crowns.

Prune trees to maintain growth within space limitations, maintaining a natural appearance and balancing crown with roots.

No stripping of lower branches of young trees shall be permitted.

Retain lower branches in a "tipped back" or pinched condition to promote caliper trunk growth. Do not cut back to fewer than six (6) buds or leaves on such branches. Only cut lower branches flush with the trunk after the tree is able to stand erect without staking or other support.

Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Do primary pruning of deciduous trees during the dormant season. Do not permit any pruning of trees prone to excessive "bleeding" during growth season.

Prune damaged trees or those that constitute health or safety hazards at any time of year as required.

Make pruning cuts clean and close to the trunk, without cutting into the branch collar. "Stubbing" will not

be permitted. Cut smaller branches flush with trunk or lateral branch. Make larger cuts one-inch (1") diameter or larger parallel to shoulder rings, with the top edge of the cut at the trunk or lateral branch.

Branches too heavy to handle shall be precut in three (3) stages to prevent splitting or peeling of bark. Make the first two (2) cuts eighteen inches (18") or more from the trunk to remove the branch. Make the third cut at the trunk to remove the resulting stub.

Do not prune or clip shrubs into balled or boxed forms unless specifically called for by design.

Clip shrubs to be hedged when branches project two-inches (2") beyond limit of clipped hedge shown on the Contract Drawings.

Take extreme care to avoid transmitting disease from one infected plant to another. Properly sterilize pruning tools before going from one infected plant to other plant materials.

Staking and Guying of Trees:

Adjustments: Inspect stakes and guys periodically (minimum once per month) throughout duration of Landscape Establishment Period to check for rubbing of staking materials on trunks or branches causing bark wounds.

Repair and replace faulty staking and guying materials as shown and as specified.

Maintenance of Existing Plant Materials to Remain:

General: Conform to applicable paragraphs regarding pruning, watering, spraying and fertilizing of new plant materials as indicated herein this Section.

Symptoms: Be alert to symptoms of construction damage to existing plantings as evidenced by wilting, un-seasonal or early flowering or loss of leaves, and insect or disease infestation due to declining vigor.

Notification: Submit in writing of evidences of declining vigor immediately upon discerning the problem. Take appropriate interim measures to mitigate the severity of the problem as specified in this Section.

Proposal: Submit written proposal and cost estimate for the correction of all conditions before proceeding with permanent correction Work.

GROUNDCOVER ESTABLISHMENT

Irrigation:

Check for moisture penetration throughout the root zone at least twice a month.

Water as frequently as necessary to maintain healthy growth of groundcovers.

Weed Control:

Control weeds, preferably by hand removal, with pre-emergent herbicides and with selective systemic herbicides.

Minimize hoeing of weeds in order to avoid plant damage.

Fertilization:

Recently installed plant materials: Verify with Owner actual completion date of planting installation and rate of prior application of fertilizers.

New Plant Materials: Place Planting Tablets (per Section 329113 – Soil Preparation) beside the root ball about one-inch (1") from root tips.

Established Plant Materials: Do not use complete fertilizers unless soil test shows specific nutrient deficiencies.

Mowing and Edging:

Edge groundcovers to keep in bounds. Trim top growth as necessary to achieve an overall even appearance.

Ground covers which lend themselves to mowing shall be mowed to specified height above finished

grade in order to renew growth, improve density and attractiveness.

Replacements:

Replace dead and missing plants after obtaining Owner's agreement to pay for replacement.

Damages due to Contractor's negligence shall be paid for without charge to Owner.

INSECTS, PESTS, AND DISEASE CONTROL

Inspection: Inspect plant materials for signs of stress, damage and potential trouble from the following:

Presence of insects, moles, gophers, rabbits, ground squirrels, snails and slugs in planting areas.

Discolored or blotching leaves or needles.

Unusually light green or yellowish green color inconsistent with normal green color of leaves.

Personnel: Only licensed, qualified, trained personnel shall perform spraying for insect, pest and disease control.

Application: Spray with extreme care to avoid all hazards to any person or pet in the area or adjacent areas.

Lawn or vegetation-damaging pests shall be controlled in a timely manner to minimize damage.

IRRIGATION

General:

Apply water in sufficient quantities and as often as seasonal conditions require to keep installed planted areas moist at all times, well below the root system of plants. Hand water as required if irrigation system is not fully functional.

Repair without additional charge to Owner damages to Irrigation System caused by Contractor's operations. Perform repairs within one (1) watering period.

Report promptly to Owner accidental damage not resulting from Contractor's negligence or operations.

Twice a month, use a probe or other acceptable tool to check the rootball moisture of representative plants as well as the surrounding soil.

Cleaning and Monitoring the System:

Continually monitor the irrigation systems to verify that they are functioning properly as designed. Make program adjustments required by changing field conditions.

Prevent spraying on windows, building walls, by balancing the throttle control on the remote-control valves and the adjustment screws on the sprinkler heads. Do not allow water to atomize and drift.

GRADING AND DRAINAGE

During the Landscape Establishment Period, all flow lines shall be maintained to allow for free flow of surface water. Displaced material which interferes with drainage shall be removed and placed as directed. Low Spots and pockets shall be graded to drain properly. Jute netting or other erosion control measures as directed shall be installed at flow lines and other locations where surface erosion is evident.

Damage to planting areas shall be repaired immediately and throughout the Landscape Establishment Period. Depressions caused by vehicles, bicycles, or foot traffic shall be filled and leveled. Replant damaged areas.

All paved areas shall be washed and maintained in a neat and clean condition at all times.

All subsurface drains and inlets shall be periodically cleared of debris, leaves, trash, etc., and flushed with clear water to avoid buildup of silt and debris.

CLEANING

General: Dispose of pruned plant materials, vacuum turf grass clippings and leaves, sweep walkways

and rake smooth mulched areas. Remove from the site containers and other evidence of maintenance activities.

Litter Control:

Site areas under the Contract shall be cleared on a weekly basis of visible litter or debris, grass clippings, and garage.

Debris caused by normal seasonal winds shall be removed from site

Contractor shall be responsible for disposal of debris in accordance with local rules and regulations.

Blowing:

Landscape debris generated by Work under this Section shall be blown-off or swept on a weekly basis. Do not blow grass clippings, edgings, or debris into shrub beds or onto paved areas unless after such blowing, the resultant accumulation of material is gathered and removed from the site.

TERMINATION OF THE LANDSCAPE ESTABLISHMENT PERIOD

Final Acceptance Procedure:

Work will be accepted by the Landscape Architect upon satisfactory completion of all Work, including Landscape Establishment Period, but exclusive of replacement of materials under the Warranty Period.

Submit a written request to Landscape Architect for review for Final Acceptance at least five (5) working days prior to anticipated Final Review date, which is at the end of the Landscape Establishment Period.

Corrective Work:

Work requiring corrective action or replacement shall be performed within ten (10) calendar days after the Final Review.

Perform corrective Work and materials replacement in accordance with the Contract Documents, Work shall be made by the Contractor at no cost to the Owner.

After corrective Work is completed, the Contractor shall again request a Final Review for Final Acceptance as outlined above.

Continue maintenance of all landscaped areas until such time as all corrective measures have been completed and accepted.

Conditions for Acceptance of Work at End of Landscape Establishment Period:

Each plant shall be alive and thriving, showing signs of growth and no signs of stress, disease, or any other weaknesses.

Replace plant materials not meeting these conditions. An additional Warranty Period equal in length to the original shall be commenced for all such plants and planted areas.

Final Acceptance Date: The date on which the Landscape Architect issues a Letter of Final Acceptance. Upon Final Acceptance, Owner will assume responsibility for maintenance of the Work beyond the Landscape Establishment Period.

CLOSE OUT

Landscape Maintenance Record:

Submit binder to Owner with documentation and records required and utilized during the Landscape Establishment Period.

Keys and Identification: Return keys and identification materials supplied by Owner for the purpose of site access.

PART 8:

CITY OF CULVER CITY

ELECTRICAL WORK

SECTION 801

S-31 ELECTRICAL AND LIGHTING SYSTEM

Part 1 – General

1.01 GENERAL REQUIREMENTS

It is the responsibility of the Contractor to obtain and thoroughly review construction drawings and specifications that pertain to this project.

The Contractor shall furnish and install all material, labor, and equipment necessary for a complete and operable electrical system.

The electrical drawings, which constitute an integral part of this contract, are schematic and they are intended to indicate a general layout of the electrical system. The actual field conditions of construction, including the work of the other trades involved in the construction will dictate the exact methods and materials to be used. The Contractor is responsible to adequately review the plans and work of the other trades to assure that the work is properly coordinated with others.

1.02 WORK RESPONSIBILITY OF LUMP SUM CONTRACTS

The Contractor shall be responsible for all electrical improvements.

1.03 CODES, STANDARDS, AND PERMITS

Design, manufacture, testing and method of installation of all apparatus and materials furnished under requirements of these specifications shall conform to latest publications or standard rules of the following:

- Institute of Electrical and Electronic Engineers IEEE
- National Electrical Manufacturers' Association NEMA
- Underwriters' Laboratories, Inc. UL
- National Fire Protection Association NFPA
- Federal Specifications Fed. Spec.
- American Society for Testing and Materials ASTM
- American National Standards Institute ANSI
- National Electrical Code NEC
- National Electrical Safety Code NESC
- Insulated Cable Engineers Association ICEA
- American Institute of Steel Construction AISC
- State and Municipal Codes in Force in The Specific Project Area
- Occupational Safety and Health Administration (OSHA)

Perform Work in accordance with the National Electrical Code, applicable building ordinances, and other applicable codes, hereinafter referred to as the "Code." The Contractor shall comply with the Code including local amendments and interpretations without added cost to the Owner. Where Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved.

Comply with all requirements for permits, licenses, fees and codes.

Comply with requirements of the applicable utility companies serving this Project. Make all arrangements with utility companies for proper coordination of Work.

1.04 Workmanship

The Contractor shall be responsible to use experienced personnel who are fully competent and familiar with proper installation techniques and with the manufacturers' recommendations relative to the products that are used. As a minimum, personnel shall be equivalent to that of a licensed electrician. The Contractor shall be fully responsible for the work methods and safety of these personnel. In the acceptance or rejection of the finished installation, no allowance will be made for the lack of skill on behalf of the personnel.

Work in Cooperation with Other Trades

Examine the Drawings and Specifications and determine the work to be performed by the electrical, mechanical and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation sequence of all electrical, mechanical and other systems or equipment.

Provide conduit only for low voltage wiring required for control of mechanical and plumbing equipment described in this or other parts of the Contract Documents. Install all control housings and back boxes required for installing conduit and wire to the controls.

1.05 Construction Review

The Electrical Engineer reserves the right to visit the job site for the purpose of determining that the work of the Contractor is in general compliance with the intent of the construction documents.

1.06 Schedule of Work

The Contractor shall be responsible for the scheduling of his work to meet the required completion date and shall also coordinate with other Contractors so that the overall project can be accomplished on schedule.

When product submittals are required as defined in subsequent sections of this specification, the Contractor is responsible to arrange these lead times, submittals and notification of any substitutions such that they do not delay the completion of the project.

Immediately upon the Notice to Proceed, the Contractor shall coordinate with the suppliers of intended materials and products to be used in construction to verify that delivery of these materials and products will not impact the completion date of construction.

1.07 SUBMITTALS

Prior to ordering any material, i.e.: lighting fixtures, lamps, service and distribution equipment, transformers, wiring devices, cabinets, conduit, wire, pull boxes or relays, the Contractor shall submit manufacturers' catalogs and/or shop drawings to the Electrical Engineer/Owner for approval. The Contractor will be notified when the review is completed and at such time, the Contractor may order material and products. The submittals shall be five (5) copies in one package, including:

Light Fixtures Lamps Concrete Pull Boxes Waterproof Wire Terminations/Splices Outlets and Weatherproof Covers.

Materials List and Product Data: For requirements regarding product data, see Section "Work to Match

Approved Mockup, Materials, Samples and Product Data by Others".

Samples: For requirements regarding samples, see Section "Work to Match Approved Mockup, Materials, Samples and Product Data by Others".

Shop Drawings: Submit shop drawings, packaged as associated equipment groups (for example, all switchgear, or all lighting fixtures and controls). Prior to submitting the shop drawings for review, the Contractor shall verify that the proposed equipment will fit in the location(s) indicated, and that the equipment as installed will comply with all code required electrical working clearance requirements. Shop drawings shall include the following:

Catalog cut sheets for component items. Installation instructions/instruction manuals. Dimensioned plans, elevations, and details. Schematic and wiring diagrams, including description of required operating sequences and testing/commissioning procedures.

Certified equipment inspection/test records, and warranty certificates.

Operating and Maintenance Manuals: Submit five (5) copies of operating and maintenance manuals. In addition to the requirements specified in the Contract Documents (also see technical specification sections following for additional requirements), include the following information for equipment items:

Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers and replacement parts. Maintenance procedures for routine preventative maintenance and trouble-shooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

Servicing instructions and lubrication charts and schedules.

1.08 Cleaning

All exposed parts of electrical equipment shall be completely and thoroughly cleaned and free from cement, plaster, paint, etc. All scratches are to be refinished in an acceptable manner.

Part 2 - Products

2.01 Product and Materials

All products and materials used in the project shall be new and delivered to the job site in the original packaging.

All materials used and furnished for which UL Standards have been established shall be listed and bear the label of Underwriters Laboratories. Inc.

Prior to ordering any materials needed to complete the site electrical work, the Contractor shall submit manufacturers' catalogs and/or shop drawings to the Electrical Engineer for approval. This requirement is necessary to check whether or not the Contractor truly is providing the specified equipment, part numbers, and manufacturers, etc. Five (5) copies are required to be submitted for review. The Contractor will be notified when the review is completed and at such time, the Contractor may order material and products.

Part 3 - Testing and Adjusting of Electrical System

3.01 Insulation Resistance Testing

It is the responsibility of the Contractor to assure the integrity of the insulation in all wiring. It is recommended that all wiring be tested as it is installed. This testing is to be conducted by a licensed

electrician utilizing methods and equipment that are acceptable by members of the trade. This is a requirement of the City of Irvine and is detailed on the drawings. Keep all test results and forward a copy to the Electrical Engineer.

3.02 Systems and Equipment Testing

Control systems for outdoor lighting, dimming systems for indoor lighting, master controls for lighting systems, and emergency power systems (whether integral in fixtures, by inverter/battery sets, and/or generators) shall be thoroughly tested during installation, and these systems shall be tested at the completion of construction in the presence of the Owner, Architect, and Electrical Engineer and any approving agencies.

3.03 Ground Testing

It is the responsibility of the Contractor to assure the integrity of the grounding system throughout the project and it is mandatory that the entire system be thoroughly tested. It is also mandatory that the main electrical service ground bus be tested by a licensed electrician utilizing methods and equipment that are acceptable by members of the trade. A written record of this testing shall be made by the Contractor indicating the time and date of the test, the name of the person conducting the test, the equipment and method used, and this record shall be kept by the Contractor and made available to the Electrical Engineer and Owner upon request for a period of three (3) years following completion of the construction.

3.04 Voltage Adjusting

The Contractor shall be responsible to coordinate testing of the main service utilization voltage. In the case of 120/208 volt systems the voltage shall test at 117 volts +/- 3 volts on each phase to neutral. This testing shall be conducted with a main service load of 50% by turning "on" lighting equipment during the test. The actual voltages of each phase after adjusting and as determined in three (3) separate tests shall be recorded and reported to the Electrical Engineer in written form.

3.05 GFI and GFCI Equipment Testing

All GFI circuit breakers and GFI convenience outlets shall be thoroughly tested during installation and at the completion of the project.

END OF SECTION 16010 – GENERAL REQUIREMENTS

SECTION 16100 – BASIC MATERIALS AND METHODS

Part 1 - General

1.01 Quality Assurance

The Contractor is responsible to assure that all material and equipment delivered to the job site are new and in proper usable condition. All materials and products used are to be inspected and may be rejected if found to be defective or flawed. It shall be the responsibility of the Contractor to assure that this element of the specifications is satisfactorily completed. The Owner, Architects, and Electrical Engineers reserve the right to reject any materials or equipment which, are deemed to be flawed or defective in the finished project.

1.02 Product and Equipment Verification

The Contractor shall be responsible to check all products and equipment that is specified in the drawings when it is received at the job site to assure that it is in fact compatible with the electrical plans based upon the enclosed manufacturers' instructions including any instructions or information placed on the products

and equipment.

In the case of service and distribution equipment the Contractor shall verify that the nameplates agree with the approved shop drawings relative to voltage, phase, bus ampacity, short circuit and/or AIC rating, and enclosure type.

In the case of lighting fixtures, the Contractor shall verify the fixture is rated for the specified lamp, the specified input voltage, the specified mounting and/or installation application, and the specified control system.

In the case of motors the Contractor shall verify the proper input voltage and phase, FLA, recommended fuse size, and installation application, based upon the attached nameplate.

Part 2 - Products

2.01 Conduit General

All conductors and wiring are to be installed in conduit unless the drawings clearly state that conduit is not required and that the use of an approved cable is permitted. Conduits are to be concealed in all finished areas. The conduits shall be continuous terminating only in junction boxes, panels, approved wireways, etc. Where metallic conduits establish grounds, they shall be installed such that continuity shall be maintained.

Where nonmetallic conduit is used in construction, the Contractor shall include a ground conductor in the run whether or not shown on the drawings and the conduit shall be sized accordingly.

2.02 Rigid Nonmetallic Conduit (RNMC)

RNMC may only be used underground or below concrete slabs when used for conductors of 110 volts or higher. Conduit shall be polyvinyl chloride schedule 40, electrical conduit, rated 90 degrees C. Only approved electrical fittings may be used. Where run in concrete maintain a minimum of four (4) inches of cover on all sides, and convert to rigid galvanized steel to stub out of concrete.

Any conduit and fittings installed for the use of a utility company shall meet the requirements of the utility company for such installations except that in the case of conduit for high voltage feeders (600 volts or above) the Contractor shall take special precaution to provide safety to persons excavating around and about the installation. It is the responsibility of the Contractor to provide for this protection but it is recommended that one or more of the following methods be utilized: concrete encasement of at least two (2) inches of concrete on all sides of the conduit; concrete or concrete slurry three (3) or more inches deep on top of conduit; eight (8) or more inches of sand on top of conduit and a warning tape manufactured for direct burial placed six (6) inches above the sand.

2.03 Rigid Metal Conduit (RMC)

Steel RMC shall be mild steel, hot dipped galvanized inside and outside, and all couplings and connectors shall be tapered pipe thread. Running threads and split couplings are not permitted.

When used underground the conduit and fittings and couplings shall be moisture protected. "Tapecoat CT" protective spiral wrap with recommended primer treatment.

2.04 Electrical Metallic Tubing (EMT)

EMT shall be mild steel, electrically welded and galvanized per ANSI #C80.3. In damp locations fittings shall be gland compression type malleable iron. In dry locations fittings shall be all steel, zinc plated, screw set type.

2.05 LIQUIDTIGHT Flexible METAL Conduit (LFMC)

LFMC shall be manufactured by Electri-flex and is known as "Liquatite". Provide type LA in brown color and sized to contain low voltage cable. Fittings shall be listed for direct burial.

2.06 Pull And Junction Boxes

Boxes are to be installed in all conduit runs in sufficient number to meet the requirements of codes, special requirements of utility companies, requirements of providers of special equipment and systems, and to allow for efficient and convenient installation of conductors. It is the responsibility of the Contractor to locate these boxes and size them according to code requirements. Boxes shown on the drawings are to be installed as shown but do not necessarily indicated all boxes necessary for any installation. Boxes installed in outdoor or wet locations shall be of the type approved for the purpose.

Boxes installed indoors shall be coded with gauge steel, galvanized on all surfaces, with removable covers and secured with machine screws.

They shall be adequately supported by mechanical connection to the structure of the building. They shall be located such that they are readily accessible for maintenance purposes. All junction boxes in branch circuits shall be marked on the cover with the circuit identifications. Boxes used in the utility site system shall be marked Electric, Telephone, or CATV as appropriate. Concrete boxes shall be installed on a six (6) inch crushed rock base. The Contractor shall coordinate the finished elevation with specific conditions of the installation. In general the Contractor shall attempt to locate boxes such that they are as visually unobtrusive as possible.

Boxes used in runs for primary feeders of panels, transformers, switchboards, and other distribution equipment shall indicate the originating source and destination on the cover (i.e. "MSB to P10"), and they shall not be shared for sub-feeds to more than one (1) of the above types of equipment.

Boxes exposed to weather shall be weatherproof and rain tight and shall be fabricated of minimum 14gauge stainless steel. Covers are to be properly installed in its gasket and set with stainless steel screws. Covers are to be stainless steel or brass. Visible covers are to be left with a clean factory finish.

Boxes located outdoors in landscape or in traffic areas, shall be pre-casted with concrete as manufactured by Christie (no substitutions). The covers of these boxes shall be appropriate to their specific location. Boxes used in the utility site system, covers shall be marked Electric, Telephone, or CATV as appropriate. Concrete boxes shall be installed on a 12-inch crushed rock base. The Contractor shall coordinate the finished elevation with the specific conditions of the installation. In general the Contractor shall attempt to locate boxes such that they are as visually unobtrusive as possible.

Boxes that are located in wet areas shall be installed with conduits in boxes such that they are protected from intrusion of water. Furthermore, if there is a possibility that water can enter buildings or equipment by entering into conduits owing to grades and elevations, the Contractor shall make the Electrical Engineer and Owner aware of this field condition prior to completion of the installation so as to allow the Electrical Engineer and Owner to take appropriate actions and protective measures.

2.07 Conductors

The Contractor shall be responsible to install all conductors used on the project in compliance with Article 310 of the NEC. In the event that the Contractor receives approval from the Inspector to utilize insulation types other than those shown on the drawings he shall pay particular attention to ensure that these conductors are properly sized.

Conductors used as service entrance conductors, to sub-feed switchboards, panels, transformers, and other equipment, where the wire sizes are #6 and larger shall be installed with the wire size, insulation class, and voltage rating indications on the insulation visible without touching the conductors from the

front of the connections.

Where conductors of multiple phases are pulled through the same conduit to feed more than one (1) piece of equipment they shall be color-coded. These colors shall be permanent and consistent for the entire run.

The choice of colors is the option of the Contractor except that grounds shall be green and neutrals shall be white.

The Contractor may gather runs of conductors based on field decisions, but shall comply with the applicable code requirements.

All conductors #12 AWG and larger shall be stranded. The minimum wire size to be used is #12 AWG. The minimum insulation rating shall be 600 volts.

In no event may aluminum conductors be used. All conductors used in fixture troughs, stems, and ballast compartments shall be insulation type MTW.

2.08 Connectors

Copper conductors for wire sizes #10 AWG and smaller shall be spliced, in dry locations, utilizing "spring-lock" connectors, in particular, "Scotchlock" by 3M or "Wing Nuts" by Ideal. The Contractor is responsible to assure that all splices are completed in a secure and permanent fashion, maintaining the integrity of the connection without faults or shorts. In cases where the conductors may be affected by adverse conditions the Contractor shall take special precaution to protect the conductors such as by wrapping connectors with an appropriate tape.

Copper conductors for wire size #8 AWG and larger shall be made with approved split bolt connectors. These types of un-insulated connections shall be thoroughly protected with applied insulation such as 3M #2200 vinyl insulating pads.

Conductors shall employ as few splices as possible. This means that the Contractor shall be responsible to show suitable reason for any splices within a run. The location of these splices as installed by the Contractor shall be indicated in the "as-built" drawings.

Connections made in outdoor locations shall be insulated according the notes on the drawings to protect from moisture.

Part 3 - Execution

3.01 Trenching / Excavation

Where specifications appear in the architectural portion of the specifications that pertain to trenching and backfilling, the Contractor is responsible to review these specifications and comply. In the absence of other specifications, the Contractor shall:

The minimum depth of conduit is to allow 24" of cover from finish surface in landscape areas and 30" of cover under asphalt. Any utility ducts shall comply with the utility company requirements relative to these depths.

Maintain a minimum of 12-inches separation between: 0-600 volt feeders; and over 600 volt feeders; and low voltage (telephone, alarm, communications, CATV, other Class 2 conductors, etc.); and non-electrical installations (water, gas, drains, sewers, etc.). This condition shall apply to joint trench situations and to conditions where trenches cross.

Each layer of backfill shall be compacted to a minimum density of 90% and the top six (6) inch shall be

compacted to 95% maximum density. It is the responsibility of the Contractor to provide verification that this condition is accomplished.

Upon completion of backfill and compacting the Contractor shall leave the site in the same condition that it was at the commencement of the work. This requirement includes replacement of any damaged landscape materials, asphalt, concrete, other pavements and finish materials, fences, lawns, trees, etc. Additionally, the Contractor shall be responsible for any damage to other installations such as sprinkler lines, and the like. If the Contractor feels that damage to other installations is unavoidable then it is his responsibility to bring this to the attention of the Electrical Engineer and Owner prior to any specific work to allow the Electrical Engineer and Owner to designate corrective procedures.

Upon completion of the trenching and backfill the Contractor is responsible to remove any excess dirt, rock, and other debris from the job site.

END OF SECTION 16100 – BASIC MATERIALS AND METHODS

SECTION 16400 – SERVICE AND DISTRIBUTION EQUIPMENT

Part of the Building ELECTRICAL Section

SECTION 16600 – LIGHTING FIXTURES

Part 1 - General

1.01 Equipment

All Pole Lighting fixtures and Lighting Fixtures as indicated in the drawings to be purchased and installed by Contractor. The Contractor is responsible to coordinate with the manufacturers of specified fixtures and assure that submittals for approvals and subsequent orders and delivery dates will not conflict with the job schedule. The Contractor shall apply the following procedure to the ordering of light fixtures:

The Contractor shall maintain complete and accurate documentation of communications with the suppliers.

Samples: For requirements regarding samples, See Section "Work to Match Approved Mockup, Materials, Samples and Product Data by Other's".

The confirmed order for the purchase of the fixtures shall be placed within an adequate time period to allow for the timely delivery of the fixtures. If there is to be a delay in the delivery the Contractor shall make every reasonable attempt to inform the Electrical Engineer and Owner of the delay at the soonest possible time. As a minimum, the Contractor is to secure a confirm delivery date from the manufacturer at the time of ordering and follow up on this delivery date periodically until the order is received by the Contractor.

In the event that there is to be a delay in delivery the Contractor is to make available to the Electrical Engineer and Owner all of the written records pertaining to the order.

1.02 Quality Assurance

Lighting fixtures shall be manufactured by a recognized manufacturer and bear the approval label of a test lab recognized by the code enforcing agency. Additionally, this label shall conform to the specific location of installation such as "damp" or "wet".

Where fixtures are installed on a surface of low-density materials they shall be approved for such installation or be spaced a minimum of one (1) inch from the surface. The Contractor is responsible to

field verify this requirement.

Where fixtures such as open strip fluorescents are installed in architectural features such as coffers, valences, and the like, the Contractor shall install the fixtures such that the lamps are not visible from view. If this condition cannot be met based on field conditions, the Contractor shall notify the Electrical Engineer and Owner allowing sufficient time for corrective action before the completion of the installation.

All fixtures shown on the drawings are to be furnished with all necessary mounting devices and accessories. In all cases the Contractor is responsible to install fixtures with proper and appropriate structural support.

Lamps shall be provided for all fixtures. Where specific lamps are indicated in the drawings these lamps shall be provided. Where general specifications of lamps are given they shall be Sylvania, General Electric, Philips or a manufacturer approved by the Electrical Engineer prior to purchase.

The Contractor shall exercise care when handling and installing fixtures to protect finishes and lenses and other visible components. The Owner, Architect, and Electrical Engineer reserve the right to reject any damaged or flawed materials and products.

Part 2 - Products

2.01 High Intensity Discharge Fixtures

Ballast for the fixtures shall be:

Metal Halide – Electronic Pulse Start High Pressure Sodium - high power factor or CWA

For outdoor applications, the minimum starting temperature rating shall be at least -20 degrees F. The ballast shall be manufactured by a recognized manufacturer and bear the label of an approved test lab appropriate to the location of the fixture. Contractor must notify the Electrical Engineer if the specified ballast fixture does not meet the requirements before purchase. Ballast will be considered faulty if the noise emitted exceeds that of other fixtures of the same type installed on the job and will be replaced at the directive of the Electrical Engineer or Owner. The Electrical Engineer and Owner reserve the rights to reject lamps that show noticeable color shifts.

2.02 Fluorescent Light Fixtures

Fluorescent fixtures shall contain "P" rated ballast with "A" sound rating unless specified otherwise, they shall be manufactured by a recognized manufacturer and bear the label of an approved test lab appropriate to the location of the fixture, and be certified by Certified Ballast Manufacturers Association (CBM). The ballast shall be considered faulty if the sound emitted exceeds that of other fixtures of the same type on the job and will be replaced at the directive of the Electrical Engineer or Owner. Unless specified otherwise the lens shall be acrylic plastic. For fixtures located in wet or damp locations the ballast shall be low temperature with a rating of 0 degrees F or lower. Power factors shall be at least .9 unless specified otherwise.

2.03 LED LIGHT FIXTURES

LED Light Fixtures shall be a fully integrated assembly produced by a recognized manufacturer. The assembly shall include the lamps, drivers, and modules and shall bear appropriate test lab listing (UL or equal) appropriate for the environment in which it's installed. The lamps shall be guaranteed to produce 100% lumen output for a minimum of 50,000 hours. The drivers shall be guaranteed for a minimum of 3 years. The Electrical Engineer and Owner reserve the right to reject LED Light Fixtures that show noticeable color shifts and shall be provided in the color rendition (i.e. 4000k) indicated in the document set.
2.04 Light Pole Assemblies

In general, the finish on light pole assemblies shall match that of the fixture. The Electrical Engineer and Owner reserve the right to reject unmatched material. Poles shall be handled carefully at the job site and any scratches shall be repaired. Any damaged poles are to be replaced if rejected. Aluminum base covers are to be installed on all poles such that there are no exposed anchor bolts and nuts. All poles are to have factory fabricated hand holes and contain brazed-on ground lugs.

Part 3 - Execution

3.01 Lighting Pole Bases

Where light pole assemblies include components set perpendicular to the pole, these members will be set plumb with respect to right angles. Light fixture poles shall be set within one (1) degree of plumb. Contractor is to wire lights.

END OF SECTION 16600 – LIGHTING FIXTURES

END OF CATEGORY 6 – SITE ELECTRICAL

PART 9: TRAFFIC SIGNAL

Add to the beginning of section 6-1.02:

FPL HT (01/04/19)**

The Department furnishes you with:

- Model <u>2070</u> controller assembly, including controller unit, completely wired controller cabinet, and detector sensor units
- Modems

FPL HT (01/04/19)**

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit at <u>city of Culver City</u>. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

FPL HT (01/04/19)** FPL HT (01/04/19)** FPL HT (01/04/19)** FPL HT (01/04/19)** FPL HT (01/04/19)**

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Replace *Reserved* in section 8-1.04C with:

Section 8-1.04B does not apply.

FPL HT (01/04/19)**

Start job site activities within <u>180</u> days after receiving notice that the Contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department. FPL HT $(01/04/19)^{**}$

Do not start job site activities until the Department authorizes or accepts your submittal for:

3. CPM baseline schedule

FPL HT (01/04/19)**

Do not start other job site activities until all the submittals from the above list are authorized or accepted and the following information is received by the Engineer:

- 1. Notice of Materials To Be Used form.
- 2. Written statement from the vendor that the order for electrical material has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.

FPL HT (01/04/19)**

You may start job site activities before the <u>180th</u> day after Contract approval if you:

- 1. Obtain specified authorization or acceptance for each submittal before the <u>180th</u> day
- 2. Receive authorization to start

Submit a notice 72 hours before starting job site activities. If the project has more than 1 location of work, submit a separate notice for each location.

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Add to the end of section 15-1.03C:

FPL HT (01/04/19)**

At least 2 business days before hauling the material to the salvaged material stockpile location, notify the

Engineer and inform the district recycle coordinator at telephone no. (310) 253-5635 FPL HT (01/04/19)** The stockpile location is: <u>Department of Public Work</u> <u>9770 Culver Boulevard</u> <u>Culver City, CA 90232-0507</u>

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Add to section 49-3.02B(6)(c):

The synthetic slurry must be one of the materials shown in the following table:

Material	Manufacturer
SlurryPro CDP	KB INTERNATIONAL LLC 735 BOARD ST STE 209 CHATTANOOGA TN 37402 (423) 266-6964
Super Mud	PDS CO INC 105 W SHARP ST EL DORADO AR 71731 (870) 863-5707
Shore Pac GCV	CETCO CONSTRUCTION DRILLING PRODUCTS 2870 FORBS AVE HOFFMAN ESTATES IL 60192 (800) 527-9948
Terragel or Novagel Polymer	GEÓ-TECH SERVICES LLC 220 N. ZAPATA HWY STE 11A-449A LAREDO TX 78043 (210) 259-6386
BIG FOOT	MATRIX CONSTRUCTION PRODUCTS 50 S MAIN ST STE 200 NAPERVILLE IL 60540 (877) 591-3137
POLY-BORE	BAROID INDUSTRIAL DRILLING PRODUCTS 3000 N SAM HOUSTON PKWY EAST HOUSTON TX 77032 (877) 379-7412

Use synthetic slurries in compliance with the manufacturer's instructions. Synthetic slurries shown in the above table may not be appropriate for a given job site.

Synthetic slurries must comply with the Department's requirements for synthetic slurries to be included in the above table. The requirements are available from the Offices of Structure Design, P.O. Box 168041, MS# 9-4/11G, Sacramento, CA 95816-8041.

SlurryPro CDP synthetic slurry must comply with the requirements shown in the following table:

Quality characteristic	Test method	Requirement
Density	Mud weight (density),	< 07.03
During arilling (pct)	section 4	≤ 67.0ª
Before final cleaning and immediately before placing concrete (pcf)		≤ 64.0ª
Viscosity	Marsh funnel and cup.	
During drilling (sec/qt)	API RP 13B-1, section 6.2	50–120
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 70
рН	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume	Sand,	
Before final cleaning and immediately before placing concrete (%)	API RP 13B-1, section 9	≤ 1.0

SlurryPro CDP

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Super Mud synthetic slurry must comply with the requirements shown in the following table:

Quality characteristic	Test method	Requirement	
Density	Mud weight (density),		
During drilling (pcf)	API RP 13B-1,	≤ 64.0ª	
	section 4		
Before final cleaning and immediately		≤ 64.0ª	
before placing concrete (pcf)			
Viscosity	Marsh funnel and cup.		
During drilling (sec/qt)	API RP 13B-1, section 6.2	32–60	
Before final cleaning and immediately		≤ 60	
before placing concrete (sec/qt)			
pH	Glass electrode pH meter	8.0–10.0	
	or pH paper		
Sand content, percent by volume	Sand,		
Before final cleaning and immediately	API RP 13B-1, section 9	≤ 1.0	
before placing concrete (%)			

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Shore Pac GCV synthetic slurry must comply with the requirements shown in the following table: **Shore Pac GCV**

Quality characteristic	Test method	Requirement
Density	Mud weight (density),	
During drilling (pcf)	API RP 13B-1,	≤ 64.0ª
	section 4	
Before final cleaning and immediately		≤ 64.0ª
before placing concrete (pcf)		
Viscosity	Marsh funnel and cup.	
During drilling (sec/qt)	API RP 13B-1, section 6.2	33–74
Before final cleaning and immediately		≤ 57
before placing concrete (sec/qt)		
рН	Glass electrode pH meter	8.0–11.0
	or pH paper	
Sand content, percent by volume	Sand,	
Before final cleaning and immediately	API RP 13B-1, section 9	≤ 1.0
before placing concrete (%)		

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Terragel or Novagel Polymer synthetic slurry must comply with the requirements shown in the following table:

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Quality characteristic	Test method	Requirement	
Density	Mud weight (density),		
During drilling (pcf)	API RP 13B-1,	≤ 67.0ª	
	section 4		
Before final cleaning and immediately		≤ 64.0ª	
before placing concrete (pcf)			
Viscosity	Marsh funnel and cup.		
During drilling (sec/qt)	API RP 13B-1, section 6.2	45–104	
Before final cleaning and immediately		≤ 104	
before placing concrete (sec/qt)			
pH	Glass electrode pH meter	6.0–11.5	
	or pH paper		
Sand content, percent by volume	Sand,		
Before final cleaning and immediately	API RP 13B-1, section 9	≤ 1.0	
before placing concrete (%)			

Terragel or Novagel Polymer

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

BIG-FOOT synthetic slurry must comply with the requirements shown in the following table:

BIG-FUUT			
Quality characteristic	Test method	Requirement	
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	≤ 64.0ª	
Before final cleaning and immediately before placing concrete (pcf)		≤ 64.0ª	
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	30–125	
Before final cleaning and immediately before placing concrete (sec/qt)		55-114	
рН	Glass electrode pH meter or pH paper	8.5–10.5	
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0	

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

POLY-BORE synthetic slurry must comply with the requirements shown in the following table:

FOLT-BOIL			
Quality characteristic	Test method	Requirement	
Density	Mud weight (density),		
During drilling (pcf)	API RP 13B-1,	62.8-65.8ª	
	section 4		
Before final cleaning and immediately		62.8-64.0ª	
before placing concrete (pcf)			
Viscosity	Marsh funnel and cup.		
During drilling (sec/qt)	API RP 13B-1, section 6.2	50-80	
Before final cleaning and immediately		50-80	
before placing concrete (sec/qt)			
pH	Glass electrode pH meter	7.0–10.0	
	or pH paper		
Sand content, percent by volume	Sand,		
Before final cleaning and immediately	API RP 13B-1, section 9	≤ 1.0	
before placing concrete (%)			

NOTE: Slurry temperature must be at least 40 °F when tested.

^aIf authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

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Add to section 56-2.02K(3):

Seal the perimeters of direct tension indicator gaps with caulking. Caulking must be gray and at least 50 mils thick. Apply caulking before painting.

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Add to section 56-3.01C(1):

The sign mounting hardware must be installed at the locations shown.

The sign panels will be Department furnished.

Install non-illuminated street name signs on signal mast arms using a minimum 3/4 by 0.020-inch round edge stainless steel strap and saddle bracket. Wrap the strap at least twice around the mast arm, tighten, and secure with a 3/4-inch stainless strap seal. Level the sign panel and tighten the hardware securely. Set the Type 1 standards with the handhole on the downstream side of the pole in relation to traffic or as shown.

Replace 15 in the 6th paragraph of the RSS for section 86-1.01C(1) with:

Replace the 1st paragraph of the RSS for section 86-1.01D(3) with:

Deliver the material and equipment for testing to the following location: <u>Department of Public Work</u> <u>9770 Culver Boulevard</u> Culver City, CA 90232-0507

86-1.02F(3)(d)(v) Signal Interconnect Cables

Signal interconnect cable must be a <u>25</u>-pair type with stranded, tinned, copper no. <u>22</u> conductors. The insulation for each conductor must be color-coded polypropylene with a minimum 13-mils nominal thickness. The conductors must be in color-coded, twisted pairs. Each pair must be wrapped with an aluminum polyester shield and have a no. 22 or larger, stranded, tinned, copper drain wire inside the shielded pair.

Replace 10,000 in the 14th paragraph of the RSS for section 86-1.02P(2) with:

.

Replace the 1st sentence of the 15th paragraph of section 86-1.02P(2) of the RSS with:

The interior of the enclosure must accept cable-in/cable-out circuit breakers. The circuit breakers must be mounted on nonenergized clips and vertically with the up position of the handle being the *ON* position.

Add to the end of section 86-1.02Q(3) of the RSS:

Replace the 1st sentence in the 1st paragraph of section 86-1.02U of the RSS with:

The housing for a push button assembly must be made of UV-stabilized, self-extinguishing structural plastic.

Replace "Reserved" in section 86-1.02V with:

86-1.02V Microwave Vehicle Detection Assembly (MVDA)

86-1.02V(1) General

This work consists of furnishing and installing a Microwave Vehicle Detection Assembly (MVDA). **86-1.02V(2)** Materials List and Drawings

A list of materials that the Contractor proposes to install for the MVDA, together with the drawings and other data, must be submitted under section 86-1.04. Additionally, the following must be provided before the completion of the Contract:

- 1. Certificate of Compliance Submit a certificate of compliance for MVDA.
- 2. Site Analysis Report Prior to MVDA installation, the Contractor must review each detection site and provide a written analysis recommending the optimum sensor placement for complying with the performance requirements of this special provision. The analysis must be reviewed and approved by the MVDA manufacturer.
- 3. Lane Configuration The documentation must include a diagram that illustrates how the microwave beam is covering the traffic lanes as well as the MVDA connector pins or wire terminals that correspond to the respective lanes. The lanes must be identified by direction (i.e., NB, SB, EB, WB) and in order with lane one being the lane nearest to the center of the roadway.
- 4. Mounting and Wiring Information The Contractor must provide to the Engineer for authorization 1 set of detailed diagrams showing wiring and service connections for each MVDA. The authorized diagrams must be covered separately on each side with clear self-adhesive plastic and placed in a heavy-duty plastic envelope. The envelope must be attached securely to the inside of the cabinet door or at a location ordered.
- 5. Communication Protocol The MVDA communication protocol must be open and must be freely available for use in the public domain. The Contractor must provide documentation that defines the complete MVDA communication protocol. The documentation consists of a message structure organization, data packet length, and all information necessary to make use of the messages.
- 6. Remote Programming The Contractor must provide all information and software necessary for operating the system from a remote Windows 2000/NT-based or newer PC. This information and software must include at a minimum the capability to calibrate, tune, align, and program the MVDA and be provided on a CD compatible with Windows 2000/NT-based or newer PC. The information must be formatted such that the files can be matched with the equipment being calibrated or aligned. This documentation must contain files that allow for replacement equipment to be loaded with the same configuration.
- 7. MVDA Accuracy Analysis The Contractor must be responsible for conducting MVDA Performance

Testing and must submit an MVDA accuracy analysis that complies with the requirements of the special provisions within 15 days of MVDA testing. The original video recordings as well as DVD or CD copies of the video images covering the analysis periods must be included.

- 8. Acceptance Testing Documentation The Contractor must provide a test plan including the time and the period of the testing to be authorized. The test plan must be organized to allow the Engineer to perform acceptance testing by using the documentation and without assistance from the Contractor. The Contractor must collect and submit the data to be certified. If requested, the data must be collected in the presence of the Engineer.
- 9. Acceptance Testing Schedule The Contractor must submit a testing schedule for authorization 15 days prior to acceptance testing of the MVDA. If the testing period extends beyond the normal working shift or if the Contractor fails to provide the necessary material for the testing within 1 hour of the scheduled testing start time, the Engineer may cancel the testing for the day.
- 10. Training The Contractor must provide a copy of the training material for authorization 30 days prior to the training. The content of the training must include instruction on how to align, program, adjust, calibrate, and maintain the MVDA.

86-1.02V(3) Functional Requirements

MVDAs must simultaneously provide vehicle detection data in the form of vehicle presence, volumes, counts, speed, classification, and occupancy for a minimum of 8 lanes of traffic and must comply with the performance requirements of the special provisions. MVDAs must provide a separate zone per lane and detect vehicles as close as 9.8 feet and as far as 197 feet from the MVDA sensor. MVDAs must monitor traffic lanes in the presence of barrier railings, guard railings, and other obstacles.

MVDA must comply with the following detection performance criteria when installed at a minimum of 9.8 feet from the nearest lane and at a minimum height of 16.4 feet above the roadway detection zone:

- 1. Average 5-minute volumes for all lanes combined with better than 95-percent accuracy compared to vehicles observed in video images for the same period for any 15-minute period selected by the Engineer.
- 2. Average 30-second volumes in every lane with better than 90-percent accuracy compared to vehicles observed in video images for the same period for any 5-minute period selected by the Engineer.
- 3. Average 30-second speed in any lane with better than 95-percent accuracy for any 5-minute period selected by the Engineer.
- 4. Average 5-minute occupancy for any lane with better than 85-percent accuracy for any 15-minute period selected by the Engineer.
- 5. Count accuracy, when compared to vehicles observed in video images for the same period, must be not less than 90 percent for any lane and not less than 95 percent for all lanes combined.
- 6. Average 15-minute classification according to user-defined criteria with better than 90-percent accuracy compared to vehicles observed in video images for the same period. Vehicle or length classification must be provided for categories of small car, average car, mid-size car, long car, and extra-long car that are user definable by either length parameters, minimum length to maximum length for the category, or by a multiple of length of the average car.
- 7. The Contractor must provide the criteria for speed and volume acceptance testing for authorization. The Contractor must also provide speed and volume date for verification by the Engineer.

MVDA must consist of a sensor unit and include all required mounting hardware, power supplies, surge suppression, cables, connectors, and wiring. The MVDA sensor must include, as a minimum, a directional microwave transmitter, antenna, microwave receiver, processor, memory, and communication interface. The MVDA must have an EIA-RS232, EIA-485, or Ethernet communication port that supports the National Transportation Communication for ITS Protocol (NTCIP). The MVDA communication protocol must be nonproprietary and openly specified and available for use in the public domain. The MVDA must be addressable and must download count, speed, and occupancy data when polled by the traffic management center computer. Speed must be configurable in U.S. customary or metric units. The MVDA must support unit setup from a serial console port on the MVDA unit. The console port protocol must support sensor unit setup from a local Windows 2000/NT or newer compatible laptop or from a remote location with a desktop computer and standard phone modem.

When MVDA sensor contact outputs will be connected to Model 170E/2070 controller to emulate inductive loops, comply with the following:

- 1. The MVDA sensors must be connected to a microwave sensor interface card (MSIF) installed in the input file of a Department-furnished Model 170E or Model 2070 controller cabinet.
- 2. Each detection zone must provide an optically isolated relay contact pair that follows the presence of vehicles in every traffic lane and sends signals to the controller with the accuracy stated in the special provisions.
- 3. The MSIF must have indications for power, communication, and the real-time operation of each detection contact output.

MVDAs must be user programmable in the field via the MVDA unit console port with a Windows 2000/NT or newer compatible laptop computer. The Contractor must provide software, firmware, and equipment to set up, calibrate, and operate the unit. MVDA software must observe the vehicular traffic and automatically place detection lanes and set the sensor sensitivity. MVDAs must be designed such that a trained Department employee can configure and calibrate the MVDA in less than 15 minutes per lane once the MVDA sensor unit is installed.

86-1.02V(4) Technical Requirements

MVDAs must be FCC certified under 47 CFR 15 for low power, unlicensed, continuous radio transmitter operation. The MVDA must comply with FCC regulations for all specified operating conditions and over the expected life of the MVDA.

MVDA sensor unit must not weigh more than 11 pounds. The MVDA must operate over a temperature range from –30 degrees C to +70 degrees C, with up to 95 percent relative humidity. The MVDA sensor enclosure must be weatherproof with a NEMA 3R rating and the sensor mounted and directed perpendicular to the flow of traffic lanes at the locations shown.

All electronic assemblies must comply with the specifications in chapters 1 and 5 of the TEES. The MSIF must be inserted into the controller input file slots using the edge connector to obtain limited 24 V(dc) power and to provide contact closure outputs. No rewiring to the Model 170E or Model 2070 cabinet must be allowed. The MSIF must comply with the specifications in chapter 1 as well as sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, 5.4.5, and 5.4.6, 5.5.1, 5.5.5, and 5.5.6 of TEES.

MVDA sensors must be wired with a connectorized cable harness. Cables must run continuously without splices between the sensor and controller cabinet and terminate in labeled terminal blocks identified with the purpose served. The connector must be a standard mil type and rated plug. The cable must have the number of conductors specified by the MVDA manufacturer to support the number of detection zones shown plus spares for 2 future zones with an overall shield and copper drain wire. Conductors must be stranded copper equal to or exceeding the minimum strands and wire dimensions specified by the MVDA manufacturer for the wiring distance involved and covered with a minimum 12 mil polyvinyl chloride (PVC) insulation rated for 300 V at 105 degrees C. The outer jacket must be chrome PVC with minimum thickness of 53 mils and the outside diameter of the cable must not exceed 3/4 inch. A minimum of 6.5-foot slack of MVDA cable must be coiled at the bottom of the controller cabinet. Slack in other cabinets must be as shown or as ordered.

MVDA sensor unit power supplies or transformers must be vertically mounted on a standard DIN-rail rack using standard mounting hardware. The Contractor must wire the MVDA power conductors to DIN-rail rack-mounted terminal blocks in the controller cabinet as ordered. The serial data communication output conductors must be terminated at TB-0 and continue for a minimum of 9.8 feet to a DB9F connector for setup and diagnostic access. The contact pair output conductors must be terminated at terminal block, TB-2. The ends of unused and spare conductors must be coiled and taped to prevent accidental contact to other circuits. Conductors inside the cabinet must be labeled for the functions as shown on the authorized detailed diagrams.

The power supply or transformer must comply with or exceed the following minimum requirements:

	Power supply	Transformer
Power cord	Standard 120V(ac), 3 prong cords,	Standard 120V(ac), 3 prong cords,
	at least 40 inches in length (may be	at least 40 inches in length (may
	added by Contractor)	be added by Contractor)
Туре	Switching mode type	Class 2
Rated power	Twice (2x) full system load	Twice (2x) full system load
Operating temperature	From –35 °C to +74 °C	From –35 °C to +74 °C
Operating humidity range	From 5 percent to 95	From 5 percent to 95
Input voltage	From 90 V to 135 VAC	From 90V to 135 VAC
Input frequency	60 Hz +/- 1 Hz	60 Hz +/- 1 Hz
Inrush current	Cold start, 25 A max. at 115 V	N/A
Output voltage	As required by the MVDA	As required by the MVDA
Overload protection	From 105 percent to 150 percent in	Power limited at >150 percent
	output pulsing mode	
Over voltage protection	From 115 percent to 135 percent of	N/A
	rated output voltage	
Setup, rise, hold up	800ms, 50ms,15ms at 115VAC	N/A
Withstand voltage	I/P-0/P:3kV, I/P-FG:1.5kV, for 60	I/P-0/P:3kV, I/P-FG:1.5kV, for 60
	sec.	sec
Working temperature	Not to exceed 70 °C@30% load	Not to exceed 70 °C@30% load
Safety standards	UL 1012, TUV EN60950	UL 1585
EMC standards	EN55022 Class B, EN61000-4-2, 3,	N/A
	4, 5 and EN61000-3-2, 3	

Field terminated circuits must include transient protection that complies with IEEE Standard 587-1980 Category C.

The MVDA must automatically restore normal operation following a power failure within 3 minutes and not require manual intervention. The MVDA must maintain the configuration and calibration information in nonvolatile memory and retain the information while powered off for at least 90 days.

The MVDA must be configurable for 30-second to 24-hour polling cycles and store vehicle count, speed, classification, and occupancy data in 10-second to not less than 15-minute intervals.

The MVDA must be tested and in standard production for a minimum of 3 months. The Contractor must not install any MVDA older than 6 months from the scheduled start date of the MVDA installation as indicated by date codes or serial numbers of electronic circuit assemblies.

The MVDA system and all supporting equipment must be designed to operate continuously in an outdoor traffic monitoring and control environment. The Contractor must provide a manufacturer's warranty stating that the manufacturing quality and electronic components must support a "mean time between failure" of 10 years in this environment.

Add to the end of section 86-1.02V of the RSS with:

86-1.02V(5) Video Image Vehicle Detection Assembly (VIVDA)

Section 86-1.02V(5) includes installing Video Image Vehicle Detection Assembly (VIVDA) for traffic signals or ramp meters.

86-1.02V(6) Definitions

Video Detection Unit (VDU): Processor unit that converts the video image from the camera and provides vehicle detection in defined zones. Unit includes an image processor, extension module, and communication card.

Video Image Sensor Assembly (VIS): An enclosed and environmentally-protected camera assembly used to collect the video image.

Video Image Vehicle Detection Assembly (VIVDA): A system that detects video images of vehicles in defined zones and provides video output.

86-1.02V(7) Submittals

Submit documentation within 30 days after Contract approval but before installing VIVDA equipment. The documentation submittal must include:

- 1. Certificate of Compliance: As specified in Section 6-2.03C, "Certificates of Compliance," of the Standard Specifications.
- 2. Site Analysis Report: Written analysis for each detection site, recommending the optimum video image sensor assembly placement approved by the manufacturer.
- 3. Lane Configuration: Shop drawing showing:
 - 3.1. Detection zone setback
 - 3.2. Detection zone size
 - 3.3. Camera elevation
 - 3.4. Selected lens viewing angle
 - 3.5. Illustration of detection zone mapping to reporting contact output
 - 3.6. Illustration of output connector pin or wire terminal for lane assignment.
- 4. Configuration Record: Windows PC compatible CD containing:
 - 4.1. Proposed zone designs
 - 4.2. Calibration settings
- 5. Mounting and Wiring Information: Manufacturer approved wiring video cable and service connection diagrams.
- 6. Communication Protocol: Industry standard available in public domain. Document defining:
 - 6.1. Message structure organization
 - 6.2. Data packet length
 - 6.3. Message usability
 - 6.4. Necessary information to operate a system from a remote windows based personal computer.
- 7. Programming Software: CD containing set up and calibration software that observes and detects the vehicular traffic, including bicycles, motorcycles, and sub-compact cars, with overlay of detection zones and allows adjustment of the detection sensitivity for a traffic signal application.
- 8. Detector Performance DVD Recordings and Analysis: Performance analysis based on 24-hour DVD recording of contiguous activity for each approach. Include:
 - 8.1. Two contiguous hours of sunny condition, with visible shadows projected a minimum of 6 feet into the adjacent lanes
 - 8.2. Two 1-hour night periods with vehicle headlights present.
- 9. Preventative Maintenance Parts Documentation: List of equipment replacement parts for
 - preventative maintenance, including:
 - 9.1. Electrical parts, wiring and video cable
 - 9.2. Mechanical parts
 - 9.3. Assemblies.
- Allow 7 days for the Engineer to review the documentation submittal.

If the Engineer requires revisions, submit a revised submittal within 5 days of receipt of the Engineer's comments and allow 5 days for the Engineer to review. If agreed to by the Engineer, revisions may be included as attachments in the re-submittal. The Engineer may conditionally approve, in writing, re-submittals that include revisions submitted as attachments, in order to allow construction activities to proceed.

Upon the Engineer's approval of the re-submittal, submit copies of the final documents (with approved revisions incorporated) to the Engineer.

Submit an acceptance testing schedule for approval 15 days before starting acceptance testing. When beginning acceptance testing of VIVDA and detector performance and analysis, submit approved copies of the following:

- 1. Configuration Record: Windows PC compatible CD containing:
 - 1.1. Final zone designs
 - 1.2. Calibration settings to allow reinstallation.
- 2. Mounting and Wiring Information: Final wiring and service connection diagrams.
 - 2.1. One copy for the Engineer
 - 2.2. A second copy wrapped in clear self-adhesive plastic, be placed in a heavy-duty plastic envelope, and secured to the inside of the cabinet door.

86-1.02V(8) Quality Control and Assurance

86-1.02V(8)(a) General

VIVDA and support equipment required for acceptance testing must be new and as specified in the

manufacturer's recommendations. Date of manufacture, as shown by date codes or serial numbers of electronic circuit assemblies, must not be older than 12 months from the scheduled installation start date. Material substitutions must not deviate from the material list approved by the Engineer. **86-1.02V(8)(b)** Training

Not Used 86-1.02V(8)(c) Warranty

Not Used

86-1.02V(9) Materials

VIVDA must include necessary firmware, hardware, and software for designing the detection patterns or zones at the intersection or approach. Detection zones must be created with a graphic user interface designed to allow to anyone trained in VIVDA system setup to configure and calibrate a lane in less than 15 minutes.

System elements must comply with the manufacturer's recommendations and be designed to operate continuously in an outdoor environment.

All equipment, cables, and hardware must be part of an engineered system that is designed by the manufacturer to fully interoperate with all other system components. Mounting assemblies must be corrosion resistant. Connectors installed outside the cabinets and enclosures must be corrosion resistant, weather proof, and watertight. Exposed cables must be sunlight and weather resistant.

86-1.02V(9)(a) Physical and Mechanical Requirements

VIVDA must include:

- 1. VIS and mounting hardware. Use a clamping device as mounting hardware on a pole or mast-arm.
- 2. VDU
- 3. Power supply
- 4. Surge suppression
- 5. Cables
- 6. Connectors
- 7. Wiring for connecting to the Department-furnished Model 332L traffic controller cabinet.
- 8. Communication card with multi-display port
- 9. Flat panel video display
- DIN Rail mounted AC power assembly that includes a minimum of one convenience receptacle, four camera chassis ground connections, four camera AC neutral (AC-) connections, four 2-amp camera circuit breakers for hot (AC+) connections, and one AC source connection for Line, Neutral and Ground wires.
- 11. DIN Rail video surge suppression protection assembly that can accommodate up to six surge suppression modules

86-1.02V(9)(b) Electrical

VIVDA must operate between 90 to 135 V(ac) service as specified in NEMA TS-1. VIS, excluding the heater circuit, must draw less than 10 W of power. Power supply or transformer for the VIVDA must meet the following minimum requirements:

Item	Power Supply	Transformer
Power Cord	Standard 120 V(ac), 3	Standard 120 V(ac),
	prong cord, 3 feet minimum	3 prong cord, 3 feet
	length (may be added by	minimum length
	Contractor)	(may be added by
		Contractor)
Туре	Switching mode type	Class 2
Rated Power	Two times (2x) full system	Two times (2x) full
	load	system load
Operating Temperature	From -37 to 74 °C	From -37 to 74 °C
Operating Humidity Range	From 5 to 95 percent	From 5 to 95 percent
Input Voltage	From 90 to 135 V(ac)	From 90 to 135 V(ac)
Input Frequency	60 ± 3 Hz	60 ± 3 Hz
Inrush Current	Cold start, 25 A Max. at	N/A
	115 V(ac)	
Output Voltage	As required by VIVDA	As required by
		VIVDA
Overload Protection	From 105 to 150 percent in	Power limited at
	output pulsing mode	>150 percent
Over Voltage Protection	From 115 to 135 percent of	N/A
	rated output voltage	
Setup, Rise, Hold Up	800ms, 50ms,15ms at 115	N/A
	V(ac)	
Withstand Voltage	I/P-0/P:3kV, I/P-FG:1.5kV,	I/P-0/P:3kV, I/P-
	for 60 s.	FG:1.5kV, for 60 s
Working Temperature	Not to exceed 70°C at 30	Not to exceed 70 °C
	percent load	at 30 percent load
Safety Standards	UL 1012, UL 60950	UL 1585

Minimum Requirements for Power Supply and Transformers

Field terminated circuits must include transient protection as specified in IEEE Standard 587-1980, Category C. Video connections must be isolated from ground.

86-1.02V(9)(c) Technical Requirements

Camera assembly must be housed in an environmentally sealed enclosure that complies with NEMA 4 standards. Enclosure must be watertight and protected from dust. Enclosure must include a thermostatcontrolled heater to prevent condensation and to ensure proper lens operation at low temperatures. Adjustable sun shield that diverts water from the camera's field of view must be included. Connectors, cables and wiring must be enclosed and protected from weather. A gas tight (protected from dust and moisture ingress) connector must be used at the rear plate of the housing. Wiring to the connector must be sealed with silicone or potting compound.

Each camera and its mounting hardware must be less than 10 pounds and less than 1 square foot equivalent pressure area. Only one camera must be mounted on a traffic signal or luminaire arm. Top of camera must not be more than 12 inches above top of luminaire arm or 30 inches above top of traffic signal arm.

VIS must use a charge-coupled device (CCD) element, support National Television Standards Committee (NTSC) and RS170 video output formats, and have a horizontal resolution of at least 360 lines. VIS must include an auto gain control (AGC) circuit, have a minimum sensitivity to scene luminance from 0.01 to 930 foot-candle, and produce a usable video image of vehicular traffic under all roadway lighting conditions regardless of the time of day. VIS must have a motorized lens with variable focus and zoom control with an aperture of f/1.4 or better. Focal length must allow ± 50 percent adjustment of the viewed detection scene.

A flat panel video display with a minimum 17-inch screen and that supports NTSC video output must be enclosed in the Model 332L cabinet for viewing video detector images and for performing diagnostic testing. Display must be viewable in direct sunlight. Each VIVDA must have video system connections that support the NTSC video output format, can be seen in each camera's field of view, and has a

program to allow the user to switch to any video signal at an intersection. A metal shelf or pull-out document tray with metal top capable of supporting the VDU and monitor must be furnished and placed on an EIA 19-inch rack with 10-32 "Universal Spacing" threaded holes in the Model 332L cabinet. System must allow independent viewing of a scene while video recording other scenes without interfering with the operation of the system's output.

Mounting hardware must be powder-coated aluminum, stainless steel, or treated to withstand 250 hours of salt fog exposure as specified in ASTM B 117 without any visible corrosion damage.

VDU must operate between –37 to +74 °C and from 0 to 95 percent relative humidity.

VDU front panel must have indicators for power, communication, presence of video input for each VIS, and a real time detector output operation. Hardware or software test switch must be included to allow the user to place either a constant or momentary call for each approach. Indicators must be visible in daylight from 5 feet away.

VDU must have a serial communication port, EIA 232/USB 2.0 that supports sensor unit setup, diagnostics, and operation from a local PC compatible laptop with Windows XP or later version operating system. VIVDA must have an Ethernet communication environment, including Ethernet communication card. VIVDA must include central and field software to support remote real-time viewing and diagnostics for operational capabilities through wide area network (WAN).

VDU, image processors, extension modules, and video output assemblies must be inserted into the controller input file slots using the edge connector to obtain limited 24 V(dc) power and to provide contact closure outputs. Cabling the output file to a "D" connector on the front of the VDU is acceptable. No rewiring to the standard Model 332L cabinet is allowed. Controller cabinet resident modules must comply with the requirements in Chapter 1 and Sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, 5.5.1, 5.5.5, and 5.5.6 of TEES.

86-1.02V(9)(d) Functional Requirements

VIVDA must support normal operation of existing detection zones while a zone is being added or modified. Zone must flash or change color on a viewing monitor when vehicular traffic is detected. Length and width of each detection zone for each lane must be approved by the Engineer.

Software and firmware must detect vehicular traffic presence, provide vehicle counts, set up detection zones, test VIVDA performance, and allow video scene and system operation viewing from the local traffic management center/office. VIVDA must support a minimum of 2 separate detection patterns or zones that can be enacted by a remote operator at the signal controller cabinet.

VIVDA detection zone must detect vehicles by providing an output for presence and pulse. At least one detection output must be provided for each detection zone. One spare detection output must be provided for each approach. Detection performance must be achieved for each detection zone with a maximum of 8 user-defined zones for every camera's field of view.

VIVDA must detect the presence of vehicles under all types of adverse weather and environmental conditions, including snow, hail, fog, dirt, dust or contaminant buildup on the lens or faceplate, minor camera motion due to winds, and vibration. Under low visibility conditions, the VIVDA must respond by selecting a fail-safe default pattern, placing a constant call mode for all approaches. VIVDA outputs must assume a fail-safe "on" or "call" pattern for presence detection if video signal or power is not available and must recover from a power failure by restoring normal operations within 3 minutes without manual intervention. If powered off for more than 90 days, system must maintain the configuration and calibration information in memory.

Detection algorithm must be designed to accommodate naturally occurring lighting and environment changes, specifically the slow-moving shadows cast by buildings, trees, and other objects. These changes must not result in a false detection or mask a true detection. VIVDA must not require manual interventions for day-night transition or for reflections from poles, vehicles or pavement during rain and weather changes. VIVDA must suppress blooming effects from vehicle headlights and bright objects at night.

Vehicle detection must call service to a phase only if a demand exists and extend green service to the phase until the demand is taken care of or until the flow rates have reduced to levels for phase termination. VIVDA must detect the presence of vehicular traffic at the detection zone positions and provide the call contact outputs to the Model 170E or Model 2070L controller assembly with the following performance:

Detector Performance			
Requirements	Performance during	Performance during	
	AMBER and RED Interval	GREEN Interval	
Average response time after	≤ 1 s	≤ 100 ms	
vehicle enters 3 feet into			
detection zone or after exiting 3			
feet past detection zone			
Maximum number of MISSED	0	10	
CALLS in 24-hour duration,			
where MISSED CALLS are			
greater than 5 s during AMBER			
and RED intervals and greater			
than 1 s during GREEN intervals			
(upon entering 3 feet of detection			
zone or after exiting 3 feet past			
detection zone).			
Maximum number of FALSE	20	20	
CALLS in 24-hour duration (calls			
greater than 500ms without a			
vehicle present)			

VIVDA must be able to locally store, for each lane, vehicle count data in 5, 15, 30, and 60-minute intervals for a minimum period of 7 days and be remotely retrievable. VIVDA must count vehicular traffic in detection zone with a 95 percent accuracy or better for every hour counted over a morning or an evening peak hour. VIVDA detection zone tested must have a minimum range of 60 feet behind the limit line for each approach. Testing period will be pre-approved by the Engineer 48 hours in advance.

86-1.02V(10) Construction

Install VDU in a Department-furnished Model 170E or Model 2070 controller assembly. Install VIS power supply or transformer on a standard DIN rail using standard mounting hardware and power conductors wired to DIN rail mounted terminal blocks in the controller cabinet. Each VIS must be connected to an individual circuit breaker in the DIN Rail mounted power assembly.

Wiring must be routed through end caps or existing holes and sealed. New holes for mounting or wiring must be shop-drilled.

Wire each VIS to the controller cabinet with a wiring harness that includes all power, control wiring, and coaxial video cable. Attach harness with standard MIL type and rated plugs. Cable type, connectors and wire characteristics must comply with manufacturer's recommendations for the VIS to cabinet distance. Wiring and cables must be continuous, without splices, between the VIS and controller cabinet. Coil a minimum of 7 feet of slack in the bottom of the controller cabinet. For setup and diagnostic access, terminate serial data communication output conductors at TB-0 and continue for a minimum of 10 feet to a DB9F connector. Tape ends of unused and spare conductors to prevent accidental contact to other circuits.

Label conductors inside the cabinet for the functions depicted the approved detailed diagrams. Label cables with permanent cable labels at each end.

Adjust the lens to view 110 percent of the largest detection area dimension. Zones or elements must be logically combined into reporting contact outputs that are equivalent to the detection loops and with the detection accuracy required.

Verify the performance of each unit, individually, and submit the recorded average and necessary material at the conclusion of the performance test. Determine and document the accuracy of each unit, individually, so that each unit may be approved or rejected separately. Failure to submit necessary material at the conclusion of testing invalidates the test. The recorded media serves as acceptance evidence and must not be used for calibration. Calibration must have been completed before testing and verification.

Verify the detection accuracy by observing the VIVDA performance and recorded video images for a contiguous 24-hour period. The recorded video images must show the viewed detection scene, the detector call operation, the signal phase status for each approach, the vehicular traffic count, and timestamp to 1/100 of a second, all overlaid on the recorded video. Transfer the 24-hour analysis to DVD.

VIVDA must meet the detection acceptance criterion specified in table titled "Detector Performance." Calculate the VIVDA's vehicular traffic count accuracy as 100[1-(|TC-DC|/TC)], where DC is the detector's vehicular traffic count and TC is the observed media-recorded vehicular traffic count and where the resulting fraction is expressed as an absolute value.

The Engineer will review the data findings and accept or reject the results within 7 days. Vehicle anomalies or unusual occurrences will be decided by the Engineer. Data or counts not agreed by the Engineer will be considered errors and count against the unit's calibration. If the Engineer determines that the VIVDA does not meet the performance requirements, you must re-calibrate and retest the unit, and resubmit new test data within 7 days. After 3 failed attempts, you must replace the VIVDA with a new unit. Notify the Engineer 20 days before the unit is ready for acceptance testing. Acceptance testing must be scheduled to be completed before the end of a normal work shift. You must demonstrate that all VIS and VDUs satisfy the functional requirements.

When inductive loop detectors are installed and operational, remove the VIVDA system and it will become your property.

Replace the 1st sentence in the 9th paragraph of the RSS for section 87-1.03A with:

The shutdown of traffic signal systems is allowed only between the hours of <u>9 AM</u> and <u>3 PM</u>

Replace the 21st paragraph of the RSS for section 87-1.03A with:

The Department places identification characters on the electrical equipment.

Add to the beginning of the RSS for section 87-1.03B(3)(a):

Use Type 3 conduit for underground installation.

Replace the 3rd paragraph of the RSS for section 87-1.03B(3)(a) with:

Place a minimum of 2 inches of sand bedding in a trench before installing Type 2 or Type 3 conduit and 4 inches of minor concrete over the conduit before placing additional backfill material. The concrete must contain at least 421 pounds of cementitious material per cubic yard.

Replace the 1st paragraph of the RSS for section 87-1.03F(2)(c)(ii) with:

Install a <u>Type B</u> loop detector lead-in cable in conduit.

Replace the 1st paragraph of the RSS for section 87-1.03F(3)(c)(ii) with:

Use a <u>Type 2</u> loop wire <u>for Type D loop detectors</u>. Use only Type 2 loop wire for Type E loop detectors.

Delete the 3rd paragraph of the RSS for section 87-1.03G.

Replace the 2nd paragraph of the RSS for section 87-1.03H(2) with:

Use <u>Method B</u> to insulate a splice. For splicing loop wire to loop detector lead-in cable (DLC), install heatshrink tubing over the entire splice after insulting the splice using "Method B". Place both the loop start wire and finish wire splice in the same heat-shrink tubing.

Add between the 1st and 2nd paragraphs of the RSS for section 87-1.03N:

If the pull box is tamper resistant, install a 10 A fuse in the pull box and an additional fuse splice connector with a 5 A fuse in the handhole.

Add to the end of the RSS for section 87-1.03T:

A manufacturer's representative must program the accessible pedestrian signals at the following intersections:

- 1. Intersection of <u>Culver Blvd</u> and <u>Harter Ave</u>
- 2. Intersection of Culver Blvd. and Huron Ave

When the extended pushbutton press is used, program the signals with messages for each street as follows:

- 1. During the pedestrian clearance interval, the message heard must be, *Wait to Cross* <u>Culver Blvd</u>. *Wait*.
- 2. <u>During the pedestrian clearance interval, the message heard must be, Wait to Cross Huron Ave.</u> <u>Wait.</u>
- 3. <u>During the pedestrian clearance interval, the message heard must be, Wait to Cross Harter Ave.</u> <u>Wait.</u>

Add between the 11th and 12th paragraphs of the RSS for section 87-1.03V(2):

Use elastomeric sealant or hot melt asphalt rubberized sealant to fill slots.

PAGE 1 OF 2

Add to the end of section 87-21.03D of the RSS for section 87:

FPL HT (01/04/19)**

FPL HT (01/04/19)**

FPL HT (01/04/19)**

Removing a signal and lighting system includes removing:

- 1. Foundations
- 2. Pull boxes
- 3. Conduit
- 4. Conductors
- 5. Cables
- 6. Standards
- 7. Signal heads
- 9. Service equipment enclosure
- 10. Department-furnished controller assembly
- 13. Push button assemblies
- 14. Pedestrian signal heads
- 15. Luminaires
- 16. Photoelectric control

FPL HT (01/04/19)**

FPL HT (01/04/19)**

CITY OF CULVER CITY

FPL HT (01/04/19)**

FPL HT (01/04/19)**

Removing interconnection conduit and cable includes removing: 1. Pull boxes

- 2. Conduit
- 3. Signal interconnect cables

---END OF SECTION F--