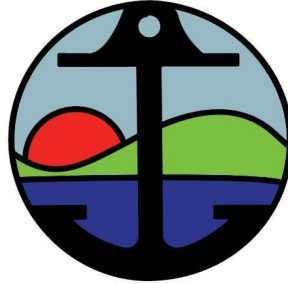


# CITY OF PITTSBURG



**NOTICE INVITING BIDS, BID PROPOSAL, CONTRACT DOCUMENTS, GENERAL AND  
SPECIAL CONDITIONS, AND TECHNICAL SPECIFICATIONS**

**FOR THE CONSTRUCTION OF**

**PROJECT NO. 3080  
PITTSBURG PREMIER FIELDS**

**IN  
PITTSBURG, CALIFORNIA**

**TO BE USED IN CONJUNCTION WITH:**

**CITY OF PITTSBURG STANDARD DETAILS AND SPECIFICATIONS (DATED 2022 AND CURRENT UPDATES),  
STANDARD SPECIFICATION AND PLANS ISSUED BY THE STATE OF CALIFORNIA, DEPARTMENT OF  
TRANSPORTATION (DATED 2023 AND CURRENT UPDATES)**

**October 2024**

*ACCEPTED FOR USE:*

A handwritten signature in blue ink, appearing to read "John Samuelson", is written over a horizontal line.

**JOHN SAMUELSON, PE**

**C – 67734**

**PUBLIC WORKS DIRECTOR/CITY ENGINEER**

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## Notice Inviting Bids

1. **Bid Submission.** The City of Pittsburg (“City”) will accept sealed bids for its Pittsburg Premier Fields Project (“Project”), by or before October 31, 2024, at 1:30 p.m., at its Pittsburg City Hall office, located at 65 Civic Avenue, Pittsburg, California, at which time the bids will be publicly opened and read aloud.
2. **Project Information.**
  - 2.1 **Location and Description.** The Project is located at 2225 John Henry Johnson Parkway and is described as follows: The project construct one multi-purpose field, parking lot, traffic signal control intersection, and water quality features. The Project will also include utilities, field lighting, landscaping and irrigation, various site furnishings, paved and unpaved walkways, trails circling the facility, a pick-up and drop off area, and all other items of work as shown on the Plans.
  - 2.2 **Time for Final Completion.** The Project must be fully completed within 240 calendar days from the start date set forth in the Notice to Proceed. City anticipates that the Work will begin on or about December 30, 2024, but the anticipated start date is provided solely for convenience and is neither certain nor binding.
  - 2.3 **Estimated Cost.** The estimated construction cost is \$5,365,000.
3. **License and Registration Requirements.**
  - 3.1 **License.** This Project requires a valid California contractor’s license for the following classification(s): Class A General Engineering.
  - 3.2 **DIR Registration.** City may not accept a Bid Proposal from or enter into the Contract with a bidder, without proof that the bidder is registered with the California Department of Industrial Relations (“DIR”) to perform public work pursuant to Labor Code § 1725.5, subject to limited legal exceptions.
4. **Contract Documents.** The plans, specifications, bid forms and contract documents for the Project, and any addenda thereto (“Contract Documents”) may be downloaded from City’s website located at: <https://www.pittsburgca.gov/business/current-bidding-opportunities>. A printed copy of the Contract Documents is not available.
5. **Bid Security.** The Bid Proposal must be accompanied by bid security of ten percent of the maximum bid amount, in the form of a cashier’s or certified check made payable to City, or a bid bond executed by a surety licensed to do business in the State of California on the Bid Bond form included with the Contract Documents. The bid security must guarantee that within ten days after City issues the Notice of Potential Award, the successful bidder will execute the Contract and submit the payment and performance bonds, insurance certificates and endorsements, valid Certificates of Reported Compliance as required under the California Air Resources Board’s In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) (“Off-Road Regulation”), if applicable, and any other submittals required by the Contract Documents and as specified in the Notice of Potential Award.
6. **Prevailing Wage Requirements.**
  - 6.1 **General.** Pursuant to California Labor Code § 1720 et seq., this Project is subject to the prevailing wage requirements applicable to the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform

the Work, including employer payments for health and welfare, pension, vacation, apprenticeship and similar purposes.

**6.2 Rates.** The prevailing rates are on file with the City and are available online at <http://www.dir.ca.gov/DLSR>. Each Contractor and Subcontractor must pay no less than the specified rates to all workers employed to work on the Project. The schedule of per diem wages is based upon a working day of eight hours. The rate for holiday and overtime work must be at least time and one-half.

**6.3 Compliance.** The Contract will be subject to compliance monitoring and enforcement by the DIR, under Labor Code § 1771.4.

7. **Bidder's Conference.** A bidder's conference will be held on October 24, 2024, at 2:00 p.m. at the following location: City Hall, located at 65 Civic Avenue, Pittsburg, CA to acquaint all prospective bidders with the Contract Documents and the Worksite. The bidders' conference is not mandatory.
8. **Performance and Payment Bonds.** The successful bidder will be required to provide performance and payment bonds, each for 100% of the Contract Price, as further specified in the Contract Documents.
9. **Substitution of Securities.** Substitution of appropriate securities in lieu of retention amounts from progress payments is permitted under Public Contract Code § 22300.
10. **Subcontractor List.** Each Subcontractor must be registered with the DIR to perform work on public projects. Each bidder must submit a completed Subcontractor List form with its Bid Proposal, including the name, location of the place of business, California contractor license number, DIR registration number, and percentage of the Work to be performed (based on the base bid price) for each Subcontractor that will perform Work or service or fabricate or install Work for the prime contractor in excess of one-half of 1% of the bid price, using the Subcontractor List form included with the Contract Documents.
11. **Instructions to Bidders.** All bidders should carefully review the Instructions to Bidders for more detailed information before submitting a Bid Proposal. The definitions provided in Article 1 of the General Conditions apply to all of the Contract Documents, as defined therein, including this Notice Inviting Bids.

By:  Date: 10/9/2024

John Samuelson, Public Works Director/City Engineer

Publication Date: October 9, 2024

END OF NOTICE INVITING BIDS

## Instructions to Bidders

Each Bid Proposal submitted to The City of Pittsburg ("City") for its Pittsburg Premier Fields Project ("Project") must be submitted in accordance with the following instructions and requirements:

### 1. Bid Submission.

- 1.1 General.** Each Bid Proposal must be completed, using the form provided in the Contract Documents, signed, and submitted to City in a sealed envelope, with all required forms and attachments, by or before the date and time set forth in Section 1 of the Notice Inviting Bids, or as amended by subsequent addendum. Faxed or emailed Bid Proposals will not be accepted, unless otherwise specified. Late submissions will be returned unopened. City reserves the right to postpone the date or time for receiving or opening bids. Each bidder is solely responsible for all of its costs to prepare and submit its bid and by submitting a bid waives any right to recover those costs from City. The bid price(s) must include all costs to perform the Work as specified, including all labor, material, supplies, and equipment and all other direct or indirect costs such as applicable taxes, insurance and overhead.
- 1.2 Bid Envelope.** The sealed envelope containing the Bid Proposal and all required forms and attachments must be clearly labeled and addressed as follows:

**BID PROPOSAL:**

Pittsburg Premier Fields Project  
Project No. 3080

City Clerk  
65 Civic Avenue  
Pittsburg, CA, 94565  
Attn: Alice Evenson

The envelope must also be clearly labeled, as follows, with the bidder's name, address, and its registration number with the California Department of Industrial Relations ("DIR") for bidding on public works contracts (Labor Code §§ 1725.5 and 1771.1):

*[Contractor company name]*  
*[street address]*  
*[city, state, zip code]*  
DIR Registration No: \_\_\_\_\_

- 1.3 DIR Registration.** Subject to limited legal exceptions for joint venture bids and federally-funded projects, City may not accept a Bid Proposal from a bidder without proof that the bidder is registered with the DIR to perform public work under Labor Code § 1725.5. If City is unable to confirm that the bidder is currently registered with the DIR, City may disqualify the bidder and return its bid unopened. (Labor Code §§ 1725.5 and 1771.1(a).)
- 2. Bid Proposal Form and Enclosures.** Each Bid Proposal must be completed in ink using the Bid Proposal form included with the Contract Documents. The Bid Proposal form must be fully completed without interlineations, alterations, or erasures. Any necessary corrections must be clear and legible, and must be initialed by the bidder's authorized representative. A Bid Proposal submitted with exceptions or terms such as "negotiable,"



“will negotiate,” or similar, will be considered nonresponsive. Each Bid Proposal must be accompanied by bid security, as set forth in Section 4 below, and by a completed Subcontractor List and Non-Collusion Declaration using the forms included with the Contract Documents, and any other required enclosures, as applicable.

3. **Authorization and Execution.** Each Bid Proposal must be signed by the bidder’s authorized representative. A Bid Proposal submitted by a partnership must be signed in the partnership name by a general partner with authority to bind the partnership. A Bid Proposal submitted by a corporation must be signed with the legal name of the corporation, followed by the signature and title of two officers of the corporation with full authority to bind the corporation to the terms of the Bid Proposal, under California Corporations Code § 313.
4. **Bid Security.** Each Bid Proposal must be accompanied by bid security of ten percent of the maximum bid amount, in the form of a cashier’s check or certified check, made payable to the City, or bid bond using the form included in the Contract Documents and executed by a surety licensed to do business in the State of California. The bid security must guarantee that, within ten days after issuance of the Notice of Potential Award, the bidder will: execute and submit the enclosed Contract for the bid price; submit payment and performance bonds for 100% of the maximum Contract Price; submit the insurance certificates and endorsements; and submit valid Certificates of Reported Compliance as required by the Off-Road Regulation, if applicable, and any other submittals, if any, required by the Contract Documents or the Notice of Potential Award. A Bid Proposal may not be withdrawn for a period of 60 days after the bid opening without forfeiture of the bid security, except as authorized for material error under Public Contract Code § 5100 et seq.
5. **Requests for Information.** Questions or requests for clarifications regarding the Project, the bid procedures, or any of the Contract Documents must be submitted in writing to Mariana Mena, Senior Engineer, at [3080bidinfo@pittsburgca.gov](mailto:3080bidinfo@pittsburgca.gov). Oral responses are not authorized and are not binding on the City. Bidders should submit any such written inquiries at least five Working Days before the scheduled bid opening. Questions received any later might not be addressed before the bid deadline. An interpretation or clarification by City in response to a written inquiry will be issued in an addendum.
6. **Pre-Bid Investigation.**
  - 6.1 **General.** Each bidder is solely responsible at its sole expense for diligent and thorough review of the Contract Documents, examination of the Project site, and reasonable and prudent inquiry concerning known and potential site and area conditions prior to submitting a Bid Proposal. Each bidder is responsible for knowledge of conditions and requirements which reasonable review and investigation would have disclosed. However, except for any areas that are open to the public at large, bidders may not enter property owned or leased by the City or the Project site without prior written authorization from City.

**A “NON-MANDATORY” PRE-BID MEETING SHALL BE HELD AT 65 CIVIC AVENUE, FIRST FLOOR, PITTSBURG, CA 94565, ON THURSDAY 10/24/2024 AT 2:00 P.M.**

- 6.2 **Document Review.** Each bidder is responsible for review of the Contract Documents and any informational documents provided “For Reference Only,” e.g., as-builts, technical reports, test data, and the like. A bidder is responsible for notifying City of any errors, omissions, inconsistencies, or conflicts it discovers in the Contract Documents, acting solely in its capacity as a contractor and subject to the limitations of Public Contract Code § 1104. Notification of any such errors, omissions, inconsistencies, or conflicts must be submitted in writing to the City no

later than five Working Days before the scheduled bid opening. (See Section 5, above.) City expressly disclaims responsibility for assumptions a bidder might draw from the presence or absence of information provided by City.

- 6.3 Project Site.** Questions regarding the availability of soil test data, water table elevations, and the like should be submitted to the City in writing, as specified in Section 5, above. Any subsurface exploration at the Project site must be done at the bidder's expense, but only with prior written authorization from City. All soil data and analyses available for inspection or provided in the Contract Documents apply only to the test hole locations. Any water table elevation indicated by a soil test report existed on the date the test hole was drilled. The bidder is responsible for determining and allowing for any differing soil or water table conditions during construction. Because groundwater levels may fluctuate, difference(s) in elevation between ground water shown in soil boring logs and ground water actually encountered during construction will not be considered changed Project site conditions. Actual locations and depths must be determined by bidder's field investigation. The bidder may request access to underlying or background information on the Project site in City's possession that is necessary for the bidder to form its own conclusions, including, if available, record drawings or other documents indicating the location of subsurface lines, utilities, or other structures.
- 6.4 Utility Company Standards.** The Project must be completed in a manner that satisfies the standards and requirements of any affected utility companies or agencies (collectively, "utility owners"). The successful bidder may be required by the third party utility owners to provide detailed plans prepared by a California registered civil engineer showing the necessary temporary support of the utilities during coordinated construction work. Bidders are directed to contact the affected third party utility owners about their requirements before submitting a Bid Proposal.
- 7. Bidders Interested in More Than One Bid.** No person, firm, or corporation may submit or be a party to more than one Bid Proposal unless alternate bids are specifically called for. However, a person, firm, or corporation that has submitted a subcontract proposal or quote to a bidder may submit subcontract proposals or quotes to other bidders.
- 8. Addenda.** Any addenda issued prior to the bid opening are part of the Contract Documents. Subject to the limitations of Public Contract Code § 4104.5, City reserves the right to issue addenda prior to bid time. Each bidder is solely responsible for ensuring it has received and reviewed all addenda prior to submitting its bid. Bidders should check City's website periodically for any addenda or updates on the Project at: <https://www.pittsburgca.gov/business/current-bidding-opportunities>.
- 9. Brand Designations and "Or Equal" Substitutions.** Any specification designating a material, product, thing, or service by specific brand or trade name, followed by the words "or equal," is intended only to indicate quality and type of item desired, and bidders may request use of any equal material, product, thing, or service. All data substantiating the proposed substitute as an equal item must be submitted with the written request for substitution. A request for substitution must be submitted within 35 days after Notice of Potential Award unless otherwise provided in the Contract Documents. This provision does not apply to materials, products, things, or services that may lawfully be designated by a specific brand or trade name under Public Contract Code § 3400(c).
- 10. Bid Protest.** Any bid protest against another bidder must be submitted in writing and received by City 65 Civic Avenue, Pittsburg, California or sent via email at [3080bidinfo@pittsburgca.gov](mailto:3080bidinfo@pittsburgca.gov) before 5:00 p.m. no later than two Working Days following bid opening ("Bid Protest Deadline") and must comply with the following requirements:

- 10.1 General.** Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest. For purposes of this Section 10, a “Working Day” means a day that City is open for normal business, and excludes weekends and holidays observed by City. Pursuant to Public Contract Code § 4104, inadvertent omission of a Subcontractor’s DIR registration number on the Subcontractor List form is not grounds for a bid protest, provided it is corrected within 24 hours of the bid opening or as otherwise provided under Labor Code § 1771.1(b).
- 10.2 Protest Contents.** The bid protest must contain a complete statement of the basis for the protest and must include all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the *specific* portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address, email address, and telephone number of the protesting bidder and any person submitting the protest on behalf of or as an authorized representative of the protesting bidder.
- 10.3 Copy to Protested Bidder.** Upon submission of its bid protest to City, the protesting bidder must also concurrently transmit the protest and all supporting documents to the protested bidder, and to any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest, by email or hand delivery to ensure delivery before the Bid Protest Deadline.
- 10.4 Response to Protest.** The protested bidder may submit a written response to the protest, provided the response is received by City before 5:00 p.m., within two Working Days after the Bid Protest Deadline or after actual receipt of the bid protest, whichever is sooner (the “Response Deadline”). The response must attach all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address, email address, and telephone number of the person responding on behalf of or representing the protested bidder if different from the protested bidder.
- 10.5 Copy to Protesting Bidder.** Upon submission of its response to the bid protest to the City, the protested bidder must also concurrently transmit by email or hand delivery, by or before the Response Deadline, a copy of its response and all supporting documents to the protesting bidder and to any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.
- 10.6 Exclusive Remedy.** The procedure and time limits set forth in this Section are mandatory and are the bidder’s sole and exclusive remedy in the event of a bid protest. A bidder’s failure to comply with these procedures will constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.
- 10.7 Right to Award.** City reserves the right, acting in its sole discretion, to reject any bid protest that it determines lacks merit, to award the Contract to the bidder it has determined to be the responsible bidder submitting the lowest responsive bid, and to issue a Notice to Proceed with the Work notwithstanding any pending or continuing challenge to its determination.

- 11. Reservation of Rights.** City reserves the unfettered right, acting in its sole discretion, to waive or to decline to waive any immaterial bid irregularities; to accept or reject any or all bids; to cancel or reschedule the bid; to postpone or abandon the Project entirely; or to perform all or part of the Work with its own forces. The Contract will be awarded, if at all, within 60 days after opening of bids or as otherwise specified in the Special Conditions, to the responsible bidder that submitted the lowest responsive bid. Any planned start date for the Project represents the City's expectations at the time the Notice Inviting Bids was first issued. City is not bound to issue a Notice to Proceed by or before such planned start date, and it reserves the right to issue the Notice to Proceed when the City determines, in its sole discretion, the appropriate time for commencing the Work. The City expressly disclaims responsibility for any assumptions a bidder might draw from the presence or absence of information provided by the City in any form. Each bidder is solely responsible for its costs to prepare and submit a bid, including site investigation costs.
- 12. Bonds.** Within ten calendar days following City's issuance of the Notice of Potential Award to the successful bidder, the bidder must submit payment and performance bonds to City as specified in the Contract Documents using the bond forms included in the Contract Documents. All required bonds must be calculated on the maximum total Contract Price as awarded, including additive alternates, if applicable.
- 13. License(s).** The successful bidder and its Subcontractor(s) must possess the California contractor's license(s) in the classification(s) required by law to perform the Work. The successful bidder must also obtain a City business license within ten days following City's issuance of the Notice of Potential Award. Subcontractors must also obtain a City business license before performing any Work.
- 14. Ineligible Subcontractor.** Any Subcontractor who is ineligible to perform work on a public works project under Labor Code §§ 1777.1 or 1777.7 is prohibited from performing work on the Project.
- 15. Safety Orders.** If the Project includes construction of a pipeline, sewer, sewage disposal system, boring and jacking pits, or similar trenches or open excavations, which are five feet or deeper, each bid must include a bid item for adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life or limb, which comply with safety orders as required by Labor Code § 6707.
- 16. In-Use Off-Road Diesel-Fueled Fleets.** If the Project involves the use of vehicles subject to the California Air Resources Board's In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) ("Off-Road Regulation"), then within ten calendar days following City's issuance of the Notice of Potential Award to the successful bidder, the bidder must submit to City valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, in accordance with the Off-Road Regulation, unless exempt under the Off-Road Regulation.
- 17. Bid Schedule.** Each bidder must complete the Bid Schedule form with unit prices as indicated, and submit the completed Bid Schedule with its Bid Proposal.

  - 17.1 Incorrect Totals.** In the event a computational error for any bid item (base bid or alternate) results in an incorrect extended total for that item, the submitted base bid or bid alternate total will be adjusted to reflect the corrected amount as the product of the estimated quantity and the unit cost. In the event of a discrepancy between the actual total of the itemized or unit prices shown on the Bid Schedule for the base bid, and the amount entered as the base bid on the Bid Proposal form, the actual total of the itemized or unit prices shown on the Bid Schedule for the base bid will be deemed the base bid price. Likewise, in the event of a discrepancy

between the actual total of the itemized or unit prices shown on the Bid Schedule for any bid alternate, and the amount entered for the alternate on the Bid Proposal form, the actual total of the itemized prices shown on the Bid Schedule for that alternate will be deemed the alternate price. Nothing in this provision is intended to prevent a bidder from requesting to withdraw its bid for material error under Public Contract Code § 5100 et seq.

- 17.2 Estimated Quantities.** Unless identified as a “Final Pay Quantity,” the quantities shown on the Bid Schedule are estimated and the actual quantities required to perform the Work may be greater or less than the estimated amount. The Contract Price will be adjusted to reflect the actual quantities required for the Work based on the itemized or unit prices provided in the Bid Schedule, with no allowance for anticipated profit for quantities that are deleted or decreased, and no increase in the unit price, and without regard to the percentage increase or decrease of the estimated quantity and the actual quantity.
- 18. Bidder’s Questionnaire.** A completed, signed Bidder’s Questionnaire using the form provided with the Contract Documents and including all required attachments must be submitted within 48 hours following a request by City. A bid that does not fully comply with this requirement may be rejected as nonresponsive. A bidder who submits a Bidder’s Questionnaire which is subsequently determined to contain false or misleading information, or material omissions, may be disqualified as non-responsible.
- 19. Subcontractor Work Limits.** The prime contractor must perform at least 50% of the Work on the Project, calculated as a percentage of the base bid price, with its own forces, except for any Work identified as “Specialty Work” in the Contract Documents. The total bid amount for any such Specialty Work, as shown on the Bid Schedule, may be deducted from the base bid price before computing the 50% self-performance requirement. The remaining Work may be performed by qualified Subcontractor(s).

END OF INSTRUCTIONS TO BIDDERS

**Bid Proposal**

Pittsburg Premier Fields Project

\_\_\_\_\_ (“Bidder”) hereby submits this Bid Proposal to the City of Pittsburg (“City”) for the above-referenced project (“Project”) in response to the Notice Inviting Bids and in accordance with the Contract Documents referenced in the Notice.

1. **Base Bid.** Bidder proposes to perform and fully complete the Work for the Project as specified in the Contract Documents, within the time required for full completion of the Work, including all labor, materials, supplies, and equipment and all other direct or indirect costs including, but not limited to, taxes, insurance and all overhead, for the following price (“Base Bid”):  
\$ \_\_\_\_\_.

2. **Addenda.** Bidder agrees that it has confirmed receipt of or access to, and reviewed, all addenda issued for this bid. Bidder waives any claims it might have against the City based on its failure to receive, access, or review any addenda for any reason. Bidder specifically acknowledges receipt of the following addenda:

Addendum:	Date Received:	Addendum:	Date Received:
#01	_____	#05	_____
#02	_____	#06	_____
#03	_____	#07	_____
#04	_____	#08	_____

3. **Bidder’s Certifications and Warranties.** By signing and submitting this Bid Proposal, Bidder certifies and warrants the following:

3.1 **Examination of Contract Documents.** Bidder has thoroughly examined the Contract Documents and represents that, to the best of Bidder’s knowledge, there are no errors, omissions, or discrepancies in the Contract Documents, subject to the limitations of Public Contract Code § 1104.

3.2 **Examination of Worksite.** Bidder has had the opportunity to examine the Worksite and local conditions at the Project location.

3.3 **Bidder Responsibility.** Bidder is a responsible bidder, with the necessary ability, capacity, experience, skill, qualifications, workforce, equipment, and resources to perform or cause the Work to be performed in accordance with the Contract Documents and within the Contract Time.

3.4 **Responsibility for Bid.** Bidder has carefully reviewed this Bid Proposal and is solely responsible for any errors or omissions contained in its completed bid. All statements and information provided in this Bid Proposal and enclosures are true and correct to the best of Bidder’s knowledge.

3.5 **Nondiscrimination.** In preparing this bid, the Bidder has not engaged in discrimination against any prospective or present employee or Subcontractor on grounds of race, color, ancestry, national origin, ethnicity, religion, sex, sexual orientation, age, disability, or marital status.

3.6 **Iran Contracting Act.** If the Contract Price exceeds \$1,000,000, Bidder is not identified on a list created under the Iran Contracting Act, Public Contract Code § 2200 et seq. (the “Act”),

as a person engaging in investment activities in Iran, as defined in the Act, or is otherwise expressly exempt under the Act.

4. **Award of Contract.** By signing and submitting this Bid Proposal, Bidder agrees that, if City issues the Notice of Potential Award to Bidder, then within ten days following issuance of the Notice of Potential Award to Bidder, Bidder will do all of the following:
- 4.1 **Execute Contract.** Enter into the Contract with City in accordance with the terms of this Bid Proposal, by signing and submitting to City the Contract prepared by City using the form included with the Contract Documents;
  - 4.2 **Submit Required Bonds.** Submit to City a payment bond and a performance bond, each for 100% of the Contract Price, using the bond forms provided and in accordance with the requirements of the Contract Documents;
  - 4.3 **Insurance Requirements.** Submit to City the insurance certificate(s) and endorsement(s) as required by the Contract Documents; and
  - 4.4 **Certificates of Reported Compliance.** Submit to City valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, if the Project involves the use of vehicles subject to the Off-Road Regulation. (See Section 16 of the Instructions to Bidders.)
5. **Bid Security.** As a guarantee that, if awarded the Contract, Bidder will perform its obligations under Section 4 above, Bidder is enclosing bid security in the amount of ten percent of its maximum bid amount in one of the following forms (check one):

\_\_\_\_\_ A cashier's check or certified check payable to City and issued by  
\_\_\_\_\_ [Bank name] in the amount of  
\$\_\_\_\_\_.

\_\_\_\_\_ A bid bond, using the Bid Bond form included with the Contract Documents, payable to City and executed by a surety licensed to do business in the State of California.

This Bid Proposal is hereby submitted on \_\_\_\_\_, 20\_\_.

s/ \_\_\_\_\_

\_\_\_\_\_  
Name and Title

s/ \_\_\_\_\_  
[See Section 3 of Instructions to Bidders]

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
License #, Expiration Date, and Classification

\_\_\_\_\_  
Address

\_\_\_\_\_  
DIR Registration #

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Contact Name

\_\_\_\_\_  
Contact Email

END OF BID PROPOSAL

### Bid Schedule

This Bid Schedule must be completed in ink and included with the sealed Bid Proposal. Pricing must be provided for each Bid Item as indicated. Items marked "(SW)" are Specialty Work that must be performed by a qualified Subcontractor. The lump sum or unit cost for each item must be inclusive of all costs, whether direct or indirect, including profit and overhead. The sum of all amounts entered in the "Extended Total Amount" column must be identical to the Base Bid price entered in Section 1 of the Bid Proposal form.

AL = Allowance      CF = Cubic Feet      CY = Cubic Yard      EA = Each      LB = Pounds  
 LF = Linear Foot      LS = Lump Sum      SF = Square Feet      TON = Ton (2000 lbs)

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
1	Bonding & Mobilization	1	LS		
2	Construction Surveying	1	LS		
3	Traffic Control	1	LS		
4	SWPPP	1	LS		
5	QSP Services	1	LS		
6	Clearing & Grubbing	1	LS		
7	Demolition	1	LS		
8	Tree Protection	1	LS		
9	Tree and Stump Removal	23	EA		
10	Earthwork - Rough Grade	50,000	CY		
11	Fine Grading	265,262	SF		
12	Bioretention Soil Mix (BSM)	470	CY		
13	Traffic Signalization	1	LS		
14	Drainage Catch basins (12" SQ)	4	EA		
15	Drainage Catch basins (18" SQ)	10	EA		
16	Storm Drain Landscape Area Drain	3	EA		
17	Storm Drain Manhole	5	EA		
18	Benching subdrain 4" Perforated	455	LF		
19	Storm Drain Piping 6" Perforated	311	LF		
20	Storm Drain Piping 6"	386	LF		
21	Storm Drain Piping 8"	241	LF		
22	Storm Drain Piping 10"	215	LF		
23	Storm Drain Piping 12"	1,002	LF		
24	Storm Drain Piping 15"	371	LF		



BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
25	Storm Drain Connection	2	EA		
26	Storm Drain Cleanouts	17	EA		
27	Sanitary Sewer Cleanouts	2	EA		
28	Sanitary Sewer Piping 4"	386	LF		
29	Sanitary Sewer Connection	1	EA		
30	Potable Water Line	90	LF		
31	Fire Water Line	45	LF		
32	Water Valve	3	EA		
33	Water Line Tie In	3	EA		
34	Backflow Preventor	1	EA		
35	Bioretention Drain Rock	392	CY		
36	Asphalt	1,740	TONS		
37	Aggregate Base Course	8,000	TONS		
38	Concrete Curb	3,900	LF		
39	Concrete Paving A	5,437	SF		
40	Landscape Wall	40	LF		
41	Curb Ramp	8	EA		
42	Traffic Signage	1	LS		
43	Concrete Valley Gutter	1,311	LF		
44	Wheel Stops	8	EA		
45	Striping Removal	1	LS		
46	Striping	1	LS		
47	Stairs & Handrails	1	LS		
48	Hydroseed	40,235	SF		
49	Shrub - 1 Gal	1,489	EA		
50	Sod	66,095	SF		
51	Trees - 24" Box	30	EA		
52	Trees - 15 Gallon	28	EA		
53	Landscape Soil Preparation	146,500	SF		
54	Root Barrier	768	LF		
55	Mulch	19,100	SF		
56	Plant Establishment Period	146,500	SF		
57	Irrigation Controller	1	EA		

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
58	Irrigation Rotors	48	EA		
59	Irrigation Bubblers	465	EA		
60	Irrigation Air relief valve assembly	12	EA		
61	Irrigation Tree Bubblers	116	EA		
62	Irrigation Lateral Line	8,700	LF		
63	Irrigation Conduit	10	LF		
64	Irrigation Gate Valves	5	EA		
65	Irrigation Drip	13,400	SF		
66	Irrigation Sleeves 4" & 8"	1,075	LF		
67	Irrigation Main line 2"-3"	1,250	LF		
68	Irrigation Main line 4" & 6"	725	LF		
69	Irrigation Master Valve and Flow Sensor	1	EA		
70	Irrigation Low voltage wire	1	LS		
71	Irrigation Quick Coupler Valves	9	EA		
72	Irrigation Remote Control Valves	34	EA		
73	Irrigation Angle Valves	4	EA		
74	Irrigation Restoration	1	LS		
75	Boulders	2	EA		
76	Fence A (6')	155	LF		
77	Fence B (8')	135	LF		
78	Gate A	1	EA		
79	Gate B	2	EA		
80	Gate C	2	EA		
81	Header	455	LF		
82	Soccer Goals	2	EA		
83	Park Sign	1	EA		
84	Relocated Park Sign	1	EA		
85	Site/Area Post top Luminaire	27	EA		
86	Lighting control system	1	LS		
87	Electrical Main Switchboard	1	LS		
88	Distribution Power	1	LS		
89	Transformers	1	LS		

BID ITEM NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT COST	EXTENDED TOTAL AMOUNT
90	Conduit and Conductors (Electrical and Lighting)	1	LS		
91	Conduit (Technology, 2-inch, 4-inch)	960	LF		
92	Handholes (Pullbox)	27	EA		
93	Underground vaults	3	EA		
94	Fill slope, Keyway and Subdrain	1	LS		

\* Final Pay Quantity

TOTAL BASE BID:      Items 1 through 94 inclusive  
\$ \_\_\_\_\_

*Note: The amount entered as the "Total Base Bid" should be identical to the Base Bid amount entered in Section 1 of the Bid Proposal form.*

BIDDER NAME:

\_\_\_\_\_

END OF BID SCHEDULE



**Noncollusion Declaration**

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the \_\_\_\_\_ [title] of \_\_\_\_\_  
[business name], 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.

This declaration is intended to comply with California Public Contract Code § 7106 and Title 23 U.S.C § 112.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_ [date], at \_\_\_\_\_ [city], \_\_\_\_\_ [state].

s/ \_\_\_\_\_

\_\_\_\_\_  
Name [print]

END OF NONCOLLUSION DECLARATION

## Bid Bond

\_\_\_\_\_ (“Bidder”) has submitted a bid, dated \_\_\_\_\_, 20\_\_\_\_ (“Bid”), to the City of Pittsburg (“City”) for work on the Pittsburg Premier Fields Project (“Project”). Under this duly executed bid bond (“Bid Bond”), Bidder as Principal and \_\_\_\_\_, its surety (“Surety”), are bound to City as obligee in the penal sum of ten percent of the maximum amount of the Bid (the “Bond Sum”). Bidder and Surety bind themselves and their respective heirs, executors, administrators, successors and assigns, jointly and severally, as follows:

1. **General.** If Bidder is awarded the Contract for the Project, Bidder will enter into the Contract with City in accordance with the terms of the Bid.
2. **Submittals.** Within ten days following issuance of the Notice of Potential Award to Bidder, Bidder must submit to City the following:
  - 2.1 **Contract.** The executed Contract, using the form provided by City in the Project contract documents (“Contract Documents”);
  - 2.2 **Payment Bond.** A payment bond for 100% of the maximum Contract Price, executed by a surety licensed to do business in the State of California using the Payment Bond form included with the Contract Documents;
  - 2.3 **Performance Bond.** A performance bond for 100% of the maximum Contract Price, executed by a surety licensed to do business in the State of California using the Performance Bond form included with the Contract Documents;
  - 2.4 **Insurance.** The insurance certificate(s) and endorsement(s) required by the Contract Documents;
  - 2.5 **Certificates of Reported Compliance.** Valid Certificates of Reported Compliance for its fleet and its listed Subcontractors, if applicable, in accordance with the In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.) (“Off-Road Regulation”), if the Project involves the use of vehicles subject to the Off-Road Regulation; and any other documents required by the Instructions to Bidders or Notice of Potential Award.
3. **Enforcement.** If Bidder fails to execute the Contract or to submit the bonds, insurance certificates, and valid Certificates of Reported Compliance as required by the Contract Documents, Surety guarantees that Bidder forfeits the Bond Sum to City. Any notice to Surety may be given in the manner specified in the Contract and delivered or transmitted to Surety as follows:

Attn: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
Email: \_\_\_\_\_
4. **Duration and Waiver.** If Bidder fulfills its obligations under Section 2, above, then this obligation will be null and void; otherwise, it will remain in full force and effect for 60 days following the bid opening or until this Bid Bond is returned to Bidder, whichever occurs first. Surety waives the provisions of Civil Code §§ 2819 and 2845.

This Bid Bond is entered into and effective on \_\_\_\_\_, 20\_\_\_\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**BIDDER:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

END OF BID BOND

**Bidder's Questionnaire**

**PITTSBURG PREMIER FIELDS PROJECT**

Within 48 hours following a request by City, a bidder must submit to City a completed, signed Bidder's Questionnaire using this form and all required attachments, including clearly labeled additional sheets as needed. City may request the Questionnaire from one or more of the apparent low bidders following the bid opening, and may use the completed Questionnaire as part of its investigation to evaluate a bidder's qualifications for this Project. The Questionnaire must be filled out completely, accurately, and legibly. Any errors, omissions, or misrepresentations in completion of the Questionnaire may be grounds for rejection of the bid or termination of a Contract awarded pursuant to the bid.

**Part A: General Information**

Bidder Business Name: \_\_\_\_\_ ("Bidder")

Check One:     Corporation (State of incorporation: \_\_\_\_\_)  
                   Partnership  
                   Sole Proprietorship  
                   Joint Venture of: \_\_\_\_\_  
                   Other: \_\_\_\_\_

Main Office Address and Phone: \_\_\_\_\_  
\_\_\_\_\_

Local Office Address and Phone: \_\_\_\_\_  
\_\_\_\_\_

Website Address: \_\_\_\_\_

Owner of Business: \_\_\_\_\_

Contact Name and Title: \_\_\_\_\_

Contact Phone and Email: \_\_\_\_\_

Bidder's California Contractor's License Number(s): \_\_\_\_\_

Bidder's DIR Registration Number: \_\_\_\_\_

**Part B: Bidder Experience**

1. How many years has Bidder been in business under its present business name? \_\_\_\_ years
2. Has Bidder completed projects similar in type and size to this Project as a general contractor?  
\_\_\_\_ Yes      \_\_\_\_ No
3. Has Bidder ever been disqualified from a bid on grounds that it is not responsible, or otherwise disqualified or debarred from bidding under state or federal law?  
\_\_\_\_ Yes      \_\_\_\_ No



If yes, provide additional information on a separate sheet regarding the disqualification or debarment, including the name and address of the agency or owner of the project, the type and size of the project, the reasons that Bidder was disqualified or debarred, and the month and year in which the disqualification or debarment occurred.

4. Has Bidder ever been terminated for cause, alleged default, or legal violation from a construction project, either as a general contractor or as a subcontractor?

\_\_\_\_\_ Yes      \_\_\_\_\_ No

If yes, provide additional information on a separate sheet regarding the termination, including the name and address of the agency or owner of the subject project, the type and size of the project, whether Bidder was under contract as a general contractor or a subcontractor, the reasons that Bidder was terminated, and the month and year in which the termination occurred.

5. Provide information about Bidder’s past projects performed as general contractor as follows:

- 5.1 Six most recently completed public works projects within the last three years;
- 5.2 Three largest completed projects within the last three years; and
- 5.3 Any project which is similar to this Project including scope and character of the work.

6. Use separate sheets to provide all of the following information for each project identified in response to the above three categories:

- 6.1 Project name, location, and description;
- 6.2 Owner (name, address, email, and phone number);
- 6.3 Prime contractor, if applicable (name, address, email, and phone number);
- 6.4 Architect or engineer (name, email, and phone number);
- 6.5 Project and/or construction manager (name, email, and phone number);
- 6.6 Scope of work performed (as general contractor or as subcontractor);
- 6.7 Initial contract price and final contract price (including change orders);
- 6.8 Original scheduled completion date and actual date of completion;
- 6.9 Time extensions granted (number of days);
- 6.10 Number and amount of stop notices or mechanic’s liens filed;
- 6.11 Amount of any liquidated damages assessed against Bidder; and
- 6.12 Nature and resolution of any project-related claim, lawsuit, mediation, or arbitration involving Bidder.

**Part C: Safety**

1. Provide Bidder’s Experience Modification Rate (EMR) for the last three years:

Year	EMR

2. Complete the following, based on information provided in Bidder’s CalOSHA Form 300 or Form 300A, Annual Summary of Work-Related Illnesses and Injuries, from the most recent past calendar year:

- 2.1 Number of lost workday cases: \_\_\_\_\_
- 2.2 Number of medical treatment cases: \_\_\_\_\_
- 2.3 Number of deaths: \_\_\_\_\_

3. Has Bidder ever been cited, fined, or prosecuted by any local, state, or federal agency, including OSHA, CalOSHA, or EPA, for violation of any law, regulation, or requirements pertaining to health and safety?

\_\_\_\_\_ Yes \_\_\_\_\_ No

If yes, provide additional information on a separate sheet regarding each such citation, fine, or prosecution, including the name and address of the agency or owner of the project, the type and size of the project, the reasons for and nature of the citation, fine, or prosecution, and the month and year in which the incident giving rise to the citation, fine, or prosecution occurred.

4. Name, title, and email for person responsible for Bidder's safety program:

\_\_\_\_\_  
Name Title Email

**Part D: Verification**

In signing this document, I, the undersigned, declare that I am duly authorized to sign and submit this Bidder's Questionnaire on behalf of the named Bidder, and that all responses and information set forth in this Bidder's Questionnaire and accompanying attachments are, to the best of my knowledge, true, accurate and complete as of the date of submission. **I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.**

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

By: \_\_\_\_\_  
Name and Title

END OF BIDDER'S QUESTIONNAIRE

## Contract

This public works contract ("Contract") is entered into by and between the City of Pittsburgh ("City") and \_\_\_\_\_ ("Contractor"), for work on the Pittsburgh Premier Fields Project ("Project").

The parties agree as follows:

1. **Award of Contract.** In response to the Notice Inviting Bids, Contractor has submitted a Bid Proposal to perform the Work to construct the Project. On \_\_\_\_\_, 20\_\_\_\_, City authorized award of this Contract to Contractor for the amount set forth in Section 4, below. City has elected to include the following Project alternate(s) in the Contract: No alternates.
2. **Contract Documents.** The Contract Documents incorporated into this Contract include and are comprised of all of the documents listed below. The definitions provided in Article 1 of the General Conditions apply to all of the Contract Documents, including this Contract.
  - 2.1 Notice Inviting Bids;
  - 2.2 Instructions to Bidders;
  - 2.3 Addenda, if any;
  - 2.4 Bid Proposal and attachments thereto;
  - 2.5 Contract;
  - 2.6 Payment and Performance Bonds;
  - 2.7 General Conditions;
  - 2.8 Special Conditions;
  - 2.9 Project Plans and Specifications;
  - 2.10 Change Orders, if any;
  - 2.11 Notice of Potential Award;
  - 2.12 Notice to Proceed; and
  - 2.13 The following: No other documents
3. **Contractor's Obligations.** Contractor will perform all of the Work required for the Project, as specified in the Contract Documents. Contractor must provide, furnish, and supply all things necessary and incidental for the timely performance and completion of the Work, including all necessary labor, materials, supplies, tools, equipment, transportation, onsite facilities, and utilities, unless otherwise specified in the Contract Documents. Contractor must use its best efforts to diligently prosecute and complete the Work in a professional and expeditious manner and to meet or exceed the performance standards required by the Contract Documents.
4. **Payment.** As full and complete compensation for Contractor's timely performance and completion of the Work in strict accordance with the terms and conditions of the Contract Documents, City will pay Contractor \$ \_\_\_\_\_ ("Contract Price") for all of Contractor's direct and indirect costs to perform the Work, including all labor, materials, supplies, equipment, taxes, insurance, bonds and all overhead costs, in accordance with the payment provisions in the General Conditions.
5. **Time for Completion.** Contractor will fully complete the Work for the Project, meeting all requirements for Final Completion, within 240 calendar days from the start date set forth in the Notice to Proceed ("Contract Time"). By signing below, Contractor expressly waives any claim for delayed early completion.
6. **Liquidated Damages.** As further specified in Section 5.4 of the General Conditions, if Contractor fails to complete the Work within the Contract Time, City will assess liquidated

damages in the amount of \$9,500 per day for each day of unexcused delay in achieving Final Completion, and such liquidated damages may be deducted from City's payments due or to become due to Contractor under this Contract.

**7. Labor Code Compliance.**

**7.1 General.** This Contract is subject to all applicable requirements of Chapter 1 of Part 7 of Division 2 of the Labor Code, including requirements pertaining to wages, working hours and workers' compensation insurance, as further specified in Article 9 of the General Conditions.

**7.2 Prevailing Wages.** This Project is subject to the prevailing wage requirements applicable to the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the Work, including employer payments for health and welfare, pension, vacation, apprenticeship and similar purposes. Copies of these prevailing rates are available online at <http://www.dir.ca.gov/DLSR>.

**7.3 DIR Registration.** City may not enter into the Contract with a bidder without proof that the bidder and its Subcontractors are registered with the California Department of Industrial Relations to perform public work pursuant to Labor Code § 1725.5, subject to limited legal exceptions.

**8. Workers' Compensation Certification.** Pursuant to Labor Code § 1861, by signing this Contract, Contractor certifies as follows: "I am aware of the provisions of Labor Code § 3700 which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work on this Contract."

**9. Conflicts of Interest.** Contractor, its employees, Subcontractors, and agents may not have, maintain, or acquire a conflict of interest in relation to this Contract in violation of any City ordinance or requirement, or in violation of any California law, including Government Code § 1090 et seq., or the Political Reform Act, as set forth in Government Code § 81000 et seq. and its accompanying regulations. Any violation of this Section constitutes a material breach of the Contract.

**10. Independent Contractor.** Contractor is an independent contractor under this Contract and will have control of the Work and the means and methods by which it is performed. Contractor and its Subcontractors are not employees of City and are not entitled to participate in any health, retirement, or any other employee benefits from City.

**11. Notice.** Any notice, billing, or payment required by or pursuant to the Contract Documents must be made in writing, signed, dated, and sent to the other party by personal delivery, U.S. Mail, a reliable overnight delivery service, or by email as a PDF file. Notice is deemed effective upon delivery, except that service by U.S. Mail is deemed effective on the second working day after deposit for delivery. Notice for each party must be given as follows:

**City:**

Public Works Department/Engineering Division  
65 Civic Avenue  
Pittsburg, CA, 94565  
(925) 252-4930

Lydia Blakley, Administrative Specialist  
[lblakley@pittsburgca.gov](mailto:lblakley@pittsburgca.gov)

Mariana Mena, Senior Engineer  
[mmena@pittsburgca.gov](mailto:mmena@pittsburgca.gov)

**Contractor:**

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Attn: \_\_\_\_\_  
Email: \_\_\_\_\_  
Copy to: \_\_\_\_\_

**12. General Provisions.**

- 12.1 Assignment and Successors.** Contractor may not assign its rights or obligations under this Contract, in part or in whole, without City’s written consent. This Contract is binding on Contractor’s and City’s lawful heirs, successors and permitted assigns.
- 12.2 Third Party Beneficiaries.** There are no intended third party beneficiaries to this Contract.
- 12.3 Governing Law and Venue.** This Contract will be governed by California law and venue will be in the Contra Costa County Superior Court, and no other place. Contractor waives any right it may have pursuant to Code of Civil Procedure § 394, to file a motion to transfer any action arising from or relating to this Contract to a venue outside of Contra Costa County, California.
- 12.4 Amendment.** No amendment or modification of this Contract will be binding unless it is in a writing duly authorized and signed by the parties to this Contract.
- 12.5 Integration.** This Contract and the Contract Documents incorporated herein, including authorized amendments or Change Orders thereto, constitute the final, complete, and exclusive terms of the agreement between City and Contractor.
- 12.6 Severability.** If any provision of the Contract Documents is determined to be illegal, invalid, or unenforceable, in whole or in part, the remaining provisions of the Contract Documents will remain in full force and effect.
- 12.7 Iran Contracting Act.** If the Contract Price exceeds \$1,000,000, Contractor certifies, by signing below, that it is not identified on a list created under the Iran Contracting Act, Public Contract Code § 2200 et seq. (the “Act”), as a person engaging in investment activities in Iran, as defined in the Act, or is otherwise expressly exempt under the Act.
- 12.8 Authorization.** Each individual signing below warrants that he or she is authorized to do so by the party that he or she represents, and that this Contract is legally binding on that party. If Contractor is a corporation, signatures from two officers of the corporation are required pursuant to California Corporations Code § 313.

*[Signatures are on the following page.]*

The parties agree to this Contract as witnessed by the signatures below:

**CITY:**

Approved as to form:

s/ \_\_\_\_\_

s/ \_\_\_\_\_

\_\_\_\_\_  
Name, Title

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

Date: \_\_\_\_\_

**CONTRACTOR:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

Seal:

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

Second Signature (See Section 12.8):

s/ \_\_\_\_\_

\_\_\_\_\_  
Name, Title

Date: \_\_\_\_\_

\_\_\_\_\_  
Contractor's California License Number(s) and Expiration Date(s)

END OF CONTRACT

## Payment Bond

The City of Pittsburg ("City") and \_\_\_\_\_ ("Contractor") have entered into a contract for work on the Pittsburg Premier Fields Project ("Project"). The Contract is incorporated by reference into this Payment Bond ("Bond").

- 1. General.** Under this Bond, Contractor as principal and \_\_\_\_\_, its surety ("Surety"), are bound to City as obligee in an amount not less than \$ \_\_\_\_\_, under California Civil Code § 9550 et seq., to ensure payment to authorized claimants. This Bond is binding on the respective successors, assigns, owners, heirs, or executors of Surety and Contractor.
- 2. Surety's Obligation.** If Contractor or any of its Subcontractors fails to pay a person authorized in California Civil Code § 9100 to assert a claim against a payment bond, any amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of Contractor and its Subcontractors under California Unemployment Insurance Code § 13020 with respect to the work and labor, then Surety will pay the obligation.
- 3. Beneficiaries.** This Bond inures to the benefit of any of the persons named in California Civil Code § 9100, so as to give a right of action to those persons or their assigns in any suit brought upon this Bond. Contractor must promptly provide a copy of this Bond upon request by any person with legal rights under this Bond.
- 4. Duration.** If Contractor promptly makes payment of all sums for all labor, materials, and equipment furnished for use in the performance of the Work required by the Contract, in conformance with the time requirements set forth in the Contract and as required by California law, Surety's obligations under this Bond will be null and void. Otherwise, Surety's obligations will remain in full force and effect.
- 5. Waivers.** Surety waives any requirement to be notified of alterations to the Contract or extensions of time for performance of the Work under the Contract. Surety waives the provisions of Civil Code §§ 2819 and 2845. City waives the requirement of a new bond for any supplemental contract under Civil Code § 9550. Any notice to Surety may be given in the manner specified in the Contract and sent to Surety as follows:

Attn: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_

- 6. Law and Venue.** This Bond will be governed by California law, and venue for any dispute pursuant to this Bond will be in the Contra Costa County Superior Court, and no other place. Surety will be responsible for City's attorneys' fees and costs in any action to enforce the provisions of this Bond.

*[Signatures are on the following page.]*



7. **Effective Date; Execution.** This Bond is entered into and is effective on \_\_\_\_\_, 20\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**CONTRACTOR:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

**APPROVED BY CITY:**

s/ \_\_\_\_\_  
John Samuelson, Public Works Director/City Engineer

\_\_\_\_\_  
Date

END OF PAYMENT BOND

## Performance Bond

The City of Pittsburg ("City") and \_\_\_\_\_ ("Contractor") have entered into a contract for work on the Pittsburg Premier Fields Project ("Project"). The Contract is incorporated by reference into this Performance Bond ("Bond").

1. **General.** Under this Bond, Contractor as principal and \_\_\_\_\_, its surety ("Surety"), are bound to City as obligee for an amount not less than \$\_\_\_\_\_ to ensure Contractor's faithful performance of its obligations under the Contract. This Bond is binding on the respective successors, assigns, owners, heirs, or executors of Surety and Contractor.
2. **Surety's Obligations.** Surety's obligations are co-extensive with Contractor's obligations under the Contract. If Contractor fully performs its obligations under the Contract, including its warranty obligations under the Contract, Surety's obligations under this Bond will become null and void. Otherwise, Surety's obligations will remain in full force and effect.
3. **Waiver.** Surety waives any requirement to be notified of and further consents to any alterations to the Contract made under the applicable provisions of the Contract Documents, including changes to the scope of Work or extensions of time for performance of Work under the Contract. Surety waives the provisions of Civil Code §§ 2819 and 2845.
4. **Application of Contract Balance.** Upon making a demand on this Bond for completion of the Work prior to acceptance of the Project, City will make the Contract Balance available to Surety for completion of the Work under the Contract. For purposes of this provision, the Contract Balance is defined as the total amount payable by City to Contractor as the Contract Price minus amounts already paid to Contractor, and minus any liquidated damages, credits, or backcharges to which City is entitled under the terms of the Contract.
5. **Contractor Default.** Upon written notification from City of Contractor's termination for default under Article 13 of the Contract General Conditions, time being of the essence, Surety must act within the time specified in Article 13 to remedy the default through one of the following courses of action:
  - 5.1 Arrange for completion of the Work under the Contract by Contractor, with City's consent, but only if Contractor is in default solely due to its financial inability to complete the Work;
  - 5.2 Arrange for completion of the Work under the Contract by a qualified contractor acceptable to City, and secured by performance and payment bonds issued by an admitted surety as required by the Contract Documents, at Surety's expense; or
  - 5.3 Waive its right to complete the Work under the Contract and reimburse City the amount of City's costs to have the remaining Work completed.
6. **Surety Default.** If Surety defaults on its obligations under the Bond, City will be entitled to recover all costs it incurs due to Surety's default, including legal, design professional, or delay costs.
7. **Notice.** Any notice to Surety may be given in the manner specified in the Contract and sent to Surety as follows:

Attn: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
Email: \_\_\_\_\_

8. **Law and Venue.** This Bond will be governed by California law, and venue for any dispute pursuant to this Bond will be in the Contra Costa County Superior Court, and no other place. Surety will be responsible for City's attorneys' fees and costs in any action to enforce the provisions of this Bond.
9. **Effective Date; Execution.** This Bond is entered into and effective on \_\_\_\_\_, 20\_\_.

**SURETY:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

(Attach Acknowledgment with Notary Seal and Power of Attorney)

**CONTRACTOR:**

\_\_\_\_\_  
Business Name

s/ \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name, Title

**APPROVED BY CITY:**

s/ \_\_\_\_\_  
John Samuelson, Public Works Director/City Engineer

\_\_\_\_\_  
Date

END OF PERFORMANCE BOND

## General Conditions

### Article 1 - Definitions

**Definitions.** The following definitions apply to all of the Contract Documents unless otherwise indicated, e.g., additional definitions that apply solely to the Specifications or other technical documents. Defined terms and titles of documents are capitalized in the Contract Documents, with the exception of the following (in any tense or form): “day,” “furnish,” “including,” “install,” “work day,” or “working day.”

**Allowance** means a specific amount that must be included in the Bid Proposal for a specified purpose.

**Article**, as used in these General Conditions, means a numbered Article of the General Conditions, unless otherwise indicated by the context.

**Change Order** means a written document duly approved and executed by City, which changes the scope of Work, the Contract Price, or the Contract Time.

**City** means the municipality which has entered into the Contract with Contractor for performance of the Work, acting through its City Council, officers, employees, City Engineer, and any other authorized representatives.

**City Engineer** means the City Engineer for City and his or her authorized delegee(s).

**Claim** means a separate demand by Contractor for a change in the Contract Time or Contract Price, that has previously been submitted to City in accordance with the requirements of the Contract Documents, and which has been rejected by City, in whole or in part; or a written demand by Contractor objecting to the amount of Final Payment.

**Contract** means the signed agreement between City and Contractor for performing the Work required for the Project, and all documents expressly incorporated therein.

**Contract Documents** means, collectively, all of the documents listed as such in Section 2 of the Contract, including the Notice Inviting Bids; the Instructions to Bidders; addenda, if any; the Bid Proposal and attachments thereto; the Contract; the Notice of Potential Award and Notice to Proceed; the payment and performance bonds; the General Conditions; the Special Conditions; the Project Plans and Specifications; any Change Orders; and any other documents which are clearly and unambiguously made part of the Contract Documents. The Contract Documents do not include documents provided “For Reference Only,” or documents that are intended solely to provide information regarding existing conditions.

**Contract Price** means the total compensation to be paid to Contractor for performance of the Work, as set forth in the Contract and as may be amended by Change Order or adjusted for an Allowance. The Contract Price is not subject to adjustment due to inflation or due to the increased cost of labor, material, supplies, or equipment following submission of the Bid Proposal.

**Contract Time** means the time specified for complete performance of the Work, as set forth in the Contract and as may be amended by Change Order.

**Contractor** means the individual, partnership, corporation, or joint-venture that has signed the Contract with City to perform the Work.

**Day** means a calendar day unless otherwise specified.

**Design Professional** means the licensed individual(s) or firm(s) retained by City to provide architectural, engineering, or other design professional services for the Project. If no Design Professional has been retained for this Project, any reference to Design Professional is deemed to refer to the Engineer.

**DIR** means the California Department of Industrial Relations.

**Drawings** has the same meaning as Plans.

**Engineer** means the City Engineer for the City of Pittsburg and his or her authorized delegees.

**Excusable Delay** is defined in Section 5.3(B), Excusable Delay.

**Extra Work** means new or unforeseen work added to the Project, as determined by the Engineer in his or her sole discretion, including Work that was not part of or incidental to the scope of the Work when the Contractor's bid was submitted; Work that is substantially different from the Work as described in the Contract Documents at bid time; or Work that results from a substantially differing and unforeseeable condition.

**Final Completion** means Contractor has fully completed all of the Work required by the Contract Documents to the City's satisfaction, including all punch list items and any required commissioning or training, and has provided the City with all required submittals, including the instructions and manuals, product warranties, and as-built drawings.

**Final Payment** means payment to Contractor of the unpaid Contract Price, including release of undisputed retention, less amounts withheld or deducted pursuant to the Contract Documents.

**Furnish** means to purchase and deliver for the Project.

**Government Code Claim** means a claim submitted pursuant to California Government Code § 900 et seq.

**Hazardous Materials** means any substance or material identified now or in the future as hazardous under any Laws, or any other substance or material that may be considered hazardous or otherwise subject to Laws governing handling, disposal, or cleanup.

**Including**, whether or not capitalized, means "including, but not limited to," unless the context clearly requires otherwise.

**Inspector** means the individual(s) or firm(s) retained or employed by City to inspect the workmanship, materials, and manner of construction of the Project and its components to ensure compliance with the Contract Documents and all Laws.

**Install** means to fix in place for materials, and to fix in place and connect for equipment.

**Laws** means all applicable local, state, and federal laws, regulations, rules, codes, ordinances, permits, orders, and the like enacted or imposed by or under the auspices of any governmental entity with jurisdiction over any of the Work or any performance of the Work, including health and safety requirements.

**Non-Excusable Delay** is defined in Section 5.3(D), Non-Excusable Delay.

**Plans** means the City-provided plans, drawings, details, or graphical depictions of the Project requirements, but does not include Shop Drawings.

**Project** means the public works project referenced in the Contract, as modified by any Project alternates elected by City, if any.

**Project Manager** means the individual designated by City to oversee and manage the Project on City's behalf and may include his or her authorized delegee(s) when the Project Manager is unavailable. If no Project Manager has been designated for this Project, any reference to Project Manager is deemed to refer to the Engineer.

**Recoverable Costs** is defined in Section 5.3(F), Recoverable Costs.

**Request for Information** or **RFI** means Contractor's written request for information about the Contract Documents, the Work or the Project, submitted to City in the manner and format specified by City.

**Section**, when capitalized in these General Conditions, means a numbered section or subsection of the General Conditions, unless the context clearly indicates otherwise.

**Shop Drawings** means drawings, plan details or other graphical depictions prepared by or on behalf of Contractor, and subject to City acceptance, which are intended to provide details for fabrication, installation, and the like, of items required by or shown in the Plans or Specifications.

**Specialty Work** means Work that must be performed by a specialized Subcontractor with the specified license or other special certification, and that the Contractor is not qualified to self-perform.

**Specifications** means the technical, text specifications describing the Project requirements, which are prepared for and incorporated into the Contract by or on behalf of City, and does not include the Contract, General Conditions or Special Conditions.

**Subcontractor** means an individual, partnership, corporation, or joint-venture retained by Contractor directly or indirectly through a subcontract to perform a specific portion of the Work. The term Subcontractor applies to subcontractors of all tiers, unless otherwise indicated by the context. A third party such as a utility performing related work on the Project is not a Subcontractor, even if Contractor must coordinate its Work with the third party.

**Technical Specifications** has the same meaning as Specifications.

**Work** means all of the construction and services necessary for or incidental to completing the Project in conformance with the requirements of the Contract Documents.

**Work Day** or **Working Day**, whether or not capitalized, means a weekday when the City is open for business, and does not include holidays observed by the City.

**Worksite** means the place or places where the Work is performed, which includes, but may extend beyond the Project site, including separate locations for staging, storage, or fabrication.

## Article 2 - Roles and Responsibilities

### 2.1 City.

(A) **City Council.** The City Council has final authority in all matters affecting the Project, except to the extent it has delegated authority to the Engineer.

(B) **Engineer.** The Engineer, acting within the authority conferred by the City Council, is responsible for administration of the Project on behalf of City, including

authority to provide directions to the Design Professional and to Contractor to ensure proper and timely completion of the Project. The Engineer's decisions are final and conclusive within the scope of his or her authority, including interpretation of the Contract Documents.

(C) **Project Manager.** The Project Manager assigned to the Project will be the primary point of contact for the Contractor and will serve as City's representative for daily administration of the Project on behalf of City. Unless otherwise specified, all of Contractor's communications to City (in any form) will go to or through the Project Manager. City reserves the right to reassign the Project Manager role at any time or to delegate duties to additional City representatives, without prior notice to or consent of Contractor.

(D) **Design Professional.** The Design Professional is responsible for the overall design of the Project and, to the extent authorized by City, may act on City's behalf to ensure performance of the Work in compliance with the Plans and Specifications, including any design changes authorized by Change Order. The Design Professional's duties may include review of Contractor's submittals, visits to any Worksite, inspecting the Work, evaluating test and inspection results, and participation in Project-related meetings, including any pre-construction conference, weekly meetings, and coordination meetings. The Design Professional's interpretation of the Plans or Specifications is final and conclusive.

## 2.2 Contractor.

(A) **General.** Contractor must provide all labor, materials, supplies, equipment, services, and incidentals necessary to perform and timely complete the Work in strict accordance with the Contract Documents, and in an economical and efficient manner in the best interests of City, and with minimal inconvenience to the public.

(B) **Responsibility for the Work and Risk of Loss.** Contractor is responsible for supervising and directing all aspects of the Work to facilitate the efficient and timely completion of the Work. Contractor is solely responsible for and required to exercise full control over the Work, including the construction means, methods, techniques, sequences, procedures, safety precautions and programs, and coordination of all portions of the Work with that of all other contractors and Subcontractors, except to the extent that the Contract Documents provide other specific instructions. Contractor's responsibilities extend to any plan, method or sequence suggested, but not required by City or specified in the Contract Documents. From the date of commencement of the Work until either the date on which City formally accepts the Project or the effective date of termination of the Contract, whichever is later, Contractor bears all risks of injury or damage to the Work and the materials and equipment delivered to any Worksite, by any cause including fire, earthquake, wind, weather, vandalism, or theft.

(C) **Project Administration.** Contractor must provide sufficient and competent administration, staff, and skilled workforce necessary to perform and timely complete the Work in accordance with the Contract Documents. Before starting the Work, Contractor must designate in writing and provide complete contact information, including telephone numbers and email address, for the officer or employee in Contractor's organization who is to serve as Contractor's primary representative for the Project, and who has authority to act on Contractor's behalf. A Subcontractor may not serve as Contractor's primary representative.

(D) **On-Site Superintendent.** Contractor must, at all times during performance of the Work, provide a qualified and competent full-time superintendent acceptable to City, and assistants as necessary, who must be physically present at the Project site while any

aspect of the Work is being performed. The superintendent must have full authority to act and communicate on behalf of Contractor, and Contractor will be bound by the superintendent's communications to City. City's approval of the superintendent is required before the Work commences. If City is not satisfied with the superintendent's performance, City may request a qualified replacement of the superintendent. Failure to comply may result in temporary suspension of the Work, at Contractor's sole expense and with no extension of Contract Time, until an approved superintendent is physically present to supervise the Work. Contractor must provide written notice to City, as soon as practicable, before replacing the superintendent.

(E) **Standards.** Contractor must, at all times, ensure that the Work is performed in an efficient, skillful manner following best practices and in full compliance with the Contract Documents, Laws, and applicable manufacturer's recommendations. Contractor has a material and ongoing obligation to provide true and complete information, to the best of its knowledge, with respect to all records, documents, or communications pertaining to the Project, including oral or written reports, statements, certifications, Change Order requests, or Claims.

(F) **Meetings.** Contractor, its project manager, superintendent and any primary Subcontractors requested by City, must attend a pre-construction conference, if requested by City, as well as weekly Project progress meetings scheduled with City. If applicable, Contractor may also be required to participate in coordination meetings with other parties relating to other work being performed on or near the Project site or in relation to the Project, including work or activities performed by City, other contractors, or other utility owners.

(G) **Construction Records.** Contractor will maintain up-to-date, thorough, legible, and dated daily job reports, which document all significant activity on the Project for each day that Work is performed on the Project. The daily report for each day must include the number of workers at the Project site; primary Work activities; major deliveries; problems encountered, including injuries, if any; weather and site conditions; and delays, if any. Contractor will take date and time-stamped photographs to document general progress of the Project, including site conditions prior to construction activities, before and after photographs at offset trench laterals, existing improvements and utilities, damage and restoration. Contractor will maintain copies of all subcontracts, Project-related correspondence with Subcontractors, and records of meetings with Subcontractors. Upon request by the City, Contractor will permit review of and/or provide copies of any of these construction records.

(H) **Responsible Party.** Contractor is solely responsible to City for the acts or omissions of any Subcontractors, or any other party or parties performing portions of the Work or providing equipment, materials or services for or on behalf of Contractor or the Subcontractors. Upon City's written request, Contractor must promptly and permanently remove from the Project, at no cost to City, any employee or Subcontractor or employee of a Subcontractor who the Engineer has determined to be incompetent, intemperate or disorderly, or who has failed or refused to perform the Work as required under the Contract Documents.

(I) **Correction of Defects.** Contractor must promptly correct, at Contractor's sole expense, any Work that is determined by City to be deficient or defective in any way, including workmanship, materials, parts, or equipment. Workmanship, materials, parts, or equipment that do not conform to the requirements under the Plans, Specifications, and other Contract Documents, as determined by City, will be considered defective and subject to rejection. Contractor must also promptly correct, at Contractor's sole expense, any Work performed beyond the lines and grades shown on the Plans or established by City, and any Extra Work performed without City's prior written approval. If Contractor



fails to correct or to take reasonable steps toward correcting defective Work within five days following notice from City, or within the time specified in City's notice to correct, City may elect to have the defective Work corrected by its own forces or by a third party, in which case the cost of correction will be deducted from the Contract Price. If City elects to correct defective Work due to Contractor's failure or refusal to do so, City or its agents will have the right to take possession of and use any equipment, supplies, or materials available at the Project site or any Worksite on City property, in order to effectuate the correction, at no extra cost to City. Contractor's warranty obligations under Section 11.2, Warranty, will not be waived nor limited by City's actions to correct defective Work under these circumstances. Alternatively, City may elect to retain defective Work, and deduct the difference in value, as determined by the Engineer, from payments otherwise due to Contractor. This paragraph applies to any defective Work performed by Contractor during the one-year warranty period under Section 11.2.

(J) **Contractor's Records.** Contractor must maintain all of its records relating to the Project in any form, including paper documents, photos, videos, electronic records, approved samples, and the construction records required pursuant to paragraph (G), above. Project records subject to this provision include complete Project cost records and records relating to preparation of Contractor's bid, including estimates, take-offs, and price quotes or bids.

(1) Contractor's cost records must include all supporting documentation, including original receipts, invoices, and payroll records, evidencing its direct costs to perform the Work, including, but not limited to, costs for labor, materials, and equipment. Each cost record should include, at a minimum, a description of the expenditure with references to the applicable requirements of the Contract Documents, the amount actually paid, the date of payment, and whether the expenditure is part of the original Contract Price, related to an executed Change Order, or otherwise categorized by Contractor as Extra Work. Contractor's failure to comply with this provision as to any claimed cost operates as a waiver of any rights to recover the claimed cost.

(2) Contractor must continue to maintain its Project-related records in an organized manner for a period of five years after City's acceptance of the Project or following Contract termination, whichever occurs first. Subject to prior notice to Contractor, City is entitled to inspect or audit any of Contractor's records relating to the Project during Contractor's normal business hours. Contractor's records may also be subject to examination and audit by the California State Auditor, pursuant to Government Code § 8546.7. The record-keeping requirements set forth in this subsection 2.2(J) will survive expiration or termination of the Contract.

(K) **Copies of Project Documents.** Contractor and its Subcontractors must keep copies, at the Project site, of all Work-related documents, including the Contract, permit(s), Plans, Specifications, addenda, Contract amendments, Change Orders, RFIs and RFI responses, Shop Drawings, as-built drawings, schedules, daily records, testing and inspection reports or results, and any related written interpretations. These documents must be available to City for reference at all times during construction of the Project.

### 2.3 Subcontractors.

(A) **General.** All Work which is not performed by Contractor with its own forces must be performed by Subcontractors. City reserves the right to approve or reject any and all Subcontractors proposed to perform the Work, for reasons including the Subcontractor's poor reputation, lack of relevant experience, financial instability, and lack of technical

ability or adequate trained workforce. Each Subcontractor must obtain a City business license before performing any Work.

(B) **Contractual Obligations.** Contractor must require each Subcontractor to comply with the provisions of the Contract Documents as they apply to the Subcontractor's portion(s) of the Work, including the generally applicable terms of the Contract Documents, and to likewise bind their subcontractors. Contractor will provide that the rights that each Subcontractor may have against any manufacturer or supplier for breach of warranty or guarantee relating to items provided by the Subcontractor for the Project, will be assigned to City. Nothing in these Contract Documents creates a contractual relationship between a Subcontractor and City, but City is deemed to be a third-party beneficiary of the contract between Contractor and each Subcontractor.

(C) **Termination.** If the Contract is terminated, each Subcontractor's agreement must be assigned by Contractor to City, subject to the prior rights of any surety, but only if and to the extent that City accepts, in writing, the assignment by written notification, and assumes all rights and obligations of Contractor pursuant to each such subcontract agreement.

(D) **Substitution of Subcontractor.** If Contractor requests substitution of a listed Subcontractor under Public Contract Code § 4107, Contractor is solely responsible for all costs City incurs in responding to the request, including legal fees and costs to conduct a hearing, and any increased subcontract cost to perform the Work that was to be performed by the listed Subcontractor. If City determines that a Subcontractor is unacceptable to City based on the Subcontractor's failure to satisfactorily perform its Work, or for any of the grounds for substitution listed in Public Contract Code § 4107(a), City may request removal of the Subcontractor from the Project. Upon receipt of a written request from City to remove a Subcontractor pursuant to this paragraph, Contractor will immediately remove the Subcontractor from the Project and, at no further cost to City, will either (1) self-perform the remaining Work to the extent that Contractor is duly licensed and qualified to do so, or (2) substitute a Subcontractor that is acceptable to City, in compliance with Public Contract Code § 4107, as applicable.

## 2.4 Coordination of Work.

(A) **Concurrent Work.** City reserves the right to perform, have performed, or permit performance of other work on or adjacent to the Project site while the Work is being performed for the Project. Contractor is responsible for coordinating its Work with other work being performed on or adjacent to the Project site, including by any utility companies or agencies, and must avoid hindering, delaying, or interfering with the work of other contractors, individuals, or entities, and must ensure safe and reasonable site access and use as required or authorized by City. To the full extent permitted by law, Contractor must hold harmless and indemnify City against any and all claims arising from or related to Contractor's avoidable, negligent, or willful hindrance of, delay to, or interference with the work of any utility company or agency or another contractor or subcontractor.

(B) **Coordination.** If Contractor's Work will connect or interface with work performed by others, Contractor is responsible for independently measuring and visually inspecting such work to ensure a correct connection and interface. Contractor is responsible for any failure by Contractor or its Subcontractors to confirm measurements before proceeding with connecting Work. Before proceeding with any portion of the Work affected by the construction or operations of others, Contractor must give the Project Manager prompt written notification of any defects Contractor discovers which will prevent the proper execution of the Work. Failure to give notice of any known or reasonably discoverable defects will be deemed acknowledgement by Contractor that the work of others is not

defective and will not prevent the proper execution of the Work. Contractor must also promptly notify City if work performed by others, including work or activities performed by City's own forces, is operating to hinder, delay, or interfere with Contractor's timely performance of the Work. City reserves the right to backcharge Contractor for any additional costs incurred due to Contractor's failure to comply with the requirements in this Section 2.4.

**2.5 Submittals.** Unless otherwise specified, Contractor must submit to the Engineer for review and acceptance, all schedules, Shop Drawings, samples, product data, and similar submittals required by the Contract Documents, or upon request by the Engineer. Unless otherwise specified, all submittals, including Requests for Information, are subject to the general provisions of this Section, as well as specific submittal requirements that may be included elsewhere in the Contract Documents, including the Special Conditions or Specifications. The Engineer may require submission of a submittal schedule at or before a pre-construction conference, as may be specified in the Notice to Proceed.

(A) **General.** Contractor is responsible for ensuring that its submittals are accurate and conform to the Contract Documents.

(B) **Time and Manner of Submission.** Contractor must ensure that its submittals are prepared and delivered in a manner consistent with the current City-accepted schedule for the Work and within the applicable time specified in the Contract Documents, or if no time is specified, in such time and sequence so as not to delay the performance of the Work or completion of the Project.

(C) **Required Contents.** Each submittal must include the Project name and contract number, Contractor's name and address, the name and address of any Subcontractor or supplier involved with the submittal, the date, and references to applicable Specification section(s) and/or drawing and detail number(s).

(D) **Required Corrections.** If corrections are required, Contractor must promptly make and submit any required corrections as specified in full conformance with the requirements of this Section, or other requirements that apply to that submittal.

(E) **Effect of Review and Acceptance.** Review and acceptance of a submittal by City will not relieve Contractor from complying with the requirements of the Contract Documents. Contractor is responsible for any errors in any submittal, and review or acceptance of a submittal by City is not an assumption of risk or liability by City.

(F) **Enforcement.** Any Work performed or any material furnished, installed, fabricated or used without City's prior acceptance of a required submittal is performed or provided at Contractor's risk, and Contractor may be required to bear the costs incident thereto, including the cost of removing and replacing such Work, repairs to other affected portions of the Work or material, and the cost of additional time or services required of City, including costs for the Design Professional, Project Manager, or Inspector.

(G) **Excessive RFIs.** A RFI will be considered excessive or unnecessary if City determines that the explanation or response to the RFI is clearly and unambiguously discernable from the Contract Documents. City's costs to review and respond to excessive or unnecessary RFIs may be deducted from payments otherwise due to Contractor.

**2.6 Shop Drawings.** When Shop Drawings are required by the Specifications or requested by the Engineer, they must be prepared according to best practices at Contractor's expense. The Shop Drawings must be of a size and scale to clearly show all necessary details. Unless otherwise specified by City, Shop Drawings must be provided to the

Engineer for review and acceptance at least 30 days before the Work will be performed. If City requires changes, the corrected Shop Drawings must be resubmitted to the Engineer for review within the time specified by the Engineer. For all Project components requiring Shop Drawings, Contractor will not furnish materials or perform any Work until the Shop Drawings for those components are accepted by City. Contractor is responsible for any errors or omissions in the Shop Drawings, shop fits and field corrections; any deviations from the Contract Documents; and for the results obtained by the use of Shop Drawings. Acceptance of Shop Drawings by City does not relieve Contractor of Contractor's responsibility.

- 2.7 Access to Work.** Contractor must afford prompt and safe access to any Worksite by City and its employees, agents, or consultants authorized by City; and upon request by City, Contractor must promptly arrange for City representatives to visit or inspect manufacturing sites or fabrication facilities for items to be incorporated into the Work.
- 2.8 Personnel.** Contractor and its Subcontractors must employ only competent and skillful personnel to perform the Work. Contractor and its Subcontractor's supervisors, security or safety personnel, and employees who have unescorted access to the Project site must possess proficiency in English sufficient to read, understand, receive, and implement oral or written communications or instructions relating to their respective job functions, including safety and security requirements. Upon written notification from the Engineer, Contractor and its Subcontractors must immediately discharge any personnel who are incompetent, disorderly, disruptive, threatening, abusive, or profane, or otherwise refuse or fail to comply with the requirements of the Contract Documents or Laws, including Laws pertaining to health and safety. Any such discharged personnel may not be re-employed or permitted on the Project in any capacity without City's prior written consent.

### **Article 3 - Contract Documents**

#### **3.1 Interpretation of Contract Documents.**

(A) **Plans and Specifications.** The Plans and Specifications included in the Contract Documents are complementary. If Work is shown on one but not on the other, Contractor must perform the Work as though fully described on both, consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. The Plans and Specifications are deemed to include and require everything necessary and reasonably incidental to completion of the Work, whether or not particularly mentioned or shown. Contractor must perform all Work and services and supply all things reasonably related to and inferable from the Contract Documents. In the event of a conflict between the Plans and Specifications, the Specifications will control, unless the drawing(s) at issue are dated later than the Specification(s) at issue. Detailed drawings take precedence over general drawings, and large-scale drawings take precedence over smaller scale drawings. Any arrangement or division of the Plans and Specifications into sections is for convenience and is not intended to limit the Work required by separate trades. A conclusion presented in the Plans or Specifications is only a recommendation. Actual locations and depths must be determined by Contractor's field investigation. Contractor may request access to underlying or background information in City's possession that is necessary for Contractor to form its own conclusions.

(B) **Duty to Notify and Seek Direction.** If Contractor becomes aware of a changed condition in the Project, or of any ambiguity, conflict, inconsistency, discrepancy, omission, or error in the Contract Documents, including the Plans or Specifications, Contractor must promptly submit a Request for Information to the Engineer and wait for a response from City before proceeding further with the related Work. The RFI must notify City of the issue and request clarification, interpretation or direction. The Engineer's

clarification, interpretation or direction will be final and binding on Contractor. If Contractor proceeds with the related Work before obtaining City's response, Contractor will be responsible for any resulting costs, including the cost of correcting any incorrect or defective Work that results. Timely submission of a clear and complete RFI is essential to avoiding delay. Delay resulting from Contractor's failure to submit a timely and complete RFI to the Engineer is Non-Excusable Delay. If Contractor believes that City's response to an RFI justifies a change to the Contract Price or Contract Time, Contractor must perform the Work as directed, but may submit a timely Change Order request in accordance with the Contract Documents. (See Articles 5 and 6.)

(C) **Figures and Dimensions.** Figures control over scaled dimensions.

(D) **Technical or Trade Terms.** Any terms that have well-known technical or trade meanings will be interpreted in accordance with those meanings, unless otherwise specifically defined in the Contract Documents.

(E) **Measurements.** Contractor must verify all relevant measurements in the Contract Documents and at the Project site before ordering any material or performing any Work, and will be responsible for the correctness of those measurements or for costs that could have been avoided by independently verifying measurements.

(F) **Compliance with Laws.** The Contract Documents are intended to comply with Laws and will be interpreted to comply with Laws.

**3.2 Order of Precedence.** Information included in one Contract Document but not in another will not be considered a conflict or inconsistency. Unless otherwise specified in the Special Conditions, in case of any conflict or inconsistency among the Contract Documents, the following order of precedence will apply, beginning from highest to lowest, with the most recent version taking precedent over an earlier version:

- (A) Change Orders;
- (B) Addenda;
- (C) Contract;
- (D) Notice to Proceed;
- (E) Attachment B – Federal Contract Requirements (only if used);
- (F) Special Conditions;
- (G) General Conditions;
- (H) Payment and Performance Bonds;
- (I) Specifications;
- (J) Plans;
- (K) Notice of Potential Award;
- (L) Notice Inviting Bids;
- (M) Attachment A – Federal Bidding Requirements (only if used);
- (N) Instructions to Bidders;
- (O) Contractor's Bid Proposal and attachments;
- (P) the City's standard specifications, as applicable; and
- (Q) Any generic documents prepared by and on behalf of a third party, that were not prepared specifically for this Project, such as the Caltrans Standard Specifications or Caltrans Special Provisions.

**3.3 Caltrans Standard Specifications.** Any reference to or incorporation of the Standard Specifications of the State of California, Department of Transportation ("Caltrans"), including "Standard Specifications," "Caltrans Specifications," "State Specifications," or "CSS," means the most current edition of Caltrans' Standard Specifications, unless otherwise specified ("Caltrans Standard Specifications"), including the most current amendments as of the date that Contractor's bid was submitted for this Project. The

following provisions apply to use of or reference to the Caltrans Standard Specifications or Special Provisions:

(A) **Limitations.** The “General Provisions” of the Caltrans Standard Specifications, i.e., sections 1 through 9, do not apply to these Contract Documents with the exception of any specific provisions, if any, which are expressly stated to apply to these Contract Documents.

(B) **Conflicts or Inconsistencies.** If there is a conflict or inconsistency between any provision in the Caltrans Standard Specifications or Special Provisions and a provision of these Contract Documents, as determined by City, the provision in the Contract Documents will govern.

(C) **Meanings.** Terms used in the Caltrans Standard Specifications or Special Provisions are to be interpreted as follows:

(1) Any reference to the “Engineer” is deemed to mean the City Engineer.

(2) Any reference to the “Special Provisions” is deemed to mean the Special Conditions, unless the Caltrans Special Provisions are expressly included in the Contract Documents listed in Section 2 of the Contract.

(3) Any reference to the “Department” or “State” is deemed to mean City.

**3.4 For Reference Only.** Contractor is responsible for the careful review of any document, study, or report provided by City or appended to the Contract Documents solely for informational purposes and identified as “For Reference Only.” Nothing in any document, study, or report so appended and identified is intended to supplement, alter, or void any provision of the Contract Documents. Contractor is advised that City or its representatives may be guided by information or recommendations included in such reference documents, particularly when making determinations as to the acceptability of proposed materials, methods, or changes in the Work. Any record drawings or similar final or accepted drawings or maps that are not part of the Contract Documents are deemed to be For Reference Only. The provisions of the Contract Documents are not modified by any perceived or actual conflict with provisions in any document that is provided For Reference Only.

**3.5 Current Versions.** Unless otherwise specified by City, any reference to standard specifications, technical specifications, or any City or state codes or regulations means the latest specification, code, or regulation in effect on the date that bids were due.

**3.6 Conformed Copies.** If City prepares a conformed set of the Contract Documents following award of the Contract, it will provide Contractor with two hard copy (paper) sets and one copy of the electronic file in PDF format. It is Contractor’s responsibility to ensure that all Subcontractors, including fabricators, are provided with the conformed set of the Contract Documents at Contractor’s sole expense.

**3.7 Ownership.** No portion of the Contract Documents may be used for any purpose other than construction of the Project, without prior written consent from City. Contractor is deemed to have conveyed the copyright in any designs, drawings, specifications, Shop Drawings, or other documents (in paper or electronic form) developed by Contractor for the Project, and City will retain all rights to such works, including the right to possession.

## Article 4 - Bonds, Indemnity, and Insurance

- 4.1 Payment and Performance Bonds.** Within ten days following issuance of the Notice of Potential Award, Contractor is required to provide a payment bond and a performance bond, each in the penal sum of not less than 100% of the Contract Price, and each executed by Contractor and its surety using the bond forms included with the Contract Documents.
- (A) **Surety.** Each bond must be issued and executed by a surety admitted in California. If an issuing surety cancels the bond or becomes insolvent, within seven days following written notice from City, Contractor must substitute a surety acceptable to City. If Contractor fails to substitute an acceptable surety within the specified time, City may, at its sole discretion, withhold payment from Contractor until the surety is replaced to City's satisfaction, or terminate the Contract for default.
- (B) **Supplemental Bonds for Increase in Contract Price.** If the Contract Price increases during construction by five percent or more over the original Contract Price, Contractor must provide supplemental or replacement bonds within ten days of written notice from City pursuant to this Section, covering 100% of the increased Contract Price and using the bond forms included with the Contract Documents.
- 4.2 Indemnity.** To the fullest extent permitted by law, Contractor must indemnify, defend, and hold harmless City, its Council, officers, officials, employees, agents, volunteers, and consultants (individually, an "Indemnitee," and collectively the "Indemnitees") from and against any and all liability, loss, damage, claims, causes of action, demands, charges, fines, costs, and expenses (including, without limitation, attorney fees, expert witness fees, paralegal fees, and fees and costs of litigation or arbitration) (collectively, "Liability") of every nature arising out of or in connection with the acts or omissions of Contractor, its employees, Subcontractors, representatives, or agents, in bidding or performing the Work or in failing to comply with any obligation of Contractor under the Contract, except such Liability caused by the active negligence, sole negligence, or willful misconduct of an Indemnitee. This indemnity requirement applies to any Liability arising from alleged defects in the content or manner of submission of Contractor's bid for the Contract. Contractor's failure or refusal to timely accept a tender of defense pursuant to this Contract will be deemed a material breach of the Contract. City will timely notify Contractor upon receipt of any third-party claim relating to the Contract, as required by Public Contract Code § 9201. Contractor waives any right to express or implied indemnity against any Indemnitee. Contractor's indemnity obligations under this Contract will survive the expiration or any early termination of the Contract.
- 4.3 Insurance.** No later than ten days following issuance of the Notice of Potential Award, Contractor must procure and provide proof of the insurance coverage required by this Section in the form of certificates and endorsements acceptable to City. The required insurance must cover the activities of Contractor and its Subcontractors relating to or arising from the performance of the Work, and must remain in full force and effect at all times during the period covered by the Contract, through the date of City's acceptance of the Project. All required insurance must be issued by a company licensed to do business in the State of California, and each such insurer must have an A.M. Best's financial strength rating of "A" or better and a financial size rating of "VIII" or better. If Contractor fails to provide any of the required coverage in full compliance with the requirements of the Contract Documents, City may, at its sole discretion, purchase such coverage at Contractor's expense and deduct the cost from payments due to Contractor, or terminate the Contract for default. The procurement of the required insurance will not be construed to limit Contractor's liability under this Contract or to fulfill Contractor's indemnification obligations under this Contract.

(A) **Policies and Limits.** The following insurance policies and limits are required for this Contract, unless otherwise specified in the Special Conditions:

(1) **Commercial General Liability (“CGL”) Insurance:** The CGL insurance policy must be issued on an occurrence basis, written on a comprehensive general liability form, and must include coverage for liability arising from Contractor’s or its Subcontractor’s acts or omissions in the performance of the Work, including contractor’s protective coverage, contractual liability, products and completed operations, and broad form property damage, with limits of at least \$2,000,000 per occurrence and at least \$4,000,000 general aggregate. The CGL insurance coverage may be arranged under a single policy for the full limits required or by a combination of underlying policies with the balance provided by excess or umbrella policies, provided each such policy complies with the requirements set forth in this Section, including required endorsements.

(2) **Automobile Liability Insurance:** The automobile liability insurance policy must provide coverage of at least \$2,000,000 combined single-limit per accident for bodily injury, death, or property damage, including hired and non-owned auto liability.

(3) **Workers’ Compensation Insurance and Employer’s Liability:** The workers’ compensation and employer’s liability insurance policy must comply with the requirements of the California Labor Code, providing coverage of at least \$1,000,000 or as otherwise required by the statute. If Contractor is self-insured, Contractor must provide its Certificate of Permission to Self-Insure, duly authorized by the DIR.

(4) **Pollution Liability Insurance:** The pollution liability insurance policy must be issued on an occurrence basis, providing coverage of at least \$2,000,000 for all loss arising out of claims for bodily injury, death, property damage, or environmental damage caused by pollution conditions resulting from the Work.

(5) **Builder’s Risk Insurance:** The builder’s risk insurance policy must be issued on an occurrence basis, for all-risk or “all perils” coverage on a 100% completed value basis on the insurable portion of the Project for the benefit of City.

(B) **Notice.** Each certificate of insurance must state that the coverage afforded by the policy or policies will not be reduced, cancelled or allowed to expire without at least 30 days written notice to City, unless due to non-payment of premiums, in which case ten days written notice must be made to City.

(C) **Waiver of Subrogation.** Each required policy must include an endorsement providing that the carrier will waive any right of subrogation it may have against City.

(D) **Required Endorsements.** The CGL policy, automobile liability policy, pollution liability policy, and builder’s risk policy must include the following specific endorsements:

(1) The City, including its Council, officials, officers, employees, agents, volunteers and consultants (collectively, “Additional Insured”) must be named as an additional insured for all liability arising out of the operations by or on behalf of the named insured, and the policy must protect the Additional Insured against any and all liability for personal injury, death or property damage or destruction arising directly or indirectly in the performance of the Contract. The additional insured endorsement must be provided using ISO form CG 20 10 11 85 or equivalent form(s) approved by the City.



(2) The inclusion of more than one insured will not operate to impair the rights of one insured against another, and the coverages afforded will apply as though separate policies have been issued to each insured.

(3) The insurance provided by Contractor is primary and no insurance held or owned by any Additional Insured may be called upon to contribute to a loss.

(4) This policy does not exclude explosion, collapse, underground excavation hazard, or removal of lateral support.

(E) **Contractor's Responsibilities.** This Section 4.3 establishes the minimum requirements for Contractor's insurance coverage in relation to this Project, but is not intended to limit Contractor's ability to procure additional or greater coverage. Contractor is responsible for its own risk assessment and needs and is encouraged to consult its insurance provider to determine what coverage it may wish to carry beyond the minimum requirements of this Section. Contractor is solely responsible for the cost of its insurance coverage, including premium payments, deductibles, or self-insured retentions, and no Additional Insured will be responsible or liable for any of the cost of Contractor's insurance coverage.

(F) **Deductibles and Self-Insured Retentions.** Any deductibles or self-insured retentions that apply to the required insurance (collectively, "deductibles") in excess of \$100,000 are subject to approval by the City's Risk Manager, acting in his or her sole discretion, and must be declared by Contractor when it submits its certificates of insurance and endorsements pursuant to this Section 4.3. If the City's Risk Manager determines that the deductibles are unacceptably high, at City's option, Contractor must either reduce or eliminate the deductibles as they apply to City and all required Additional Insured; or must provide a financial guarantee, to City's satisfaction, guaranteeing payment of losses and related investigation, claim administration, and legal expenses.

(G) **Subcontractors.** Contractor must ensure that each Subcontractor is required to maintain the same insurance coverage required under this Section 4.3, with respect to its performance of Work on the Project, including those requirements related to the Additional Insureds and waiver of subrogation, but excluding pollution liability or builder's risk insurance unless otherwise specified in the Special Conditions. A Subcontractor may be eligible for reduced insurance coverage or limits, but only to the extent approved in writing in advance by the City's Risk Manager. Contractor must confirm that each Subcontractor has complied with these insurance requirements before the Subcontractor is permitted to begin Work on the Project. Upon request by the City, Contractor must provide certificates and endorsements submitted by each Subcontractor to prove compliance with this requirement. The insurance requirements for Subcontractors do not replace or limit the Contractor's insurance obligations.

## Article 5 - Contract Time

**5.1 Time is of the Essence.** Time is of the essence in Contractor's performance and completion of the Work, and Contractor must diligently prosecute the Work and complete it within the Contract Time.

(A) **General.** Contractor must commence the Work on the date indicated in the Notice to Proceed and must fully complete the Work in strict compliance with all requirements of the Contract Documents and within the Contract Time. Contractor may not begin performing the Work before the date specified in the Notice to Proceed.

(B) **Authorization.** Contractor is not entitled to compensation or credit for any Work performed before the date specified in the Notice to Proceed, with the exception of any schedules, submittals, or other requirements, if any, that must be provided or performed before issuance of the Notice to Proceed.

(C) **Rate of Progress.** Contractor and its Subcontractors must, at all times, provide workers, materials, and equipment sufficient to maintain the rate of progress necessary to ensure full completion of the Work within the Contract Time. If City determines that Contractor is failing to prosecute the Work at a sufficient rate of progress, City may, in its sole discretion, direct Contractor to provide additional workers, materials, or equipment, or to work additional hours or days without additional cost to City, in order to achieve a rate of progress satisfactory to City. If Contractor fails to comply with City's directive in this regard, City may, at Contractor's expense, separately contract for additional workers, materials, or equipment or use City's own forces to achieve the necessary rate of progress. Alternatively, City may terminate the Contract based on Contractor's default.

**5.2 Schedule Requirements.** Contractor must prepare all schedules using standard, commercial scheduling software acceptable to the Engineer, and must provide the schedules in electronic and paper form as requested by the Engineer. In addition to the general scheduling requirements set forth below, Contractor must also comply with any scheduling requirements included in the Special Conditions or in the Technical Specifications.

(A) **Baseline (As-Planned) Schedule.** Within ten calendar days following City's issuance of the Notice to Proceed (or as otherwise specified in the Notice to Proceed), Contractor must submit to City for review and acceptance a baseline (as-planned) schedule using critical path methodology showing in detail how Contractor plans to perform and fully complete the Work within the Contract Time, including labor, equipment, materials, and fabricated items. The baseline schedule must show the order of the major items of Work and the dates of start and completion of each item, including when the materials and equipment will be procured. The schedule must also include the work of all trades, reflecting anticipated labor or crew hours and equipment loading for the construction activities, and must be sufficiently comprehensive and detailed to enable progress to be monitored on a day-by-day basis. For each activity, the baseline schedule must be dated, provided in the format specified in the Contract Documents or as required by City, and must include, at a minimum, a description of the activity, the start and completion dates of the activity, and the duration of the activity.

(1) **Specialized Materials Ordering.** Within five calendar days following issuance of the Notice to Proceed, Contractor must order any specialized material or equipment for the Work that is not readily available from material suppliers. Contractor must also retain documentation of the purchase order date(s).

(B) **City's Review of Schedules.** City will review and may note exceptions to the baseline schedule, and to the progress schedules submitted as required below, to assure completion of the Work within the Contract Time. Contractor is solely responsible for resolving any exceptions noted in a schedule and, within seven days, must correct the schedule to address the exceptions. City's review or acceptance of Contractor's schedules will not operate to waive or limit Contractor's duty to complete the Project within the Contract Time, nor to waive or limit City's right to assess liquidated damages for Contractor's unexcused failure to do so.

(C) **Progress Schedules.** After City accepts the final baseline schedule with no exceptions, Contractor must submit an updated progress schedule and three-week look-ahead schedule, in the format specified by City, for review and acceptance with each application for a progress payment, or when otherwise specified by City, until completion

of the Work. The updated progress schedule must: show how the actual progress of the Work as constructed to date compares to the baseline schedule; reflect any proposed changes in the construction schedule or method of operations, including to achieve Project milestones within the Contract Time; and identify any actual or potential impacts to the critical path. Contractor must also submit periodic reports to City of any changes in the projected material or equipment delivery dates for the Project.

(1) **Float.** The progress schedule must show early and late completion dates for each task. The number of days between those dates will be designated as the "float." Any float belongs to the Project and may be allocated by the Engineer to best serve timely completion of the Project.

(2) **Failure to Submit Schedule.** Reliable, up-to-date schedules are essential to efficient and cost-effective administration of the Project and timely completion. If Contractor fails to submit a schedule within the time periods specified in this Section, or submits a schedule to which City has noted exceptions that are not corrected, City may withhold up to five percent from payment(s) otherwise due to Contractor until the exceptions are resolved, the schedule is corrected and resubmitted, and City has accepted the schedule. In addition, Contractor's failure to comply with the schedule requirements in this Section 5.2 will be deemed a material default and a waiver of any claims for Excusable Delay or loss of productivity arising during any period when Contractor is out of compliance, subject only to the limits of Public Contract Code § 7102.

(D) **Recovery Schedule.** If City determines that the Work is more than one week behind schedule, within seven days following written notice of such determination, Contractor must submit a recovery schedule, showing how Contractor intends to perform and complete the Work within the Contract Time, based on actual progress to date.

(E) **Effect of Acceptance.** Contractor and its Subcontractors must perform the Work in accordance with the most current City-accepted schedule unless otherwise directed by City. City's acceptance of a schedule does not operate to extend the time for completion of the Work or any component of the Work, and will not affect City's right to assess liquidated damages for Contractor's unexcused delay in completing the Work within the Contract Time.

(F) **Posting.** Contractor must at all times prominently post a copy of the most current City-accepted progress or recovery schedule in its on-site office.

(G) **Reservation of Rights.** City reserves the right to direct the sequence in which the Work must be performed or to make changes in the sequence of the Work in order to facilitate the performance of work by City or others, or to facilitate City's use of its property. The Contract Time or Contract Price may be adjusted to the extent such changes in sequence actually increase or decrease Contractor's time or cost to perform the Work.

(H) **Authorized Working Days and Times.** Contractor is limited to working Monday through Friday, excluding holidays, during City's normal business hours, except as provided in the Special Conditions or as authorized in writing by City. City reserves the right to charge Contractor for additional costs incurred by City due to Work performed on days or during hours not expressly authorized in the Contract Documents, including reimbursement of costs incurred for inspection, testing, and construction management services.

### 5.3 Delay and Extensions of Contract Time.

(A) **Notice of Delay.** If Contractor becomes aware of any actual or potential delay affecting the critical path, Contractor must promptly notify the Engineer in writing, regardless of the nature or cause of the delay, so that City has a reasonable opportunity to mitigate or avoid the delay.

(B) **Excusable Delay.** The Contract Time may be extended if Contractor encounters "Excusable Delay," which is an unavoidable delay in completing the Work within the Contract Time due to causes completely beyond Contractor's control, and which Contractor could not have avoided or mitigated through reasonable care, planning, foresight, and diligence, provided that Contractor is otherwise fully performing its obligations under the Contract Documents. Grounds for Excusable Delay may include fire, natural disasters including earthquake or unusually severe weather, acts of terror or vandalism, epidemic, unforeseeable adverse government actions, unforeseeable actions of third parties, encountering unforeseeable hazardous materials, unforeseeable site conditions, or suspension for convenience under Article 13. The Contract Time will not be extended based on circumstances which will not unavoidably delay completing the Work within the Contract Time based on critical path analysis.

(C) **Weather Delays.** A "Weather Delay Day" is a Working Day during which Contractor and its forces, including Subcontractors, are unable to perform more than 40% of the critical path Work scheduled for that day due to adverse weather conditions which impair the ability to safely or effectively perform the scheduled critical path Work that day. Adverse weather conditions may include rain, saturated soil, and Project site clean-up required due to adverse weather. Determination of what constitutes critical path Work scheduled for that day will be based on the most current, City-approved schedule. Contractor will be entitled to a non-compensable extension of the Contract Time for each Weather Delay Day in excess of the normal Weather Delay Days within a given month as determined by reliable records, including monthly rainfall averages, for the preceding ten years (or as otherwise specified in the Special Conditions or Specifications).

(1) Contractor must fully comply with the applicable procedures in Articles 5 and 6 of the General Conditions regarding requests to modify the Contract Time.

(2) Contractor will not be entitled to an extension of time for a Weather Delay Day to the extent Contractor is responsible for concurrent delay on that day.

(3) Contractor must take reasonable steps to mitigate the consequences of Weather Delay Days, including prudent workforce management and protecting the Work, Project Site, materials, and equipment.

(D) **Non-Excusable Delay.** Delay which Contractor could have avoided or mitigated through reasonable care, planning, foresight, and diligence is "Non-Excusable Delay." Contractor is not entitled to an extension of Contract Time or any compensation for Non-Excusable Delay, or for Excusable Delay that is concurrent with Non-Excusable Delay. Non-Excusable Delay includes delay caused by:

(1) weather conditions which are normal for the location of the Project, as determined by reliable records, including monthly rainfall averages, for the preceding ten years;

(2) Contractor's failure to order equipment and materials sufficiently in advance of the time needed for completion of the Work within the Contract Time;

- (3) Contractor's failure to provide adequate notification to utility companies or agencies for connections or services necessary for completion of the Work within the Contract Time;
- (4) foreseeable conditions which Contractor could have ascertained from reasonably diligent inspection of the Project site or review of the Contract Documents or other information provided or available to Contractor;
- (5) Contractor's failure, refusal, or financial inability to perform the Work within the Contract Time, including insufficient funds to pay its Subcontractors or suppliers;
- (6) performance or non-performance by Contractor's Subcontractors or suppliers;
- (7) the time required to respond to excessive RFIs (see Section 2.5(G));
- (8) delayed submission of required submittals, or the time required for correction and resubmission of defective submittals;
- (9) time required for repair of, re-testing, or re-inspection of defective Work;
- (10) enforcement of Laws by City, or outside agencies with jurisdiction over the Work; or
- (11) City's exercise or enforcement of any of its rights or Contractor's duties pursuant to the Contract Documents, including correction of defective Work, extra inspections or testing due to non-compliance with Contract requirements, safety compliance, environmental compliance, or rejection and return of defective or deficient submittals.

(E) **Compensable Delay.** Pursuant to Public Contract Code § 7102, in addition to entitlement to an extension of Contract Time, Contractor is entitled to compensation for costs incurred due to delay caused solely by City, when that delay is unreasonable under the circumstances involved and not within the contemplation of the parties ("Compensable Delay"). Contractor is not entitled to an extension of Contract Time or recovery of costs for Compensable Delay that is concurrent with Non-Excusable Delay. Delay due to causes that are beyond the control of either City or Contractor, including Weather Delay Days, discovery of Historic or Archeological Items pursuant to Section 7.18, or the actions or inactions of third parties or other agencies, is not Compensable Delay, and will only entitle Contractor to an extension of time commensurate with the time lost due to such delay.

(F) **Recoverable Costs.** Contractor is not entitled to compensation for Excusable Delay unless it is Compensable Delay, as defined above. Contractor is entitled to recover only the actual, direct, reasonable, and substantiated costs ("Recoverable Costs") for each working day that the Compensable Delay prevents Contractor from proceeding with more than 50% of the critical path Work scheduled for that day, based on the most recent progress schedule accepted by City. Recoverable Costs will not include home office overhead or lost profit.

(G) **Request for Extension of Contract Time or Recoverable Costs.** A request for an extension of Contract Time or any associated Recoverable Costs must be submitted in writing to City within ten calendar days of the date the delay is first encountered, even if the duration of the delay is not yet known at that time, or any entitlement to the Contract Time extension or to the Recoverable Costs will be deemed waived. In addition to

complying with the requirements of this Article 5, the request must be submitted in compliance with the Change Order request procedures in Article 6 below. Strict compliance with these requirements is necessary to ensure that any delay or consequences of delay may be mitigated as soon as possible, and to facilitate cost-efficient administration of the Project and timely performance of the Work. Any request for an extension of Contract Time or Recoverable Costs that does not strictly comply with all of the requirements of Article 5 and Article 6 will be deemed waived.

(1) *Required Contents.* The request must include a detailed description of the cause(s) of the delay and must also describe the measures that Contractor has taken to mitigate the delay and/or its effects, including efforts to mitigate the cost impact of the delay, such as by workforce management or by a change in sequencing. If the delay is still ongoing at the time the request is submitted, the request should also include Contractor's plan for continued mitigation of the delay or its effects.

(2) *Delay Days and Costs.* The request must specify the number of days of Excusable Delay claimed or provide a realistic estimate if the duration of the delay is not yet known. If Contractor believes it is entitled to Recoverable Costs for Compensable Delay, the request must specify the amount and basis for the Recoverable Costs that are claimed or provide a realistic estimate if the amount is not yet known. Any estimate of delay duration or cost must be updated in writing and submitted with all required supporting documentation as soon as the actual time and cost is known. The maximum extension of Contract Time will be the number of days, if any, by which an Excusable Delay or a Compensable Delay exceeds any concurrent Non-Excusable Delay. Contractor is entitled to an extension of Contract Time, or compensation for Recoverable Costs, only if, and only to the extent that, such delay will unavoidably delay Final Completion.

(3) *Supporting Documentation.* The request must also include any and all supporting documentation necessary to evidence the delay and its actual impacts, including scheduling and cost impacts with a time impact analysis using critical path methodology and demonstrating the unavoidable delay to Final Completion. The time impact analysis must be submitted in a form or format acceptable to City.

(4) *Burden of Proof.* Contractor has the burden of proving that: the delay was an Excusable Delay or Compensable Delay, as defined above; Contractor has fully complied with its scheduling obligations in Section 5.2, Schedule Requirements; Contractor has made reasonable efforts to mitigate the delay and its schedule and cost impacts; the delay will unavoidably result in delaying Final Completion; and any Recoverable Costs claimed by Contractor were actually incurred and were reasonable under the circumstances.

(5) *Legal Compliance.* Nothing in this Section 5.3 is intended to require the waiver, alteration, or limitation of the applicability of Public Contract Code § 7102.

(6) *No Waiver.* Any grant of an extension of Contract Time, or compensation for Recoverable Costs due to Compensable Delay, will not operate as a waiver of City's right to assess liquidated damages for Non-Excusable Delay.

(7) *Dispute Resolution.* In the event of a dispute over entitlement to an extension of Contract Time or compensation for Recoverable Costs, Contractor may not stop Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work. Contractor's sole recourse for an unresolved dispute

based on City's rejection of a Change Order request for an extension of Contract Time or compensation for Recoverable Costs is to comply with the dispute resolution provisions set forth in Article 12 below.

**5.4 Liquidated Damages.** It is expressly understood that if Final Completion is not achieved within the Contract Time, City will suffer damages from the delay that are difficult to determine and accurately specify. Pursuant to Public Contract Code § 7203, if Contractor fails to achieve Final Completion within the Contract Time due to Contractor's Non-Excusable Delay, City will charge Contractor in the amount specified in the Contract for each calendar day that Final Completion is delayed beyond the Contract Time, as liquidated damages and not as a penalty. Any waiver of accrued liquidated damages, in whole or in part, is subject to approval of the City Council or its authorized delegate.

(A) **Liquidated Damages.** Liquidated damages will not be assessed for any Excusable Delay or Compensable Delay, as set forth above.

(B) **Milestones.** Liquidated damages may also be separately assessed for failure to meet milestones specified elsewhere in the Contract Documents.

(C) **Setoff.** City is entitled to deduct the amount of liquidated damages assessed against any payments otherwise due to Contractor, including progress payments, Final Payment, or unreleased retention. If there are insufficient Contract funds remaining to cover the full amount of liquidated damages assessed, City is entitled to recover the balance from Contractor or its performance bond surety.

(D) **Occupancy or Use.** Occupancy or use of the Project in whole or in part prior to Final Completion does not constitute City's acceptance of the Project and will not operate as a waiver of City's right to assess liquidated damages for Contractor's Non-Excusable Delay in achieving Final Completion.

(E) **Other Remedies.** City's right to liquidated damages under this Section applies only to damages arising from Contractor's Non-Excusable Delay or failure to complete the Work within the Contract Time. City retains its right to pursue all other remedies under the Contract for other types of damage, including damage to property or persons, costs or diminution in value from defective materials or workmanship, costs to repair or complete the Work, or other liability caused by Contractor.

## Article 6 - Contract Modification

**6.1 Contract Modification.** Subject to the limited exception set forth in subsection (D) below, any change in the Work or the Contract Documents, including the Contract Price or Contract Time, will not be a valid and binding change to the Contract unless it is formalized in a Change Order, including a "no-cost" Change Order or a unilateral Change Order. Changes in the Work pursuant to this Article 6 will not operate to release, limit, or abridge Contractor's warranty obligations pursuant to Article 11 or any obligations of Contractor's bond sureties.

(A) **City-Directed Changes.** City may direct changes in the scope or sequence of Work or the requirements of the Contract Documents, without invalidating the Contract. Such changes may include Extra Work as set forth in subsection (C) below, or deletion or modification of portions of the Work. Contractor must promptly comply with City-directed changes in the Work in accordance with the original Contract Documents, even if Contractor and City have not yet reached agreement as to adjustments to the Contract Price or Contract Time for the change in the Work or for the Extra Work. Contractor is not entitled to extra compensation for cost savings resulting from "value engineering"

pursuant to Public Contract Code § 7101, except to the extent authorized in advance by City in writing, and subject to any applicable procedural requirements for submitting a proposal for value engineering cost savings.

(B) **Disputes.** In the event of a dispute over entitlement to or the amount of a change in Contract Time or a change in Contract Price related to a City-directed change in the Work, Contractor must perform the Work as directed and may not delay its Work or cease Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work, including the Work in dispute. Likewise, in the event that City and Contractor dispute whether a portion or portions of the Work are already required by the Contract Documents or constitute Extra Work, or otherwise dispute the interpretation of any portion(s) of the Contract Documents, Contractor must perform the Work as directed and may not delay its Work or cease Work pending resolution of the dispute, but must continue to comply with its duty to diligently prosecute the performance and timely completion of the Work, including the Work in dispute, as directed by City. If Contractor refuses to perform the Work in dispute, City may, acting in its sole discretion, elect to delete the Work from the Contract and reduce the Contract Price accordingly, and self-perform the Work or direct that the Work be performed by others. Alternatively, City may elect to terminate the Contract for convenience or for cause. Contractor's sole recourse for an unresolved dispute related to changes in the Work or performance of any Extra Work is to comply with the dispute resolution provisions set forth in Article 12, below.

(C) **Extra Work.** City may direct Contractor to perform Extra Work related to the Project. Contractor must promptly perform any Extra Work as directed or authorized by City in accordance with the original Contract Documents, even if Contractor and City have not yet reached agreement on adjustments to the Contract Price or Contract Time for such Extra Work. If Contractor believes it is necessary to perform Extra Work due to changed conditions, Contractor must promptly notify the Engineer in writing, specifically identifying the Extra Work and the reason(s) the Contractor believes it is Extra Work. This notification requirement does not constitute a Change Order request pursuant to Section 6.2, below. Contractor must maintain detailed daily records that itemize the cost of each element of Extra Work, and sufficiently distinguish the direct cost of the Extra Work from the cost of other Work performed. For each day that Contractor performs Extra Work, or Work that Contractor contends is Extra Work, Contractor must submit no later than the following Working Day, a daily report of the Extra Work performed that day and the related costs, together with copies of certified payroll, invoices, and other documentation substantiating the costs ("Extra Work Report"). The Engineer will make any adjustments to Contractor's Extra Work Report(s) based on the Engineer's records of the Work. When an Extra Work Report(s) is agreed on and signed by both City and Contractor, the Extra Work Report(s) will become the basis for payment under a duly authorized and signed Change Order. Failure to submit the required documentation by close of business on the next Working Day is deemed a full and complete waiver for any change in the Contract Price or Contract Time for any Extra Work performed that day.

(D) **Minor Changes and RFIs.** Minor field changes, including RFI replies from City, that do not affect the Contract Price or Contract Time and that are approved by the Engineer acting within his or her scope of authority, do not require a Change Order. By executing an RFI reply from City, Contractor agrees that it will perform the Work as clarified therein, with no change to the Contract Price or Contract Time.

(E) **Remedy for Non-Compliance.** Contractor's failure to promptly comply with a City-directed change is deemed a material breach of the Contract, and in addition to all other remedies available to it, City may, at its sole discretion, hire another contractor or use its own forces to complete the disputed Work at Contractor's sole expense, and may deduct the cost from the Contract Price.



**6.2 Contractor Change Order Requests.** Contractor must submit a request or proposal for a change in the Work, compensation for Extra Work, or a change in the Contract Price or Contract Time as a written Change Order request or proposal.

(A) **Time for Submission.** Any request for a change in the Contract Price or the Contract Time must be submitted in writing to the Engineer within ten calendar days of the date that Contractor first encounters the circumstances, information or conditions giving rise to the Change Order request, even if the total amount of the requested change in the Contract Price or impact on the Contract Time is not yet known at that time. If City requests that Contractor propose the terms of a Change Order, unless otherwise specified in City's request, Contractor must provide the Engineer with a written proposal for the change in the Contract Price or Contract Time within five working days of receiving City's request, in a form satisfactory to the Engineer.

(B) **Required Contents.** Any Change Order request or proposal submitted by Contractor must include a complete breakdown of actual or estimated costs and credits, and must itemize labor, materials, equipment, taxes, insurance, subcontract amounts, and, if applicable, Extra Work Reports. Any estimated cost must be updated in writing as soon as the actual amount is known.

(C) **Required Documentation.** All claimed costs must be fully documented, and any related request for an extension of time or delay-related costs must be included at that time and in compliance with the requirements of Article 5 of the General Conditions. Upon request, Contractor must permit City to inspect its original and unaltered bidding records, subcontract agreements, subcontract change orders, purchase orders, invoices, or receipts associated with the claimed costs.

(D) **Required Form.** Contractor must use City's form(s) for submitting all Change Order requests or proposals, unless otherwise specified by City.

(E) **Certification.** All Change Order requests must be signed by Contractor and must include the following certification:

"The undersigned Contractor certifies under penalty of perjury that its statements and representations in this Change Order request are true and correct. Contractor warrants that this Change Order request is comprehensive and complete as to the Work or changes referenced herein, and agrees that any known or foreseeable costs, expenses, or time extension requests not included herein, are deemed waived."

**6.3 Adjustments to Contract Price.** The amount of any increase or decrease in the Contract Price will be determined based on one of the following methods listed below, in the order listed with unit pricing taking precedence over the other methods. Markup applies only to City-authorized time and material Work, and does not apply to any other payments to Contractor. For Work items or components that are deleted in their entirety, Contractor will only be entitled to compensation for those direct, actual, and documented costs (including restocking fees), reasonably incurred before Contractor was notified of the City's intent to delete the Work, with no markup for overhead, profit, or other indirect costs.

(A) **Unit Pricing.** Amounts previously provided by Contractor in the form of unit prices, either in a bid schedule or in a post-award schedule of values pursuant to Section 8.1, Schedule of Values, will apply to determine the price for the affected Work, to the extent applicable unit prices have been provided for that type of Work. No additional markup for overhead, profit, or other indirect costs will be added to the calculation.

(B) **Lump Sum.** A mutually agreed upon, all-inclusive lump sum price for the affected Work with no additional markup for overhead, profit, or other indirect costs.

(C) **Time and Materials.** On a time and materials basis, if and only to the extent compensation on a time and materials basis is expressly authorized by City in advance of Contractor's performance of the Work and subject to any not-to-exceed limit. Time and materials compensation for increased costs or Extra Work (but not decreased costs or deleted Work), will include allowed markup for overhead, profit, and other indirect costs, calculated as the total of the following sums, the cumulative total of which may not exceed the maximum markup rate of 15%:

(1) All direct labor costs provided by the Contractor, excluding superintendence, project management, or administrative costs, plus 15% markup;

(2) All direct material costs provided by the Contractor, including sales tax, plus 15% markup;

(3) All direct plant and equipment rental costs provided by the Contractor, plus 15% markup;

(4) All direct additional subcontract costs plus 10% markup for Work performed by Subcontractors; and

(5) Increased bond or insurance premium costs computed at 1.5% of total of the previous four sums.

**6.4 Unilateral Change Order.** If the parties dispute the terms of a proposed Change Order, including disputes over the amount of compensation or extension of time that Contractor has requested, the value of deleted or changed Work, what constitutes Extra Work, or quantities used, City may elect to issue a unilateral Change Order, directing performance of the Work, and authorizing a change in the Contract Price or Contract Time for the adjustment to compensation or time that the City believes is merited. Contractor's sole recourse to dispute the terms of a unilateral Change Order is to submit a timely Claim pursuant to Article 12, below.

**6.5 Non-Compliance Deemed Waiver.** Contractor waives its entitlement to any increase in the Contract Price or Contract Time if Contractor fails to fully comply with the provisions of this Article. Contractor will not be paid for unauthorized Extra Work.

## Article 7 - General Construction Provisions

### 7.1 Permits, Fees, Business License, and Taxes.

(A) **Permits, Fees, and City Business License.** Contractor must obtain and pay for all permits, fees, and licenses required to perform the Work, including a City business license. Contractor must cooperate with and provide notifications to all government agencies with jurisdiction over the Project, as may be required. Contractor must provide City with copies of all records of permits and permit applications, payment of required fees, and any licenses required for the Work.

(B) **Taxes.** Contractor must pay for all taxes on labor, material, and equipment, except Federal Excise Tax to the extent that City is exempt from Federal Excise Tax.

**7.2 Temporary Facilities.** Contractor must provide, at Contractor's sole expense, any and all temporary facilities for the Project, including an onsite staging area for materials and equipment, a field office, sanitary facilities, utilities, storage, scaffolds, barricades, walkways, and any other temporary structure required to safely perform the Work along with any incidental utility services. The location of all temporary facilities must be approved by the City prior to installation. Temporary facilities must be safe and adequate for the intended use and installed and maintained in accordance with Laws and the Contract Documents. Contractor must fence and screen the Project site and, if applicable, any separate Worksites, including the staging area, and its operation must minimize inconvenience to neighboring properties. Additional provisions pertaining to temporary facilities may be included in the Specifications or Special Conditions.

(A) **Utilities.** Contractor must install and maintain the power, water, sewer, and all other utilities required for the Project site, including the piping, wiring, internet and wifi connections, and any related equipment necessary to maintain the temporary facilities.

(B) **Removal and Repair.** Contractor must promptly remove all such temporary facilities when they are no longer needed or upon completion of the Work, whichever comes first. Contractor must promptly repair any damage to City's property or to other property caused by the installation, use, or removal of the temporary facilities, and must promptly restore the property to its original or intended condition.

**7.3 Noninterference and Site Management.** Contractor must avoid interfering with City's use of its property at or adjacent to the Project site, including use of roadways, entrances, parking areas, walkways, and structures. Contractor must also minimize disruption of access to private property in the Project vicinity. Contractor must coordinate with affected property owners, tenants, and businesses, and maintain some vehicle and pedestrian access to their residences or properties at all times. Temporary access ramps, fencing or other measures must be provided as needed. Before blocking access to a private driveway or parking lot, Contractor must provide effective notice to the affected parties at least 48 hours in advance of the pending closure and allow them to remove vehicles. Private driveways, residences and parking lots must have access to a roadway during non-Work hours.

(A) **Offsite Acquisition.** Unless otherwise provided by City, Contractor must acquire, use, and dispose of, at its sole expense, any Worksites, licenses, easements, and temporary facilities necessary to access and perform the Work.

(B) **Offsite Staging Area and Field Office.** If additional space beyond the Project site is needed, such as for the staging area or the field office, Contractor may need to make arrangements with the nearby property owner(s) to secure the space. Before using or occupying any property owned by a third party, Contractor must provide City with a copy of the necessary license agreement, easement, or other written authorization from the property owner, together with a written release from the property owner holding City harmless from any related liability, in a form acceptable to the City Attorney.

(C) **Traffic Management.** Contractor must provide traffic management and traffic controls as specified in the Contract Documents, as required by Laws, and as otherwise required to ensure public and worker safety, and to avoid interference with public or private operations or the normal flow of vehicular, bicycle, or pedestrian traffic.

**7.4 Signs.** No signs may be displayed on or about City's property, except signage which is required by Laws or by the Contract Documents, without City's prior written approval as to size, design, and location.

## 7.5 Project Site and Nearby Property Protections.

(A) **General.** Contractor is responsible at all times, on a 24-hour basis and at its sole cost, for protecting the Work, the Project site, and the materials and equipment to be incorporated into the Work, until the City has accepted the Project, excluding any exceptions to acceptance, if any. Except as specifically authorized by City, Contractor must confine its operations to the area of the Project site indicated in the Plans and Specifications. Contractor is liable for any damage caused by Contractor or its Subcontractors to the Work, City's property, the property of adjacent or nearby property owners and the work or personal property of other contractors working for City, including damage related to Contractor's failure to adequately secure the Work or any Worksite.

(1) Subject to City's approval, Contractor will provide and install safeguards to protect the Work; any Worksite, including the Project site; City's real or personal property and the real or personal property of adjacent or nearby property owners, including plant and tree protections.

(2) City wastewater systems may not be interrupted. If the Work disrupts existing sewer facilities, Contractor must immediately notify City and establish a plan, subject to City's approval, to convey the sewage in closed conduits back into the sanitary sewer system. Sewage must not be permitted to flow in trenches or be covered by backfill.

(3) Contractor must remove with due care, and store at City's request, any objects or material from the Project site that City will salvage or reuse at another location.

(4) If directed by Engineer, Contractor must promptly repair or replace any property damage, as specified by the Engineer. However, acting in its sole discretion, City may elect to have the property damage remedied otherwise, and may deduct the cost to repair or replace the damaged property from payment otherwise due to Contractor.

(5) Contractor will not permit any structure or infrastructure to be loaded in a manner that will damage or endanger the integrity of the structure or infrastructure.

(B) **Securing Project Site.** After completion of Work each day, Contractor must secure the Project site and, to the extent feasible, make the area reasonably accessible to the public unless City approves otherwise. All excess materials and equipment not protected by approved traffic control devices must be relocated to the staging area or demobilized. Trench spoils must be hauled off the Project site daily and open excavations must be protected with steel plates. Contractor and Subcontractor personnel may not occupy or use the Project site for any purpose during non-Work hours, except as may be provided in the Contract Documents or pursuant to prior written authorization from City.

(C) **Unforeseen Conditions.** If Contractor encounters facilities, utilities, or other unknown conditions not shown on or reasonably inferable from the Plans or apparent from inspection of the Project site, Contractor must immediately notify the City and promptly submit a Request for Information to obtain further directions from the Engineer. Contractor must avoid taking any action which could cause damage to the facilities or utilities pending further direction from the Engineer. The Engineer's written response will be final and binding on Contractor. If the Engineer's subsequent direction to Contractor affects Contractor's cost or time to perform the Work, Contractor may submit a Change Order request as set forth in Article 6 above.

(D) **Support; Adjacent Properties.** Contractor must provide, install, and maintain all shoring, bracing, and underpinning necessary to provide support to City's property and adjacent properties and improvements thereon. Contractor must provide notifications to adjacent property owners as may be required by Laws. See also, Section 7.15, Trenching of Five Feet or More.

(E) **Notification of Property Damage.** Contractor must immediately notify the City of damage to any real or personal property resulting from Work on the Project. Contractor must immediately provide a written report to City of any such property damage in excess of \$500 (based on estimated cost to repair or replace) within 24 hours of the occurrence. The written report must include: (1) the location and nature of the damage, and the owner of the property, if known; (2) the name and address of each employee of Contractor or any Subcontractor involved in the damage; (3) a detailed description of the incident, including precise location, time, and names and contact information for known witnesses; and (4) a police or first responder report, if applicable. If Contractor is required to file an accident report with another government agency, Contractor will provide a copy of the report to City.

## 7.6 Materials and Equipment.

(A) **General.** Unless otherwise specified, all materials and equipment required for the Work must be new, free from defects, and of the best grade for the intended purpose, and furnished in sufficient quantities to ensure the proper and expeditious performance of the Work. Contractor must employ measures to preserve the specified quality and fitness of the materials and equipment. Unless otherwise specified, all materials and equipment required for the Work are deemed to include all components required for complete installation and intended operation and must be installed in accordance with the manufacturer's recommendations or instructions. Contractor is responsible for all shipping, handling, and storage costs associated with the materials and equipment required for the Work. Contractor is responsible for providing security and protecting the Work and all of the required materials, supplies, tools and equipment at Contractor's sole cost until City has formally accepted the Project as set forth in Section 11.1, Final Completion. Contractor will not assign, sell, mortgage, or hypothecate any materials or equipment for the Project, or remove any materials or equipment that have been installed or delivered.

(B) **City-Provided.** If the Work includes installation of materials or equipment to be provided by City, Contractor is solely responsible for the proper examination, handling, storage, and installation in accordance with the Contract Documents. Contractor must notify City of any defects discovered in City-provided materials or equipment, sufficiently in advance of scheduled use or installation to afford adequate time to procure replacement materials or equipment as needed. Contractor is solely responsible for any loss of or damage to such items which occurs while the items are in Contractor's custody and control, the cost of which may be offset from the Contract Price and deducted from any payment(s) due to Contractor.

(C) **Intellectual Property Rights.** Contractor must, at its sole expense, obtain any authorization or license required for use of patented or copyright-protected materials, equipment, devices, or processes that are incorporated into the Work. Contractor's indemnity obligations in Article 4 apply to any claimed violation of intellectual property rights in violation of this provision.

## 7.7 Substitutions.

(A) **"Or Equal."** Any Specification designating a material, product, or thing (collectively, "item") or service by specific brand or trade name, followed by the words "or

equal," is intended only to indicate the quality and type of item or service desired, and Contractor may request use of any equal item or service. Unless otherwise stated in the Specifications, any reference to a specific brand or trade name for an item or service that is used solely for the purpose of describing the type of item or service desired, will be deemed to be followed by the words "or equal." A substitution will only be approved if it is a true "equal" item or service in every aspect of design, function, and quality, as determined by City, including dimensions, weight, maintenance requirements, durability, fit with other elements, and schedule impacts.

(B) **Request for Substitution.** A post-award request for substitution of an item or service must be submitted in writing to the Engineer for approval in advance, within the applicable time period provided in the Contract Documents. If no time period is specified, the substitution request may be submitted any time within 35 days after the date of award of the Contract, or sufficiently in advance of the time needed to avoid delay of the Work, whichever is earlier.

(C) **Substantiation.** Any available data substantiating the proposed substitute as an equal item or service must be submitted with the written request for substitution. Contractor's failure to timely provide all necessary substantiation, including any required test results as soon as they are available, is grounds for rejection of the proposed substitution, without further review.

(D) **Burden of Proving Equality.** Contractor has the burden of proving the equality of the proposed substitution at Contractor's sole cost. City has sole discretion to determine whether a proposed substitution is equal, and City's determination is final.

(E) **Approval or Rejection.** If the proposed substitution is approved, Contractor is solely responsible for any additional costs or time associated with the substituted item or service. If the proposed substitution is rejected, Contractor must, without delay, install the item or use the service as specified by City.

(F) **Contractor's Obligations.** City's approval of a proposed substitution will not relieve Contractor from any of its obligations under the Contract Documents. In the event Contractor makes an unauthorized substitution, Contractor will be solely responsible for all resulting cost impacts, including the cost of removal and replacement and the impact to other design elements.

## 7.8 Testing and Inspection.

(A) **General.** All materials, equipment, and workmanship used in the Work are subject to inspection and testing by City at all times and at all locations during construction and/or fabrication, including at any Worksite, shops, and yards. All manufacturers' application or installation instructions must be provided to the Inspector at least ten days prior to the first such application or installation. Contractor must, at all times, make the Work available for testing or inspection. Neither City's inspection or testing of Work, nor its failure to do so, operate to waive or limit Contractor's duty to complete the Work in accordance with the Contract Documents.

(B) **Scheduling and Notification.** Contractor must cooperate with City in coordinating the inspections and testing. Contractor must submit samples of materials, at Contractor's expense, and schedule all tests required by the Contract Documents in time to avoid any delay to the progress of the Work. Contractor must notify the Engineer no later than noon of the Working Day before any inspection or testing and must provide timely notice to the other necessary parties as specified in the Contract Documents. If Contractor schedules an inspection or test beyond regular Work hours, or on a Saturday, Sunday, or recognized City holiday, Contractor must notify the Engineer at least two

Working Days in advance for approval. If approved, Contractor must reimburse City for the cost of the overtime inspection or testing. Such costs, including the City's hourly costs for required personnel, may be deducted from payments otherwise due to Contractor.

(C) **Responsibility for Costs.** City will bear the initial cost of inspection and testing to be performed by independent consultants retained by City, subject to the following exceptions:

- (1) Contractor will be responsible for the costs of any subsequent inspections or tests which are required to substantiate compliance with the Contract Documents, and any associated remediation costs.
- (2) Contractor will be responsible for inspection costs, at City's hourly rates, for inspection time lost because the Work is not ready, or Contractor fails to appear for a scheduled inspection.
- (3) If any portion of the Work that is subject to inspection or testing is covered or concealed by Contractor prior to the inspection or testing, Contractor will bear the cost of making that portion of the Work available for the inspection or testing required by the Contract Documents, and any associated repair or remediation costs.
- (4) Contractor is responsible for properly shoring all compaction test sites deeper than five feet below grade, as required under Section 7.15 below.
- (5) Any Work or material that is defective or fails to comply with the requirements of the Contract Documents must be promptly repaired, removed, replaced, or corrected by Contractor, at Contractor's sole expense, even if that Work or material was previously inspected or included in a progress payment.

(D) **Contractor's Obligations.** Contractor is solely responsible for any delay occasioned by remediation of defective or noncompliant Work or material. Inspection or testing of the Work does not in any way relieve Contractor of its obligations to perform the Work as specified. Any Work done without the inspection(s) or testing required by the Contract Documents will be subject to rejection by City.

(E) **Distant Locations.** If required off-site testing or inspection must be conducted at a location more than 100 miles from the Project site, Contractor is solely responsible for the additional travel costs required for testing and/or inspection at such locations.

(F) **Final Inspection.** The provisions of this Section 7.8 also apply to final inspection under Article 11, Completion and Warranty Provisions.

**7.9 Project Site Conditions and Maintenance.** Contractor must at all times, on a 24-hour basis and at its sole cost, maintain the Project site and staging and storage areas in clean, neat, and sanitary condition and in compliance with all Laws pertaining to safety, air quality, and dust control. Adequate toilets must be provided, and properly maintained and serviced for all workers on the Project site, located in a suitably secluded area, subject to City's prior approval. Contractor must also, on a daily basis and at its sole cost, remove and properly dispose of the debris and waste materials from the Project site.

(A) **Air Emissions Control.** Contractor must not discharge smoke or other air contaminants into the atmosphere in violation of any Laws. Contractor must comply with all Laws, including the California Air Resources Board's In-Use Off-Road Diesel-Fueled Fleets Regulation (13 CCR § 2449 et seq.).

(B) **Dust and Debris.** Contractor must minimize and confine dust and debris resulting from the Work. Contractor must abate dust nuisance by cleaning, sweeping, and immediately sprinkling with water excavated areas of dirt or other materials prone to cause dust, and within one hour after the Engineer notifies Contractor that an airborne nuisance exists. The Engineer may direct that Contractor provide an approved water-spraying truck for this purpose. If water is used for dust control, Contractor will only use the minimum necessary. Contractor must take all necessary steps to keep waste water out of streets, gutters, or storm drains. See Section 7.19, Environmental Control. If City determines that the dust control is not adequate, City may have the work done by others and deduct the cost from the Contract Price. Contractor will immediately remove any excess excavated material from the Project site and any dirt deposited on public streets.

(C) **Clean up.** Before discontinuing Work in an area, Contractor must clean the area and remove all debris and waste along with the construction equipment, tools, machinery, and surplus materials.

(1) Except as otherwise specified, all excess Project materials, and the materials removed from existing improvements on the Project site with no salvage value or intended reuse by City, will be Contractor's property.

(2) Hauling trucks and other vehicles leaving the Project site must be cleaned of exterior mud or dirt before traveling on City streets. Materials and loose debris must be delivered and loaded to prevent dropping materials or debris. Contractor must immediately remove spillage from hauling on any publicly traveled way. Streets affected by Work on the Project must be kept clean by street sweeping.

(D) **Disposal.** Contractor must dispose of all Project debris and waste materials in a safe and legal manner. Contractor may not burn or bury waste materials on the Project site. Contractor will not allow any dirt, refuse, excavated material, surplus concrete or mortar, or any associated washings, to be disposed of onto streets, into manholes or into the storm drain system.

(E) **Completion.** At the completion of the Work, Contractor must remove from the Project site all of its equipment, tools, surplus materials, waste materials and debris, presenting a clean and neat appearance. Before demobilizing from the Project site, Contractor must ensure that all surfaces are cleaned, sealed, waxed, or finished as applicable, and that all marks, stains, paint splatters, and the like have been properly removed from the completed Work and the surrounding areas. Contractor must ensure that all parts of the construction are properly joined with the previously existing and adjacent improvements and conditions. Contractor must provide all cutting, fitting and patching needed to accomplish that requirement. Contractor must also repair or replace all existing improvements that are damaged or removed during the Work, both on and off the Project site, including curbs, sidewalks, driveways, fences, signs, landscaping, utilities, street surfaces and structures. Repairs and replacements must be at least equal to the previously existing improvements, and the condition, finish and dimensions must match the previously existing improvements. Contractor must restore to original condition all property or items that are not designated for alteration under the Contract Documents and leave each Worksite clean and ready for occupancy or use by City.

(F) **Non-Compliance.** If Contractor fails to comply with its maintenance and cleanup obligations or any City clean up order, City may, acting in its sole discretion, elect to suspend the Work until the condition(s) is corrected with no increase in the Contract Time or Contract Price, or undertake appropriate cleanup measures without further notice and deduct the cost from any amounts due or to become due to Contractor.



**7.10 Instructions and Manuals.** Contractor must provide to City three copies each of all instructions and manuals required by the Contract Documents, unless otherwise specified. These must be complete as to drawings, details, parts lists, performance data, and other information that may be required for City to easily maintain and service the materials and equipment installed for this Project.

(A) **Submittal Requirements.** All manufacturers' application or installation instructions must be provided to City at least ten days prior to the first such application. The instructions and manuals, along with any required guarantees, must be delivered to City for review.

(B) **Training.** Contractor or its Subcontractors must train City's personnel in the operation and maintenance of any complex equipment or systems as a condition precedent to Final Completion, if required in the Contract Documents.

**7.11 As-built Drawings.** Contractor and its Subcontractors must prepare and maintain at the Project site a detailed, complete and accurate as-built set of the Plans which will be used solely for the purpose of recording changes made in any portion of the original Plans in order to create accurate record drawings at the end of the Project.

(A) **Duty to Update.** The as-built drawings must be updated as changes occur, on a daily basis if necessary. City may withhold the estimated cost for City to have the as-built drawings prepared from payments otherwise due to Contractor, until the as-built drawings are brought up to date to the satisfaction of City. Actual locations to scale must be identified on the as-built drawings for all runs of mechanical and electrical work, including all site utilities installed underground, in walls, floors, or otherwise concealed. Deviations from the original Plans must be shown in detail. The exact location of all main runs, whether piping, conduit, ductwork or drain lines, must be shown by dimension and elevation. The location of all buried pipelines, appurtenances, or other improvements must be represented by coordinates and by the horizontal distance from visible above-ground improvements.

(B) **Final Completion.** Contractor must verify that all changes in the Work are depicted in the as-built drawings and must deliver the complete set of as-built drawings to the Engineer for review and acceptance as a condition precedent to Final Completion and Final Payment.

**7.12 Existing Utilities.**

(A) **General.** The Work may be performed in developed, urban areas with existing utilities, both above and below ground, including utilities identified in the Contract Documents or in other informational documents or records. Contractor must take due care to locate identified or reasonably identifiable utilities before proceeding with trenching, excavation, or any other activity that could damage or disrupt existing utilities. This may include excavation with small equipment, potholing, or hand excavation, and, if practical, using white paint or other suitable markings to delineate the area to be excavated. Except as otherwise provided herein, Contractor will be responsible for costs resulting from damage to identified or reasonably identifiable utilities due to Contractor's negligence or failure to comply with the Contract Documents, including the requirements in this Article 7.

(B) **Unidentified Utilities.** Pursuant to Government Code § 4215, if, during the performance of the Work, Contractor discovers utility facilities not identified by City in the Contract Documents, Contractor must immediately provide written notice to City and the utility. City assumes responsibility for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Project site if those utilities are not

identified in the Contract Documents. Contractor will be compensated in accordance with the provisions of the Contract Documents for the costs of locating, repairing damage not due to Contractor's failure to exercise reasonable care, and removing or relocating utility facilities not indicated in the Plans or Specifications with reasonable accuracy, and for equipment on the Project necessarily idled during such work. Contractor will not be assessed liquidated damages for delay in completion of the Work, to the extent the delay was caused by City's failure to provide for removal or relocation of the utility facilities.

**7.13 Notice of Excavation.** Contractor must comply with all applicable requirements in Government Code § 4216 et seq., which are incorporated by reference herein.

**7.14 Trenching and Excavations of Four Feet or More.** As required by Public Contract Code § 7104, if the Work includes digging trenches or other excavations that extend deeper than four feet below the surface, the provisions in this Section apply to the Work and the Project.

(A) **Duty to Notify.** Contractor must promptly, and before the following conditions are disturbed, provide written notice to City if Contractor finds any of the following conditions:

(1) Material that Contractor believes may be a hazardous waste, as defined in § 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing Laws;

(2) Subsurface or latent physical conditions at the Project site differing from those indicated by information about the Project site made available to bidders prior to the deadline for submitting bids; or

(3) Unknown physical conditions at the Project site of any unusual nature, materially different from those ordinarily encountered and generally recognized as inherent in work of the character required by the Contract Documents.

(B) **City Investigation.** City will promptly investigate the conditions and if City finds that the conditions materially differ from those indicated, apparent, or reasonably inferred from information about the Project site made available to bidders, or involve hazardous waste, and cause a decrease or increase in Contractor's cost of, or the time required for, performance of any part of the Work, City will issue a Change Order.

(C) **Disputes.** In the event that a dispute arises between City and Contractor regarding any of the conditions specified in subsection (B) above, or the terms of a Change Order issued by City, Contractor will not be excused from completing the Work within the Contract Time, but must proceed with all Work to be performed under the Contract. Contractor will retain any and all rights provided either by the Contract or by Laws which pertain to the resolution of disputes between Contractor and City.

**7.15 Trenching of Five Feet or More.** As required by Labor Code § 6705, if the Contract Price exceeds \$25,000 and the Work includes the excavation of any trench or trenches of five feet or more in depth, a detailed plan must be submitted to City for acceptance in advance of the excavation. The detailed plan must show the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If the plan varies from the shoring system standards, it must be prepared by a California registered civil or structural engineer. Use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders is prohibited.

**7.16 New Utility Connections.** Except as otherwise specified, City will pay connection charges and meter costs for new permanent utilities required by the Contract Documents, if any. Contractor must notify City sufficiently in advance of the time needed to request service from each utility provider so that connections and services are initiated in accordance with the Project schedule.

**7.17 Lines and Grades.** Contractor is required to use any benchmark provided by the Engineer. Unless otherwise specified in the Contract Documents, Contractor must provide all lines and grades required to execute the Work. Contractor must also provide, preserve, and replace if necessary, all construction stakes required for the Project. All stakes or marks must be set by a California licensed surveyor or a California registered civil engineer. Contractor must notify the Engineer of any discrepancies found between Contractor's staking and grading and information provided by the Contract Documents. Upon completion, all Work must conform to the lines, elevations, and grades shown in the Plans, including any changes directed by a Change Order.

**7.18 Historic or Archeological Items.**

(A) **Contractor's Obligations.** Contractor must ensure that all persons performing Work at the Project site are required to immediately notify the Project Manager, upon discovery of any potential historic or archeological items, including historic or prehistoric ruins, a burial ground, archaeological or vertebrate paleontological site, including fossilized footprints or other archeological, paleontological or historical feature on the Project site (collectively, "Historic or Archeological Items").

(B) **Discovery; Cessation of Work.** Upon discovery of any potential Historic or Archeological Items, Work must be stopped within an 85-foot radius of the find and may not resume until authorized in writing by City. If required by City, Contractor must assist in protecting or recovering the Historic or Archeological Items, with any such assistance to be compensated as Extra Work on a time and materials basis under Article 6, Contract Modification. At City's discretion, a suspension of Work required due to discovery of Historic or Archeological Items may be treated as Excusable Delay pursuant to Article 5, or as a suspension for convenience under Article 13.

**7.19 Environmental Control.** Contractor must not pollute any drainage course or its tributary inlets with fuels, oils, bitumens, acids, insecticides, herbicides or other harmful materials. Contractor must prevent the release of any hazardous material or hazardous waste into the soil or groundwater, and prevent the unlawful discharge of pollutants into City's storm drain system and watercourses as required below. Contractor and its Subcontractors must at all times in the performance of the Work comply with all Laws concerning pollution of waterways.

(A) **Stormwater Permit.** Contractor must comply with all applicable conditions of the State Water Resources Control Board National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Discharges of Stormwater Runoff Associated with Construction Activity ("Stormwater Permit").

(B) **Contractor's Obligations.** If required for the Work, a copy of the Stormwater Permit is on file in City's principal administrative offices, and Contractor must comply with it without adjustment of the Contract Price or the Contract Time. Contractor must timely and completely submit required reports and monitoring information required by the conditions of the Stormwater Permit. Contractor also must comply with all other Laws governing discharge of stormwater, including applicable municipal stormwater management programs.

- 7.20 Noise Control.** Contractor must comply with all applicable noise control Laws. Noise control requirements apply to all equipment used for the Work or related to the Work, including trucks, transit mixers or transient equipment that may or may not be owned by Contractor.
- 7.21 Mined Materials.** Pursuant to the Surface Mining and Reclamation Act of 1975, Public Resources Code § 2710 et seq., any purchase of mined materials, such as construction aggregate, sand, gravel, crushed stone, road base, fill materials, and any other mineral materials must originate from a surface mining operation included on the AB 3098 List, which may be accessed online at: <https://www.conservation.ca.gov/smgb/Pages/AB-3098-List.aspx>.

## **Article 8 - Payment**

- 8.1 Schedule of Values.** Prior to submitting its first application for payment, Contractor must prepare and submit to the Project Manager a schedule of values apportioned to the various divisions and phases of the Work, including mobilization and demobilization. If a Bid Schedule was submitted with Contractor's bid, the amounts in the schedule of values must be consistent with the Bid Schedule. Each line item contained in the schedule of values must be assigned a value such that the total of all items equals the Contract Price. The items must be sufficiently detailed to enable accurate evaluation of the percentage of completion claimed in each application for payment, and the assigned value consistent with any itemized or unit pricing submitted with Contractor's bid.

(A) **Measurements for Unit Price Work.** Materials and items of Work to be paid for on the basis of unit pricing will be measured according to the methods specified in the Contract Documents.

(B) **Deleted or Reduced Work.** Contractor will not be compensated for Work that City has deleted or reduced in scope, except for any labor, material, or equipment costs for such Work that Contractor reasonably incurred before Contractor learned that the Work could be deleted or reduced. Contractor will only be compensated for those actual, direct and documented costs incurred, and will not be entitled to any mark up for overhead or lost profits.

- 8.2 Progress Payments.** Following the last day of each month, or as otherwise required by the Special Conditions or Specifications, Contractor will submit to the Project Manager a monthly application for payment for Work performed during the preceding month based on the estimated value of the Work performed during that preceding month.

(A) **Application for Payment.** Each application for payment must be itemized to include labor, materials, and equipment incorporated into the Work, and materials and equipment delivered to the Project site, as well as authorized and approved Change Orders. Each payment application must be supported by the unit prices submitted with Contractor's Bid Schedule and/or schedule of values and any other substantiating data required by the Contract Documents.

(B) **Payment of Undisputed Amounts.** City will pay the undisputed amount due within 30 days after Contractor has submitted a complete and accurate payment application, subject to Public Contract Code § 20104.50. City will deduct a percentage from each progress payment as retention, as set forth in Section 8.5, below, and may deduct or withhold additional amounts as set forth in Section 8.3, below.

- 8.3 Adjustment of Payment Application.** City may adjust or reject the amount requested in a payment application, including application for Final Payment, in whole or in part, if the amount requested is disputed or unsubstantiated. Contractor will be notified in writing of

the basis for the modification to the amount requested. City may also deduct or withhold from payment otherwise due based upon any of the circumstances and amounts listed below. Sums withheld from payment otherwise due will be released when the basis for that withholding has been remedied and no longer exists.

- (A) For Contractor's unexcused failure to perform the Work as required by the Contract Documents, including correction or completion of punch list items, City may withhold or deduct an amount based on the City's estimated cost to correct or complete the Work.
- (B) For loss or damage caused by Contractor or its Subcontractors arising out of or relating to performance of the Work or any failure to protect the Project site, City may deduct an amount based on the estimated cost to repair or replace.
- (C) For Contractor's failure to pay its Subcontractors and suppliers when payment is due, City may withhold an amount equal to the total of past due payments and may opt to pay that amount separately via joint check pursuant to Section 8.6(B), Joint Checks.
- (D) For Contractor's failure to timely correct rejected, nonconforming, or defective Work, City may withhold or deduct an amount based on the City's estimated cost to correct or complete the Work.
- (E) For any unreleased stop notice, City may withhold 125% of the amount claimed.
- (F) For Contractor's failure to submit any required schedule or schedule update in the manner specified or within the time specified in the Contract Documents, City may withhold an amount equal to five percent of the total amount requested until Contractor complies with its schedule submittal obligations.
- (G) For Contractor's failure to maintain or submit as-built documents in the manner specified or within the time specified in the Contract Documents, City may withhold or deduct an amount based on the City's cost to prepare the as-builts.
- (H) For Work performed without Shop Drawings that have been accepted by City, when accepted Shop Drawings are required before proceeding with the Work, City may deduct an amount based on the estimated cost to correct unsatisfactory Work or diminution in value.
- (I) For fines, payments, or penalties assessed under the Labor Code, City may deduct from payments due to Contractor as required by Laws and as directed by the Division of Labor Standards Enforcement.
- (J) For any other costs or charges that may be withheld or deducted from payments to Contractor, as provided in the Contract Documents, including liquidated damages, City may withhold or deduct such amounts from payment otherwise due to Contractor.

**8.4 Early Occupancy.** Neither City's payment of progress payments nor its partial or full use or occupancy of the Project constitutes acceptance of any part of the Work.

**8.5 Retention.** City will retain five percent of the full amount due on each progress payment (i.e., the amount due before any withholding or deductions pursuant to Section 8.3, Adjustment of Payment Application), or the percentage stated in the Notice Inviting Bids, whichever is greater, as retention to ensure full and satisfactory performance of the Work. Contractor is not entitled to any reduction in the rate of withholding at any time, nor to release of any retention before 35 days following City's acceptance of the Project.

(A) **Substitution of Securities.** As provided by Public Contract Code § 22300, Contractor may request in writing that it be allowed, at its sole expense, to substitute securities for the retention withheld by City. Any escrow agreement entered into pursuant to this provision must fully comply with Public Contract Code § 22300 and will be subject to approval as to form by City's legal counsel. If City exercises its right to draw upon such securities in the event of default pursuant to section (7) of the statutory Escrow Agreement for Security Deposits in Lieu of Retention, pursuant to subdivision (g) of Public Contract Code § 22300 ("Escrow Agreement"), and if Contractor disputes that it is in default, its sole remedy is to comply with the dispute resolution procedures in Article 12 and the provisions therein. It is agreed that for purposes of this paragraph, an event of default includes City's rights pursuant to these Contract Documents to withhold or deduct sums from retention, including withholding or deduction for liquidated damages, incomplete or defective Work, stop payment notices, or backcharges. It is further agreed that if any individual authorized to give or receive written notice on behalf of a party pursuant to section (10) of the Escrow Agreement are unavailable to give or receive notice on behalf of that party due to separation from employment, retirement, death, or other circumstances, the successor or delegate of the named individual is deemed to be the individual authorized to give or receive notice pursuant to section (10) of the Escrow Agreement.

(B) **Release of Undisputed Retention.** All undisputed retention, less any amounts that may be assessed as liquidated damages, retained for stop notices, or otherwise withheld pursuant to Section 8.3, Adjustment of Payment Application, will be released as Final Payment to Contractor no sooner than 35 days following recordation of the notice of completion, and no later than 60 days following acceptance of the Project by City's governing body or authorized designee pursuant to Section 11.1(C), Acceptance, or, if the Project has not been accepted, no later than 60 days after the Project is otherwise considered complete pursuant to Public Contract Code § 7107(c).

**8.6 Payment to Subcontractors and Suppliers.** Each month, Contractor must promptly pay each Subcontractor and supplier the value of the portion of labor, materials, and equipment incorporated into the Work or delivered to the Project site by the Subcontractor or supplier during the preceding month. Such payments must be made in accordance with the requirements of Laws pertaining to such payments, and those of the Contract Documents and applicable subcontract or supplier contract.

(A) **Withholding for Stop Notice.** Pursuant to Civil Code § 9358, City will withhold 125% of the amount claimed by an unreleased stop notice, a portion of which may be retained by City for the costs incurred in handling the stop notice claim, including attorneys' fees and costs, as authorized by law.

(B) **Joint Checks.** City reserves the right, acting in its sole discretion, to issue joint checks made payable to Contractor and a Subcontractor or supplier, if City determines this is necessary to ensure fair and timely payment for a Subcontractor or supplier who has provided services or goods for the Project. As a condition to release of payment by a joint check, the joint check payees may be required to execute a joint check agreement in a form provided or approved by the City Attorney's Office. The joint check payees will be jointly and severally responsible for the allocation and disbursement of funds paid by joint check. Payment by joint check will not be construed to create a contractual relationship between City and a Subcontractor or supplier of any tier beyond the scope of the joint check agreement.

**8.7 Final Payment.** Contractor's application for Final Payment must comply with the requirements for submitting an application for a progress payment as stated in Section 8.2, above. Corrections to previous progress payments, including adjustments to estimated quantities for unit priced items, may be included in the Final Payment. If

Contractor fails to submit a timely application for Final Payment, City reserves the right to unilaterally process and issue Final Payment without an application from Contractor in order to close out the Project. For the purposes of determining the deadline for Claim submission pursuant to Article 12, the date of Final Payment is deemed to be the date that City acts to release undisputed retention as final payment to Contractor, or otherwise provides written notice to Contractor of Final Payment or that no undisputed funds remain available for Final Payment due to offsetting withholdings or deductions pursuant to Section 8.3, Adjustment of Payment Application. If the amount due from Contractor to City exceeds the amount of Final Payment, City retains the right to recover the balance from Contractor or its sureties.

- 8.8 Release of Claims.** City may, at any time, require that payment of the undisputed portion of any progress payment or Final Payment be contingent upon Contractor furnishing City with a written waiver and release of all claims against City arising from or related to the portion of Work covered by those undisputed amounts subject to the limitations of Public Contract Code § 7100. Any disputed amounts may be specifically excluded from the release.
- 8.9 Warranty of Title.** Contractor warrants that title to all work, materials, or equipment incorporated into the Work and included in a request for payment will pass over to City free of any claims, liens, or encumbrances upon payment to Contractor.

#### Article 9 - Labor Provisions

- 9.1 Discrimination Prohibited.** Discrimination against any prospective or present employee engaged in the Work on grounds of race, color, ancestry, national origin, ethnicity, religion, sex, sexual orientation, age, disability, or marital status is strictly prohibited. Contractor and its Subcontractors are required to comply with all applicable Laws prohibiting discrimination, including the California Fair Employment and Housing Act (Govt. Code § 12900 et seq.), Government Code § 11135, and Labor Code §§ 1735, 1777.5, 1777.6, and 3077.5.
- 9.2 Labor Code Requirements.**
- (A) **Eight Hour Day.** Pursuant to Labor Code § 1810, eight hours of labor constitute a legal day's work under this Contract.
- (B) **Penalty.** Pursuant to Labor Code § 1813, Contractor will forfeit to City as a penalty, the sum of \$25.00 for each day during which a worker employed by Contractor or any Subcontractor is required or permitted to work more than eight hours in any one calendar day or more than 40 hours per calendar week, except if such workers are paid overtime under Labor Code § 1815.
- (C) **Apprentices.** Contractor is responsible for compliance with the requirements governing employment and payment of apprentices, as set forth in Labor Code § 1777.5, which is fully incorporated by reference.
- (D) **Notices.** Pursuant to Labor Code § 1771.4, Contractor is required to post all job site notices prescribed by Laws.
- 9.3 Prevailing Wages.** Each worker performing Work under this Contract that is covered under Labor Code §§ 1720, 1720.3, or 1720.9, including cleanup at the Project site, must be paid at a rate not less than the prevailing wage as defined in §§ 1771 and 1774 of the Labor Code. The prevailing wage rates are on file with the City and available online at

<http://www.dir.ca.gov/dlsr>. Contractor must post a copy of the applicable prevailing rates at the Project site.

(A) **Penalties.** Pursuant to Labor Code § 1775, Contractor and any Subcontractor will forfeit to City as a penalty up to \$200.00 for each calendar day, or portion thereof, for each worker paid less than the applicable prevailing wage rate. Contractor must also pay each worker the difference between the applicable prevailing wage rate and the amount actually paid to that worker.

(B) **Federal Requirements.** If this Project is subject to federal prevailing wage requirements in addition to California prevailing wage requirements, Contractor and its Subcontractors are required to pay the higher of the currently applicable state or federal prevailing wage rates.

**9.4 Payroll Records.** Contractor must comply with the provisions of Labor Code §§ 1771.4, 1776, and 1812 and all implementing regulations, which are fully incorporated by this reference, including requirements for monthly electronic submission of payroll records to the DIR.

(A) **Contractor and Subcontractor Obligations.** Contractor and each Subcontractor must keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the Work. Each payroll record must contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct; and

(2) Contractor or the Subcontractor has complied with the requirements of Labor Code §§ 1771, 1811, and 1815 for any Work performed by its employees on the Project.

(B) **Certified Record.** A certified copy of an employee's payroll record must be made available for inspection or furnished to the employee or his or her authorized representative on request, to City, to the Division of Labor Standards Enforcement, to the Division of Apprenticeship Standards of the DIR, and as further required by the Labor Code.

(C) **Enforcement.** Upon notice of noncompliance with Labor Code § 1776, Contractor or Subcontractor has ten days in which to comply with the requirements of this section. If Contractor or Subcontractor fails to do so within the ten-day period, Contractor or Subcontractor will forfeit a penalty of \$100.00 per day, or portion thereof, for each worker for whom compliance is required, until strict compliance is achieved. Upon request by the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement, these penalties will be withheld from payments then due to Contractor.

**9.5 Labor Compliance.** Pursuant to Labor Code § 1771.4, the Contract for this Project is subject to compliance monitoring and enforcement by the DIR.

## Article 10 - Safety Provisions

**10.1 Safety Precautions and Programs.** Contractor and its Subcontractors are fully responsible for safety precautions and programs, and for the safety of persons and property in the performance of the Work. Contractor and its Subcontractors must at all



times comply with all applicable health and safety Laws and seek to avoid injury, loss, or damage to persons or property by taking reasonable steps to protect its employees and other persons at any Worksite, materials and equipment stored on or off site, and property at or adjacent to any Worksite.

(A) **Reporting Requirements.** Contractor must immediately notify the City of any death, serious injury or illness resulting from Work on the Project. Contractor must immediately provide a written report to City of each recordable accident or injury occurring at any Worksite within 24 hours of the occurrence. The written report must include: (1) the name and address of the injured or deceased person; (2) the name and address of each employee of Contractor or of any Subcontractor involved in the incident; (3) a detailed description of the incident, including precise location, time, and names and contact information for known witnesses; and (4) a police or first responder report, if applicable. If Contractor is required to file an accident report with a government agency, Contractor will provide a copy of the report to City.

(B) **Legal Compliance.** Contractor's safety program must comply with the applicable legal and regulatory requirements. Contractor must provide City with copies of all notices required by Laws.

(C) **Contractor's Obligations.** Any damage or loss caused by Contractor arising from the Work which is not insured under property insurance must be promptly remedied by Contractor.

(D) **Remedies.** If City determines, in its sole discretion, that any part of the Work or Project site is unsafe, City may, without assuming responsibility for Contractor's safety program, require Contractor or its Subcontractor to cease performance of the Work or to take corrective measures to City's satisfaction. If Contractor fails to promptly take the required corrective measures, City may perform them and deduct the cost from the Contract Price. Contractor agrees it is not entitled to submit a Claim for damages, for an increase in Contract Price, or for a change in Contract Time based on Contractor's compliance with City's request for corrective measures pursuant to this provision.

**10.2 Hazardous Materials.** Unless otherwise specified in the Contract Documents, this Contract does not include the removal, handling, or disturbance of any asbestos or other Hazardous Materials. If Contractor encounters materials on the Project site that Contractor reasonably believes to be asbestos or other Hazardous Materials, and the asbestos or other Hazardous Materials have not been rendered harmless, Contractor may continue Work in unaffected areas reasonably believed to be safe, but must immediately cease work on the area affected and report the condition to City. No asbestos, asbestos-containing products or other Hazardous Materials may be used in performance of the Work.

**10.3 Material Safety.** Contractor is solely responsible for complying with § 5194 of Title 8 of the California Code of Regulations, including by providing information to Contractor's employees about any hazardous chemicals to which they may be exposed in the course of the Work. A hazard communication program and other forms of warning and training about such exposure must be used. Contractor must also maintain Safety Data Sheets ("SDS") at the Project site, as required by Laws, for materials or substances used or consumed in the performance of the Work. The SDS will be accessible and available to Contractor's employees, Subcontractors, and City.

(A) **Contractor Obligations.** Contractor is solely responsible for the proper delivery, handling, use, storage, removal, and disposal of all materials brought to the Project site and/or used in the performance of the Work. Contractor must notify the Engineer if a specified product or material cannot be used safely.

(B) **Labeling.** Contractor must ensure proper labeling on any material brought onto the Project site so that any persons working with or in the vicinity of the material may be informed as to the identity of the material, any potential hazards, and requirements for proper handling, protections, and disposal.

**10.4 Hazardous Condition.** Contractor is solely responsible for determining whether a hazardous condition exists or is created during the course of the Work, involving a risk of bodily harm to any person or risk of damage to any property. If a hazardous condition exists or is created, Contractor must take all precautions necessary to address the condition and ensure that the Work progresses safely under the circumstances. Hazardous conditions may result from, but are not limited to, use of specified materials or equipment, the Work location, the Project site condition, the method of construction, or the way any Work must be performed.

**10.5 Emergencies.** In an emergency affecting the safety or protection of persons, Work, or property at or adjacent to any Worksite, Contractor must take reasonable and prompt actions to prevent damage, injury, or loss, without prior authorization from the City if, under the circumstances, there is inadequate time to seek prior authorization from the City.

## **Article 11 - Completion and Warranty Provisions**

### **11.1 Final Completion.**

(A) **Final Inspection and Punch List.** When the Work required by this Contract is fully performed, Contractor must provide written notification to City requesting final inspection. The Engineer will schedule the date and time for final inspection, which must include Contractor's primary representative for this Project and its superintendent. Based on that inspection, City will prepare a punch list of any items that are incomplete, missing, defective, incorrectly installed, or otherwise not compliant with the Contract Documents. The punch list to Contractor will specify the time by which all of the punch list items must be completed or corrected. The punch list may include City's estimated cost to complete each punch list item if Contractor fails to do so within the specified time. The omission of any non-compliant item from a punch list will not relieve Contractor from fulfilling all requirements of the Contract Documents. Contractor's failure to complete any punch list item within the time specified in the punch list will not waive or abridge its warranty obligations for any such items that must be completed by the City or by a third party retained by the City due to Contractor's failure to timely complete any such outstanding item.

(B) **Requirements for Final Completion.** Final Completion will be achieved upon completion or correction of all punch list items, as verified by City's further inspection, and upon satisfaction of all other Contract requirements, including any commissioning required under the Contract Documents and submission of all final submittals, including instructions and manuals as required under Section 7.10, and complete, final as-built drawings as required under Section 7.11, all to City's satisfaction.

(C) **Acceptance.** The Project will be considered accepted upon City Council action during a public meeting to accept the Project, unless the Engineer is authorized to accept the Project, in which case the Project will be considered accepted upon the date of the Engineer's issuance of a written notice of acceptance. In order to avoid delay of Project close out, the City may elect, acting in its sole discretion, to accept the Project as complete subject to exceptions for punch list items that are not completed within the time specified in the punch list.

(D) **Final Payment and Release of Retention.** Final Payment and release of retention, less any sums withheld pursuant to the provisions of the Contract Documents, will not be made sooner than 35 days after recordation of the notice of completion. If Contractor fails to complete all of the punch list items within the specified time, City may withhold up to 150% of City's estimated cost to complete each of the remaining items from Final Payment and may use the withheld retention to pay for the costs to self-perform the outstanding items or to retain a third party to complete any such outstanding punch list item.

## 11.2 Warranty.

(A) **General.** Contractor warrants that all materials and equipment will be new unless otherwise specified, of good quality, in conformance with the Contract Documents, and free from defective workmanship and materials. Contractor further warrants that the Work will be free from material defects not intrinsic in the design or materials required in the Contract Documents. Contractor warrants that materials or items incorporated into the Work comply with the requirements and standards in the Contract Documents, including compliance with Laws, and that any Hazardous Materials encountered or used were handled as required by Laws. At City's request, Contractor must furnish satisfactory evidence of the quality and type of materials and equipment furnished. Contractor's warranty does not extend to damage caused by normal wear and tear, or improper use or maintenance.

(B) **Warranty Period.** Contractor's warranty must guarantee its Work for a period of one year from the date of Project acceptance (the "Warranty Period"), except when a longer guarantee is provided by a supplier or manufacturer or is required by the Specifications or Special Conditions. Contractor must obtain from its Subcontractors, suppliers and manufacturers any special or extended warranties required by the Contract Documents.

(C) **Warranty Documents.** As a condition precedent to Final Completion, Contractor must supply City with all warranty and guarantee documents relevant to equipment and materials incorporated into the Work and guaranteed by their suppliers or manufacturers.

(D) **Subcontractors.** The warranty obligations in the Contract Documents apply to Work performed by Contractor and its Subcontractors, and Contractor agrees to be co-guarantor of such Work.

(E) **Contractor's Obligations.** Upon written notice from City to Contractor of any defect in the Work discovered during the Warranty Period, Contractor or its responsible Subcontractor must promptly correct the defective Work at its own cost. Contractor's obligation to correct defects discovered during the Warranty Period will continue past the expiration of the Warranty Period as to any defects in Work for which Contractor was notified prior to expiration of the Warranty Period. Work performed during the Warranty Period ("Warranty Work") will be subject to the warranty provisions in this Section 11.2 for a one-year period that begins upon completion of such Warranty Work to City's satisfaction.

(F) **City's Remedies.** If Contractor or its responsible Subcontractor fails to correct defective Work within ten days following notice by City, or sooner if required by the circumstances, City may correct the defects to conform with the Contract Documents at Contractor's sole expense. Contractor must reimburse City for its costs in accordance with subsection (H), below.

(G) **Emergency Repairs.** In cases of emergency where any delay in correcting defective Work could cause harm, loss or damage, City may immediately correct the defects to conform with the Contract Documents at Contractor's sole expense. Contractor or its surety must reimburse City for its costs in accordance with subsection (H), below.

(H) **Reimbursement.** Contractor must reimburse City for its costs to repair under subsections (F) or (G), above, within 30 days following City's submission of a demand for payment pursuant to this provision. If City is required to initiate legal action to compel Contractor's compliance with this provision, and City is the prevailing party in such action, Contractor and its surety are solely responsible for all of City's attorney's fees and legal costs expended to enforce Contractor's warranty obligations herein, in addition to any and all costs City incurs to correct the defective Work.

**11.3 Use Prior to Final Completion.** City reserves the right to occupy or make use of the Project, or any portions of the Project, prior to Final Completion if City has determined that the Project or portion of it is in a condition suitable for the proposed occupation or use, and that it is in its best interest to occupy or make use of the Project, or any portions of it, prior to Final Completion.

(A) **Non-Waiver.** Occupation or use of the Project, in whole or in part, prior to Final Completion will not operate as acceptance of the Work or any portion of it, nor will it operate as a waiver of any of City's rights or Contractor's duties pursuant to these Contract Documents, and will not affect nor bear on the determination of the time of substantial completion with respect to any statute of repose pertaining to the time for filing an action for construction defect.

(B) **City's Responsibility.** City will be responsible for the cost of maintenance and repairs due to normal wear and tear with respect to those portions of the Project that are being occupied or used before Final Completion. The Contract Price or the Contract Time may be adjusted pursuant to the applicable provisions of these Contract Documents if, and only to the extent that, any occupation or use under this Section actually adds to Contractor's cost or time to complete the Work within the Contract Time.

**11.4 Substantial Completion.** For purposes of determining "substantial completion" with respect to any statute of repose pertaining to the time for filing an action for construction defect, "substantial completion" is deemed to mean the last date that Contractor or any Subcontractor performs Work on the Project prior to City acceptance of the Project, except for warranty work performed under this Article.

## Article 12 - Dispute Resolution

**12.1 Claims.** This Article applies to and provides the exclusive procedures for any Claim arising from or related to the Contract or performance of the Work.

(A) **Definition.** "Claim" means a separate demand by Contractor, submitted in writing by registered or certified mail with return receipt requested, for a change in the Contract Time, including a time extension or relief from liquidated damages, or a change in the Contract Price, when the demand has previously been submitted to City in accordance with the requirements of the Contract Documents, and which has been rejected or disputed by City, in whole or in part. A Claim may also include that portion of a unilateral Change Order that is disputed by the Contractor.

(B) **Limitations.** A Claim may only include the portion of a previously rejected demand that remains in dispute between Contractor and City. With the exception of any dispute regarding the amount of money actually paid to Contractor as Final Payment,

Contractor is not entitled to submit a Claim demanding a change in the Contract Time or the Contract Price, which has not previously been submitted to City in full compliance with Article 5 and Article 6, and subsequently rejected in whole or in part by City.

(C) **Scope of Article.** This Article is intended to provide the exclusive procedures for submission and resolution of Claims of any amount and applies in addition to the provisions of Public Contract Code § 9204 and § 20104 et seq., which are incorporated by reference herein.

(D) **No Work Delay.** Notwithstanding the submission of a Claim or any other dispute between the parties related to the Project or the Contract Documents, Contractor must perform the Work and may not delay or cease Work pending resolution of a Claim or other dispute, but must continue to diligently prosecute the performance and timely completion of the Work, including the Work pertaining to the Claim or other dispute.

(E) **Informal Resolution.** Contractor will make a good faith effort to informally resolve a dispute before initiating a Claim, preferably by face-to-face meeting between authorized representatives of Contractor and City.

**12.2 Claims Submission.** The following requirements apply to any Claim subject to this Article:

(A) **Substantiation.** The Claim must be submitted to City in writing, clearly identified as a “Claim” submitted pursuant to this Article 12 and must include all of the documents necessary to substantiate the Claim including the Change Order request that was rejected in whole or in part, and a copy of City’s written rejection that is in dispute. The Claim must clearly identify and describe the dispute, including relevant references to applicable portions of the Contract Documents, and a chronology of relevant events. Any Claim for additional payment must include a complete, itemized breakdown of all known or estimated labor, materials, taxes, insurance, and subcontract, or other costs. Substantiating documentation such as payroll records, receipts, invoices, or the like, must be submitted in support of each component of claimed cost. Any Claim for an extension of time or delay costs must be substantiated with a schedule analysis and narrative depicting and explaining claimed time impacts.

(B) **Claim Format and Content.** A Claim must be submitted in the following format:

(1) Provide a cover letter, specifically identifying the submission as a “Claim” submitted under this Article 12 and specifying the requested remedy (e.g., amount of proposed change to Contract Price and/or change to Contract Time).

(2) Provide a summary of each Claim, including underlying facts and the basis for entitlement, and identify each specific demand at issue, including the specific Change Order request (by number and submittal date), and the date of City’s rejection of that demand, in whole or in part.

(3) Provide a detailed explanation of each issue in dispute. For multiple issues included within a single Claim or for multiple Claims submitted concurrently, separately number and identify each individual issue or Claim, and include the following for each separate issue or Claim:

a. A succinct statement of the matter in dispute, including Contractor’s position and the basis for that position;

b. Identify and attach all documents that substantiate the Claim, including relevant provisions of the Contract Documents, RFIs,

calculations, and schedule analysis (see subsection (A), Substantiation, above);

c. A chronology of relevant events; and

d. Analysis and basis for claimed changes to Contract Price, Contract Time, or any other remedy requested.

(4) Provide a summary of issues and corresponding claimed damages. If, by the time of the Claim submission deadline (below), the precise amount of the requested change in the Contract Price or Contract Time is not yet known, Contractor must provide a good faith estimate, including the basis for that estimate, and must identify the date by which it is anticipated that the Claim will be updated to provide final amounts.

(5) Include the following certification, executed by Contractor's authorized representative:

"The undersigned Contractor certifies under penalty of perjury that its statements and representations in this Claim submittal are true and correct. Contractor warrants that this Claim submittal is comprehensive and complete as to the matters in dispute, and agrees that any costs, expenses, or delay not included herein are deemed waived."

(C) **Submission Deadlines.**

(1) A Claim disputing rejection of a request for a change in the Contract Time or Contract Price must be submitted within 15 days following the date that City notified Contractor in writing that a request for a change in the Contract Time or Contract Price, duly submitted in compliance with Article 5 and Article 6, has been rejected in whole or in part. A Claim disputing the terms of a unilateral Change Order must be submitted within 15 days following the date of issuance of the unilateral Change Order. These Claim deadlines apply even if Contractor cannot yet quantify the total amount of any requested change in the Contract Time or Contract Price. If the Contractor cannot quantify those amounts, it must submit an estimate of the amounts claimed pending final determination of the requested remedy by Contractor.

(2) With the exception of any dispute regarding the amount of Final Payment, any Claim must be filed on or before the date of Final Payment or will be deemed waived.

(3) A Claim disputing the amount of Final Payment must be submitted within 15 days of the effective date of Final Payment, under Section 8.7, Final Payment.

(4) Strict compliance with these Claim submission deadlines is necessary to ensure that any dispute may be mitigated as soon as possible, and to facilitate cost-efficient administration of the Project. **Any Claim that is not submitted within the specified deadlines will be deemed waived by Contractor.**

**12.3 City's Response.** City will respond within 45 days of receipt of the Claim with a written statement identifying which portion(s) of the Claim are disputed, unless the 45-day period is extended by mutual agreement of City and Contractor or as otherwise allowed under Public Contract Code § 9204. However, if City determines that the Claim is not adequately substantiated pursuant to Section 12.2(A), Substantiation, City may first request in writing, within 30 days of receipt of the Claim, any additional documentation

supporting the Claim or relating to defenses to the Claim that City may have against the Claim.

(A) **Additional Information.** If additional information is thereafter required, it may be requested and provided upon mutual agreement of City and Contractor. If Contractor's Claim is based on estimated amounts, Contractor has a continuing duty to update its Claim as soon as possible with information on actual amounts in order to facilitate prompt and fair resolution of the Claim.

(B) **Non-Waiver.** Any failure by City to respond within the times specified above will not be construed as acceptance of the Claim, in whole or in part, or as a waiver of any provision of these Contract Documents.

**12.4 Meet and Confer.** If Contractor disputes City's written response, or City fails to respond within the specified time, within 15 days of receipt of City's response or within 15 days of City's failure to respond within the applicable 45-day time period under Section 12.3, respectively, Contractor may notify City of the dispute in writing sent by registered or certified mail, return receipt requested, and demand an informal conference to meet and confer for settlement of the issues in dispute. If Contractor fails to notify City of the dispute and demand an informal conference to meet and confer in writing within the specified time, Contractor's Claim will be deemed waived.

(A) **Schedule Meet and Confer.** Upon receipt of the demand to meet and confer, City will schedule the meet and confer conference to be held within 30 days, or later if needed to ensure the mutual availability of each of the individuals that each party requires to represent its interests at the meet and confer conference.

(B) **Location for Meet and Confer.** The meet and confer conference will be scheduled at a location at or near City's principal office.

(C) **Written Statement After Meet and Confer.** Within ten working days after the meet and confer has concluded, City will issue a written statement identifying which portion(s) of the Claim remain in dispute, if any.

(D) **Submission to Mediation.** If the Claim or any portion remains in dispute following the meet and confer conference, within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute, the Contractor may identify in writing disputed portion(s) of the Claim, which will be submitted for mediation, as set forth below.

#### **12.5 Mediation and Government Code Claims.**

(A) **Mediation.** Within ten working days after the City issues the written statement identifying any portion(s) of the Claim remaining in dispute following the meet and confer, City and Contractor will mutually agree to a mediator, as provided under Public Contract Code § 9204. Mediation will be scheduled to ensure the mutual availability of the selected mediator and all of the individuals that each party requires to represent its interests. If there are multiple Claims in dispute, the parties may agree to schedule the mediation to address all outstanding Claims at the same time. The parties will share the costs of the mediator and mediation fees equally, but each party is otherwise solely and separately responsible for its own costs to prepare for and participate in the mediation, including costs for its legal counsel or any other consultants.

(B) **Government Code Claims.**

(1) Timely presentation of a Government Code Claim is a condition precedent to filing any legal action based on or arising from the Contract. Compliance with the Claim submission requirements in this Article 12 is a condition precedent to filing a Government Code Claim.

(2) The time for filing a Government Code Claim will be tolled from the time Contractor submits its written Claim pursuant to Section 12.2, above, until the time that Claim is denied in whole or in part at the conclusion of the meet and confer process, including any period of time used by the meet and confer process. However, if the Claim is submitted to mediation, the time for filing a Government Code Claim will be tolled until conclusion of the mediation, including any continuations, if the Claim is not fully resolved by mutual agreement of the parties during the mediation or any continuation of the mediation.

**12.6 Tort Claims.** This Article does not apply to tort claims and nothing in this Article is intended nor will be construed to change the time periods for filing tort-based Government Code Claims.

**12.7 Arbitration.** It is expressly agreed, under Code of Civil Procedure § 1296, that in any arbitration to resolve a dispute relating to this Contract, the arbitrator's award must be supported by law and substantial evidence.

**12.8 Burden of Proof and Limitations.** Contractor bears the burden of proving entitlement to and the amount of any claimed damages. Contractor is not entitled to damages calculated on a total cost basis, but must prove actual damages. Contractor is not entitled to speculative, special, or consequential damages, including home office overhead or any form of overhead not directly incurred at the Project site or any other Worksite; lost profits; loss of productivity; lost opportunity to work on other projects; diminished bonding capacity; increased cost of financing for the Project; extended capital costs; non-availability of labor, material or equipment due to delays; or any other indirect loss arising from the Contract. The Eichleay Formula or similar formula will not be used for any recovery under the Contract. The City will not be directly liable to any Subcontractor or supplier.

**12.9 Legal Proceedings.** In any legal proceeding that involves enforcement of any requirements of the Contract Documents, the finder of fact will receive detailed instructions on the meaning and operation of the Contract Documents, including conditions, limitations of liability, remedies, claim procedures, and other provisions bearing on the defenses and theories of liability. Detailed findings of fact will be requested to verify enforcement of the Contract Documents. All of the City's remedies under the Contract Documents will be construed as cumulative, and not exclusive, and the City reserves all rights to all remedies available under law or equity as to any dispute arising from or relating to the Contract Documents or performance of the Work.

**12.10 Other Disputes.** The procedures in this Article 12 will apply to any and all disputes or legal actions, in addition to Claims, arising from or related to this Contract, including disputes regarding suspension or early termination of the Contract, unless and only to the extent that compliance with a procedural requirement is expressly and specifically waived by City. Nothing in this Article is intended to delay suspension or termination under Article 13.



## Article 13 - Suspension and Termination

**13.1 Suspension for Cause.** In addition to all other remedies available to City, if Contractor fails to perform or correct Work in accordance with the Contract Documents, including non-compliance with applicable environmental or health and safety Laws, City may immediately order the Work, or any portion of it, suspended until the circumstances giving rise to the suspension have been eliminated to City's satisfaction.

(A) **Notice of Suspension.** Upon receipt of City's written notice to suspend the Work, in whole or in part, except as otherwise specified in the notice of suspension, Contractor and its Subcontractors must promptly stop Work as specified in the notice of suspension; comply with directions for cleaning and securing the Worksite; and protect the completed and in-progress Work and materials. Contractor is solely responsible for any damages or loss resulting from its failure to adequately secure and protect the Project.

(B) **Resumption of Work.** Upon receipt of the City's written notice to resume the suspended Work, in whole or in part, except as otherwise specified in the notice to resume, Contractor and its Subcontractors must promptly re-mobilize and resume the Work as specified; and within ten days from the date of the notice to resume, Contractor must submit a recovery schedule, prepared in accordance with the Contract Documents, showing how Contractor will complete the Work within the Contract Time.

(C) **Failure to Comply.** Contractor will not be entitled to an increase in the Contract Time or Contract Price for a suspension occasioned by Contractor's failure to comply with the Contract Documents.

(D) **No Duty to Suspend.** City's right to suspend the Work will not give rise to a duty to suspend the Work, and City's failure to suspend the Work will not constitute a defense to Contractor's failure to comply with the requirements of the Contract Documents.

**13.2 Suspension for Convenience.** City reserves the right to suspend, delay, or interrupt the performance of the Work in whole or in part, for a period of time determined to be appropriate for City's convenience. Upon notice by City pursuant to this provision, Contractor must immediately suspend, delay, or interrupt the Work and secure the Project site as directed by City except for taking measures to protect completed or in-progress Work as directed in the suspension notice, and subject to the provisions of Section 13.1(A) and (B), above. If Contractor submits a timely request for a Change Order in compliance with Articles 5 and 6, the Contract Price and the Contract Time will be equitably adjusted by Change Order pursuant to the terms of Articles 5 and 6 to reflect the cost and delay impact occasioned by such suspension for convenience, except to the extent that any such impacts were caused by Contractor's failure to comply with the Contract Documents or the terms of the suspension notice or notice to resume. However, the Contract Time will only be extended if the suspension causes or will cause unavoidable delay in Final Completion. If Contractor disputes the terms of a Change Order issued for such equitable adjustment due to suspension for convenience, its sole recourse is to comply with the Claim procedures in Article 12.

**13.3 Termination for Default.** City may declare that Contractor is in default of the Contract for a material breach of or inability to fully, promptly, or satisfactorily perform its obligations under the Contract.

(A) **Default.** Events giving rise to a declaration of default include Contractor's refusal or failure to supply sufficient skilled workers, proper materials, or equipment to perform the Work within the Contract Time; Contractor's refusal or failure to make prompt payment to its employees, Subcontractors, or suppliers or to correct defective Work or

damage; Contractor's failure to comply with Laws, or orders of any public agency with jurisdiction over the Project; evidence of Contractor's bankruptcy, insolvency, or lack of financial capacity to complete the Work as required within the Contract Time; suspension, revocation, or expiration and nonrenewal of Contractor's license or DIR registration; dissolution, liquidation, reorganization, or other major change in Contractor's organization, ownership, structure, or existence as a business entity; unauthorized assignment of Contractor's rights or duties under the Contract; or any material breach of the Contract requirements.

(B) **Notice of Default and Opportunity to Cure.** Upon City's declaration that Contractor is in default due to a material breach of the Contract Documents, if City determines that the default is curable, City will afford Contractor the opportunity to cure the default within ten days of City's notice of default, or within a period of time reasonably necessary for such cure, including a shorter period of time if applicable.

(C) **Termination.** If Contractor fails to cure the default or fails to expediently take steps reasonably calculated to cure the default within the time period specified in the notice of default, City may issue written notice to Contractor and its performance bond surety of City's termination of the Contract for default.

(D) **Waiver.** Time being of the essence in the performance of the Work, if Contractor's surety fails to arrange for completion of the Work in accordance with the Performance Bond within seven calendar days from the date of the notice of termination pursuant to paragraph (C), City may immediately make arrangements for the completion of the Work through use of its own forces, by hiring a replacement contractor, or by any other means that City determines advisable under the circumstances. Contractor and its surety will be jointly and severally liable for any additional cost incurred by City to complete the Work following termination, where "additional cost" means all cost in excess of the cost City would have incurred if Contractor had timely completed Work without the default and termination. In addition, City will have the right to immediate possession and use of any materials, supplies, and equipment procured for the Project and located at the Project site or any Worksite on City property for the purposes of completing the remaining Work.

(E) **Compensation.** Within 30 days of receipt of updated as-builts, all warranties, manuals, instructions, or other required documents for Work installed to date, and delivery to City of all equipment and materials for the Project for which Contractor has already been compensated, Contractor will be compensated for the Work satisfactorily performed in compliance with the Contract Documents up to the effective date of the termination pursuant to the terms of Article 8, Payment, subject to City's rights to withhold or deduct sums from payment otherwise due pursuant to Section 8.3, and excluding any costs Contractor incurs as a result of the termination, including any cancellation or restocking charges or fees due to third parties. If Contractor disputes the amount of compensation determined by City, its sole recourse is to comply with the Claim Procedures in Article 12, by submitting a Claim no later than 30 days following notice from City of the total compensation to be paid by City.

(F) **Wrongful Termination.** If Contractor disputes the termination, its sole recourse is to comply with the Claim procedures in Article 12. If a court of competent jurisdiction or an arbitrator later determines that the termination for default was wrongful, the termination will be deemed to be a termination for convenience, and Contractor's damages will be strictly limited to the compensation provided for termination for convenience under Section 13.4, below. Contractor waives any claim for any other damages for wrongful termination including special or consequential damages, lost opportunity costs, or lost profits, and any award of damages is subject to Section 12.8, Burden of Proof and Limitations.

**13.4 Termination for Convenience.** City reserves the right, acting in its sole discretion, to terminate all or part of the Contract for convenience upon written notice to Contractor.

(A) **Compensation to Contractor.** In the event of City's termination for convenience, Contractor waives any claim for damages, including for loss of anticipated profits from the Project. The following will constitute full and fair compensation to Contractor, and Contractor will not be entitled to any additional claim or compensation:

(1) **Completed Work.** The value of its Work satisfactorily performed as of the date notice of termination is received, based on Contractor's schedule of values and unpaid costs for items delivered to the Project site that were fabricated for incorporation in the Work;

(2) **Demobilization.** Demobilization costs specified in the schedule of values, or if demobilization costs were not provided in a schedule of values pursuant to Section 8.1, then based on actual, reasonable, and fully documented demobilization costs; and

(3) **Termination Markup.** Five percent of the total value of the Work performed as of the date of notice of termination, including reasonable, actual, and documented costs to comply with the direction in the notice of termination for convenience, and demobilization costs, which is deemed to cover all overhead and profit to date.

(B) **Disputes.** If Contractor disputes the amount of compensation determined by City pursuant to paragraph (A), above, its sole recourse is to comply with the Claim procedures in Article 12, by submitting a Claim no later than 30 days following notice from City of total compensation to be paid by City.

**13.5 Actions Upon Termination for Default or Convenience.** The following provisions apply to any termination under this Article, whether for default or convenience, and whether in whole or in part.

(A) **General.** Upon termination, City may immediately enter upon and take possession of the Project and the Work and all tools, equipment, appliances, materials, and supplies procured or fabricated for the Project. Contractor will transfer title to and deliver all completed Work and all Work in progress to City.

(B) **Submittals.** Unless otherwise specified in the notice of termination, Contractor must immediately submit to City all designs, drawings, as-built drawings, Project records, contracts with vendors and Subcontractors, manufacturer warranties, manuals, and other such submittals or Work-related documents required under the terms of the Contract Documents, including incomplete documents or drafts.

(C) **Close Out Requirements.** Except as otherwise specified in the notice of termination, Contractor must comply with all of the following:

(1) Immediately stop the Work, except for any Work that must be completed pursuant to the notice of termination and comply with City's instructions for cessation of labor and securing the Project and any other Worksite(s).

(2) Comply with City's instructions to protect the completed Work and materials, using best efforts to minimize further costs.

(3) Contractor must not place further orders or enter into new subcontracts for materials, equipment, services or facilities, except as may be necessary to complete any portion of the Work that is not terminated.

(4) As directed in the notice, Contractor must assign to City or cancel existing subcontracts that relate to performance of the terminated Work, subject to any prior rights, if any, of the surety for Contractor's performance bond, and settle all outstanding liabilities and claims, subject to City's approval.

(5) As directed in the notice, Contractor must use its best efforts to sell any materials, supplies, or equipment intended solely for the terminated Work in a manner and at market rate prices acceptable to City.

(D) **Payment Upon Termination.** Upon completion of all termination obligations, as specified herein and in the notice of termination, Contractor will submit its request for Final Payment, including any amounts due following termination pursuant to this Article 13. Payment will be made in accordance with the provisions of Article 8, based on the portion of the Work satisfactorily completed, including the close out requirements, and consistent with the previously submitted schedule of values and unit pricing, including demobilization costs. Adjustments to Final Payment may include deductions for the cost of materials, supplies, or equipment retained by Contractor; payments received for sale of any such materials, supplies, or equipment, less re-stocking fees charged; and as otherwise specified in Section 8.3, Adjustment of Payment Application.

(E) **Continuing Obligations.** Regardless of any Contract termination, Contractor's obligations for portions of the Work already performed will continue and the provisions of the Contract Documents will remain in effect as to any claim, indemnity obligation, warranties, guarantees, submittals of as-built drawings, instructions, or manuals, record maintenance, or other such rights and obligations arising prior to the termination date.

## Article 14 - Miscellaneous Provisions

- 14.1 Assignment of Unfair Business Practice Claims.** Under Public Contract Code § 7103.5, Contractor and its Subcontractors agree to assign to City all rights, title, and interest in and to all causes of action it may have under section 4 of the Clayton Act (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 (commencing with § 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract or any subcontract. This assignment will be effective at the time City tenders Final Payment to Contractor, without further acknowledgement by the parties.
- 14.2 Provisions Deemed Inserted.** Every provision of law required to be inserted in the Contract Documents is deemed to be inserted, and the Contract Documents will be construed and enforced as though such provision has been included. If it is discovered that through mistake or otherwise that any required provision was not inserted, or not correctly inserted, the Contract Documents will be deemed amended accordingly.
- 14.3 Waiver.** City's waiver of a breach, failure of any condition, or any right or remedy contained in or granted by the provisions of the Contract Documents will not be effective unless it is in writing and signed by City. City's waiver of any breach, failure, right, or remedy will not be deemed a waiver of any other breach, failure, right, or remedy, whether or not similar, nor will any waiver constitute a continuing waiver unless specified in writing by City.

- 14.4 Titles, Headings, and Groupings.** The titles and headings used and the groupings of provisions in the Contract Documents are for convenience only and may not be used in the construction or interpretation of the Contract Documents or relied upon for any other purpose.
- 14.5 Statutory and Regulatory References.** With respect to any amendments to any statutes or regulations referenced in these Contract Documents, the reference is deemed to be the version in effect on the date that bids were due.
- 14.6 Survival.** The provisions that survive termination or expiration of this Contract include Contract Section 11, Notice, and subsections 12.1, 12.2, 12.3, 12.4, 12.5, and 12.6 of Section 12, General Provisions; and the following provisions in these General Conditions: Section 2.2(J), Contractor's Records, Section 2.3(C), Termination, Section 3.7, Ownership, Section 4.2, Indemnity, Article 12, Dispute Resolution, and Section 11.2, Warranty.

END OF GENERAL CONDITIONS

## Special Conditions

### 1. Authorized Work Days and Hours.

- 1.1 Authorized Work Days.** Except as expressly authorized in writing by City, Contractor is limited to performing Work on the Project on the following days of the week, excluding holidays observed by City:  
Monday through Friday
- 1.2 Authorized Work Hours.** Except as expressly authorized in writing by City, Contractor is limited to performing Work on the Project during the following hours:  
**8:00 a.m. to 5:00 p.m.** All traffic control must be removed by 5:00 p.m. Failure to do so will result in a payment deduction. Refer to Temporary Traffic Control Specification 01 55 26 3.11(B) for deductible schedule.

**2. Pre-Construction Conference.** City will designate a date and time for a pre-construction conference with Contractor following Contract execution. Project administration procedures and coordination between City and Contractor will be discussed, and Contractor must present City with the following information or documents at the meeting for City's review and acceptance before the Work commences:

- 2.1** Name, 24-hour contact information, and qualifications of the proposed on-site superintendent;
- 2.2** List of all key Project personnel and their complete contact information, including email addresses and telephone numbers during regular hours and after hours;
- 2.3** Staging plans that identify the sequence of the Work, including any phases and alternative sequences or phases, with the goal of minimizing the impacts on residents, businesses and other operations in the Project vicinity;
- 2.4** If required, traffic control plans associated with the staging plans that are signed and stamped by a licensed traffic engineer;
- 2.5** Draft baseline schedule for the Work as required under Section 5.2 of the General Conditions, to be finalized within ten days after City issues the Notice to Proceed;
- 2.6** Breakdown of lump sum bid items, to be used for determining the value of Work completed for future progress payments to Contractor;
- 2.7** Schedule with list of Project submittals that require City review, and list of the proposed material suppliers;
- 2.8** Plan for coordination with affected utility owner(s) and compliance with any related permit requirements;
- 2.9** Videotape and photographs recording the conditions throughout the pre-construction Project site, showing the existing improvements and current condition of the curbs, gutters, sidewalks, signs, landscaping, streetlights, structures near the Project such as building faces, canopies, shades and fences, and any other features within the Project area limits;
- 2.10** If requested by City, Contractor's cash flow projections; and

**2.11** Any other documents specified in the Special Conditions or Notice of Potential Award.

**3. Insurance Requirements.** The insurance requirements under Section 4.3 of the General Conditions are modified for this Contract, as set forth below. Except as expressly stated below, all other provisions in Section 4.3 are unchanged and remain in full force and effect.

**3.1 Builders Risk Insurance Waived.** The builder's risk insurance policy requirement set forth in subsection 4.3(A)(5) of the General Conditions is hereby waived and does not apply to this Contract.

**4. Close Out Requirements.** Contractor's close out requirements include the following, if applicable:

**4.1** Contractor must replace, with thermoplastic, any existing striping within and adjacent to the Project site that is damaged during the Work. Partially damaged striping must be replaced in its entirety.

**4.2** Contractor must replace any survey monuments that are damaged or removed during the Work, with a Record of Survey filed by a licensed land surveyor as required by California law.

**4.3** Before removing any traffic control or street signs on the Project site, Contractor must take photographs showing their original locations. Upon completion of each phase of construction, Contractor must temporarily reset the signs at those locations. Contractor must then replace the signs permanently upon completion of the Work and the cost of their removal and replacement must be included in the Bid Proposal.

END OF SPECIAL CONDITION

**SECTION 01 10 00 – SUMMARY****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section describes the contract and other work, plus project requirements.
- B. Related Sections:
  - 1. Division 00 – General Conditions.

**1.2 CONTRACT DESCRIPTION**

- A. Summary of the Work: The Project includes all work described in Division 00 – General Conditions.
- B. Contract: Perform Work of Contract under stipulated sum contract with City per Contract Documents.
- C. Responsible Parties: Construction of the Project is governed by the agreement between the City and the Contractor. Statements in the specifications are directed to this contractor, who has overall responsibility for the subcontractors.
- D. Project Manager: The City will provide a Project Manager who will administer the project during the contract.

**1.3 WORK UNDER OTHER CONTRACTS**

- A. Separate Contracts: The City may award separate contracts for performance of certain construction operations at the site. Those operations will be conducted simultaneously with the work under the Contract. The Contracts are described in Division 00 Article 2 Section 2.4 – Coordination of Work.

**1.4 SCHEDULE OF VALUES**

- A. Schedule of Values: The Schedule of Values and Bid Schedule are described in Division 00 Article 8 – Payment. Any bid item may be deleted in total or in part prior to or after award of Contract without compensation in any form or adjustment of other bid items or prices, therefore.

**1.5 MISCELLANEOUS WORK**

- A. Miscellaneous Work Requirements: Coordinating, handling, transporting, and installing items such as field testing of systems; leveling; furnishing, coordinating, and installing sleeves, anchors, and other embedded items; posting of signs; performing traffic routing work; providing operating and maintenance data and



instruction of the City Project Manager; performing warranty work as required; and doing incidental and related work to place all systems and structures in operating condition as designed and as required by Federal, State and Local codes and regulations. Refer to Division 00 – General Conditions for a summary of work requirements.

## 1.6 OWNER-FURNISHED PRODUCTS

### A. Owner's Responsibilities:

1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples to Contractor.
2. Upon delivery, inspect products jointly with Contractor.
3. Submit claims for transportation damage and replace damaged, defective, or deficient items.
4. Arrange for manufacturers' warranties, inspections, and service.

### B. Contractor's Responsibilities:

1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload products at Site; inspect for completeness or damage jointly with Owner.
3. Arrange and pay for delivery to Site. Retrieve items from City Corporation Yard or other designated location, as required, and transport to site. Transport salvaged items to City Corporation Yard.
4. Handle, store, install, and finish products.
5. Repair or replace items damaged after receipt.

## 1.7 WORK SEQUENCE

- ### A. Stages: Construct Work in stages and at times to accommodate City operation requirements during the construction period; coordinate construction schedule and operations with Project Manager.

## 1.8 COOPERATION OF CONTRACTOR AND COORDINATION WITH OTHER WORK

- ### A. Coordination: Coordinate with City and any City forces, or other contractors and forces, as required by Division 00 Article 2 Section 2.4 – Coordination of Work.

## 1.9 CONTRACTOR USE OF PREMISES

- ### A. General: During the construction period the Contractor shall have full use of the premises within the "limits of work" for construction operations, including use of the site. The Contractor's use of the premises is limited only by the City's right to perform work or to retain other contractors on portions of the Project.

### B. Use of the Site:

1. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available for emergency vehicles at all times.

2. Traffic and Barrier Plan: When the Contractor needs to access portions of roadways and driveways, on and adjacent to the work, Contractor is required to submit a traffic and barrier plan to the City for their review and approval prior to setting up any traffic control devices.
  3. Stored Materials: The Contractor assumes all responsibility for protection and safekeeping of material stored on the premises. Moving stored materials which interfere with the operations of the City or other contractors is the responsibility of the Contractor.
  4. Condition of Site: Maintain work areas in a safe condition at all times, remove all graffiti and accumulated rubbish and surplus materials at the end of each work day, and clean and restore the work site at completion of the work to the condition that existed prior to the start of work.
- C. Security of the Contractor's Work Area: The security of the Contractor's work areas and its property, equipment, construction materials, and all other items contained in the Contractor's staging areas or elsewhere on the construction site shall be solely the Contractor's responsibility at all times.

#### 1.10 MAINTENANCE

- A. Contractor's Responsibility: Cost of maintenance of systems and equipment prior to Final Acceptance will be considered as included in prices bid and no direct or additional payment will be made therefore.

#### 1.11 OCCUPANCY REQUIREMENTS

- A. Early Occupancy: Whenever, in the opinion of Project Manager, Work or any part thereof is in a condition suitable for use, and the best interest of City requires such use, City may take beneficial occupancy of and connect to, open for public use, or use the Work or such part thereof. In such case, City will inspect the Work or part thereof, and issue a Certificate of Substantial Completion for that part of Work.
- B. Repairs: Prior to date of Final Acceptance of the Work by City, all necessary repairs or renewals in Work or part thereof so used, not due to ordinary wear and tear, but due to defective materials or workmanship or to operations of Contractor, shall be made at expense of Contractor, as required in Division 00 Article 11 – Completion and Warranty Provisions.
- C. Acceptance: Use by City of Work or part thereof as contemplated by this section shall in no case be construed as constituting acceptance of Work or any part thereof. Such use shall neither relieve Contractor of any responsibilities under Contract, nor act as waiver by City of any of the conditions thereof.
- D. Partial Completion: City may specify in the Contract Documents that portions of the Work, including electrical and mechanical systems or separate structures, shall be substantially completed on milestone dates prior to substantial completion of all of the Work. Contractor shall notify Project Manager in writing

when Contractor considers any such part of the Work ready for its intended use and substantially complete and request Project Manager to issue a Certificate of Substantial Completion for that part of the Work.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 10 00**

## **SECTION 01 22 00 –UNIT PRICES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section specifies procedures and requirements for measurement and payment for unit price items listed on the Bid Form for each unit of work described herein.
- B. Refer to Division 00 General Conditions and Division 00 Article 8 – Payment for related requirements pertaining to change orders, payments and unit prices.
- C. Prices:
  - 1. In addition to Base Bid, Bidder shall quote unit prices, in appropriate spaces on Bid Form for each unit of work as described herein. Change Orders will be based on unit prices quoted on Bid Form for applicable work.
  - 2. In event any unit price quoted appears to compare unfavorably with currently established prices for type of work, City reserves the right to require quoted price to be substantiated or adjusted prior to execution of contract.
  - 3. Unit prices listed on the Bid Form for the following items shall constitute full and complete compensation for each unit, and shall include cost of temporary and administrative work, permits, bonds, insurance, sales taxes, overhead, profit and every other expense, direct or indirect, incident to accomplishment of work under each item.

### **PART 2 - PRODUCTS**

NOT USED

### **PART 3 - EXECUTION**

#### **3.1 MEASUREMENT**

- A. Measurement of quantities for payment will be made or determined by City's Inspector.
  - 1. Volume of any material shall be based on information included with Drawings and additional measurements obtained by Inspector, or by combination of such information, or in a manner which, in the opinion of the Inspector, is best suited to obtain necessary accuracy.
  - 2. In case of unit prices based upon weight measurement, certified weight tickets shall be supplied at time of delivery of materials.

3. Excess materials delivered to the site, but not incorporated in the work, will not be paid for.

### 3.2 UNIT PRICE ITEMS

#### A. Bid Item No.1 – Bonding & Mobilization

1. All work involved in Mobilization will be measured by Lump Sum, unless otherwise specified in the Contract Documents.
2. Payment for “Mobilization” shall constitute but not limited to full compensation for all such work. Payment for mobilization will be made in the form of a Lump Sum, non-prorate-able payment, no part of which will be approved for payment under the Contract until all mobilization items listed herein have been completed as specified. The scope of the work included under this bid item shall include the obtaining of all bonds, insurance, and permits; moving onto the project site, inclusive of any staging areas, all equipment, personnel, and permanent and temporary facilities as required for the proper performance and completion of the Work. Mobilization shall include but not be limited to the following principal items:
  - a. Arrangement with and payment for project staging areas with necessary responsible parties, inclusive of all necessary site investigation, reporting, permitting, traffic control, temporary fencing, crushed rock surfacing (if required), and all other improvements upon the land and work associated with the establishment and ongoing maintenance of staging areas.
  - b. Moving on to the project site of all Contractor's equipment, personnel, and temporary and permanent facilities required for the project.
  - c. Installing a minimum of one (1) project identification sign, including all necessary work to manufacture, label, place, maintain, remove, and dispose of such identification signs and all labor, materials, tools, and equipment in performing the work required per the Contract Documents.
  - d. Providing on site sanitary facilities and potable water facilities.
  - e. Furnishing, installing, and maintaining all storage buildings or sheds required for temporary storage of products, equipment, or materials that have not yet been installed in the Work. All such storage shall meet manufacturer's specified storage requirements, and the specific provisions of the specifications, including temperature and humidity control, if recommended by the manufacturer, and for all security.
  - f. Any work, coordination, hardware/software, Internet, and related technical or process-based activities associated with the project's web-based document management system.
  - g. Obtaining and paying for all required bonds, insurance, permits and licenses.
  - h. Posting all OSHA required notices and establishment of safety programs.
  - i. Submittal of required Construction Schedule.

- j. Conducting a pre-construction photographic survey of construction access, existing areas to remain, and all work areas.
  3. Note: Contractor is advised that no payment for the "Mobilization" bid item will be made unless the construction schedule and traffic control plan have been submitted and accepted by the Engineer.
  4. In addition to the requirements specified above, all submittals shall conform to the applicable requirements of Section City Standard Section 1-14, Shop Drawings and Product Data Submittals for submittal requirements and procedures.
  5. No payment for any of the listed mobilization and demobilization work items will be made until all of the listed items have been completed, as specified, to the satisfaction of the Engineer.
- B. Bid Item No 2 – Construction Surveying
1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in land survey and staking, including control surveying, staking calculations, calculating grades for all hardscape, pipes grading and all other items listed in the specifications, submitting staking calculations in AutoCAD to the engineer for all items listed in the specifications, field surveying/staking, topo shots on curb forms prior to pouring concrete, protecting survey monuments, referencing survey monuments, pothole survey, quality control survey and as-built GPS surveys complete in place as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.
- C. Bid Item No 3 – Traffic Control
1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in providing Traffic Control and Pedestrian Access Plans for each stage of construction, including placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system (excluding construction area signs), installing AC paving as required for all traffic control and handling, temporary traffic striping and markers as required and supervision, furnishing Flaggers as necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered, complete in place, including coordinating for traffic control and maintaining of existing, temporary and proposed bus stops; providing Temporary Railings (Type K) and crash cushions, and all other work described in this section, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Full compensation for providing pedestrian facilities shall be considered as included in the contract Lump Sum price paid for Traffic Control System & Construction Area Signs and no additional compensation will be allowed, therefore.

Full Compensation for Flagging Costs shall be considered as included in the contract Lump Sum price paid for Traffic Control System & Construction Area Signs and no additional compensation will be allowed, therefore.

Full Compensation for doing all the work involved in furnishing, installing, maintaining Construction Area Signs and for removing Construction Area Signs when no longer required, including pedestrian access signs shall be considered as included in the contract Lump Sum price paid for Traffic Control System & Construction Area Signs and no additional compensation will be allowed. Therefore.

Full Compensation for temporary K-Railing and crash cushions including furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing, including excavation and backfill, any flagging costs, drilling holes and bonding threaded rods or dowels when required, removing threaded rods or dowels and filling the drilled holes with mortar and moving and replacing removable panels as required to new locations of K-Rail shall be considered as included in the contract Lump Sum price paid for Traffic Control System & Construction Area Signs and no additional compensation will be allowed, therefore.

3. Includes public notice to police, fire, school, etc.

D. Bid Item No 4 – SWPPP (Storm Water Pollution Prevention Plan)

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Measurement: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing, installing, maintaining, relocating and removing when no longer required best management practices, erosion and sedimentation control measures such as temporary fiber rolls, temporary silt fences, hydroseeding during construction, maintenance of construction entrance, protecting adjacent waterways, temporary drainage inlet protection, maintaining construction entrance/exit, temporary concrete washout, stockpile cover, protection of storage and recyclable materials, portable toilets, maintaining drainage patterns to allow flows to the low points, as shown on the Plans, as specified in the Standard Specifications, these Special Provisions, and as directed by the Engineer.
3. All temporary and permanent storm water pollution prevention facilities, equipment, and materials as required by or as necessary to comply with the SWPPP/WPCP as described in the current California Stormwater Quality Association (CASQA) BMP handbook.
4. Temporary erosion and sediment control work shall consist of applying erosion control materials to embankment slopes, excavation slopes and

other areas designated on the plans, installing silt fence, inlet protection, gravel bags, headwall protection and stabilized construction entrance ways, or other measures as specified in the project SWPPP/WPCP or necessary for compliance with the CGP.

E. Bid Item No 5 – QSP Services

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in QSP Services including but not limited to complying with the project SWPPP as shown on the plans, as specified and as directed by the Engineer.

F. Bid Item No 6 – Clearing & Grubbing

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in clearing and grubbing including but not limited to removal of organics, off haul, trucking, testing, and disposal as shown on the plans, as specified and as directed by the Engineer, including the removal and disposal of all the resulting material.

G. Bid Item No 7 – Demolition

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in Demolition, including obtaining demolition permits, permit fees, fence removal and disposal, sawcut, remove asphalt and concrete paving and base to design subgrade, remove foundation and base; terminating and removing utilities to be demolished and other items of work as specified in the plans, Standard Specification and the Technical Specifications, and as directed by the Engineer.
3. Miscellaneous demolition includes removal, off-haul, and legal disposal of incidental items included in the scope as specified in the plans, Standard Specification and the Technical Specifications, and as directed by the Engineer.

H. Bid Item No 8 – Tree Protection

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.



2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in tree protection as shown on the plans, as specified and as directed by the Engineer, including the removal and disposal of all the resulting material.
  3. Tree Protection includes standard construction fencing and posts. Includes review and approval by the Engineer.
- I. Bid Item No 9 – Tree and Stump Removal
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in tree and stump removal as shown on the plans, as specified, and as directed by the Engineer, including the removal and disposal of all the resulting material.
  3. This bid item is for the removal and disposal of all trees with a trunk diameter size of six inches or greater including the root balls. Tree and stump removal includes review and approval by the Engineer.
- J. Bid Item No 10 – Earthwork – Rough Grade
1. Basis of Measurement: By Cubic Yard as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to excavating existing subsoil, verifying if existing subsoil meets the engineered fill requirements, supplying engineered fill, materials, stockpiling, maintaining, moving, placing, rough grading, and compacting of engineered fills as shown on the plans, as specified, and as directed by the Engineer.
- K. Bid Item No 11 – Fine Grading
1. Basis of Measurement: By Square Feet as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Fine Grading as shown on the plans, as specified, and as directed by the Engineer.
- L. Bid Item No 12 – Bioretention Soil Mix (BSM)
1. Basis of Measurement: By Cubic Yard as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, bioretention soil mix, soil testing report, tools, equipment, and incidentals, and for doing all work involved in Bioretention Soil Mix as shown on the plans, as specified, and as directed by the Engineer.

## M. Bid Item No 13 – Traffic Signalization

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing labor, materials, tools, equipment and incidentals, to install traffic signals including, but not limited to, the installation of signal poles, traffic signal controller, cabinet and cabinet equipment, battery backup system and equipment, input/output files, detector handholds, signal detection system as indicated on Plan, push buttons and posts, signal heads, conduits, all associated wiring and conductors, pull boxes, sign installations, internally illuminated street name signs, mounting equipment, foundations, trenching/backfill, and all other necessary materials not otherwise included in separate items, as indicated in the Plans, and these Technical Provisions, in order to provide a fully functioning traffic signal system as directed by the Engineer, as well as all testing as required and as directed by the Engineer, as well as coordination with PG&E to provide service connection to the cabinet, and no additional compensation shall be allowed.

## N. Bid Item No 14 – Drainage catch basins (12" SQ)

## Bid Item No. 15 - Drainage catch basins (18" SQ)

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents. Structure bedding and backfill are incidental to the bid item most closely related to and no separate compensation allowed therefore.
2. Basis of Payment: Shall include but not limited to excavating, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, concrete foundation slab, concrete structure sections, bedding, backfill, concrete masonry structure construction, transition to cover frame, cover frame and cover to indicated design depth, forming, sealing pipe inlets and outlets and air testing of structures as required by the contract documents and as directed by the Engineer.

## O. Bid Item No 16 – Storm Drain Landscape Area Drain

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents. Structure bedding and backfill are incidental to the bid item most closely related to and no separate compensation allowed therefor.
2. Basis of Payment: Shall include but not limited to excavating, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, concrete foundation slab, concrete structure sections, bedding, backfill, concrete masonry structure construction, transition to cover frame, cover frame and cover to indicated design depth, forming, sealing pipe inlets and outlets and air testing of structures as required by the contract documents and as directed by the Engineer

## P. Bid Item No 17 – Storm Drain Manhole

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents. Structure bedding and backfill are incidental to the bid item most closely related to and no separate compensation allowed therefore.
  2. Basis of Payment: Shall include but not limited to excavating, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, concrete foundation slab, concrete structure sections, bedding, backfill, concrete masonry structure construction, transition to cover frame, cover frame and cover to indicated design depth, forming, sealing pipe inlets and outlets and air testing of structures as required by the contract documents and as directed by the Engineer.
- Q. Bid Item No 18 – Benching subdrain 4" Perforated
1. Basis of Measurement: By Linear Foot as specified in the bid form measured from edge of structure to edge of structure for various pipe materials and various sizes irrespective of the depth of pipes, complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Storm Drainage Piping, complete in place including bends, elbows or other pipe fittings, saw cut, excavating to required elevations, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OSHA, removing excavated materials, dewatering, bedding, cradles, backfill and backfill material, pipe installation with warning tape, restoration and disposing of materials outside the Right-of-Way and connections to existing or new storm drainage mains and manholes as required by the contract documents and as directed by the Engineer.
- R. Bid Item No. 19 – Storm Drain Piping 6" Perforated
1. Basis of Measurement: By Linear Foot as specified in the bid form measured from edge of structure to edge of structure for various pipe materials and various sizes irrespective of the depth of pipes, complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Storm Drainage Piping, complete in place including bends, elbows or other pipe fittings, saw cut, excavating to required elevations, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OSHA, removing excavated materials, dewatering, bedding, cradles, backfill and backfill material, pipe installation with warning tape, restoration and disposing of materials outside the Right-of-Way and connections to existing or new storm drainage mains and manholes as required by the contract documents and as directed by the Engineer.
- S. Bid Item No 20 – Storm Drain Piping 6"  
Bid Item No 21 – Storm Drain Piping 8"

Bid Item No 22 – Storm Drain Piping 10”

Bid Item No 23 – Storm Drain Piping 12”

Bid Item No 24– Storm Drain Piping 15”

1. Basis of Measurement: By Linear Foot for various sizes of storm drain piping as specified in the bid form measured from edge of structure to edge of structure for various pipe materials and various sizes irrespective of the depth of pipes, complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Storm Drainage Piping, complete in place including bends, elbows or other pipe fittings, saw cut, protecting the excavation in compliance with Cal/OSHA, excavating to required elevations, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, removing excavated materials, dewatering, bedding, cradles, backfill and backfill material, pipe installation with warning tape, restoration and disposing of materials outside the Right-of-Way and connections to existing or new storm drainage mains and manholes as required by the contract documents and as directed by the Engineer.
3. Includes sawcut, excavation, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OHSA, pipe and fittings, bedding, backfill, and surface restoration including AC patch.

T. Bid Item No 25 – Storm Drain Connection

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Storm Drain Connection shall be paid for at the contract per the number of Public Main Storm Drain Connection, which includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Storm Drain Connection as shown on the plans, as specified and as directed by the Engineer, including the removal and disposal of all the resulting material.
3. Includes City staff inspection and Testing.

U. Bid Item No 26 – Storm Drain Cleanouts

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to sawcut, excavation, including all utility trenching work as specified in Section 31 23 16 – Utility Trenching, traffic-rated box, riser, accessories, concrete collar, tests, backfill and surface restoration as required by the contract documents and as directed by the Engineer.

V. Bid Item No 27 – Sanitary Sewer Cleanouts

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Sanitary Sewer Cleanouts, complete in place including all utility trenching work as specified in Section 31 23 16 – Utility Trenching, riser pipe installation, pipe connection, fittings, aggregate base for subgrade, compaction, restoration of trench, testing, CCTV inspections and disposing of materials outside the Right-of-Way and connection to existing or new sewer mains as required by the contract documents and as directed by the Engineer.
- W. Bid Item No 28 – Sanitary Sewer Piping 4”
1. Basis of Measurement: By Linear Foot as specified in the bid form , measured along the top centerline of the pipe from inside of a structure to structure, complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Sanitary Sewer Pipes, complete in place including all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OSHA, pipe installation with warning tape, pipe connection, connection to manholes, fittings, aggregate base for subgrade, compaction, restoration of T-trench, AC patch, testing, CCTV inspections and disposing of materials outside the Right-of-Way and connection to existing or new sewer mains and manholes as required by the contract documents and as directed by the Engineer.
- X. Bid Item No 29 – Sanitary Sewer Connection
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing Sanitary Sewer Connection, complete in place including all utility trenching work as specified in Section 31 23 16 – Utility Trenching, riser pipe installation, pipe connection, fittings, aggregate base for subgrade, compaction, restoration of trench, AC patch, testing, CCTV inspections and disposing of materials outside the Right-of-Way and connection to existing or new sewer mains as required by the contract documents and as directed by the Engineer.
- Y. Bid Item No 30 – Potable Water Line  
Bid Item No. 31 – Fire Water Line
1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.

2. Basis of Payment: Shall include but not limited to hand-trimming, sawcut, excavation, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OSHA, pipe and fittings, bedding, backfill, surface restoration, AC patch, concrete thrust restraints, mechanical joints, warning tape, tracer wire, polyethylene fittings, connection and stub for future service, pressure pipeline testing, flushing, disinfection and connection and tie into municipal utility water source as required by the contract documents and as directed by the Engineer.
- Z. Bid Item No 32 – Water Valve
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to sawcut, excavation, including all utility trenching work as specified in Section 31 23 16 – Utility Trenching, water valve, valve box, riser, accessories, concrete collar, tests, backfill and surface restoration as required by the contract documents and as directed by the Engineer.
- AA. Bid Item No 33 – Water Line Tie In
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to sawcut, excavation, all utility trenching work as specified in Section 31 23 16 – Utility Trenching, protecting the excavation in compliance with Cal/OSHA, pipe and fittings, bedding, backfill, surface restoration, AC patch, concrete thrust restraints, mechanical joints, warning tape tracer wire, tapping sleeve, tapping valves, and accessories to connect to the existing water main, pressure pipeline testing, flushing, disinfection and surface restoration as required by the contract documents and as directed by the Engineer.
- BB. Bid Item No 34 – Backflow Preventor
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to sawcut, excavation, backflow assembly, accessories, test, and backfill and surface restoration complete in place as required by the contract documents and as directed by the Engineer.
  3. Includes City Staff inspection and Testing.
- CC. Bid Item No 35 – Bioretention Drain Rock
1. Basis of Measurement: By Cubic Yard as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to supplying and installation of Bioretention and Gravel Drain Rock materials, testing, stockpiling, maintaining, moving, placing, grading, and compaction complete in place as required by the contract documents and as directed by the Engineer.

## DD. Bid Item No 36 – Asphalt

1. Basis of Measurement: By Tons and will be based on certified weight-meters certificates showing gross, net weight and the type and grading of the mix for each load complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to priming surfaces, tack coating surfaces, fog seal, furnishing, placing, compacting asphalt pavement (3" for Full Depth Areas) complete in place as required by the contract documents and as directed by the Engineer.

## EE. Bid Item No 37 – Aggregate Base Course

1. Basis of Measurement: By the Tons as specified in the bid form. Quantities of aggregates will be calculated on the basis of dimensions shown on the plans. No allowance will be made for aggregate rejected or placed outside said dimensions unless otherwise order by the Engineer.
2. Aggregate Base used under concrete work such as curb and gutter, valley gutter, sidewalk, driveways, curb ramps, median curbs, median nose surfacing, bus turnouts, retaining curbs, and in utility trenches shall not be measured unless specified otherwise in the Contract Documents.
3. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment and incidentals, in aggregate base supplying fill material, stockpiling, scarifying subgrade surface, placing where required, watering, dust palliative, leveling, compacting and certifying the top of aggregate base design grades complete in place as required by the contract documents and as directed by the Engineer.
4. Aggregate Base used under concrete work such as curb and gutter, valley gutter, sidewalk, retaining curbs, etc. shall considered incidental to the item most closely related to and no separate compensation will be allowed therefore. Aggregate base used in utility trenches shall be considered incidental to the cost per linear foot paid for the utility pipes as shown on the bid form and no separate compensation will be allowed therefore.

## FF. Bid Item No 38 – Concrete Curb

1. Basis of Measurement: By Linear Feet as specified in the bid form complete in place, unless otherwise specified in the Contract Documents. Concrete pads around utility facilities and miscellaneous concrete footings are incidental to the bid item most closely related to and no separate compensation allowed therefor. Curb and gutter and vertical curbs adjacent to the curb ramp will be measured separately. Concrete Survey Monuments shall be measured on a per unit basis.
2. Basis of Payment: Shall include but not limited to all labor, materials, tools, equipment, and incidentals including subgrade preparation, excavation,

base preparation, forms, reinforcing, concrete, accessories, placing concrete, finishing concrete, expansion joints, weakened plane joints, scoring joints, curing, removal of all forms, and testing complete in place as required by the contract documents and as directed by the Engineer.

GG. Bid Item No 39 - Pedestrian Concrete Paving A

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing full compensation for furnishing all labor, materials, tools, equipment, incidentals, excavation, subgrade preparation, aggregate base, compaction testing, Portland cement mix, finishes, sand base, reinforcing steel, up to (3) 4' x 4' field mock-up panels of each paving type, and for doing all the work involved in installing Pedestrian Concrete Paving A, complete in place as required by the contract documents and as directed by the Engineer.

HH. Bid Item No 40– Landscape Wall

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for full compensation for furnishing all labor, materials, tools, equipment, incidentals, Portland cement, integral color concrete, finishes, caulking, aggregate base, reinforcing steel, field mock-up wall, and for doing all the work involved in installing Landscape Wall, complete in place as required by the contract documents and as directed by the Engineer.

II. Bid Item No 41– Curb Ramp

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents. Truncated domes for curb ramps are not measured separately and are considered incidental to the pay item for Curb Ramps. Retaining curbs at curb ramps are not measured and are considered incidental to the measurement of curb ramps.
2. Basis of Payment: Includes all labor, materials, tools, equipment, and incidentals including subgrade preparation, excavation, base preparation, forms, reinforcing, concrete, accessories, placing concrete, finishing concrete, expansion joints, weakened plane joints, scoring joints, curing, removal of all forms, and testing complete in place as required by the contract documents and as directed by the Engineer.

JJ. Bid Item No 42– Traffic Signage

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.



2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, signage, post, footing, and incidentals, and for doing all work involved in installing Traffic Signage complete in place as required by the contract documents and as directed by the Engineer.

KK. Bid Item No 43– Concrete Valley Gutter

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to all labor, materials, tools, equipment, and incidentals including subgrade preparation, excavation, base preparation, forms, reinforcing, concrete, accessories, placing concrete, finishing concrete, expansion joints, weakened plane joints, scoring joints, curing, removal of all forms, and testing as required by the contract documents and as directed by the Engineer.

LL. Bid Item No 44 – Wheel Stops

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in installing Wheel Stops as required by the contract documents and as directed by the Engineer.

MM. Bid Item No 45 – Striping Removal

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Striping Removal, as shown on the plans, as specified and as directed by the Engineer, including the removal and disposal of all the resulting material.

NN. Bid Item No 46 – Striping

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, paint, template, tools, equipment, and incidentals, and for doing all work involved in Striping as required by the contract documents and as directed by the Engineer.

OO. Bid Item No 47 – Stairs & Handrail

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for full compensation for furnishing all labor, materials, tools, equipment,

incidentals, excavation, footings, metal fabrication, finishing, Portland cement, decomposed granite, binder, aggregate base, and for doing all the work involved in installing Stairs & Handrail, complete in place as required by the contract documents and as directed by the Engineer.

PP. Bid Item No 48 – Hydroseed

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, fine grading, seed mix, binder, soil amendment, organic fertilizers, warranties, and for doing all the work involved in installing Hydroseed, complete in place as required by the contract documents and as directed by the Engineer.

QQ. Bid Item No 49 – Shrub -1 Gallon

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, 1-gallon shrubs, and warranties and for doing all the work involved in installing Shrub (1-Gallon), complete in place as required by the contract documents and as directed by the Engineer.

RR. Bid Item No 50 – Sod

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, sod, post-planting fertilizers, warranties, and for doing all the work involved in installing Sod, complete in place as required by the contract documents and as directed by the Engineer.

SS. Bid Item No 51 –Tree – 24” Box

Bid Item No 52 –Tree – 15 Gallon

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, excavation, tree stakes, tree ties, warranties, and for doing all the work involved in installing Tree (24” Box) and Tree (15 Gallon),, complete in place as required by the contract documents and as directed by the Engineer.

TT. Bid Item No 53 – Landscape Soil Preparation

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, and incidentals, soil testing report, fine grading, soil amendment with organic compost, import topsoil, organic fertilizers, warranties, and for doing all the work involved in installing in Landscape Soil Preparation, complete in place as required by the contract documents and as directed by the Engineer.

UU. Bid Item No 54 – Root Barrier

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, root barrier, and warranties and for doing all the work involved in installing Root Barrier, complete in place as required by the contract documents and as directed by the Engineer.

VV. Bid Item No 55 – Mulch

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, mulch, and for doing all the work involved in installing Mulch, complete in place as required by the contract documents and as directed by the Engineer.

WW. Bid Item No 56 – Plant Establishment Period

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, repairs, soils testing, irrigation adjustments, additional bark mulch, fertilizers, weed control, mowing, rodent control, and for doing all the work involved in Plant Establishment Period (90 days) complete in place as required by the contract documents and as directed by the Engineer.

XX. Bid Item No 57 – Irrigation Controller

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, rain sensor, cellular network card, irrigation controller, and for doing all the work involved in installing Irrigation Controller complete in place as required by the contract documents and as directed by the Engineer.

## YY. Bid Item No 58 – Irrigation Rotors

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, adjustments, , trenching, backfill, warranties, and for doing all the work involved in installing Irrigation Rotors complete in place as required by the contract documents and as directed by the Engineer.

## ZZ. Bid Item No. 59 – Irrigation (Bubblers)

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, adjustments, , trenching, backfill, warranties, and for doing all the work involved in installing Irrigation (Bubblers) complete in place as required by the contract documents and as directed by the Engineer.

## AAA. Bid Item No 60 – Irrigation Air Relief Valve Assembly

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, irrigation air relief valve assembly, connection to air relief valve, and for doing all the work involved in installing Irrigation Air Relief Valve Assembly complete in place as required by the contract documents and as directed by the Engineer.

## BBB. Bid Item No 61 – Irrigation Tree Bubblers

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, tree bubblers, and for doing all the work involved in installing Irrigation Tree Bubbler complete in place as required by the contract documents and as directed by the Engineer.

## CCC. Bid Item No 62– Irrigation Lateral Line

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, conduits, trenching, bedding, fittings, fill and compaction, and for doing all

the work involved in installing Irrigation Lateral Line complete in place as required by the contract documents and as directed by the Engineer.

DDD. Bid Item No 63– Irrigation Conduit

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, conduits, and for doing all the work involved in installing Irrigation Conduit complete in place as required by the contract documents and as directed by the Engineer.

EEE. Bid Item No 64 – Irrigation Gate Valves

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, irrigation gate valve assembly, valve box, drain rocks, wire mesh, PVC pipe, connection to gate valve, and for doing all the work involved in installing Irrigation Gate Valve complete in place as required by the contract documents and as directed by the Engineer.

FFF. Bid Item No 65– Irrigation Drip

1. Basis of Measurement: By Square Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, schedule 40 PVC pipe, schedule 40 tee, fittings, dripline, operation indicator, flush valve, tubing, and for doing all the work involved in installing Irrigation Drip complete in place as required by the contract documents and as directed by the Engineer.

GGG. Bid Item No 66 – Irrigation Sleeves 4" & 8"

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, excavation, 4" dia. and 8" dia. sleeves, backfill, and for doing all the work involved in installing Irrigation Sleeves (4" & 8") complete in place as required by the contract documents and as directed by the Engineer.

HHH. Bid Item No 67 – Irrigation Main line 2"-3"

Bid Item No 68 – Irrigation Main line 4" & 6"

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.

2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, excavation, 1120-200 psi PVC pipe with ductile iron fittings, concrete thrust blocks, Class 315 PVC pipe with schedule 80 PVC solvent weld fittings, backfill, and for doing all the work involved in installing & testing Irrigation Main Line (2"-3", 4" & 6") complete in place as required by the contract documents and as directed by the Engineer.
- III. Bid Item No 69 – Irrigation Master Valve and Flow Sensor
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, flow sensor cable & master valve wires, 4" PVC conduit and low voltage wires extended to new controller and for doing all the work involved in installing Master Valve and Flow Sensor complete in place as required by the contract documents and as directed by the Engineer.
- JJJ. Bid Item No 70 – Irrigation Low Voltage Wire
1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, and for doing all the work involved in installing Irrigation Low Voltage Wire complete in place as required by the contract documents and as directed by the Engineer.
- KKK. Bid Item No 71 – Irrigation Quick Coupler Valves  
Bid Item No 72 – Irrigation Remote Control Valves  
Bid Item No 73 – Irrigation Angle Valves
1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
  2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties, irrigation quick coupler and remote control valve assembly, valve box, drain rocks, wire mesh, PVC pipe, connection to gate valve, and for doing all the work involved in installing Irrigation Quick Coupler Valves and Irrigation Remote Control Valves complete in place as required by the contract documents and as directed by the Engineer.
- LLL. Bid Item No 74 – Irrigation Restoration
1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.

2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, incidentals, warranties to remove, or replace all aspects of the irrigation system, mainline, lateral lines, spray heads, rotors, sleeves, valve boxes, wires, conduits, trenching, backfill which is damaged during and, or impacted by construction, and for doing all the work involved in installing Irrigation Restoration complete in place as required by the contract documents and as directed by the Engineer.

MMM. Bid Item No 75 – Boulders

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, boulder, excavation, coordination of delivery incidentals, warranties, and for doing all the work involved in installing Boulder complete in place as required by the contract documents and as directed by the Engineer.

NNN. Bid Item No 76 – Fence A (6')

Bid Item No 77 – Fence B (8')

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, shop drawings, chain link fence posts of various height, chain link fabric, anchors, accessories, excavation, concrete footings, incidentals, warranties, and for doing all the work involved in installing Fence A (6'), and Fence B (8') complete in place as required by the contract documents and as directed by the Engineer.

OOO. Bid Item No 78– Gate A

Bid Item No 79 – Gate B

Bid Item No 80 – Gate C

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, shop drawings, steel members, steel posts, finishing, hardware, accessories, reflective tape, excavation, receiver posts, knox boxes, concrete footings, incidentals, warranties, and for doing all the work involved in installing Gate A, Gate B, and Gate C, complete in place as required by the contract documents and as directed by the Engineer.

PPP. Bid Item No 81 – Header

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, header, stakes, accessories, incidentals, and for doing all the work involved in installing Header complete in place as required by the contract documents and as directed by the Engineer.

QQQ. Bid Item No 82 – Soccer Goals

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, soccer goal, hardware, wheels, net, handle, coordination of delivery, incidentals, warranties, and for doing all the work involved in installing Soccer Goals complete in place as required by the contract documents and as directed by the Engineer.

RRR. Bid Item No 83 – Park Sign

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, shop drawings, sign, stone veneered base, letters, City logo, accessories, excavation, concrete footing, reinforcing, incidentals, warranties, and for doing all the work involved in installing Park Sign complete in place as required by the contract documents and as directed by the Engineer.

SSS. Bid Item No 84 – Relocated Park Sign

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, excavation, concrete footing, reinforcement, incidentals, and for doing all the work involved in installing Relocated Park Sign complete in place as required by the contract documents and as directed by the Engineer.

TTT. Bid Item No 85 – Site/Area Post top Luminaire

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, connection, pole, light fixture, concrete base, reinforcement, gravel dry well, pull box, expertise and incidentals, warranties, and for doing all the work involved in installing Site/Area Post Top Luminaire complete in place as required by the contract documents and as directed by the Engineer.



UUU. Bid Item No 86 – Lighting Control System

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, lighting control panel, connection, expertise and incidentals, warranties, acceptance testing, and for doing all the work involved in installing Lighting Control System (non-sports lighting) complete in place as required by the contract documents and as directed by the Engineer.

VVV. Bid Item No 87 – Electrical Main Switchboard

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, concrete pad, subgrade preparation, wiring, connections, expertise and incidentals, testing, warranties, and for doing all the work involved in installing Electrical Main Switchboard complete in place as directed by the Engineer.

WWW. Bid Item No 88– Distribution Power

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, panels, connections, concrete pad, supports, subgrade preparation, anchors, bracing, fittings, supports, reinforcement, wiring, expertise and incidentals, testing, warranties, and for doing all the work involved in installing the Distribution Power complete in place as required by the contract documents and as directed by the Engineer

XXX. Bid Item No 89 – Transformers

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, concrete pad or supports, subgrade preparation, connection, expertise and incidentals, warranties, and for doing all the work involved in installing Transformer complete in place as required by the contract documents and as directed by the Engineer.

YYY. Bid Item No 90 – Conduit and Conductors (Electrical and Lighting)

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.

2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, expertise and incidentals, warranties, and for doing all the work involved in installing Conduit and Conductors complete in place as required by the contract documents and as directed by the Engineer.

ZZZ. Bid Item No 91 – Conduit (Technology, 2-inch, 4-inch)

1. Basis of Measurement: By Linear Foot as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, expertise and incidentals, warranties, and for doing all the work involved in installing Conduit (Technology, 2-inch, 4-inch) complete in place as required by the contract documents and as directed by the Engineer.

AAAA. Bid Item No 92 – Handholes (Pullbox)

1. Basis of Measurement: By Each as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, expertise and incidentals, warranties, and for doing all the work involved in installing Handholes complete in place as required by the contract documents and as directed by the Engineer.

BBBB. Bid Item No 93 – Underground Vaults

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: Shall include but not limited to full compensation for furnishing all labor, materials, tools, equipment, expertise and incidentals, warranties, and for doing all the work involved in installing Underground Vaults complete in place as required by the contract documents and as directed by the Engineer.

CCCC. Bid Item No 94 - Fill Slope, Keyway and Subdrain

1. Basis of Measurement: By Lump Sum as specified in the bid form complete in place, unless otherwise specified in the Contract Documents.
2. Basis of Payment: This shall include but not be limited to the lump sum cost for the full deduction for removal of Fill Slope, Keyway, and Subdrain as shown on sheet C4.3 and Detail 4/ C5.4. This shall include all related labor, work, materials, engineered fill, earthwork, benching, compaction, hydroseed, and temporary irrigation for the southern cut fill slope as specified by the contract documents and as directed by the Engineer. Approval of Deductive Alternate #1 shall be reviewed in the field during Earthwork excavation with the Engineer to determine the direction of the bed rock bedding plane.

**END OF SECTION 01 22 00**

## SECTION 01 23 00 – ALTERNATES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements governing Alternates. Each Alternate is identified by number and describes the basic changes to be made in the Work.
- B. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for work defined in the Bidding Requirements that the City may elect to add to or deduct from the Base Bid amount, if the City decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.
- C. Related Requirements:
  - 1. Materials and Methods Required by Alternates: Pertinent Specification Sections.

#### 1.2 ALTERNATE BIDS

- A. Alternates will be accepted at option of the City; the Base Bid, including additive or deductive Alternates accepted by the City, will be an element considered in the award of the Contract.

#### 1.3 SCHEDULE OF ALTERNATES

- A. Deduct Alternate No. 1 – Fill Slope, Keyway, and Subdrain

### PART 2 - EXECUTION

#### 2.1 MODIFICATIONS TO WORK

- A. Execute accepted alternates under the same conditions as other Work of this Contract.
- B. Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

- C. Modify or adjust affected adjacent Work as required to completely and fully integrate that Work into the Project.

**END OF SECTION 01 23 00**

**SECTION 01 25 00 – SUBSTITUTION PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Related Sections:
  - 1. [Division 00 – General Conditions](#).

**1.2 DEFINITIONS**

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions.
  - 1. Substitutions will not be considered during the Bid process.
  - 2. The following are not considered to be requests for substitution:
    - a. Revisions to the Contract Documents requested by the Owner or Architect/Engineer.
    - b. Specified options of products and construction methods included in the Contract Documents.
  - 3. The following are considered to be requests for substitution:
    - a. Any manufacturer, product, process, or method identified in the special provisions, specifications or on the Drawings as either “or equal” or “equal products of another manufacturer when approved in advance by the Architect/Engineer per this Section 01 25 00 – Substitution Procedures”.

**1.3 SUBMITTALS**

- A. Request for Substitution (RFS) Submittal:
  - 1. Receipt:
    - a. The Architect/Engineer will consider requests for substitution (RFS) if received within thirty-five (35) calendar days after the Notice to Proceed.
    - b. Requests received after thirty-five (35) calendar days after the Notice to Proceed may be considered or rejected at the discretion of the Project Manager and/or Architect/Engineer.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to the procedures required in [Division 00 – General Conditions](#).
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Special Provisions, Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
  - a. Coordination information, including a list of change or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed substitution.
  - b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, operations, maintenance, and visual effect.
  - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
  - d. Samples, where applicable or requested.
  - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without the approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
  - f. Cost information, including a proposal of net change, if any, in the Contract Sum.
  - g. The Contractor's certification that the proposed substitution conforms to the requirements in the Contract Documents, in every respect and is appropriate for the applications indicated.
  - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
4. Architect/Engineer Action: If necessary, the Architect/Engineer will request additional information or documentation for evaluation within fourteen (14) calendar days of receipt of a request for substitution. The Project Manager will route to the Contractor, the Architect/Engineer's acceptance or rejection of the substitution within fourteen (14) days of the receipt of the request, or receipt of addition information or documentation.

## **PART 2 - PRODUCTS**

### **2.1 SUBSTITUTIONS**

- A. Conditions: The Architect/Engineer will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect/Engineer. If the following conditions are not

satisfied, the Architect/Engineer will return the requests without action except to record non-compliance with these requirements:

1. Extensive revisions to the Contract Documents are not required.
  2. Proposed changes are in keeping with the general intent of the Contract Documents.
  3. The request is timely, fully documented, and properly submitted.
  4. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
  5. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, maintainability, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect/Engineer for redesign and evaluation services, compensation to the Project Manager for additional management and coordination, increased cost of other construction by the Owner, and similar considerations.
  6. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
  7. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
  8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
- B. The Contractor's submittal and the Architect/Engineer acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

### **PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 25 00**



## SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section describes general procedural requirements for alterations, modifications and extras.
- B. Related Sections:
  - 1. [Document 00 72 00 – General Conditions](#)
  - 2. [Section 01 29 00 – Payment Procedures](#)

#### 1.2 GENERAL

- A. Any change in scope of work or deviation from Drawings, Special Provisions, or Specifications shall be accomplished only when authorized in writing by Project Manager.
- B. Changes in scope of Work or deviation from Drawings, Special Provisions, or Specifications may be initiated only by Contractor or Project Manager.
  - 1. Contractor may initiate changes by submitting Requests for Interpretation (RFI), Requests for Substitution (RFS), Notice of Concealed or Unknown Conditions, or Notice of Hazardous Waste Conditions.
    - a. RFIs shall be submitted to seek clarification of Contract Documents in accordance with [Section 01 26 13 – Requests for Interpretation](#).
    - b. RFSs shall be submitted in accordance with [Section 01 25 00 – Substitution Procedures](#) to request substitution of materials or methods of execution.
    - c. Notices of Concealed or Unknown Conditions shall be submitted in accordance with [Document 00 72 00 – General Conditions](#).
    - d. Notices of Hazardous Waste Conditions shall be submitted in accordance with [Document 00 72 00 – General Conditions](#).
  - 2. Contractor shall be responsible for its costs to implement and administer RFIs and RFSs throughout the Contract duration. Regardless of the number of RFIs submitted, Contractor will not be entitled to additional compensation. Contractor shall be responsible for both City's and Architect/Engineer's administrative costs for answering its RFIs where the answer could reasonably be found by reviewing the Contract Documents, as determined by City; such costs will be deducted from progress payments.
  - 3. The City may initiate changes by issuing a Supplemental Instruction.
  - 4. Project Manager may initiate changes in the Work or Contract Time by issuing Requests for Proposal (RFP) to Contractor. Such RFPs will detail all proposed changes in the Work and request a quotation of changes in Contract Sum and Contract Time from Contractor.

### 1.3 PROCEDURE

- A. Contractor shall submit RFI to Project Manager in accordance with [Section 01 26 13 – Requests for Interpretation](#). Contractor shall reference each RFI to an activity of Progress Schedule and shall note time criticality of the RFI.
1. If Contractor is satisfied with the Clarification and does not request change in Contract Sum or Contract Time, then the Clarification shall be considered executed without a change.
  2. If Contractor believes that the Clarification results in change in Contract Sum or Contract Time, Contractor shall notify Project Manager who may then deny request for change or issue RFP.
- B. Contractor shall submit RFS to Project Manager who may then approve or deny request. If denied, Project Manager shall set forth in writing reasons for the denial. Contractor may revise and resubmit submittal with a rebuttal based on Section 3400 Public Contract Code CA. The RFS should set forth:
1. Reason for substitution
  2. Any deviations from special provisions or specifications
  3. Cost increase or decrease
  4. Any necessary revisions to drawings/related work
  5. Schedule impacts.
- C. Contractor shall submit Notices of Concealed or Unknown Conditions to resolve unanticipated conditions incurred in the execution of the Work. Procedures in [Document 00 72 00 – General Conditions](#) shall be followed. If Project Manager determines that a change in Contract Sum or Contract Time is justified, Project Manager shall issue RFP.
- D. Contractor shall submit Notices of Hazardous Waste Conditions to resolve problems regarding hazardous materials encountered in the execution of the Work. Procedures in [Document 00 72 00 – General Conditions](#) shall be followed. If Project Manager determines that a change in Contract Sum or Contract Time is justified, Project Manager shall issue RFP.
- E. Project Manager may issue Supplemental Instruction from the Architect/Engineer to Contractor. Contractor shall not proceed with Supplemental Instruction until Project Manager approves it in writing.
1. If Contractor is satisfied with Supplemental Instruction and does not request change in Contract Sum or Contract Time, then Supplemental Instruction shall be executed without a Change Order.
  2. If Contractor believes that Supplemental Instruction results in change in Contract Sum or Contract Time, Contractor shall notify Project Manager. Project Manager may then deny request for change, cancel Supplemental Instruction or issue RFP.
- F. If Project Manager issues to Contractor an RFP, then Contractor shall respond to the RFP within fifteen (15) working days by furnishing a complete breakdown of

costs of credits, deducts, extra costs or cost savings, resulting from the change in the Work. Contractor shall itemize materials, labor, taxes, overhead and profit. Subcontract work shall be so indicated.

- G. Upon approval of RFP, Project Manager will issue a Change Order directing Contractor to proceed with extra work. If the parties do not agree on the price for an RFP, the Project Manager may decide the issue per [Document 00 72 00 – General Conditions](#).
- H. Payment shall be made as follows:
  - 1. Change Orders which increase or decrease the Contract Sum or Contract Time shall be included by Contract Modification Form, signed by Project Manager, accepted by Contractor.
  - 2. Payment shall be made for Change Order work along with other work in progress payment following completion of Change Order work. Partial completion of Change Order work shall be paid for that part completed during the period covered by the monthly payment request.

#### 1.4 COST DETERMINATION

- A. Total cost of extra work or of work omitted shall be the sum of labor cost (hourly rate plus employer paid benefits, taxes, insurance, etc.), material costs, equipment rental costs and specialist costs as defined herein plus overhead and profit as allowed herein. This limit applies in all cases of claims for extra work, whether calculating Change Orders, RFPs, or calculating claims of all types, and applies even in the event of fault, negligence, strict liability, or tort claims of all kinds, including strict liability or negligence. No other costs arising out of or connected with the performance of extra work, of any nature, may be recovered by Contractor. No special, incidental or consequential damages may be claimed or recovered against City, their officers, agents, employees, and consultants (including, but not limited to Architect/Engineer or Construction Manager), whether arising from breach of contract, negligence or strict liability, unless specifically authorized in the Contract Documents.
- B. Overhead and Profit:
  - 1. "Overhead and Profit" may also be referred to as "Markup".
  - 2. Overhead shall be defined in Paragraph 1.8 below.
  - 3. Overhead and profit on labor for extra work shall be thirty-five percent (35%).
  - 4. Overhead and profit on materials shall be fifteen percent (15%).
  - 5. Overhead and profit on equipment rental for extra work shall be fifteen percent (15%).
  - 6. When extra work is performed by a first tier subcontractor, Contractor shall receive a ten percent (10%) markup on subcontractors' total costs of extra work.
- C. Taxes:
  - 1. Contra Costa County Sales Tax shall be included.

2. Federal and Excise Tax shall not be included.

D. Owner Operated Equipment:

1. When owner-operated equipment is used to perform extra work, Contractor will be paid for equipment and operator as follows:
  - a. Payment for equipment will be made in accordance with Paragraph 1.5.C below.
  - b. Payment for cost of labor will be made at no more than rates of such labor established by collective bargaining agreements for type of worker and location of work, whether or not owner-operator is actually covered by such an agreement.

1.5 COST BREAKDOWN

A. Labor: Contractor will be paid cost of labor for workers (including forepersons when authorized by Project Manager) used in actual and direct performance of extra work. Labor rate, whether employer is Contractor, subcontractor or other forces, will be sum of following:

1. Actual Wages: Actual wages paid shall include any employer payments to or on behalf of workers for health and welfare, pension, vacation and similar purposes.
2. Labor Surcharge: Payments imposed by City, County, State and Federal laws and ordinances, and other payments made to, or on behalf of, workers, other than actual wages as defined in subparagraph 1 above, such as taxes and insurances. Labor surcharge shall be as set forth in California Department of Transportation official labor surcharges schedule which is in effect on date upon which extra work is accomplished and which schedule is incorporated herein by reference, as though fully set forth herein.

B. Material: Only materials furnished by Contractor and necessarily used in performance of extra work will be paid for. Cost of such materials will be cost, including sales tax, to purchaser (Contractor, subcontractor or other forces) from supplier thereof, except as the following are applicable:

1. If cash or trade discount by actual supplier is offered or available to purchaser, it shall be credited to City notwithstanding the fact that such discount may not have been taken.
2. For materials salvaged upon completion of extra work, salvage value of materials shall be deducted from cost, less discount, of materials.
3. If cost of a material is, in opinion of Project Manager, excessive, then cost of material shall be deemed to be lowest current wholesale price at which material is available in quantities concerned delivered to Site, less any discounts as provided in subparagraph 1 above.

C. Equipment Rental:

1. For Contractor- or subcontractor-owned equipment, payment will be made at rental rates listed for equipment in California Department of Transportation official equipment rental rate schedule which is in effect on date upon which

extra work is accomplished and which schedule is incorporated herein by reference as though fully set forth herein. For rented equipment, payment will be made based on actual rental invoices. Equipment used on extra work shall be of proper size and type. If, however, equipment of unwarranted size or type and cost is used, cost of use of equipment shall be calculated at rental rate for equipment of proper size and type. Rental rates paid shall be deemed to cover cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. Unless otherwise specified, manufacturer's ratings, and manufacturer-approved modifications, shall be used to classify equipment for determination of applicable rental rates. Individual pieces of equipment or tools not listed in said publication and having a replacement value of five hundred dollars (\$500) or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore as payment is included in payment for labor. Rental time will not be allowed while equipment is inoperative due to breakdowns.

2. For equipment on Site, rental time to be paid for equipment shall be time equipment is in operation on extra work being performed or on standby as approved by Project Manager. The following shall be used in computing rental time of equipment:
  - a. When hourly rates are listed, less than thirty (30) minutes of operation shall be considered to be one-half (1/2) hour of operation.
  - b. When daily rates are listed, less than four (4) hours of operation shall be considered to be one-half (1/2) day of operation.
3. For equipment which must be brought to Site to be used exclusively on extra work, cost of transporting equipment to Site and its return to its original location shall be determined as follows:
  - a. City will pay for costs of loading and unloading equipment.
  - b. Cost of transporting equipment in low bed trailers shall not exceed hourly rates charged by established haulers.
  - c. Cost of transporting equipment shall not exceed applicable minimum established rates of California Public Utilities Commission.
  - d. Payment for transporting, and loading and unloading equipment as above provided will not be made if equipment is used on Work in any other way than upon extra work.
4. Rental period shall begin at time equipment is unloaded at Site of extra work and terminate at end of day on which City's Project Manager directs Contractor to discontinue use of equipment. Excluding Saturdays, Sundays, and legal holidays, unless equipment is used to perform extra work on such days, rental time to be paid shall be four (4) hours for zero (0) hours of operation, six (6) hours for four (4) hours of operation and eight (8) hours for eight (8) hours of operation, time being prorated between these parameters. Hours to be paid for equipment which is operated less than eight (8) hours due to breakdowns, shall not exceed eight (8) less number of hours equipment is inoperative due to breakdowns.

D. Work Performed by Special Forces or Other Special Services:

1. When the City's Project Manager and Contractor, by agreement, determine that special service or item of extra work cannot be performed by forces of Contractor or those of any subcontractors, service or extra work item may be performed by specialist. Invoices for service or item of extra work on basis of current market price thereof may be accepted without complete itemization of labor, material, and equipment rental costs when it is impracticable and not in accordance with established practice of special service industry to provide complete itemization. In those instances, wherein Contractor is required to perform extra work necessitating a fabrication or machining process in a fabrication or machine shop facility away from Site, charges for that portion of extra work performed in such facility may, by agreement, be accepted as a specialist billing. The City's Project Manager must be notified in advance of all off-site work. To specialist invoice price, less credit to City for any cash or trade discount offered or available, whether or not such discount may have been taken, will be added 15 percent (15%) in lieu of overhead and profit provided in Paragraph 1.4.B.

#### 1.6 FORCE-ACCOUNT

- A. City may, at any time, require Contractor to perform Work on a Force Account (time and materials, cost not to exceed) basis. When Contractor performs Force Account Work, the labor, materials and equipment used in performing such Force Account Work shall be subject to City's approval.
- B. Whenever any Force-Account work is in progress, definite price for which has not been agreed on in advance, Contractor shall report to the City's Project Manager each day in writing in detail amount and cost of labor and material used, and any other expense incurred in Force-Account work on preceding work day as required herein. No claim for compensation for Force-Account work will be allowed unless report shall have been made. City may authorize Force Account Work with specific limits on price, which Contractor shall perform up to such limit.
- C. Force Account work shall be paid as extra work under this [Section 01 26 00 – Contract Modification Procedures](#). Above described methods of determining payment for work and materials shall not apply to performance of work or furnishings of material which, in judgment of the City's Project Manager, may properly be classified under items for which prices are established in Contract.

#### 1.7 CITY FURNISHED MATERIALS

- A. City reserves right to furnish materials as it deems advisable, and Contractor shall have no claims for costs and overhead and profit on such materials.

#### 1.8 OVERHEAD DEFINED

- A. The following constitutes charges that are deemed included in overhead for all contract modifications, including Force-Account work for the entire Contract Time:

1. Drawings: Field drawings, shop drawings, etc. including submissions of drawings
2. Routine field inspection of work proposed
3. General superintendence
4. General administration and preparation of change orders
5. Computer services
6. Reproduction services
7. Salaries of project engineer, project manager, superintendent, timekeeper, storekeeper and secretaries
8. Janitorial services
9. Temporary on-site facilities
10. Offices
11. Telephones
12. Plumbing
13. Electrical: Power, lighting
14. Platforms
15. Fencing, etc.
16. Home office expenses.
17. Insurance and Bond premiums.
18. Procurement and use of vehicles and fuel used coincidentally in base bid work.
19. Surveying
20. Estimating
21. Protection of work
22. Final cleanup
23. Other incidental work
24. Labor liability insurance

#### 1.9 RECORDS AND CERTIFICATION

- A. Force-Account (cost reimbursement) charges shall be recorded daily upon Cost Breakdown for Contract Modification Form obtained from Inspector. Contractor or authorized representative shall complete and sign form. Inspector shall sign form for approval. Contract Modification Form shall provide names and classifications of workers and hours worked by each, itemize materials used, and also list size type and identification number of equipment, and hours operated, and shall indicate work done by specialists.
- B. No payment for Force-Account work shall be made until Contractor submits original invoices substantiating materials and specialist charges.
- C. City shall have the right to audit all records in possession of Contractor relating to activities covered by Contractor's claims for modification of Contract, including Force-Account work, as set forth in [Document 00 72 00 – General Conditions](#).
- D. Further, City shall have right to audit, inspect, or copy all records maintained in connection with this Contract, including financial records, in possession of

Contractor relating to any transaction or activity occurring or arising out of, or by virtue of, Contract. If Contractor is a joint venture, right of City shall apply collaterally to same extent to records of joint venture sponsor, and of each individual joint venture member.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 26 00**



DAILY EXTRA WORK REPORT

COST BREAKDOWN FORM FOR CONTRACT MODIFICATION  
SHEET 1 OF 3

One separate form shall be used by Contractor, each first tier subcontractor and each lower tier subcontractor. One form for each shall be used for each change order. One form for each, for each day shall be used for Force-Account work.

CHANGE ORDER NUMBER: \_\_\_\_\_ DATE: \_\_\_\_\_

CHANGE ORDER DESCRIPTION: \_\_\_\_\_

\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

LABOR				
NAME	CLASSIFICATION	HOURS	RATE	TOTAL
TOTAL LABOR COSTS (Enter here and on Line 1 of Sheet 3)				

COST BREAKDOWN FORM FOR CONTRACT MODIFICATION  
SHEET 2 OF 3

MATERIALS	
DESCRIPTION	COST
TOTAL MATERIAL COSTS (Enter here and on Line 4 of Sheet 3)	

EQUIPMENT RENTAL				
SIZE AND TYPE	I.D. #	HOURS	RATE	TOTAL
TOTAL EQUIPMENT RENTAL COSTS (Enter here and on Line 8)				

SPECIALIST	
DESCRIPTION	COST
TOTAL SPECIALIST COSTS (Enter here and on Line 11)	

COST BREAKDOWN FORM FOR CONTRACT MODIFICATION  
SHEET 3 OF 3

TOTAL COSTS		
1. TOTAL LABOR COSTS		
2. 10 % of Line 1		
3. ADD Lines 1 and 2		
4. TOTAL MATERIAL COSTS		
5. 10 % of Line 4		
6. 8.25 % of line 4		
7. ADD Lines 4, 5 and 6		
8. TOTAL EQUIPMENT RENTAL COSTS		
9. 10 % of Line 8		
10. ADD Lines 8 and 9		
11. TOTAL SPECIALIST COSTS		
12. 10 % of Line 11		
13. ADD Lines 11 and 12		
14. TOTAL COST OF EXTRA WORK (ADD Lines 3, 7, 10 and 13)		

CONTRACTOR OR AUTHORIZED REPRESENTATIVE: \_\_\_\_\_

APPROVED BY INSPECTOR: \_\_\_\_\_

**SECTION 01 26 13 – REQUESTS FOR INTERPRETATION****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This section describes procedural requirements for requests for interpretation, information, and/or clarification.
- B. Related Sections:
  - 1. [Document 00 72 00 – General Conditions](#)
  - 2. [Section 01 26 00 – Contract Modification Procedures](#)

## 1.2 GENERAL

- A. Description: Submit RFI to the Project Manager promptly upon identification of need, and in reasonable time so as not to affect the progress of the Work.
- B. Submission Procedures:
  - 1. Pre-submission Review: Before submitting request to the Project Manager, conduct a review to determine that the information requested, including items submitted by subcontractors or suppliers, is not shown in the Contract Documents.
  - 2. Category of Request: Submit requests for interpretation when one or more of the following conditions occur.
    - a. Need for Clarification: When information shown or indicated in the Contract Documents is unclear in its intent.
    - b. Unforeseen Condition: Discovery of unforeseen condition or circumstance that is not shown or indicated in the Contract Documents.
    - c. Conflict Within Documents: Discovery of an apparent inconsistency, conflict, or discrepancy between different portions of the Contract Documents, where the intent cannot be reasonably inferred from information shown or indicated.
    - d. Omission: Discovery of what appears to be an omission in the Contract Documents, where the intent cannot be reasonably inferred from information shown or indicated.
    - e. Coordination Problem: Discovery of unforeseen condition in coordinating placement of work that is specifically related to the Contract Documents.
  - 3. Unacceptable Requests:
    - a. General: Do not submit RFIs for confirmation of any action already taken by the Contractor. Requests will not be accepted that imply confirmation of any unauthorized change to the Work.

- b. **Untimely Submission:** An RFI that is submitted in a belated manner without proper coordination and scheduling of the Work of related subcontractors will not be reviewed and will be returned to the Contractor.
  - c. **Submittal:** An RFI that is included as part of a submittal will not be processed; see [Section 01 33 00 – Submittal Procedures](#).
  - d. **Substitution:** An RFI that is a request for substitution will not be processed; see [Section 01 25 00 – Substitution Procedures](#).
  - e. **Exclusionary Submission:** A request that implies that specific portions of the work are assumed to be excluded or considering a separate portion of the Contract Documents in part rather than as a whole will not be processed.
- C. **Log:** Prepare and maintain the official log of RFIs. Review status of log at each job progress meeting.

## **PART 2 - PRODUCTS**

### **A. SUBMISSION REQUIREMENTS:**

1. **Request for Interpretation (RFI) Form:**
  - a. **General:** Provide a completed and legible PDF of an RFI form that includes the following required information.
  - b. **RFI Number:** Identify RFIs sequentially starting from number one (1); number re-submissions with same number as original and add letter designation A, B, C, etc., in order submitted, until resolution is achieved.
  - c. **PDF Name:** Include RFI number and reference to name of project in file name; if space allows include brief description of subject in RFI file name.
  - d. **Contractor:** Provide company name and mailing address with signature of contact person responsible for work on the subject project, certifying to review of RFI.
  - e. **Subcontractor and/or Supplier** Provide company name, mailing address, telephone number and name and email of contact person responsible for work on the subject project.
  - f. **RFI Description:**
    - 1) **General:** Describe subject of RFI completely.
    - 2) **Drawing References:** Identify specific drawing number and/or detail number or note under consideration.
    - 3) **Specifications References:** Identify specification section number and paragraph number under consideration.
    - 4) **Attachments:** Identify as required, to support description.
    - 5) **Contractor's Proposed Resolution:**
      - a) **General:** Describe suggested resolution; support with attachments as required.

- b) Cost Impact: Indicate impact on costs; explain Contractor's original basis for bid and, based on the current request, reason that additional costs should be considered.
- c) Time Impact Indicate effect on schedule; explain Contractor's original basis for bid and, based on the current request, why a time extension should be considered.

### **PART 3 - EXECUTION**

#### **A. PROJECT MANAGER'S RESPONSE:**

- 1. General: Project Manager will respond on the RFI Form and include attachments, as referenced. Verbal responses to such requests are to be considered informational; official written response will only be given on annotated PDF of original RFI Form.
- 2. Project Manager's Review:
  - a. General: Allow ten (10) working days after receipt. If more than ten (10) requests are received within one (1) calendar week, the Project Manager will specifically schedule and extend response time as required to accomplish the reviews.
  - b. Prioritization: If more than five (5) requests have been received by the Project Manager, the Contractor shall identify the order of requests most critical to the schedule of the Project.

#### **B. DISTRIBUTION:**

- 1. General: Submit PDF of original, signed copy. PDF with the official response will be returned to the Contractor.
- 2. Consultants: The Project Manager will distribute copies of requests for information to project consultants, as required for their participation. Direct communication and response between project consultants and Contractor will be considered informational only.
- 3. Response: The Contractor will make and distribute copies of the official response to subcontractors and suppliers, as required.

**END OF SECTION 01 26 13**

## SECTION 01 29 00 – PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section describes the procedures for preparation and submittal of Progress Payment Requests.
- B. Related Sections:
  - 1. [Division 00 – General Conditions](#)
  - 2. [Section 01 32 16 - Construction Progress Schedule](#)

#### 1.2 REFERENCES

- A. California Public Contract Code

#### 1.3 SCOPE OF WORK

- A. Payment for the various items of the Schedule of Bid Prices, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured products, and for all labor, operations, overhead and profit, applicable taxes, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of work as specified and as shown on the Drawings. No separate payment will be made for any item that is not specifically set forth in the Schedule of Bid Prices, and all costs therefore shall be included in the prices named in the Schedule of Bid Prices for the various appurtenant items of Work.
- B. Contract Prices shall be deemed to include all bonds and insurance, all appurtenances necessary to complete the required Work, including all costs for compliance with the regulations of the public agencies having jurisdiction, including Health and Safety Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA), and including all costs for loss or damage arising from the Work, or from action of the elements, for any unforeseen difficulties which may be encountered, and for all risks of every description connected with the prosecution of the Work until Project Completion, also for all expenses incurred in consequence of the suspension or discontinuance of the Work as provided in the Contract. Unless the Contract Documents expressly provide otherwise, the Contract Sum shall be deemed to include:
  - 1. Any and all costs arising from any unforeseen difficulties which may be encountered during, and all risks of any description connected with, prosecution of Work until acceptance by City;

2. All expenses incurred due to suspension, or discontinuance of Work as provided in Contract;
  3. Escalation to allow for cost increases between time of Contract Award and completion of Work.
- C. Whenever it is specified herein that Contractor is to do work or furnish materials of any class for which no price is fixed in the Contract, it shall be understood that Contractor is to do such work or furnish such materials without extra charge or allowance or direct payment of any sort, and that cost of doing work or furnishing materials is to be included in price bid, unless it is expressly specified herein, in particular cases, that work or material is to be paid for as extra work.
- D. Neither the payment of any estimate nor of any retained percentages shall relieve Contractor of its obligation to make good all defective work or material.

#### 1.4 DETERMINATION OF QUANTITIES

- A. Quantity of work to be paid for under any item for which a unit price is fixed in Contract shall be number, as determined by Project Manager, of units of work satisfactorily completed in accordance with Drawings, Special Provisions, and Specifications and as directed pursuant to Drawings, Special Provisions, and Specifications. Unless otherwise provided, determination of number of units of work so completed will be based, so far as practicable, on actual measurement or count within prescribed or ordered limits, and no payment will be made for work done outside of limits. Measurements and computations will be made by methods as City's Project Manager may consider appropriate for class of work measured.

#### 1.5 BASIS OF PAYMENT

- A. Unit Pay Quantities: When estimated quantity for specific portions of Work is listed in Bid Form, quantity of work to be paid for shall be actual number of units satisfactorily completed in accordance with Drawings, Special Provisions, and Specifications.
- B. Lump Sum: When estimated quantity for specific portion of Work is not indicated and unit is designated as Lump Sum, payment will be on a Lump Sum basis for Work satisfactorily completed in accordance with Drawings, Special Provisions, and Specifications.
- C. City does not expressly, or by implication, agree, warrant, or represent in any manner, that actual amount of Work will correspond with amount shown or estimated and reserves right to increase or decrease amount of any class or portion of Work, to leave out entire Bid Item or Items, or to add work not included in Bid, when in its judgment such change is in best interest of City. No change in Work shall be considered waiver of any other condition of Contract. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatever, except as otherwise expressly provided for in Contract Documents,



because of any differences between amount of work actually done and estimated amount as set forth herein, or for elimination of extra Bid Items.

- D. Monthly payment requests shall be based upon information developed at monthly Application for Payment meetings and shall be prepared by Contractor. The approved Schedule of Values will be the basis for Contractor's payment requests.
1. No partial progress payment shall be made to Contractor until all cost information requested by the City is submitted and reviewed.
  2. The following information shall also be submitted with and as part of the Contractor's progress payment application; all information, noted below, will cover the same period of the progress payment application.
    - a. Progress Schedule: Submittal of one (1) copy of the progress schedule updated to include the progress achieved as of the date of the Application for Payment in accordance with this Section.
      - 1) Contractor shall, at the time any payment request is submitted, certify in writing the accuracy of the payment request and that Contractor has fulfilled all scheduling requirements of [Division 00 – General Conditions](#) and [Section 01 32 16 - Construction Progress Schedule](#), including updates and revisions. The certification shall be executed by a responsible officer of the Contractor.
    - b. Project Record Drawings: Submit project record drawings with each progress payment application for the City's Project Manager's review. The drawings shall be returned to the Contractor within fourteen (14) calendar days of submittal.
    - c. Certified Payroll: Certified payroll for all Contractor and subcontractor staffing pursuant to Section 1776 of the California Labor Code and including all subcontractors, suppliers, or creditors for all labor and materials incorporated into the work.
    - d. Lien Releases: Conditional or Unconditional lien release for the requested payment. Unconditional lien release for the previous payment.
  3. No progress payment will be processed prior to Project Manager receiving all requested information.
- E. The City will not be liable for costs arising from the delay in making progress payments.

## 1.6 PROGRESS PAYMENT PROCEDURES

- A. If requested by Contractor, progress payments will be made monthly.

B. Schedule of Values:

1. Within ten (10) calendar days from issuance of Notice of Award and prior to the Contractor's application for the first progress payment, the Contractor shall submit a detailed breakdown of its bid by scheduled Work items and/or activities. This breakdown shall be referred to as the Schedule of Values.
2. If City's Project Manager requires substantiating data, Contractor shall submit information requested by Project Manager, with cover letter identifying Project, payment request number and date, and detailed list of enclosures. Contractor shall submit one copy of substantiating data and cover letter for each Payment request submitted.

C. Payment Requests:

1. On or about the 25<sup>th</sup> of each month, the Contractor may submit to the City's Project Manager one (1) copy of an itemized Application of Payment on a standard form acceptable to the City's Project Manager covering the Work completed as of the date of the Application for payment. The following information and/or documentation will be provided as part of the Application for Payment:
  - a. Payment requests may include, but not necessarily limited to the following:
    - 1) Materials, equipment, and labor incorporated into the Work, less any previous payments for the same;
    - 2) A maximum of ninety percent (90%) of the cost of major equipment, if purchased and delivered to the site or stored offsite, as under control of the City, but not installed by the Contractor.
    - 3) Contractor's application for payment shall be accompanied by a bill of sale, invoice, or other documentation warranting that the City has received the materials and equipment free and clear of all liens and evidence that the materials and equipment area covered by appropriate property insurance and other arrangements to protect the City's interest therein.
  - b. Such requests for progress payments shall be based upon Schedule of Values prices of all labor and materials incorporated in the Work during the preceding one-month period, less the aggregate of previous payments.
  - c. Each payment request shall list each Change Order executed prior to the date of submission, including the Change Order Number, a description of the work activities, consistent with the descriptions of original work activities.
    - 1) Contractor shall submit a monthly Change Order status log to the City's Project Manager as part of that Progress Payment Request.
2. Monthly progress payments shall be made, based on total value of activities completed or partially completed, as determined by City with participation of Contractor, and based upon approved activity costs. Accumulated retainage will be shown as separate item in payment summary. If Contractor fails or

refuses to participate in construction progress evaluation with City, Contractor shall not receive current payment until Contractor has participated fully in providing construction progress information and schedule update information for City.

D. Progress Payments:

1. Upon receiving Contractor's payment request, Project Manager will review the payment request and make necessary adjustments to percent of completion of each activity. One copy will be returned to Contractor with description of adjustments made. All parties will update percentage of completion values in the same manner, i.e., express value of an accumulated percentage of completion to date.
2. The payment request may be reviewed by Project Manager for the purpose of determining that the payment request is a proper payment request, and shall be rejected, revised or approved by Project Manager pursuant to the cost breakdown prepared in accordance with this Section.
3. If it is determined that the payment request is not a proper payment request suitable for payment, Project Manager shall return it to the Contractor as soon as practicable, but no later than seven (7) working days after receipt, together with a document setting forth in writing the reasons why the payment request is not proper. If Project Manager determines that portions of the payment request are not proper or not due under the Contract Documents, then Project Manager may approve the other portions of the payment request and, in the case of disputed items or defective work not remedied, may withhold up to 150% of the disputed amount from the progress payment.
4. Pursuant to Public Contract Code, Section 20104.50, if City fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from a contractor, City shall pay interest to the Contractor equivalent to the legal rates set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure. The thirty (30) day period shall be reduced by the number of days by which City exceeds the seven (7) day return requirement set forth herein.
5. As soon as practicable after approval of each request for progress payment, City will pay to Contractor in manner provided by law, the amounts provided for below:
  - a. City shall pay an amount equal to ninety percent (90%) of Project Manager's estimate, which amount shall remain in effect until such time, if any, that the retention is reduced by Project Manager pursuant to the other provisions of this paragraph.
  - b. At any time after fifty percent (50%) in value of the Work as set forth in the Schedule of Values has been completed and the retained funds are equal to five percent (5%) of the Contract Sum (including Change Orders, if applicable), and if the progress of the Work under the Progress Schedule is satisfactory, Project Manager may, at its sole discretion, but shall not be obligated to, authorize any remaining

- progress payment to be made in the amount of ninety-five percent (95%) of the amount approved for payment.
- c. When Project Manager determines that at least ninety-five percent (95%) in value of the Work as set forth in the Schedule of Values is completed, Project Manager may, at its sole discretion, but shall not be obligated to, reduce the amount of the retained funds to one hundred twenty-five percent (125%) of the value of the Work yet to be completed, as determined by Project Manager.
  - d. After all Work is completed in accordance with Contract, the remaining retention amount shall be paid to the Contractor in accordance with Paragraph 1.9, below.
  - e. If a lesser payment amount is provided in the Contract Documents, such lesser amount shall apply instead of the amounts set forth above in this paragraph.
  - f. Progress payments may at any time be withheld if, in judgment of Project Manager, Work is not proceeding in accordance with Contract, or Contractor is not complying with requirements of Contract, or to comply with stop notices or to offset liquidated damages accruing or expected.
6. Retention will not be reduced if Contractor, in the opinion of the Project Manager, is behind schedule. If retention is reduced at any point during Contract and Contractor subsequently falls behind schedule, retention may be raised back to original percentage.
  7. Before any progress payment or final payment is made, the Contractor may be required to submit satisfactory evidence that Contractor is not delinquent in payments to employees, subcontractors, suppliers, or creditors for labor and materials incorporated into Work.
  8. City reserves and shall have the right to withhold payment for any equipment and/or specifically fabricated materials that, in the sole judgment of Project Manager, is not adequately and properly protected against weather and/or damage, prior to or following incorporation into the Work.
  9. Approval of progress payment and payment by City, or receipt thereof by Contractor, shall not be understood as constituting in any sense acceptance of Work or of any portion thereof, and shall in no way lessen liability of Contractor to replace unsatisfactory work or material, though unsatisfactory character of work or material may have been apparent or detected at time payment was made.
  10. When City shall charge sum of money against Contractor under any provision of Contract, amount of charge shall be deducted and retained by City from amount of next succeeding progress payment or from any other monies due or that may become due Contractor under Contract. If, on completion or termination of Contract, such monies due Contractor are found insufficient to cover City's charges against Contractor, City shall have right to recover balance from Contractor or Sureties.

## 1.7 SUBSTITUTION OF SECURITIES IN LIEU OF RETENTION

- A. Pursuant to provisions of Public Contract Code, Section 22300, substitution of securities for any monies withheld under Contract to insure performance is permitted under the following conditions:
1. At request and expense of Contractor, securities listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by Contractor and City which are equivalent to the amount withheld under retention provisions of Contract shall be deposited with Controller or with a state or federally chartered bank in California, as the escrow agent, who shall then pay such monies to Contractor. Upon satisfactory completion of Contract, securities shall be returned to Contractor.
  2. Alternatively, Contractor may request and City shall make payment of retentions earned directly to the escrow agent at the expense of the Contractor. At the expense of the Contractor, the Contractor may direct the investment of the payments into securities and the Contractor shall receive the interest earned on the investments upon the same terms provided for in this section for securities deposited by the Contractor. Upon satisfactory completion of the Contract, the Contractor shall receive from escrow agent all securities, interest, and payments received by the escrow agent from City, pursuant to the terms of this section. The Contractor shall pay to each subcontractor, not later than twenty (20) days after receipt of the payment, the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to insure the performance of the Contractor.
  3. Contractor shall be beneficial owner of securities substituted for monies withheld and shall receive any interest thereon.
  4. Contractor shall enter into escrow agreement with Controller according to Document 00 53 00 - Escrow Agreement for Security Deposits in Lieu of Retention, as authorized under Public Contract Code, Section 22300, specifying amount of securities to be deposited, terms and conditions of conversion to cash in case of default of Contractor, and termination of escrow upon completion of Contract.

## 1.8 APPLICATION FOR PAYMENT OF SUBSTANTIAL COMPLETION

- A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
1. This application shall reflect Certificates of Partial Substantial Completion issued previously for City occupancy of designated portions of the Work.
  2. Administrative actions and submittals that shall precede or coincide with this application include:
    - a. Occupancy permits and similar approvals.

- b. Warranties, guarantees, and maintenance agreements.
- c. Test/adjust/balance records.
- d. Operations and Maintenance instructions.
- e. Meter readings.
- f. Startup performance reports.
- g. Changeover information related to City's occupancy, use, operation, and maintenance.
- h. Final cleaning.
- i. Application for reduction of retainage and consent of surety.
- j. Final progress photographs.
- k. List of incomplete Work, recognized as exceptions to Architect/Engineer's Certificate of Substantial Completion.

## 1.9 FINAL PAYMENT

- A. As soon as practicable after all required Work is completed in accordance with Contract, including Contractor maintenance after Final Acceptance, City will pay to Contractor, in manner provided by law, unpaid balance of contract price of Work, or whole contract price of Work if no progress payment has been made, determined in accordance with terms of Contract, less sums as may be lawfully retained under any provisions of Contract or by law.
- B. Prior progress payments shall be subject to correction in the final payment. Project Manager's determination of amount due as final payment shall be final and conclusive evidence of amount of Work performed by Contractor under Contract, and shall be full measure of compensation to be received by Contractor.
- C. Contractor and each assignee under an assignment in effect at time of final payment shall execute and deliver at time of final payment and as a condition precedent to final payment, Document 00 52 13 – Agreement Form, and Release of Any and All Claims, discharging City of Pittsburg, their officers, agents, employees, and consultants (including, but not limited to Architect/Engineer and Construction Manager) of and from liabilities, obligations, and claims arising under Contract.
- D. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
  1. Completion of Project closeout requirements.
  2. Completion of items specified for completion after Substantial Completion.
  3. Ensure that unsettled claims will be settled.
  4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
  5. Transmittal of required Project construction records to the City.
  6. Certified property survey.
  7. Proof that taxes, fees, and similar obligations were paid.
  8. Removal of temporary facilities and services.

9. Removal of surplus materials, rubbish, and similar elements.
10. Change of door locks to City's access.
11. All as-built drawings.
12. Lien releases from Contractor and subcontractors.

#### 1.10 EFFECT OF PAYMENT

- A. Payment will be made by City, based on Project Manager's observations at the site and the data comprising the Application for Payment. Payment will not be a representation that Project Manager has:
  1. made exhaustive or continuous on-site inspections to check the quality or quantity of Work;
  2. reviewed construction means, methods, techniques, sequences or procedures;
  3. reviewed copies of requisitions received from subcontractors and material suppliers and other data requested by City to substantiate Contractor's right to payment; or
  4. made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.

#### **PART 2 - PRODUCTS**

NOT USED

#### **PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 29 00**

**SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This section describes requirements for coordination and meetings.
- B. Related Sections:
  - 1. [Document 00 72 00 – General Conditions](#)
  - 2. [Section 01 32 16 - Construction Progress Schedule](#)

## 1.2 COORDINATION

- A. The Contractor shall be responsible for all Project coordination.
- B. Duties of Contractor:
  - 1. Coordinate Work of all subcontractors.
  - 2. Establish on-site lines of authority and communication. Schedule and conduct progress meetings with City and subcontractors.
  - 3. Construction schedules:
    - a. Prepare detailed schedule of operations of all subcontractors on Project in accordance with [Section 01 32 16 – Construction Progress Schedule](#).
    - b. Monitor and update schedules as Work progresses.
    - c. Observe Work to monitor compliance with schedule.
  - 4. Temporary facilities:
    - a. Prepare temporary facilities site plan for City's approval.
    - b. Allocate space for temporary structures furnished by subcontractors.
    - c. Monitor use of temporary utilities.
    - d. Verify that adequate services are provided to comply with requirements for Work and climatic conditions.
    - e. Coordinate traffic control.
    - f. Administer traffic and parking controls.
  - 5. Changes:
    - a. Recommend necessary or desirable changes to Architect/Engineer.
    - b. Review subcontractor's request for changes and for substitutions.
    - c. Submit recommendations to Architect/Engineer, through the Project Manager.
    - d. Process Change Orders.
  - 6. Permits and fees: Verify that subcontractors have obtained permits for inspections.
  - 7. Review all Shop Drawings, Product Data, and Samples for compliance with Contract Documents prior to submittal to Project Manager.



8. Interpretation of Contract Documents:
  - a. Consult with Project Manager and Architect/Engineer to obtain interpretations.
  - b. Assist in resolution of questions which may arise.
  - c. Transmit written interpretations to concerned parties.
9. Maintain reports and records at Project Site:
  - a. Daily log progress of Work; make available to Project Manager and Architect/Engineer.
  - b. Records.
  - c. Contracts.
  - d. Purchases.
  - e. Materials and equipment.
  - f. Applicable handbooks, codes and standards.
  - g. Obtain information from subcontractors and maintain record documents. Assemble documentation for handling of claims and disputes.
10. Verify that specified cleaning is done during progress of Work and at completion of each contract.
11. For project requiring building permit, coordinate with the Building Division, City of Pittsburg, for inspections.
12. Start-up:
  - a. Direct the checkout of utilities, operational systems and equipment.
  - b. Assist in initial start-up testing.
  - c. Record dates of start of operation of systems and equipment.
  - d. Submit to City written notice of beginning of Warranty period for equipment put in service.

### 1.3 COORDINATION REQUIREMENTS

- A. Coordination: Contractor shall coordinate the Work as stated in the [Document 00 72 00 – General Conditions](#). Contractor shall also coordinate Work under the Contract with work under separate contracts by City. Contractor shall cooperate with City and others as directed by City in scheduling and sequencing the incorporation into the Work of City Furnished/Contractor installed products identified in the Contract Drawings, Special Provisions, and Specifications.
- B. Relationship of Contract Documents: Drawings, Special Provisions, Specifications, and other Contract Documents in the Project Manual are intended to be complementary. What is required by one shall be as if required by all. What is shown or required, or may be reasonably inferred to be required, or that is usually and customarily provided for similar work, shall be included in the Work.
- C. Discrepancies in Contract Documents: In the event of error, omission, ambiguity or conflict in Drawings, Special Provisions, or Specifications, Contractor shall bring the matter to the Architect/Engineer's attention, through the Project Manager, in a timely manner, for the Architect/Engineer's determination and

direction in accordance with provisions of [Document 00 72 00 – General Conditions](#).

- D. Construction Interfacing and Coordination: Layout, scheduling and sequencing of Work shall be solely Contractor's responsibility. Contractor shall bring together the various parts, components, systems, and assemblies as required for the correct interfacing and integration of all elements of Work.
- E. Contractor shall coordinate Work to correctly and accurately connect abutting adjoining, overlapping and related elements, including work under separate contracts by City, utility agencies and companies.

#### 1.4 COORDINATION OF SUBCONTRACTS AND SEPARATE CONTRACTS

- A. Superintendence of Work: Contractor shall appoint a field superintendent who shall directly supervise and coordinate Work shown on the Drawings, Special Provisions, and in the Specifications at all times. In order to maintain an uninterrupted construction schedule, the field superintendent shall not be replaced by the Contractor, for other than extenuating circumstances, without prior approval by the Architect/Engineer and/or City.
- B. Subcontractors, Trades and Materials Suppliers: Contractor shall require all subcontractors, trades, crafts and suppliers to coordinate their portions of Work with the Superintendent, Engineer and Construction Project Manager to prevent scheduling, sequencing, dimensional and other conflicts and omissions.
- C. Coordination with Work under Separate Contracts: Contractor shall coordinate and schedule Work under the Contract with work being performed for Project under separate contracts by City, serving utilities and public agencies. Contractor shall make direct contacts with parties responsible for work of the Project under separate contracts, in order to provide timely notifications and to facilitate information exchanges.

#### 1.5 PRECONSTRUCTION CONFERENCE

- A. Project Manager will call for and administer Preconstruction Conference at time and place to be announced. Conference will occur as soon after award as can be reasonably scheduled.
- B. Contractor, all subcontractors, and major suppliers shall attend Preconstruction Conference.
- C. Agenda will include, but not be limited to, the following items:
  - 1. Lines of Communication
  - 2. Schedules
  - 3. Employment Goals
  - 4. Personnel
  - 5. Use of premises

6. Location of Contractor's on-site facilities
7. Project access
8. Employee parking
9. Security
10. NPDES Storm Water Pollution Prevention BMPs
11. Contractor's Questions
12. Housekeeping
13. Submittals
14. Inspection and testing procedures, on-site and off-site
15. Utility shutdown procedures
16. Control and reference point survey procedures
17. Injury and Illness Prevention Program
18. Contractor's Initial CPM Schedule
19. Preparation of Record Documents.

- D. Project Manager will distribute copies of minutes to attendees. Attendees shall have five (5) working days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of the Preconstruction Conference.

## 1.6 SCHEDULING MEETINGS

- A. Meet with Project Manager no later than Start Date of Contract and conduct initial review of Contractor's Initial Progress Schedule submittal, draft Shop Drawing and Sample Submittal Schedule, and draft Schedule of Values ("Schedule Review Meeting").
- B. Authorized representative in Contractor's organization, designated in writing, who will be responsible for working and coordinating with Project Manager's representative(s) relative to preparation and maintenance of Progress Schedule, shall attend initial Schedule Review Meeting.
- C. Contractor shall, within thirty (30) calendar days from the Notice to Proceed date, meet with City to review Contractor's Original CPM Schedule submittal, and final Shop Drawing and Sample Submittal Schedule, and final Schedule of Values.
1. Contractor shall have its manager, superintendent, scheduler, and key subcontractor representatives, as required by City, in attendance. The meeting will take place over a continuous one-day period.
  2. City's review of Schedule Submittals will be limited to conformance to Contract requirements, including, but not limited to, coordination requirements. However, review may also include:
    - a. Clarifications of Contract Requirements
    - b. Directions to include activities and information missing from submittal
    - c. Requests to Contractor to clarify its schedule
  3. Within five (5) working days of the initial Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by City at the meeting.

- D. Project Manager will administer scheduling meetings and shall distribute minutes of scheduling meetings to attendees. Attendees shall have five (5) working days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of the scheduling meetings.

#### 1.7 PROGRESS MEETINGS

- A. A progress meeting will be held weekly to review the schedule update submittal and progress payment application. At this meeting, at a minimum, the following items will be reviewed:
  - 1. Previous meeting notes.
  - 2. Percent complete of each activity
  - 3. Time impact evaluations for Change Orders and Time Extension Request
  - 4. Actual and anticipated activity sequence changes
  - 5. Actual and anticipated duration change
  - 6. Actual and anticipated contractor delays
  - 7. Interface requirement
  - 8. Status on submittals
  - 9. Documentation of information for payment request.
- B. These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
- C. Project Manager will record and distribute minutes to Contractor, Building and/or Special Inspector, Architect/Engineer, and all other participants, and those affected by decisions made at the meeting, within five (5) working days after the meeting. Attendees shall have five (5) working days to submit comments or additions to the minutes. The Minutes will constitute final memorialization of the results of the progress meeting.

#### 1.8 SPECIAL MEETINGS

- A. Special meetings may be called by any party by notifying all desired participants, Project Manager, and Building and/or Special Inspector five (5) working days in advance, giving reason for meeting. Special Meetings may be held without advance notice in emergency situations.
- B. At any time during the progress of the Work, any party shall have the right to require attendance at conference, and notice of such conference shall be duly observed and complied with by Contractor.
- C. Contractors shall schedule and conduct coordination meetings as necessary to discharge coordination responsibilities in [Document 00 72 00 – General Conditions](#). Project Manager shall be given five (5) working days written notice of coordination meetings. Contractors shall maintain minutes of coordination me

etings. Attendees shall have five (5) working days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of the meetings.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 31 00**

## SECTION 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Preconstruction photographs and videos.
2. Periodic construction photographs and videos.

##### B. Submittals:

1. Key Plan: Submit key plan of project site and construction with notation of vantage points marked for location and direction of each photograph and video.
2. Construction Photographs: Submit digital copy of photographs in PDF and JPEG form in a CD or a USB flash drive with a folder containing pictures of each street in subfolders.
3. Identification: Identify the project by Contract Number. Identify each photograph by naming it according to the station number on the drawings. Example: Sta 10+00 looking northeast; Sta 12+30 looking west.
4. Digital Images:
  - a. General: Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.
  - b. Usage Rights: Submit statement of transfer copyright usage rights to City allowing unlimited reproduction of photographic documentation.
5. Video:
  - a. General: Submit videos on acceptable electronic transfer medium to the Project Manager, accompanied by a detailed log, including descriptions and corresponding counter numbers to facilitate the quick location of information. Videos will be maintained by the Project Manager during construction and may be viewed at any time by Contractor upon request. Upon final acceptance, the videos will become the permanent property of the City.
  - b. Submit video documentations to the Project Manager prior to start of construction work and as otherwise required.
  - c. Usage Rights: Submit statement of transfer copyright usage rights to City allowing unlimited reproduction of videographic documentation.

### PART 2 - PRODUCTS

#### 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images capable of a digital capture resolution of not less than 2240x1680 - 4 Megapixels.

- B. Videos: Provide videos in high resolution digital format with audio capability.

### **PART 3 - EXECUTION**

#### **3.1 CONSTRUCTION PHOTOGRAPHS**

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
- B. Key Plan: Maintain with each set of construction photographs that identifies each photographic location.
- C. Digital Images:
  - 1. General: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 2. Date and Time: Include date and time in filename for each image.
  - 3. Field Office Images: Maintain one set of images on acceptable electronic transfer medium in the field office at Project Site, available at all times for reference. Identify images same as for those submitted to Project Manager.
- D. Preconstruction Photographs:
  - 1. General: Before starting construction, take color photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Project Manager.
  - 2. Construction Limits: Flag before taking construction photographs.
  - 3. Adjacent Conditions:
    - a. General: Take three (3) color photographs, from different views, to show existing conditions adjacent to property before starting the Work.
    - b. Existing Buildings: Take three (3) color photographs, different views, of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

#### **3.2 CONSTRUCTION VIDEOS**

- A. Preconstruction Videos: Document existing conditions of adjacent areas (curbs, gutters, sidewalks, driveways, private improvements immediately adjacent to the project site, roadway pavement, access roads, landscaping, etc.) that might be affected by construction operations. Take care to record all existing conditions which exhibit deterioration, imperfections, structural failures, or situations that would be considered substandard.
- B. All Videos: Provide temporary lighting as necessary to properly videotape areas where natural lighting is insufficient (shadows, etc.). Include an audio soundtrack to provide the following information:

1. Detailed description of location being viewed.
2. Direction (N, E, S, W, looking up, looking down, etc.) of camera view.
3. Date, time, temperature, environmental conditions at time of videotaping.
4. Describe in detail areas not readily visible by video. Unless otherwise approved by the Project Manager, do not perform videotaping during inclement weather or when the ground is covered partially or totally with leaves or debris.

**END OF SECTION 01 32 00**



## SECTION 01 32 16 – CONSTRUCTION PROGRESS SCHEDULE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
  - 1. Development of schedule, cost and resource loading of the schedule, monthly payment requests and project status reporting requirements of the Contract shall employ scheduling as required in this Document.
  - 2. The Schedule shall be cost loaded based on Schedule of Values as approved by City.
  - 3. Submit schedules and reports as specified in [Document 00 72 00 - General Conditions](#).
- B. Upon Award of Contract, Contractor shall immediately commence development of Initial Schedule to ensure compliance with schedule submittal requirements.
- C. Related Sections
  - 1. [Section 00 52 13 - Agreement Form](#)
  - 2. [Section 01 10 00 – Summary](#)
  - 3. [Section 01 29 00 – Payment Procedures](#)
  - 4. [Section 01 31 00 – Project Management and Coordination](#)
  - 5. [Section 01 33 00 – Submittal Procedures](#)

#### 1.2 GENERAL

- A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.
- B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in [Section 00 52 13 - Agreement Form](#), unless an earlier (advanced) time of completion is requested by Contractor and agreed to by City. Any such agreement shall be formalized by a Change Order.
  - 1. City is not required to accept an earlier (advanced) schedule, i.e., one that shows early completion dates for the Contract Times.
  - 2. Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier (advanced) schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in earlier (advanced) schedule but within the Contract Times.
  - 3. A schedule showing the work completed in less than the Contract Times, which has been accepted by City, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work

and Contract Substantial Completion. Project Float is a resource available to both City and Contractor.

- C. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- D. Failure of Progress Schedule to include any element of the Work or any inaccuracy in Progress Schedule will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. City's acceptance of Schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests, and shall not, in any manner, impose a duty of care upon City, or act to relieve Contractor of its responsibility for means and methods of construction.
- E. Transmit each item per [Section 01 33 00 – Submittal Procedures](#) under form approved by City.
  - 1. Identify Project with the City Contract number, and name of Contractor.
  - 2. Provide space for Contractor's approval stamp and City's review stamps.
  - 3. Submittals received from sources other than Contractor will be returned to Contractor without City's review.

### 1.3 INITIAL AND ORIGINAL SCHEDULE

- A. Initial Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to thirty (30) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first thirty (30) calendar days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; and procurement of materials and equipment. Show Work beyond thirty (30) calendar days in summary form.
- C. Original (or "Baseline") Schedule shall be submitted for review no later than Contractor's first progress payment application submittal.
- D. All schedules shall be time-scaled.
- E. All schedules shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments. Use of Initial Schedule for progress payments shall not exceed thirty (30) calendar days.
- F. City and Contractor shall meet to review and discuss the Schedule within seven (7) calendar days after it has been submitted to City.
  - 1. City's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).

2. Contractor shall make corrections to Schedule necessary to comply with Contract requirements and shall adjust Schedule to incorporate any missing information requested by City. Contractor shall resubmit Initial Schedule if requested by City.

#### 1.4 CONSTRUCTION SCHEDULE FORMAT AND LEVEL OF DETAIL

- A. The Construction Schedule is to indicate all separate fabrication and field construction activities required for completion of the work, including but not limited to the following:
  1. All Contractor, Subcontractor and assigned Contractor work shall be shown in a logical work sequence that demonstrates a coordinated plan of work for all contractors. The intent is to provide a common basis of acceptance, understanding and communication, as well as interface with other contractors.
  2. Activities related to the delivery of City-furnished equipment to be contractor-installed per Contract shall be shown.
  3. All activities shall be identified through codes or other identification to indicate the building (i.e. buildings, site work) and Contractor/subcontractor responsibility to which they pertain.
  4. Contractor shall break up the work schedule into activities of durations of approximately fifteen (15) calendar days or less each, except for non-field construction activities or as otherwise deemed acceptable by the Project Manager.
- B. Seasonal weather conditions (which do not constitute a delay as defined herein) shall be considered in the planning and scheduling of all work influenced by high or low ambient temperatures or presence of high moisture for the completion of the work within the allotted contract time.
- C. In conformance with the Contract Documents Contractor shall furnish a breakdown of the bid by assigning dollar values (cost estimated) to each applicable network activity, which cumulatively equals the bid. Upon acceptance by City, the values will be used as the basis for determining progress payments. Contractor's overhead, profit, and cost of bonds and insurance, shall be prorated through all activities.
- D. Failure by Contractor to include any element of work required for performance of the work on the detailed construction schedule shall not excuse Contractor from completing all work required within the Contract time.
- E. A two-week "look ahead" detailed, daily bar chart schedule shall be updated and issued weekly, no later than the time of the scheduled weekly meeting.
- F. Contractor shall utilize computer scheduling software, such as PRIMAVERA or approved equivalent software for all scheduling including schedule updates.

Contractor shall supply computer data files for all schedules including the original schedule and monthly schedule updates.

#### 1.5 MONTHLY SCHEDULE UPDATE SUBMITTALS

- A. Following acceptance of Contractor's Initial Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
  - 1. Each schedule update submitted shall be complete, including all information requested for the Initial Schedule submittal.
  - 2. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held after the first Project Meeting of each month to review the schedule update submittal and progress payment application.
  - 1. At this meeting, at a minimum, the following items will be reviewed: percent complete of each activity; time impact evaluations for change orders and time extension requests; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated contractor delays.
  - 2. These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
  - 3. Contractor shall plan on the meeting taking no less than two (2) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated Schedule update.
- D. Within five (5) working days of receipt of above noted revised submittals, City will either accept or reject monthly schedule update submittal.
  - 1. If accepted, percent complete shown in monthly update will be basis for Application for Payment by Contractor. The schedule update shall be submitted as part of Contractor's Application for Payment.
  - 2. If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule or narrative submitted to City by Contractor under this Contract, nor City's review or acceptance of any such report, curve, schedule or narrative, shall have the effect of amending or modifying, in any way, the Contract Substantial Completion date or milestone dates or of modifying or limiting, in any way, Contractor's obligations under this Contract.

## 1.6 SCHEDULE REVISIONS

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the schedule, Contractor shall provide City with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. Contractor shall provide the written narrative and schedule diagram for revisions two (2) calendar days in advance of the monthly schedule update meeting.
- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by City. City may request further information and justification for schedule revisions and Contractor shall, within three (3) calendar days, provide City with a complete written narrative response to City's request.
- D. If Contractor's revision is still not accepted by City, and Contractor disagrees with City's position, Contractor has seven (7) calendar days from receipt of City's letter rejecting the revision, to provide a written narrative providing full justification and explanation for the revision. Contractor's failure to respond in writing within seven (7) calendar days of City's written rejection of a schedule revision shall be contractually interpreted as acceptance of City's position, and Contractor waives its rights to subsequently dispute or file a claim regarding City's position.
- E. At City's discretion, Contractor can be required to provide subcontractor certifications of performance regarding proposed schedule revisions affecting said subcontractors.

## 1.7 RECOVERY SCHEDULE

- A. If the Schedule Update shows a substantial completion date twenty-one (21) calendar days beyond the Contract Substantial Completion date, or individual milestone completion dates, Contractor shall submit to City the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by City.
- C. If Contractor's revisions are not accepted by City, City and Contractor shall follow the procedures in paragraph 1.6.C, 1.6.D and 1.6.E above.

- D. At City's discretion, Contractor can be required to provide subcontractor certifications for revisions affecting said subcontractors.

## 1.8 TIME EXTENSIONS

- A. Contractor is responsible for requesting time extensions for time impacts that, in the opinion of Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with [Document 00 72 00 - General Conditions](#).
- B. Where an event for which City is responsible impacts the projected Substantial Completion date, Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how the impact can be mitigated (e.g., increase crew size, overtime, etc.). Contractor shall also include a detailed cost breakdown of the labor, equipment and material Contractor would expend to mitigate City caused time impact. Contractor shall submit its mitigation plan to City within ten (10) working days from the date of discovery of said impact. Contractor is responsible for the cost to prepare the mitigation plan.
- C. Failure to request time or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. City will not be obligated to consider any time extension request unless requirements of Contract Documents are satisfied.
- F. Failure of Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

## 1.9 PROJECT STATUS REPORTING

- A. In addition to submittal requirements for scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each Schedule as specified herein. Status reporting shall be in form specified below.
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to City. Written status reports shall include:
  1. Status of major Project components (percent complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
  2. Progress made on critical activities indicated on Schedule, inspections and visits by the Building and/or Special Inspection Inspector.
  3. Explanations for any lack of work on critical path activities planned to be performed during last month.
  4. Explanations for any schedule changes, including changes to logic or to activity durations.

5. List of critical activities scheduled to be performed next month.
6. Status of major material and equipment procurement.
7. Any delays encountered during reporting period.
8. Contractor shall provide a printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
  - a. Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in monthly and weekly printed reports.
  - b. Contractor shall explain all variances and mitigation measures.
9. Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by City at no additional cost.
10. Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 32 16**

**SECTION 01 33 00 – SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

A. This section describes general requirements for submittals for the Work:

1. Procedures
2. Schedule of Shop Drawing and Sample Submittals
3. Safety Plan
4. Progress Schedule
5. Product Data
6. Shop drawings
7. Samples
8. Quality Control Submittals
  - a. Design Data
  - b. Test Reports
  - c. Certificates
  - d. Manufacturers' Instructions
9. Machine Inventory Sheets
10. Operations and Maintenance Manuals
11. Keys
12. Project Record Documents

B. Related Sections:

1. [Section 01 10 00 - Summary](#)
2. [Section 01 25 00 – Substitution Procedures](#)
3. [Section 01 26 00 – Contract Modification Procedures](#)
4. [Section 01 29 00 – Payment Procedures](#)
5. [Section 01 32 16 – Construction Progress Schedule](#)
6. [Section 01 78 00 – Closeout Submittals](#)

**1.2 PROCEDURES**

A. Upon issuance of the “Notice to Proceed”, the Contractor shall have thirty-five (35) calendar days to submit, at Contractor/Vendor expense, sets of the following: Schedule of Shop Drawing and Sample Submittals, Safety Plans, Progress Schedule, Product Data, Shop Drawings, Samples, Quality Control Data, Machine Inventory Sheets, Operations and Maintenance Manuals, and Project Record Documents required by the Contract Documents. Submit these submittals to Project Manager for review and approval in accordance with accepted schedule of Shop Drawings and Samples submittals.



- B. Transmit each item with a standard letter of transmittal. Identify project, Contractor, subcontractor, major supplier, pertinent drawing sheet and detail number, special provisions, and specification section number as appropriate. Provide space for Contractor, Project Manager and Architect/Engineer review stamps. Where manufacturer's standard drawings or data sheets are used, they shall be marked clearly to show those portions of the data which are applicable to this project. The transmittal sheet will include the following:
1. Date
  2. Project and Contract Name and Number
  3. Subcontractor or supplier as appropriate
  4. Trade
  5. Contractor Review Stamp
- C. The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show Project Manager and Architect/Engineer the materials and equipment Contractor proposes to provide and to enable Project Manager and Architect/Engineer to review the information for the limited purposes specified below. Samples shall be identified clearly as to material, supplier; pertinent data such as catalog numbers and the use for which it is intended and otherwise as Project Manager and Architect/Engineer may require enabling Project Manager and Architect/Engineer to review the submittal.
- D. At the time of each submission, Contractor shall give City specific written notice of all variations, if any; that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, and the reasons therefore. This written notice shall be a separate document from the submittal. In addition, Contractor shall cause a specific notation to be made on each Shop Drawing and Sample submitted to City for review and approval of each such variation. If City accepts deviation, City shall issue appropriate Contract Modification.
- E. Submittal coordination and verification of contract compliance is responsibility of Contractor; this responsibility shall not be delegated in whole or in part to subcontractors or suppliers. Before submitting each Shop Drawing or Sample, Contractor shall have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents, and shall have determined and verified:
1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto;
  2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work; and
  3. All information relative to Contractor's sole responsibilities and of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

- F. Contractor's submission to City of a Shop Drawing or Sample submittal will constitute Contractor's representation that it has satisfied its obligations under the Contract Documents, and as set forth immediately above, with respect to Contractor's review and approval of that submittal.
- G. After review by Project Manager and Architect/Engineer of each of Contractor's submittals, one set of materials will be returned to Contractor with actions defined as follows:
1. NO EXCEPTIONS TAKEN - Accepted subject to its compatibility with future submittals and additional partial submittals for portions of the work not covered in this submittal. Does not constitute approval or deletion of specified or required items not shown on the submittal.
  2. MAKE CORRECTIONS NOTED (NO RESUBMISSIONS REQUIRED) - Same as 1. above, except that minor corrections as noted shall be made by Contractor.
  3. AMEND AND RESUBMIT - Rejected because of major inconsistencies or errors which shall be resolved or corrected by Contractor prior to subsequent review by Project Manager and Architect/Engineer.
  4. REJECTED - RESUBMIT - Submitted material does not conform to Plans and Specifications in major respect, i.e.: wrong size, model, capacity, or material.
- H. It is considered reasonable that Contractor shall make a complete and acceptable submittal at least by second submission. City reserves the right to deduct monies from payments due Contractor to cover additional costs of Project Manager's and Architect/Engineer's review beyond the second submission. Illegible submittals will be rejected and returned to Contractor for resubmission.
- I. Favorable review will not constitute acceptance by City of any responsibility for the accuracy, coordination and completeness of the submittals. Accuracy, coordination, and completeness of Submittals shall be sole responsibility of Contractor, including responsibility to back check comments, corrections, and modifications resulting from City's review which shall be incorporated in design before fabrication. Submittals may be prepared by Contractor, subcontractors, or suppliers, but Contractor shall ascertain that submittals meet requirements of Contract Documents, while conforming to structural space and access conditions at point of installation. Project Manager and Architect/Engineer's review will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as indicated by the Contract Documents. Favorable review of submittal, method of work, or information regarding materials and equipment Contractor proposes to furnish shall not relieve Contractor of responsibility for errors therein and shall not be regarded as assumption of risks or liability by Architect/Engineer or City, or any officer or employee thereof, and Contractor shall have no claim under Contract on account of failure or partial failure or inefficiency or insufficiency of any plan or method of work or material and equipment so accepted. Favorable review shall be considered to mean merely that Architect/Engineer or City has no objection to

Contractor using, upon his own full responsibility, plan or method of work proposed, or furnishing materials and equipment proposed.

- J. City's review shall not be construed as approval of means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
- K. Submit complete initial submittal for those items where required by individual special provisions, or specification sections. Complete submittal shall contain sufficient data to demonstrate that items comply with Specifications, shall meet minimum requirements for submissions cited in technical specifications, shall include motor data and seismic anchorage certifications, where required, and shall include necessary revisions required for equipment other than first named. If Contractor submits incomplete initial submittal, when complete submittal is required, submittal may be returned to Contractor without review.
- L. It shall be Contractor's responsibility to copy, conform and distribute reviewed submittals in sufficient numbers for Contractor's files, subcontractors and vendors.
- M. After Project Manager's and Architect/Engineer's review of submittal, revise and resubmit as required. Identify changes made since previous submittal.
  - 1. Begin no fabrication or work which require submittals until return of submittals not requiring re-submittal.
  - 2. Normally, submittals will be processed and returned to Contractor within fifteen (15) calendar days of receipt.
- N. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

### 1.3 SCHEDULE OF SHOP DRAWING AND SAMPLE SUBMITTALS

- A. Submit preliminary Schedule of Shop Drawing and Sample Submittals as required by [Division 00 - General Conditions](#). Submit three (3) copies and PDF of final and accepted schedule of submittals of shop drawings and samples as required by Document 00 72 00 - General Conditions, and in no event later than thirty-five (35) calendar days following Notice to Proceed.
- B. Schedule of Shop Drawing and Sample Submittals will be used by Project Manager and Architect/Engineer to schedule their activities relating to review of submittals. Schedule of submittals shall indicate a spreading out of submittals and early submittals of long-lead-time items and of items which require extensive review.
- C. Schedule of Shop Drawing and Sample Submittals shall be reviewed by Project Manager and shall be revised and resubmitted until accepted by Project Manager.

#### 1.4 SAFETY PLAN

- A. Submit three (3) copies of Safety Plan specific to this Contract to Project Manager within fifteen (15) calendar days of issuance of the Notice to Proceed.
- B. One (1) copy of accepted Safety Plan will be returned to Contractor.
- C. No on-site work shall be started until Safety Plan has been reviewed and accepted by City. Acceptance of Safety Plan shall not affect Contractor's responsibility for maintaining a safe working place and instituting safety programs in connection with project.

#### 1.5 PROGRESS SCHEDULE

- A. See [Section 01 32 16 – Construction Progress Schedule](#) for schedule and report requirements.
- B. Submit three (3) copies and PDF of schedule at each of the following times:
  - 1. Initial CPM Schedule at the Preconstruction Conference (covering in detail first thirty (30) calendar days of contract performance, and at a summary level for remainder of contract).
  - 2. Original CPM Schedule within thirty (30) calendar days of the Notice to Proceed date (covering in detail entire Work of Contract to completion).
  - 3. Adjustments to the CPM Schedule as required.
  - 4. CPM Schedule updates weekly, two (2) calendar days prior to weekly progress meeting.
- C. Submit three (3) copies and PDF of the reports listed in [Section 01 32 16 – Construction Progress Schedule](#) with:
  - 1. Initial CPM Schedule
  - 2. Original CPM Schedule
  - 3. Each weekly Schedule update
- D. Progress Schedules and Reports shall be submitted electronically and stored in a USB flash drive in addition to hard copies specified above.

#### 1.6 PRODUCT DATA

- A. Within ten (10) calendar days after Start Date of the Contract Times, submit copies of complete list of major products and equipment proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- C. Tabulate products by Special Provisions and Specification Section Number.

- D. Supplemental Data: Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to Project.
- E. Provide copies for Project Record Documents described in [Section 01 78 00 – Closeout Submittals](#).

#### 1.7 SHOP DRAWINGS

- A. Submit three (3) copies and PDF of shop drawings.
- B. Minimum Sheet Size: 8-1/2 inches by 11 inches. All others: Multiples of 8-1/2 inches by 11 inches, 22 inches by 34 inches (ANSI D) maximum.
- C. Original sheet or reproducible transparency will be marked with Project Manager's and/or Architect/Engineer's review comments and returned to Contractor.
- D. Mark each copy to identify applicable Products, models, options, and other data; supplement manufacturers' standard data to provide information unique to Work.
- E. Include manufacturers' installation instructions when required by special provisions or specification section.

#### 1.8 SAMPLES

- A. Submit full range of manufacturers' standard colors, textures, and patterns for Project Manager's selection where not indicated in documents or for substitutions or "equals".
- B. Submit samples to illustrate functional and aesthetic characteristics of Product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification on each sample, giving full information.
- D. Submit three (3) samples unless otherwise specified.
- E. Sizes: Unless otherwise specified, provide the following:
  - 1. Paint Chips: Manufacturers' standard.
  - 2. Flat or Sheet Products: Minimum 6 inches square, maximum 12 inches square.
  - 3. Linear Products: Minimum 6 inches, maximum 12 inches long.
  - 4. Bulk Products: Minimum 1 pint, maximum 1 gallon.
- F. Full size samples may be used in Work upon approval.
- G. Mock-ups:

1. Erect field samples and mock-ups at Project site in accordance with requirements of Special Provisions or Specification sections.
2. Modify or make additional field samples and mock-ups as required to provide appearance and finishes approved by Project Manager.
3. Approved field samples and mock-ups may be used in Work upon approval.

#### 1.9 QUALITY CONTROL SUBMITTALS

- A. Design Data: Three (3) copies and PDF.
- B. Test Reports: Three (3) copies and PDF.
  1. Indicate that material or product conforms to or exceeds specified requirements.
  2. Reports may be from recent or previous tests on material or product, but must be acceptable to Project Manager. Comply with requirements of each individual special provisions or specification Section.
- C. Certificates: Three (3) copies and PDF.
  1. Indicate that material or product conforms to or exceeds specified requirements.
  2. Submit supporting reference data, affidavits, and certifications as appropriate.
  3. Certificates may be recent or from previous test results on material or product, but must be acceptable to Project Manager.
- D. Manufacturers' Instructions: Three (3) copies and PDF.
  1. Include manufacturer's printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing.
  2. Identify conflicts between manufacturer's instructions and Contract Documents.

#### 1.10 MACHINE INVENTORY SHEETS

- A. Submit three (3) copies of machine inventory sheets including inventory list for spare parts and materials. If necessary, copies will be marked with Project Manager's and/or Architect/Engineer's review comments and returned to Contractor for correction until satisfactory information is provided. City will retain satisfactorily corrected sheets for its own use.

#### 1.11 OPERATIONS AND MAINTENANCE MANUALS

- A. Submit three (3) copies and PDF of manufacturers' operations and maintenance manuals. If necessary, copies will be marked with City's review comments and returned to Contractor for correction until satisfactory information is provided. City will retain satisfactorily corrected manuals for its own use.
- B. Operations and maintenance manuals shall include the following as appropriate:
  1. Operating instructions.
  2. Preventive maintenance instructions.

3. Cleaning instructions.
  4. Safety precautions.
  5. Trouble shooting procedures.
  6. Theory of operation to discrete component level.
  7. Schematic diagrams, flow diagrams, wiring diagrams, logic diagrams, etc. to discrete component level.
  8. Parts lists showing all discrete components with part number, current prices and availability.
  9. List of replaceable supplies; paper, ink, ribbon, etc. with part numbers, current prices and availability.
  10. Recommended levels of spare parts and supplies to keep on hand.
  11. Manufacturers' service and maintenance technical manuals.
  12. Names, addresses and telephone numbers of service and repair firms for the equipment.
- C. Manuals shall be the same as are used by manufacturers' authorized technicians to completely service and repair the equipment.
- 1.12 KEYS
- A. Submit two (2) complete sets of keys for the Project and all related facilities.
  - B. Submit an inventory list of keys.
- 1.13 PROJECT RECORD DOCUMENTS
- A. Submit copies of each of the Project Record Documents as listed in [Section 01 78 00 – Closeout Submittals](#).

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 33 00**

**SECTION 01 41 00 – REGULATORY REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section includes regulatory requirements applicable to Contract.

**1.2 REFERENCES TO REGULATORY REQUIREMENTS**

- A. Codes, laws, ordinances, rules and regulations referred to shall have full force and effect as though printed in full in these specifications.
- B. Conform to referenced codes, laws, ordinances, rules and regulations which are in effect on date of receipt of bids.

**1.3 CODES**

- A. Codes which apply to Contract include, but are not limited to, the following:
  - 1. California Building Code (CBC) – Latest Edition:
    - a. California Administrative Code: Title 24, Part 1.
    - b. California Building Code: Title 24, Part 2 (Includes the California Historical Building Code, Part 8 and California Existing Building Code, Part 10).
    - c. California Residential Code: Title 24, Part 2.5
    - d. California Electrical Code: Title 24, Part 3.
    - e. California Mechanical Code: Title 24, Part 4.
    - f. California Plumbing Code: Title 24, Part 5.
    - g. California Energy Code: Title 24, Part 6.
    - h. California Fire Code: Title 24, Part 9.
    - i. California Green Building Standards Code (CALGreen): Title 24, Part 11.
    - j. California Referenced Standards Code: Title 24, Part 12.

**1.4 LAWS, ORDINANCES, RULES AND REGULATIONS**

- A. During prosecution of Work to be done under Contract, comply with applicable laws, ordinances, rules and regulations, including, but not limited to, the following:
  - 1. Federal/National:
    - a. Americans with Disabilities Act (ADA): Latest edition; Civil Rights Division, Office on the Americans with Disabilities Act, U.S. Department of Justice
    - b. National Fire Protection Association (NFPA): Life Safety Code - NFPA 101.
    - c. U. S. Environmental Protection Agency (EPA): Laws and regulations.



- d. 29 CFR, Section 1910.1001, Asbestos
- e. 40 CFR, Subpart M, National Emission Standards for Asbestos
- f. Executive Order 11246
- 2. State of California:
  - a. California Code of Regulations, Titles 5, 8, 19, 21, 24
  - b. California Education Code
  - c. California Public Contract Code
  - d. California Health and Safety Code
  - e. California Government Code
  - f. California Labor Code
  - g. California Civil Code
  - h. California Code of Civil Procedure
  - i. CPUC General Order 95, Rules for Overhead Electric Line Construction
  - j. CPUC General Order 128, Rules for Construction of Underground Electric Supply and Communications Systems
- 3. State of California Agencies:
  - a. State and Consumer Services Agency
  - b. Department of Industrial Relations – Public Works
  - c. Office of the State Fire Marshal
  - d. California Environmental Protection Agency (CalEPA): State regulations and standards.
  - e. California Integrated Waste Management Board:
    - 1) General: Sustainable Building Guidelines.
    - 2) Construction Waste Management: Construction and Demolition Debris Recycling.
  - f. California State Water Resources Control Board (SWRCB): SWPPP Standards.
  - g. California Department of Toxic Substances Control (DTSC): Hazardous Waste Management standards.
- 4. City Codes:
  - a. Pittsburg Municipal Code
- 5. Local Agencies:
  - a. Bay Area Air Quality Management
  - b. County of Contra Costa
  - c. City of Pittsburg

#### 1.5 REQUIRED PROVISIONS ON CONTRACT CLAIM RESOLUTION

- A. The California Public Contract Code specifies required provisions on resolving contract claims less than \$375,000, which are set forth below, and constitute a part of this Contract.
- B. For the purposes of this section, "CLAIM" means a separate demand by Contractor of \$375,000 or less for (1) a time extension, (2) payment of money or damages arising from work done by or on behalf of Contractor arising under the Contract Documents and payment of which is not otherwise expressly provided

for or the claimant is not otherwise entitled to, or (3) an amount the payment of which is disputed by City. In order to qualify as a CLAIM, the written demand must state that it is a claim submitted under [Division 00 - General Conditions](#) and be submitted in compliance with all requirements of Document 00 72 00 - General Conditions. Separate claims which total more than \$375,000 do not qualify as a "separate demand of \$375,000 or less", as referenced above, and are not subject to this section.

- C. A voucher, invoice, payment application, or other routine or authorized form of request for payment is not a claim under the Contract. If such request is disputed as to liability or amount, then the disputed portion of the submission may be converted to a claim under the Contract by submitting a separate claim in compliance with Contract claim submission requirements.
- D. CAUTION: This section does not apply to tort claims and nothing in this section is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 and Chapter 2 of Part 3 of Division 3.6 of Title 1 of the California Government Code.
- E. PROCEDURE
  - 1. The CLAIM must be in writing, submitted in compliance with all requirements of [Division 00 - General Conditions](#), including, but not limited to, the time prescribed by and including the documents necessary to substantiate the CLAIM, pursuant to [Division 00 - General Conditions](#). CLAIMS must be filed on or before the day of final payment. Nothing in this section is intended to extend the time limit or supersede notice requirements for the filing of claims as set forth in [Division 00 - General Conditions](#) or elsewhere in the Contract Documents.
  - 2. For CLAIMS of fifty thousand dollars (\$50,000) or less:
    - a. City shall respond in writing within 45 calendar days of receipt of the CLAIM, or
    - b. City may request in writing within 30 calendar days of receipt of the CLAIM, any additional documentation supporting the CLAIM or relating to any defenses or claims City may have against Claimant.
      - 1) If additional information is thereafter required, it shall be requested and provided in accordance with this section, upon mutual agreement of City and Claimant.
      - 2) City's written response to the CLAIM, as further documented, shall be submitted to Claimant within 15 calendar days after receipt of further documentation or within a period of time no greater than taken by Claimant in producing the additional information, whichever is greater.
  - 3. For CLAIMS over fifty thousand dollars (\$50,000) and less than or equal to \$375,000:
    - a. City shall respond in writing within 60 calendar days of receipt of the CLAIM, or

- b. City may request in writing within 30 calendar days of receipt of the CLAIM, any additional documentation supporting the CLAIM or relating to any defenses or claims City may have against Claimant.
  - 1) If additional information is thereafter required, it shall be requested and provided in accordance with this section, upon mutual agreement of City and Claimant;
  - 2) City's written response to the CLAIM, as further documented, shall be submitted to Claimant within 30 calendar days after receipt of further documentation or within a period of time no greater than taken by Claimant in producing the additional information, whichever is greater.
- c. Meet and Confer:
  - 1) If Claimant disputes City's written response, or City fails to respond within the time prescribed above, Claimant shall notify City, in writing, either 15 calendar days of receipt of City's response or within 15 calendar days of City's failure to timely respond, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon demand City will schedule a meet and confer conference within 30 calendar days for settlement of the dispute.
  - 2) Following the meet and confer conference, if the CLAIM or any portion remains in dispute, Claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the California Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time Claimant submits his or her written claim as set forth above in [Division 00 - General Conditions](#), until the time that CLAIM is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

#### F. MEDIATION/ARBITRATION

1. In accordance with Subparagraph 20104.4 of The California Public Contract Code, the following procedures are established for all civil actions filed to resolve CLAIMS subject to this article:
  - a. Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator

within the 15-day period, any party may petition the court to appoint the mediator.

- b. Judicial Arbitration:
  - 1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with Section 2016.010) of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.
  - 2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.
  - 3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.
- c. The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.
- 2. In accordance with Subparagraph 20104.6:
  - a. No local agency shall fail to pay money as to any portion of a CLAIM which is undisputed except as otherwise provided in the contract.
  - b. In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 41 00**

**SECTION 01 42 00 – REFERENCES****PART 1 - GENERAL****1.1 SUMMARY****A. Section Includes:**

1. This section includes reference standards, symbols and definitions used in Contract Documents.
2. Material and workmanship specified by reference to number, symbol, or title of specific standard such as state standard, commercial standard, federal specifications, technical society, or trade association standard, or other similar standard shall comply with requirements of standards except when more rigid requirements are specified or required by applicable codes.
3. Standards referred to, except as modified herein, shall have full force and effect as though printed in the Contract Documents. Standards are not furnished to Contractor, since manufacturers and trades involved are assumed to be familiar with their requirements.

**1.2 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES; REPORTING AND RESOLVING DISCREPANCIES:**

- A. Latest in Effect:** Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or laws or regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated in the Contract Documents.
- B. Discrepancies:** If during the performance of the Work, Contractor discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any supplier, Contractor shall report it in writing at once to Inspector, with copies to Project Manager and Architect/Engineer, and Contractor shall not proceed with the Work affected thereby until consent to do so is given by Project Manager.
- C. Precedence:** Except as otherwise specifically stated in the Contract Documents or as may be provided by Change Order, or supplemental instruction, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

1. The provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
2. The provisions of any such laws or regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such law or regulation).
3. No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of City, Contractor, Project Manager, or Architect/Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to City, Architect/Engineer, Project Manager, or any of their consultants, agents or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

### 1.3 STANDARDS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
APWA	American Public Works Association
AREMA	The American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers

ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BASMAA	Bay Area Stormwater Management Agencies Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BFL	Bay Friendly Landscaping
CALOSHA	California Occupational Safety and Health Administration
CA MUTCD	California Manual on Uniform Traffic Control Devices
CALTRANS	State of California Department of Transportation
CBC	California Building Code
CCR	California Code of Regulations
CLFMI	Chain Link Fence Manufacturer's Institute
CRSI	Concrete Reinforcing Steel Institute
DDW	Division of Drinking Water
EIA	Electronic Industries Association
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MSS	Manufacturers Standardization Society
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code

NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration (Federal)
PCA	Portland Cement Association
PUC	Public Utilities Commission
SSPC	Steel Structures Painting Council
STA	Seal of Testing Assurance Program
UL	Underwriters Laboratories, Inc
USCC	U S Composting Council

#### 1.4 SYMBOLS

- A. Symbols, used only on Drawings, are shown thereon.

#### 1.5 DEFINITIONS

- A. Wherever any of the words or phrases defined below, or a pronoun used in place thereof, is used in any part of the Contract Documents, it shall have the meaning here set forth:
1. **ADDENDUM/ADDENDA:** Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding requirements or the Contract Documents.
  2. **ADDITIVE BID:** The sum to be added to the Base Bid if the change in scope of work as described in Additive Bid is accepted by City.
  3. **AGREEMENT ([Division 00 - General Conditions](#)):** Agreement is the basic contract document that binds the parties to construction Work. Agreement defines relationships and obligations between City and Contractor and by reference incorporates Conditions of the Contract, Drawings, Special Provisions, Specifications and contains Addenda and all Modifications subsequent to execution of Contract.
  4. **ALTERNATE:** Work added to or deducted from the Base Bid, if accepted by City.
  5. **APPROVED EQUAL:** Approved in writing by City as being of equivalent quality, utility and appearance.



6. ARCHITECT/ENGINEER:
  - a. Design Architect: The person holding a valid California State Architect's or Landscape Architect's license, whose firm has been designated within the Contract Documents to provide architectural or landscape architectural services on the project, and who may have engaged engineering subconsultants to provide services on Project.
  - b. Design Engineer: The person holding a valid California State Engineering license, whose firm has been designated within the Contract Documents to provide civil, structural, traffic or other engineering services on the project, and who may have engaged engineering subconsultants to provide services on Project.
  - c. When the Architect/Engineer is referred to within the Contract Documents and no Architect or Engineer has in fact been designated, then the matter shall be referred to City. The term Architect/Engineer shall be construed to include all his or her consultants retained for the Project, as well as employees of the Architect/Engineer. When the designated Architect/Engineer is an employee of City, his or her authorized representatives on the Project within the district will be included under the term Architect/Engineer.
7. AS-BUILTS: Project Record Documents as required by the General Conditions and [Section 01 78 00 – Closeout Submittals](#).
8. BID: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
9. BIDDER: One who submits a Bid.
10. BY CITY: Work that will be performed by City or its agents at the City's expense.
11. BY OTHERS: Work that is outside scope of Work to be performed by Contractor under this Contract, which will be performed by City, other contractors, or other means.
12. CITY: City of Pittsburg, acting through its City Council or any of its authorized agents.
13. CITY CORPORATION YARD: Located at 357 East 12<sup>th</sup> Street, Pittsburg, CA 94565-2628.
14. CITY ENGINEER: City employee in charge of Engineering.
15. CITY-FURNISHED, CONTRACTOR-INSTALLED: Items furnished by City at its cost for installation by Contractor at its cost under this Contract.
16. CITY'S PROJECT MANAGER(S): The person or persons assigned by City to be City's agent(s) or representative(s) at the site. City's authorized agent representing City on all matters of the Contract. Project Manager may authorize agents and representatives to act in carrying out Project Manager's duties, including a "Construction Manager", to act under the authority of the Project Manager. As City's agent, the Project Manager is the beneficiary of all contract obligations of Contractor to City, including without limitation, all releases and indemnities.
17. CHANGE ORDER: A written instrument prepared by City and signed by City and Contractor, stating their agreement upon all of the following:

- a. a change in the Work,
  - b. the amount of the adjustment in the Contract Sum, if any, and
  - c. the amount of the adjustment in the Contract Time, if any.
18. CONCEALED: Work not exposed to view in the finished Work, including within or behind various construction elements.
  19. CONTRACT CONDITIONS: Conditions of the Contract define basic rights, responsibilities and relationships of Contractor and City and consists of two parts: General Conditions and Supplementary Conditions.
    - a. General Conditions are general clauses which are common to the City Contracts.
    - b. Supplementary conditions modify or supplement General Conditions to meet specific requirements for this Contract.
  20. CONTRACT DOCUMENTS: Contract Documents shall consist of the documents identified as the Contract Documents in [Division 00 - General Conditions](#), plus all changes, addenda and modifications thereto.
  21. CONTRACT MODIFICATION: Either:
    - a. a written amendment to Contract signed by Contractor and City; or
    - b. a Change Order; or
    - c. a written directive for a minor change in the Work issued by City.
  22. CONTRACT SUM: The sum stated in the Agreement and, including authorized adjustments, the total amount payable by City to Contractor for performance of the Work and the Contract Documents. The Contract Sum is also referred to as the Contract Price or the Contract Amount.
  23. CONTRACT TIMES or CONTRACT TIME: The number or numbers of days or the dates stated in the Agreement (i) to achieve substantial completion of the Work or designated milestones and/or (ii) to complete the Work so that it is ready for final payment and is accepted.
  24. CONSTRUCTION MANAGER: A representative of City with authority to act on behalf of City, as specified by City or Project Manager.
  25. CONTRACTOR: The person or entity identified as such in the Agreement and referred to throughout the Contract Documents as if singular in number and neuter in gender. The term "Contractor" means the Contractor or its authorized representative.
  26. CONTRACTOR'S EMPLOYEES: Persons engaged in execution of Work under Contract as direct employees of Contractor, as subcontractors, or as employees of subcontractors.
  27. DATE OF SUBSTANTIAL COMPLETION: Date of Substantial Completion of Work or designated portion thereof is date certified by Project Manager when construction is sufficiently complete in accordance with Contract Documents for City to occupy Work or designated portion thereof and have beneficial use of it for the purposes intended.
  28. DAY: One calendar day, unless the word "day" is specifically modified to the contrary.
  29. DEFECTIVE: An adjective which, when modifying the word "Work", refers to Work that is unsatisfactory or unsuited for the use intended, faulty, or deficient, that it does not conform to the Contract Documents, or does not

- meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents (including but not limited to approval of samples and "or equal" items), or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by City). Project Manager is the judge of whether Work is defective.
30. DRAWINGS: The graphic and pictorial portions of Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.
  31. EQUAL: Equal in opinion of Project Manager. Burden of proof of equality is responsibility of Contractor.
  32. EXPOSED: Work exposed to view in the finished Work, including behind louvers, grilles, registers and various other construction elements.
  33. FINAL ACCEPTANCE or FINAL COMPLETION: City's acceptance of the Work as satisfactorily completed in accordance with Contract Documents. Requirements for Final Acceptance/Final Completion include, but are not limited to:
    - a. All Systems having been tested and accepted as having met requirements of Contract Documents.
    - b. All required instructions and training sessions having been given by Contractor.
    - c. All as-built drawings, operations and maintenance manuals, and other closeout submittals having been submitted by Contractor, and reviewed and accepted by City.
    - d. All punch list work, as directed by City, having been completed by Contractor.
    - e. All Work, except Contractor maintenance after Final Acceptance, having been completed to satisfaction of City.
    - f. See [Section 01 29 00 – Payment Procedures](#), 1.9.D regarding Final Payment.
    - g. See [Section 01 77 00 – Closeout Requirements](#).
  34. FORCE ACCOUNT: Work directed to be performed without prior agreement as to lump sum or unit price cost thereof, and which is to be billed at cost for labor, materials, equipment, taxes, and other costs, plus a specified percentage for overhead and profit.
  35. FURNISH: Supply and deliver to the jobsite.
  36. INDICATED: Shown or noted on the Drawings.
  37. INSPECTOR: The person engaged by City to inspect the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes.
  38. INSTALL: Anchor, fasten, or connect in place and adjust for use; place or apply in proper position and location; establish in place for use or service.

39. LATENT: Not apparent by reasonable inspection, including but not limited to, the inspections and research required as a condition to bidding under the General Conditions.
40. MATERIAL OR MATERIALS: These words shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise), and any other classes of material to be furnished in connection with Contract, except where a more limited meaning is indicated by context.
41. MILESTONE: A principal event specified in Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all Work.
42. MODIFICATION: Same as Contract Modification.
43. NOT IN CONTRACT: Work that is outside the scope of work to be performed by Contractor under this Contract.
44. NOTICE OF AWARD: A written notice given by City to lowest responsive, responsible bidder advising that Bidder's bid and other qualifying information is acceptable to City, requiring Bidder to fulfill the requirements of Article 4 of [Division 00 - General Conditions](#).
45. NOTICE TO PROCEED: A written notice given by City to Contractor fixing the date on which the Contract Time will commence to run and on which contractor shall start to perform Contractor's obligations under the Contract Documents.
46. OFF SITE: Outside geographical location of the Project.
47. OWNER: City of Pittsburg, acting through its officers, employees, or its authorized agent.
48. PROGRESS REPORT: A periodic report submitted by Contractor to City with progress payment invoices accompanying actual work accomplished to the Program Schedule. See [Section 01 32 16 - Construction Progress Schedule](#) and Reports required in [Division 00 - General Conditions](#).
49. PROJECT: Total construction of which Work performed under this Contract may be whole or part.
50. PROJECT MANUAL: Project Manual consists of Bidding Requirements, Agreement, Bonds, Certificates, Contract Conditions, Special Provisions, and Specifications.
51. PROVIDE: Furnish and install.
52. REQUESTS FOR INTERPRETATION ("RFI"): A document prepared by Contractor requesting interpretation, information, and/or clarification regarding the Project or Contract Documents.
53. SAMPLES: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
54. SHOP DRAWINGS: All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the work.
55. SITE/JOBSITE: The particular geographical location of Work performed pursuant to Contract.

56. SPECIAL PROVISIONS: Document 00 80 00 – Special Provisions, which states project-specific requirements.
57. SPECIFICATIONS: The written portion of the Contract Documents consisting of requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services; and are contained in Divisions 01 through 48.
58. SPECIFIED: As written in Special Provisions and Specifications.
59. SUBCONTRACTOR: A person or entity who has a direct contract with Contractor to perform a portion of the Work at the site. The term "subcontractor" is referred to throughout the Contract Documents as if singular in number and neuter in gender and means a subcontractor or an authorized representative of the subcontractor. The term "subcontractor" does not include a separate contractor or subcontractors of a separate contractor.
60. SUBMITTALS: Shop drawings, samples and other items specified in [Section 01 33 00 - Submittal Procedures](#).
61. SUBSTANTIAL COMPLETION: The Work (or a specified part thereof) has progressed to the point where, in the opinion of the Project Manager and Architect/Engineer and as evidenced by a Certificate of Substantial Completion, the Work is sufficiently complete, in accordance with Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by written recommendation of Project Manager and/or Architect/Engineer for final payment. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof. See [Section 01 29 00 – Payment Procedures](#), 1.8.A.2 regarding application for payment of Substantial Completion and [Section 01 77 00 – Closeout Requirements](#).
62. SUPPLEMENTAL INSTRUCTION: A written work change directive to Contractor from Project Manager or Architect/Engineer, approved by Project Manager, ordering alterations or modifications which do not result in change in Contract Sum or Contract Times, and do not substantially change Drawings, Special Provisions, or Specifications.
63. UNDERGROUND FACILITIES: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: Electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.
64. WORK: The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents within the Contract Time. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services

and furnishing documents, all as required by the Contract Documents including the Drawings, Special Provisions, and Specifications. Wherever the word "work" is used, rather than the word "Work", it shall be understood to have its ordinary and customary meaning.

65. WORKING DAY. A working day is defined as any day, except as follows:
- a. Saturdays, Sundays, and legal holidays
  - b. Days on which the Contractor is prevented from performing work by inclement weather or conditions resulting therefrom.
- B. Wherever words "as directed", "as required", "as permitted", or words of like effect are used, it shall be understood that direction, requirements, or permission of City or Project Manager is intended. Words "sufficient", "necessary", "proper", and the like shall mean sufficient, necessary or proper in judgment of City or Project Manager. Words "approved", "acceptable", "satisfactory", or words of like import, shall mean approved by, or acceptable to, or satisfactory to, City or Project Manager.
- C. Wherever the word "may" is used, the action to which it refers is discretionary. Wherever the word "shall" is used, the action to which it refers is mandatory. Where a colon (:) is used within sentences or phrases, the words "shall" or "shall be" are included by inference. Such imperative statements in the specifications are directed to the Contractor, who has overall responsibility for the subcontractors.

## **PART 2 - PRODUCTS**

NOT USED

## **PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 42 00**

**SECTION 01 42 13 - ABBREVIATIONS****PART 1 - GENERAL**

## 1.1 GENERAL

- A. Wherever in these Specifications references are made to the Standards, Specifications or other published data of the various national, regional, or local organizations, such organization may be referred to by their acronym or abbreviation only. As a guide to the use of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meaning indicated herein.

## 1.2 ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
APWA	American Public Works Association
AREMA	The American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASLA	American Society of Landscape Architects

ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BASMAA	Bay Area Stormwater Management Agencies Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BFL	Bay Friendly Landscaping
CALOSHA	California Occupational Safety and Health Administration
CA MUTCD	California Manual on Uniform Traffic Control Devices
CALTRANS	State of California Department of Transportation
CBC	California Building Code
CCR	California Code of Regulations
CFC	California Fire Code
CLFMI	Chain Link Fence Manufacturer's Institute
CPC	California Plumbing Code
CRSI	Concrete Reinforcing Steel Institute
CVC	California Vehicle Code
DBE	Disadvantaged Business Enterprise
DDW	Division of Drinking Water
EIA	Electronic Industries Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers



MSS	Manufacturers Standardization Society
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration (Federal)
PCA	Portland Cement Association
PUC	Public Utilities Commission
SSPC	Steel Structures Painting Council
STA	Seal of Testing Assurance Program
UL	Underwriters Laboratories, Inc
USCC	U S Composting Council

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 42 13**

## SECTION 01 43 00 – QUALITY ASSURANCE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section includes administrative and procedural requirements for quality assurance.
  - 1. Workmanship: Quality of work.
  - 2. Tolerances: Finished surfaces.
- B. References:
  - 1. General: Refer to [Division 00 - General Conditions](#) and [Section 01 42 00 - References](#). Products or workmanship specified in the Project Manual by association, trade, or other consensus standards shall conform to the requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
  - 2. Contractual Relationship: The contractual duties and responsibilities of the parties of the Contract and those of the Project Manager shall not be altered from the requirements of the Contract Documents by any statement or inference in any reference document.
- C. Testing: Refer to [Section 01 45 00 – Quality Control](#).

### PART 2 - PRODUCTS

- 2.1 Refer to [Section 01 60 00 – Product Requirements](#); assure a consistent quality of products furnished by suppliers and manufacturers as indicated throughout the Project Manual.

### PART 3 - EXECUTION

#### 3.1 PERFORMANCE

- A. Refer to [Section 01 70 00 – Execution](#).
- B. Workmanship: Perform shop and field work with mechanics, craftspersons, artisans, and workers skilled and experienced in the fabrication and installation of work specified. Install and erect work plumb, level, square, and true, or true to indicated angle, and in proper alignment and relationship to other work. Finished work shall be free from defects and damage. Quality of work shall conform to the highest established standards and practices of the various trades required. The Project Manager reserves the right to reject materials and work quality which

does not meet accepted standards. Repair or replace substandard material or work as directed, at no additional cost to the City.

### 3.2 INSTALLATION

- A. General: Conduct quality control in concert with suppliers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Manufacturer's Instructions:
  - 1. General: Follow manufacturer's instructions, including each step in progression of installation. If manufacturer's instructions conflict with Contract Documents, request clarification from Project Manager before commencing Work.
  - 2. Installer: Manufacturer approved, as required in the technical sections of the Project Manual.
  - 3. Field Services: Coordinate with manufacturer of a product, system, or assembly which requires special knowledge and skill for proper application/installation of the product, system, or assembly to obtain field service, consultation and inspection as required for the application/installation work at no additional cost to the City.
- C. Reference Standards: Conform to specified standards as minimum quality for the Work except where more stringent codes or specified requirements indicate higher standards or more precise workmanship.
- D. Anchorage: Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration, physical distortion, or disfigurement.
- E. Tolerances: Adjust products to appropriate dimensions; position before securing in place. Monitor and control tolerances of installed products to produce acceptable Work.

**END OF SECTION 01 43 00**

**SECTION 01 45 00 – QUALITY CONTROL****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality-control services.
- B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Owner.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
- E. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products. Refer to the following:
  - 1. [Section 03 30 00 – Utility Cast-in-place Concrete](#) - 3.9 Field Quality Control
  - 2. [Section 03 60 00 – Grouting](#) - 3.4 Field Quality Control
  - 3. [Section 31 05 13 – Clearing & Grubbing, Excavation, and Earthwork](#) – 2.5 – Source Quality Control.
  - 4. [Section 31 23 16 – Utility Trenching](#) - 3.17 Field Quality Control
  - 5. [Section 32 11 23 – Aggregate Base Courses](#) – 3.5 Field Quality Control
  - 6. [Section 32 12 16 – Asphalt Paving](#) – 1.5 Quality Control Plan & 3.13 – Field Quality Control
  - 7. [Section 32 12 17 – Asphalt Paving Rehabilitation](#) – 1.5 Quality Control Plan & 3.17 – Field Quality Control
  - 8. [Section 32 13 13 – Concrete Surface Improvements](#) – 3.5 Field Quality Control
  - 9. [Section 32 17 26 – Detectable Warning Surfacing](#) – 3.4 Field Quality Control
  - 10. [Section 33 01 30 – Testing for Sanitary Sewer, Storm Drainage – Piping and Manholes](#) – 3.3 Field Quality Control
  - 11. [Section 33 05 13 – Manholes and Structures](#) – 3.4 Field Quality Control
  - 12. [Section 33 05 17 – Precast Concrete Valve Vaults and Meter Boxes](#) – 3.4 Field Quality Control
  - 13. [Section 33 11 13 – Water Distribution Piping](#) – 3.6 Field Quality Control
  - 14. [Section 33 12 00 – Water Distribution Equipment](#) – 3.4 Field Quality Control
  - 15. [Section 33 12 13 – Water Service Connections](#) – 3.4 Field Quality Control

16. [Section 33 12 16 – Water Distribution Valves](#) – 3.4 Field Quality Control
17. [Section 33 12 19 – Water Distribution Fire Hydrants](#) – 3.4 Field Quality Control
18. [Section 33 13 00 –Disinfecting of Water Distribution](#) – 3.3 Field Quality Control
19. [Section 33 31 13 – Sanitary Sewer Piping](#) – 3.4 Field Quality Control
20. [Section 33 41 13 – Storm Drainage Piping](#) – 3.5 Field Quality Control

- F. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
- G. Requirements for Contractor to provide quality-control services required by Owner, or authorities having jurisdiction are not limited by provisions of this Section.

## 1.2 RESPONSIBILITIES

- A. Owner's Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, the Owner shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction.
- B. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.'
- C. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.
- D. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility. Refer to [Division 00 - General Conditions](#).
  1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility and will be at no cost to the Owner where required tests performed on original construction indicated noncompliance with Contract Document requirements.
- E. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
  2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
  3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
  4. Provide facilities for storage and curing of test samples.
  5. Deliver samples to testing laboratories.
  6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
  7. Provide security and protection of samples and test equipment at the Project Site.
- F. Duties of the Owner: Owner will retain a qualified independent agency to perform inspections, sampling, and testing of materials and construction specified in individual Sections.
1. Upon receipt of notice from the testing agency, Owner will notify the Contractor promptly of irregularities or deficiencies identified in the testing Work performance.
  2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
  3. The agency shall not perform any duties of the Contractor.

### 1.3 SUBMITTALS

- A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Owner. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
  2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
    - a. Date of issue.
    - b. Project title and number.
    - c. Name, address, and telephone number of testing agency.
    - d. Dates and locations of samples and tests or inspections.
    - e. Names of individuals making the inspection or test.
    - f. Designation of the Work and test method.
    - g. Identification of product and Special Provisions/Specification Section.
    - h. Complete inspection or test data.
    - i. Test results and an interpretation of test results.
    - j. Ambient conditions at the time of sample taking and testing.
    - k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.

- l. Name and signature of laboratory inspector.
- m. Recommendations on retesting.

#### 1.4 QUALITY ASSURANCE

- A. Qualifications for Service Agencies: Owner will engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.
  - 1. Each independent inspection and testing agency engaged on the Project shall be authorized by (authorities having jurisdiction) to operate in the state where the Project is located.

### **PART 2 - PRODUCTS**

NOT USED

### **PART 3 - EXECUTION**

#### 3.1 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for [Section 01 70 00 - Execution](#).
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

**END OF SECTION 01 45 00**

**SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes requirements for installation and removal of temporary facilities and controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
  - 3. Temporary heat.
  - 4. Ventilation.
  - 5. Sanitary facilities, including drinking water.
  - 6. Fire protection water service.
- C. Support facilities include, but are not limited to, the following:
  - 1. Temporary enclosures.
  - 2. Temporary project identification signs and bulletin boards.
  - 3. Waste disposal services.
  - 4. Rodent and pest control.
  - 5. Signs.
- D. Security and protection facilities include, but are not limited to, the following:
  - 1. Barricades, warning signs, and lights.
  - 2. Sidewalk bridge or enclosure fence for the site.
  - 3. Environmental protection.

**1.2 SUBMITTALS**

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Within ten (10) working days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.
- C. Temporary Facilities Plan: Within ten (10) working days prior to scheduled installation of any temporary facility, submit a plan to the Project Manager for review and approval.

**1.3 TEMPORARY FACILITIES**



- A. Temporary Structures: Obtain permits for, install and maintain in safe condition, whatever scaffolds, hoisting equipment, barricades, walkways, or other temporary structures which may be required to accomplish the work on the Project. Such structures shall be adequate for the intended use and capable of safely accepting all loads that may be imposed upon them. They shall be installed and maintained in accordance with all applicable State and local codes and regulations.
- B. Temporary Heat: Provide and maintain temporary heat from an approved source whenever in the course of the Work it may become necessary for curing and drying of materials, or to warm spaces as may be required for the installation of materials or finishes.
- C. Dewatering: Provide and maintain facilities that may be required for dewatering in order that work may proceed on the Project. If it is necessary for dewatering to occur continually, have on hand whatever spare parts or equipment that may be required to prevent interruption of dewatering. If required, obtain Dewatering Permit from Delta Diablo (Sewer District) for waste discharge.
- D. Temporary Utilities: Provide and maintain all utility services necessary to perform the work under this Contract. These may include, but are not limited to, temporary electricity, water, gas, sewer and telephone, including charges and installation fees. Furnish and maintain all means of distribution of utility services required within the site to properly complete the Project.
- E. Storage: Store materials, tools, accessories, etc., only where directed by City. Keep storage area neat and clean. Security of stored items is Contractor's responsibility.
- F. Flammable Materials: When flammable materials are stored on site, take extra precautions, including clear identification.
- G. Sanitary Facilities: Provide and maintain temporary toilets and wash facilities in quantities and locations as required by CAL/OSHA and other local codes and regulations. Keep them maintained and supplied in a usable and sanitary condition at all times.
- H. Drinking Water: Provide and maintain adequate potable water stations at site until final completion of the Project.
- I. Field Office: If required by the Special Provisions, maintain an office at the Project site which will be the Contractor's headquarters for the Project. Any communications delivered to this office shall be considered as delivered to Contractor. Location and size of office shall be such that it will adequately serve the needs of Contractor's superintendent and assistants in the performance of their duties.

- J. Removal of Temporary Facilities: Promptly remove temporary facilities when they are no longer needed for the work or for completion of the Project, mutually agreed upon by Contractor and City.
- K. Fire Hydrant: Provide site access and operational fire hydrant prior to any combustible construction on site. Fire hydrants to be relocated shall remain operational until the replacement fire hydrant is operational.

#### 1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
  - 1. Building code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, fire department, and rescue squad rules.
  - 5. Environmental protection regulations.
- B. Standards: Comply with the following:
  - 1. NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations,"
  - 2. ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and
  - 3. NECA Electrical Design Library "Temporary Electrical Facilities."
- C. Electrical Service:
  - 1. Comply with NEMA, NECA, and UL standards and regulations for temporary electric service.
  - 2. Install service in compliance with NFPA 70 "National Electric Code" and PG&E Green Book, latest edition.
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

#### 1.5 SIGNS

- A. No signs may be displayed on or about City's property (except those required by law) without City's specific approval; the size, content, and location to be as specified by City.

## 1.6 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
- C. Use of Roadways and Walkways: Do not block or interfere with use of any existing roadway, walkway or other facility for vehicular or pedestrian traffic, from any party entitled to use it. Wherever and whenever such interference becomes necessary for the proper and convenient performance of the Work, and no satisfactory detour route exists, before beginning the interference, notify City and post signs at least 72 hours in advance of such interference, and provide a satisfactory detour, including temporary bridge if necessary, or other proper facility for traffic to pass around or over the interference. Maintain the detour in a safe and satisfactory condition as long as the interference continues, all without extra payment unless otherwise expressly stipulated in the Special Provisions. Refer to [Section 01 55 26 – Temporary Traffic Control](#).

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Owner's Representative, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood:
  - 1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
  - 2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
  - 3. For fences and vision barriers, provide minimum 3/8-inch-thick exterior plywood.
  - 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood.

- C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.
- E. Paint: Comply with requirements of [Section 09 90 00 – Painting and Coating](#). For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
- F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- G. Water: Provide potable water approved by local health authorities.
- H. Open-Mesh Fencing: Provide 0.120-inch-thick, galvanized 2-inch chain link fabric fencing 6 feet high with galvanized steel pipe posts; 1-1/2 inches I.D. for line posts and 2-1/2 inches I.D. for corner posts.

## 2.2 EQUIPMENT

- A. General: Provide new equipment. The Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: For non-potable use (construction water) provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge and backflow devices as required per City standards.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: If required by the Special Provisions, provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
- J. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. Obtain easements to bring temporary utilities to the site where the Owner's

easements cannot be used for that purpose.

- B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping prior to use in compliance with City Standards. Refer to [Section 33 13 00 - Disinfecting of Water Distribution](#).
- C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switchgear. Install wiring overhead and rise vertically where least exposed to damage.
- D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- F. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel oil heaters with individual space thermostatic control.
- G. Sanitary Facilities: Provide lockable temporary toilets and wash facilities. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Locate away from storm drainage inlets and other water bodies. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access. Location will be subject to City's approval.
- B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Field Offices: Provide insulated, weather tight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep the office clean and orderly for use for small progress meetings.
- D. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
  - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  - 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
  - 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
- F. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.
- G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
- H. Rodent and Pest Control: Before deep foundation work has been completed, retain an Integrated Pest Management (IPM) Certified exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and

control procedures at regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using EPA recommended environmentally safe materials.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  - 2. Store combustible materials in containers in fire-safe locations.
  - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- B. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- D. Enclosure Fence: Before construction begins, install an enclosure fence with lockable entrance gates. Provide open-mesh, chain link fencing with posts. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental



regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site. Contractor is responsible for locking, and any vandalism, theft, unauthorized access and violation are Contractor's responsibility.

### 3.5 SIGNS

- A. Project Construction Sign: Provide minimum 32-square foot Project identification sign of wood frame and exterior grade plywood construction painted, with exhibit lettering by professional sign painter.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are the Contractor's property.
  - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
  - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
    - a. Replace air filters and clean inside of ductwork and housings.
    - b. Replace significantly worn parts and parts subject to unusual operating conditions.

- c. Replace lamps burned out or noticeably dimmed by hours of use.

**END OF SECTION 01 50 00**

**SECTION 01 55 26 – TEMPORARY TRAFFIC CONTROL****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Section Includes: temporary traffic control system including preparing and submitting temporary traffic control, pedestrian and bicycle access plans, temporary traffic signal, traffic control for utility trenching and backfill, utility coordination, vehicular traffic control, traffic control for adjacent property owners, traffic control for on-street parking, traffic control for bus stops and coordination with Tri Delta transit, maintaining traffic, temporary railing (type K), temporary crash cushion module, construction area signs, and temporary signing and striping.
- B. All temporary traffic control plans including temporary pedestrian and bicycle access plans submitted by the Contractor shall conform to California Manual of Uniform Traffic Control Devices (CA MUTCD) – Latest Edition.

## 1.2 REFERENCES

- A. California Manual of Uniform Traffic Control Devices (CA MUTCD) – Latest Edition.
- B. Cal/OSHA – California Division of Occupation Safety and Health
- C. Caltrans Standard Specifications
  - 1. Section 7 – Legal Relations and Responsibility to the Public
  - 2. Section 12 – Temporary Traffic Control

## 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Measurement and Payment:
  - 1. When temporary traffic control is included as a bid item, measurement will be made as a percentage of the costs incurred according to the list submitted except that not more than 75% of the bid price shall be paid prior to the final estimate for payment being due, said remaining 25% paid upon completion of cleanup and removal with final payment.
  - 2. When the contract does not include a contract pay item for temporary traffic control, full compensation for any necessary traffic control required shall be

considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefore.

3. The adjustment provisions in the State Standard Specifications, Section 4.1.05, "Changes and Extra Work", shall not apply to the item of temporary traffic control system. Any adjustment in compensation for temporary traffic control due to an increase or decrease in the amount of traffic control system required by changes ordered by the Project Manager will be made on the basis of the cost of the increased or decreased temporary traffic control necessary. Such adjustment will be made on a force-account basis as provided in Section 9-1.04, "Force Account", of the State Standard Specifications for increased work.

## **PART 2 - (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 TEMPORARY TRAFFIC CONTROL SYSTEM**

- A. A temporary traffic control system shall consist of closing traffic lanes in conformance with the CA MUTCD, details shown on the Drawings, the provisions in Section 12, "Temporary Traffic Control", of the State Standard Specifications, the provisions under "Maintaining Traffic", and "Construction Area Signs" of the State Standard Specifications and the Special Provisions.
- B. The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with the provisions in Section 7-1.04, "Public Safety," of the State Standard Specifications and CA MUTCD.
- C. During traffic striping and pavement marker placement activities using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 12-6.03, "Construction," of the State Standard Specifications.
- D. If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.
- E. A traffic control system shall consist of closing traffic lanes in accordance with the details shown on T-9 through T-17 of the latest edition of the Caltrans Standard Plans, California Manual of Uniform Traffic Control Devices (CA MUTCD), the

contract plans, the provisions of Section 12, " Temporary Traffic Control" of the State Standard Specifications and the Special Provisions.

- F. Each vehicle used to place, maintain, and remove components of a traffic control system on multilane roadways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing said components. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion.
- G. The location of temporary traffic control devices shall be checked by the Contractor especially at the beginning of the work period and periodically throughout the work day, to ensure that the devices are properly placed and maintained.
- H. 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 notify the Project Manager and repair the said component to its original condition or replace said component and shall restore the component to its original location. The cost of providing temporary traffic control as required by the Project Manager shall be considered as included in the cost of traffic control. No additional compensation will be allowed therefor.
- I. The Contractor shall furnish competent Flaggers whose sole duties shall consist of directing the movement of traffic through or around the work. Flaggers shall not be used during the hours of darkness unless authorized by the City.
- J. The Contractor shall conduct all operations with the least possible obstruction and inconvenience to the public. The Contractor shall have under construction no greater length or amount of work than can be completed within a workday with due regards to the rights of the public.
- K. The Contractor shall provide and maintain all traffic control and safety items. The Contractor assumes sole and complete responsibility for the job and site conditions during the course of construction, including safety of all persons and property. This requirement shall apply continuously twenty-four (24) hours/day and shall not be limited to normal work hours.
- L. Personal and work vehicles of the Contractor, subcontractor or the Contractor's employees shall not be parked on the paved shoulders, sidewalk or the traveled way, including any section closed to public traffic. No vehicles of the Contractor shall be parked or driven on the sidewalk.
- M. All personnel occupying the roadway shall be required to wear approved safety vests with protective coloration.
- N. The Contractor shall notify local authorities of his intent to begin work at least five (5) working days before work is begun. The Contractor shall cooperate with local

authorities relative to handling traffic through the area and shall make his own arrangements relative to keeping the working area clear of parked vehicles.

- O. Upon completion of all work requiring use of lane closures, the Contractor shall remove all temporary signs, barricades, and markers and shall return the roadway and roadside areas to a condition equal to that which existed prior to construction.
- P. All asphalt concrete and temporary pavement delineations including pavement markers at the end of each stage shall be considered as a part of Traffic Control work.
- Q. No full road closures are allowed unless approved by the City Manager.
- R. No lane closures will be allowed on weekdays from 6:00 AM to 8:30 AM, or from 3:00 PM to 6:00 PM, except for emergencies or unless otherwise approved by the City Traffic Engineer.
- S. The full width of the traveled way shall be open for use by public traffic on Fridays after 3:00pm, Saturdays, Sundays and designated legal holidays, and when construction operations are not actively in progress.
- T. Two or more lane closures and lane closures with reversible control will not be allowed on weekdays before 9:00 AM, or after 3:00 PM.
- U. The lane closure(s) must be limited in duration and area as practicable and the times and dates of closure must be stated on the approved temporary traffic control plan.
- V. Lane closures and lane reduction shall conform to the provisions in "Maintaining Traffic" of the State Standard Specifications and the CA MUTCD.
- W. When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except temporary portable delineators, K-rails and crash cushions placed along open trenches or excavation adjacent to the traveled way shall be removed from the traveled way and shoulder.
- X. To minimize the disruption to traffic, the Contractor shall:
  - 1. Permit local traffic to pass through the work with the least possible inconvenience or delay.
  - 2. Maintain existing driveways, commercial and residential, within the vicinity of the work area, keeping them open and in good, safe condition at all times.
  - 3. Remove or repair any condition resulting from the work that might impede traffic or create a hazard.
  - 4. Keep existing traffic signal and roadway lighting systems in operation throughout the construction work.
  - 5. Maintain continuous ADA accessible pedestrian and bicycle routes.

### 3.2 TEMPORARY TRAFFIC CONTROL, PEDESTRIAN AND BICYCLE ACCESS PLANS

- A. The Contractor shall provide a Temporary Traffic Control, Pedestrian and Bicycle Access Plans for each stage of construction and for each location.
- B. Temporary Traffic Control, Pedestrian and Bicycle Access Plans will be hand drawn and legible with an approximate graphic scale.
- C. Temporary Traffic Control, Pedestrian and Bicycle Access Plans will show all temporary striping, cones, barricades, channelizers, signs, flaggers, temporary k-rail, crash cushion modules; temporary turn pockets, dimensions of all stripe segments and lane widths, street names, temporary signal modifications, temporary traffic loops, portable changeable message signs, detour signs, construction area signs on all side streets, construction schedule, work hours and all times the temporary traffic control plan will be in effect.
- D. Temporary Traffic Control, Pedestrian and Bicycle Access Plans will also show continuous pedestrian and bicycle path of travel arrows, pedestrian and bicycle signage, pedestrian ADA ramps, bike ramps, temporary pedestrian crosswalks, temporary bike crossings, temporary pedestrian push buttons for signals, pedestrian and bicycle signage on all side streets, pedestrian and bicycle crossing signs, and areas for temporary ADA upgrades along the pedestrian path of travel.
- E. Temporary Traffic Control, Pedestrian and Bicycle Access Plans will be submitted to the City Traffic Engineer two (2) weeks prior to commencement of each stage of construction. The Temporary Traffic Control, Pedestrian and Bicycle Access Plans shall be reviewed by the City Traffic Engineer. Contractor to incorporate all comments from the City Traffic Engineer and resubmit the plans for approval prior to implementation. Assume two (2) rounds of review and resubmittal for each stage of construction.
- F. Once any segment of sidewalk or trail or corner is commenced with sawcut and/or any segment of sidewalk/trail is closed to pedestrians and bicyclists, Contractor will backfill and complete the improvements unless an approved detour plan is provided and approved by the City Traffic Engineer.

### 3.3 TRAFFIC SIGNAL

- A. If traffic signal inductive vehicle loop detectors and lead-in wiring not designated to be replaced on the Plans are damaged during the course of the construction period, they shall be replaced within one (1) week or as directed by the Project Manager. The cost of replacing damaged loop detectors including detector handholes or any other necessary repairs to the components of the traffic signal system shall be included in the cost of traffic control. No additional compensation will be allowed therefore.

### 3.4 UTILITY COORDINATION

- A. Contractor shall notify the utility companies as a first order of work about the project and submit a detailed project schedule to all utility companies.
- B. Each stage of construction shall allow for utility companies to complete their work. If Utility company's utilities are to be constructed, adjusted or relocated. the Contractor shall provide four (4) week window during each stage of construction for utility companies to have unobstructed access to the site. This four (4) week period will likely occur after demolition and setting of curb forms by the Contractor. The related utility work shall be coordinated with the utility companies prior to the two (2) week window. The Contractor shall also allow utility companies to work on site during the remaining time of each construction stage.
- C. The construction schedule shall identify the related utility work during each stage and shall be submitted for approval. Changes during construction that will impact the related utility work shall be identified on the Progress Schedule.
- D. The Contractor shall notify to the utility companies and the Project Manager immediately of any changes to the schedule.

### 3.5 TEMPORARY TRAFFIC CONTROL FOR UTILITY TRENCHING & BACKFILL

- A. All excavations shall be backfilled or covered at the end of each workday. Trench covers will be constructed to withstand pedestrian, bicyclist and vehicle loads. Trench covers in the vehicle areas will be steel plated to withstand vehicle loads. All trench covers shall be non-skid. In sidewalk areas, AC cutback shall be used as temporary ramps. Contractor shall maintain temporary AC surface to provide safe and comfortable passage over or along same, for pedestrian, bicyclist and vehicular traffic to the satisfaction of the Inspector in the field. Items which will require trench plates include, but are not limited to: storm drain, sewer, water main trenches, and irrigation crossings. Contractor to submit shop drawings to demonstrate method of trench plating, anchoring and asphalt tapers.
- B. The Contractor shall comply with the provisions in Section 7-1.02K(6), "Occupational Safety and Health Standards" of the State Standard Specifications.
- C. Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately by the Contractor. The Contractor shall leave the project site in a neat, clean, and presentable state at the close of every workday.
- D. If material from the trench excavation spills onto the roadway, the roadway area shall be swept and washed with water to provide a safe and dust free surface before the lane is re-opened.



- E. The Contractor shall conform to the order of work requirements described on the plans and specifications. If the work items are not completed by the time specified, including any extension of time for excusable delays, the Contractor shall be liable to the City for any additional cost incurred by the City in its completion of the work, and the Contractor shall also be liable to the City for liquidated damages for any delay in the completion of the work.

### 3.6 TRAFFIC CONTROL FOR ADJACENT PROPERTY OWNERS

- A. A. The Contractor shall notify residents/businesses within a closed section by door hanger of sidewalk closures stating the date(s) of closure, limits of sidewalk closure, hours of construction, and detours. The door hangers shall be delivered no later than two (2) working days prior to sidewalk closure. Prior to dissemination, the Contractor shall present a copy to the Project Manager and get approval from the Project Manager for the door hanger.
- B. Work shall be accomplished in such a manner as to provide access to all intersecting streets and adjacent properties whenever possible. If during the course of the work, it is necessary to restrict access to certain driveways for an extended period of time, the Contractor shall
  1. Notify the affected residents, in writing, at least two (2) working days in advance.
  2. Provide signage and provide continuous Flaggers to direct traffic in and out of the parking.
  3. Maintain 11' minimum width.
  4. Reopen driveway by the end of the work day.
  5. Include the signage and Flaggers on the Traffic Control and Pedestrian Access Plans.
- C. To protect the rights of abutting property owners, the Contractor shall
  1. Conduct the construction so that the least inconvenience as possible is caused to abutting property owners.
  2. Maintain ready access to houses or businesses along the line of work, including ramps over work area.
  3. Notify all parties at least five (5) days, and again two (2) working days, in advance of work which would affect their property. The Contractor shall coordinate with City to obtain Right of Entry for any work within private property.
  4. The Contractor shall maintain access to adjacent private property at all times, and shall address driveway access on approved Traffic Control Plans.
  5. For Utility company and Developer projects, permittee shall obtain right of entry for any work in private properties.
  6. The Contractor shall maintain safe pedestrian and bicycle access at all times, including crosswalks, when it is required to close sidewalks.

7. Contractor shall provide Temporary Pedestrian and Bicycle Access Plan for any change in pedestrian and bicycle movements. All openings shall be covered or steel plated at the end of each workday, when working in an intersection and traffic lane. Covers in pedestrian areas shall be non-skid and ADA compliant. Contractor shall maintain temporary AC surface to provide safe and comfortable passage over or along same, for pedestrian, bicyclist and vehicular traffic to the satisfaction of the Inspector in the field.
8. The Contractor shall provide temporary pedestrian bridges and walkways as shown on Contractor's approved Temporary Traffic Control Plans. Temporary pedestrian bridges shall be provided to each affected doorway.

### 3.7 TRAFFIC CONTROL FOR ON-STREET PARKING:

- A. To maintain On-Street parking, the Contractor shall provide temporary signs for any existing On-Street parking closure and coordinate with adjacent businesses. Contractor shall restripe the existing On-Street Parking impacted by construction in-kind as required by the Project Manager within the project limits.
- B. The Contractor shall post City approved parking restrictions a minimum two (2) working days before work begins. All legal parking areas must be maintained and access to legally parked vehicles doors and storage areas must be maintained.
- C. Parking restrictions must be limited in time as practicable.

### 3.8 TRAFFIC CONTROL FOR BUS STOPS AND COORDINATION WITH TRANSIT AGENCY (TRI DELTA TRANSIT)

- A. If construction shall obstruct a bus stop, the Contractor shall notify the Transit Agency two (2) working days in advance. The Contractor shall be responsible for providing temporary bus stop with temporary bench, bus stop signs posts and no parking signs at locations specified by Transit Agency within a distance of maximum of 400' from existing bus stop.
- B. The Contractor shall be responsible for providing adequate safeguards, safety devices, protective equipment, and any other needed actions to protect life, health, and safety of the public, and to protect property in connection with the performance of the work covered by the contract. The Contractor shall perform any measures or actions the Project Manager may deem necessary to protect the public and property. Contractor shall install K-rail at all new bus stop pad construction areas.

### 3.9 MAINTAINING TRAFFIC

- A. Maintaining traffic shall conform to CA MUTCD, the provisions in Sections 7-1.03, "Public Convenience," Section 7-1.04, "Public Safety," and Section 12,

"Temporary Traffic Control," of the State Standard Specifications, and the City Standard Specifications.

- B. Closure is defined as the closure of a traffic lane or lanes, including shoulder, ramp or connector lanes, within a single traffic control system.
- C. The full width of the traveled way shall be open for use by public traffic as specified in Part 3.1 above, when construction operations are not actively in progress.
- D. Personal and work vehicles of the Contractor, subcontractor or the Contractor's employees shall not be parked on the traveled way or shoulders including sections closed to public traffic.
- E. The Contractor shall immediately restore to the original position and location a temporary traffic cone or delineator that is displaced or overturned, during the progress of work.
- F. If minor deviations from the Contractor's approved lane closure requirements are required, a written request shall be submitted to the City Traffic Engineer at least 15 days before the proposed date of the closure. The City Traffic Engineer may approve the deviations if there is no increase in the cost to the City and if the work can be expedited and better serve the public traffic.
- G. Designated legal holidays are:

**Holidays**

Holiday	Date observed
New Year's Day	January 1 <sup>st</sup>
Martin Luther King Jr. Day	3 <sup>rd</sup> Monday in January
Lincoln's Birthday	February 12 <sup>th</sup>
Washington's Birthday	3 <sup>rd</sup> Monday in February
Cesar Chavez Day	March 31 <sup>st</sup>
Memorial Day	Last Monday in May
Independence Day	July 4 <sup>th</sup>
Labor Day	1 <sup>st</sup> Monday in September
Columbus Day	2 <sup>nd</sup> Monday in October
Veterans Day	November 11 <sup>th</sup>
Thanksgiving Holidays	4 <sup>th</sup> Thursday and Friday in November
Christmas Day	December 25 <sup>th</sup>

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

- H. Pedestrian and Bicycle access facilities shall be provided through construction areas within the public right of way as shown on the Contractor's approved Temporary Traffic control, Pedestrian and Bicycle Access plans and as specified herein. Pedestrian walkway shall be surfaced with asphalt concrete, Portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.
- 3.10 CONTINGENCY PLAN: A detailed contingency plan shall be prepared for reopening closures to public traffic. The contingency plan shall be submitted to the Project Manager within one (1) business day of the Project Manager's request.
- 3.11 LATE REOPENING OF CLOSURES
- A. If a closure is not reopened to traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.06, "Suspensions" of the State Standard Specifications. No further closures are to be made until the City Traffic Engineer has accepted a work plan, submitted by the Contractor that will insure that future closures will be reopened to traffic at the specified time. The City Traffic Engineer will have two (2) business days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to compensation for the suspension of work resulting from the late reopening of closures.
- B. For each 10-minute interval, or fraction thereof past the time specified to reopen the closure, City will deduct payments per interval from moneys due or that may become due the Contractor under the contract. See deductible schedule below:
1. Residential Streets - \$50 per 10 minutes
  2. Collector Streets - \$100 per 10 minutes
  3. Arterial Streets - \$400 per 10 minutes.
- 3.12 TEMPORARY RAILING (TYPE K)
- A. Temporary railing (Type K) shall be placed as shown on the Contractor's approved Temporary Traffic Control, Pedestrian and Bicycle Access plans, as specified in the Drawings or where ordered by the Project Manager and shall conform to CA MUTCD, the provisions in Section 12, "Temporary Traffic Control" of the State Standard Specifications and the City Standard Specifications.

- B. Temporary railing (Type K) shall consist of interconnected new or undamaged used precast concrete barrier units as shown on the Contractor's approved Temporary Traffic Control, Pedestrian and Bicycle Access plans. Exposed surfaces of new and used units shall be freshly coated with a white color paint prior to their first use on the project. The paint shall conform to the provisions in Section 91-4.02B, "Acrylic Emulsion Paint for Exterior Masonry" of the State Standard Specification.
- C. Concrete shall conform to the provisions in Section 90-2, "Minor Concrete" of the State Standard Specifications. Load tickets and a Certificate of Compliance will not be required.
- D. Reinforcing steel shall conform to the provisions in Section 52, "Reinforcement" of the State Standard Specifications.
- E. Steel bars to receive bolts at ends of concrete panels shall conform to the requirements in ASTM Designation: A 36. The bolts shall conform to the requirements in ASTM Designation: A 307.
- F. The final surface finish of temporary railings (Type K) shall conform to the provisions in Section 51-1.03F(2), "Ordinary Surface Finish" of the State Standard Specifications. Exposed surfaces of concrete elements shall be cured by the water method, the forms in place method, or the pigmented curing compound method. The pigmented curing compound shall be curing compound (1) as specified in Section 90-1.03B(3), "Curing Compound Method" of the State Standard Specifications. The Contractor shall furnish a Certificate of Compliance to the Project Manager in conformance with the provisions in Section 6-2.03C "Certificates of Compliance" of the State Standard Specification, for all new or used temporary railing (Type K) that is not cast on the project.
- G. Temporary railing (Type K) shall be set on firm, stable foundation. The foundation shall be graded to provide a uniform bearing throughout the entire length of the railing. Any excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill" of the State Standard Specification except that compaction of earth fill placed behind the temporary railing (Type K) in a curved layout will not be required.
- H. Abutting ends of precast concrete units shall be placed and maintained in alignment without substantial offset to each other. The precast concrete units shall be positioned straight on tangent alignment and on a true arc on curved alignment.
- I. At the locations required on the plans, threaded rods or dowels shall be bonded in holes drilled in the existing concrete. Drilling of holes and bonding of threaded rods or dowels shall conform to the provisions for bonding dowels in Section 83-3.01A, "Summary" of the State Standard Specifications. After removal of the temporary railing (Type K), all threaded rods or dowels shall be removed to a

depth of at least one inch below the surface of the concrete. The resulting holes shall be filled with mortar in conformance with the provisions in Section 51-1.02F, "Mortar" of the State Standard Specification, except that the mortar shall be cured by either the water method or by the curing compound method. If the curing compound method is used, the curing shall conform to the provisions for curing concrete barrier in Section 83-3.03A(8), "Curing" of the State Standard Specifications.

- J. Each rail unit shall have a reflector installed on top of the rail. Reflectors shall be as specified in the special provisions, and adhesive shall conform to the reflector manufacturer's recommendations. A Type P marker panel shall also be installed at each end of railing installed adjacent to a two lane, two-way highway and at the end facing traffic of railing installed adjacent to a one-way roadbed. If the railing is placed on a skew, the marker shall be installed at the end of the skew nearest the traveled way. Type P marker panels shall conform to the provisions in Section 82, "Signs and Markers" of the State Standard Specifications, except that the Contractor shall furnish the marker panels.
- K. When temporary railings (Type K) are removed, any area where temporary excavation or embankment was used to accommodate the temporary railing shall be restored to its previous condition or constructed to its planned condition.
- L. Prior to each stage of construction Contractor will provide a layout of the proposed temporary railing, crash cushion locations, and temporary striping/signing for the railing.
- M. Water filled barriers will be considered in lieu of temporary railings (Type K), upon a written request from the contractor along with proposed details, layout plan, temporary signing & striping and installation.

### 3.13 TEMPORARY CRASH CUSHION MODULE

- A. This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the Contractor's approved traffic control plans, as specified in the special provisions or where designated by the Project Manager. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and the special provisions.
- B. Temporary crash cushions shall be secured in place prior to commencing work for which the temporary crash cushions are required.
- C. Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

- D. Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. When no longer required, as determined by the Project Manager, sand filled temporary crash cushions shall be removed from the site of the work.
- E. Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized.
- F. Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in pounds for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain no more than 7 percent water as determined by California Test 226.
- G. Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Project Manager, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.
- H. A Type R or P marker panel shall be attached to the front of the crash cushion. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Project Manager.
- I. At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.
- J. Repairing modules damaged by public traffic and modules damaged beyond repair by public traffic, when ordered by the Project Manager, shall be removed and replaced immediately by the Contractor. Modules replaced due to damage by public traffic will be not be measured and paid for and shall be considered as included in the lump sum price paid for Temporary Traffic Control.
- K. Include allowance for Project Manager to order a lateral move of the sand filled temporary crash cushions where the repositioning is not shown on the Contractor's approved traffic control plans. Moving the sand filled temporary crash cushion will be considered as included in the lump sum price paid for Temporary Traffic Control and no additional compensation will be allowed therefore and these temporary crash cushion modules will not be counted for payment in the new position.

3.14 CONSTRUCTION AREA SIGNS

- A. Construction area signs shall be furnished, installed, maintained, and removed when no longer required in accordance with CA MUTCD, the provisions in Section 12-3.11, "Construction Area Signs," of the State Standard Specifications, the contract drawings, and the Special Provisions. The base material of construction area signs shall not be plywood. This includes but not limited to furnishing and installation of Pedestrian and Bicycle Signs.

**END OF SECTION 01 55 26**



**SECTION 01 56 10 – PROTECTION OF PROPERTY****PART 1 - GENERAL****1.1 SUMMARY****A. Section Includes:**

1. Existing Utilities and Improvements
2. Safeguarding of Existing Facilities
3. Restoration of Pavement
4. Emergency Work
5. Preconstruction Site Documentation

**B. Related Sections:**

1. [Section 01 50 00 – Temporary Facilities and Controls](#)
2. [Section 01 32 00 – Construction Progress Documentation](#)

**1.2 EXISTING UTILITIES AND IMPROVEMENTS****A. Underground Facilities:** Notify Underground Service Alert (U.S.A.) prior to excavating at the site so that utility companies and other City departments having underground facilities in the area may be advised of the work and may field mark or otherwise protect and warn Contractor of their existing utility lines.

1. Provide reasonable access and do not hinder or otherwise interfere with any company or agency having underground facilities in removing, relocating, or protecting such facilities.

**B. Excavations:** Verify the actual locations and depths of all utilities indicated or field marked. Make a sufficient number of exploratory excavations of all utilities that may interfere with the Work sufficiently in advance of construction to avoid possible delays to Contractor's work.

1. Notify the City when such exploratory excavations show the utility location as shown or as marked to be in error.
2. When utility lines are encountered within the area of Contractor's operations, notify the Project Manager and the Owner(s) of the utility lines sufficiently in advance for the necessary protection measures to be taken to prevent interruption of service or delay to Contractor's operations.

**1.3 SAFEGUARDING OF EXISTING FACILITIES****A. Damage:** Perform all work, including dewatering operations, in such a manner as to avoid damage to existing sewer and water systems, fire hydrants, power poles, lighting standards, and all other existing utilities, facilities, trees and vegetation, and structures. The Contractor will be held responsible for any damage due to its failure to exercise due care, and at no cost to the City.

- B. Removal and Disposal: Broken concrete, debris, and the like, shall be immediately removed from the property site as the Contractor's property and disposed of in a legal manner.
- C. Existing Facilities: Exercise due care to avoid damage to existing pipe and coating, wrapping, sewers, conduit, or other existing facilities and structures. Should the Contractor damage or displace any of the above, repair same to the satisfaction of the Project Manager; all expenses in connection therewith shall be borne solely by the Contractor.
- D. Sewer System: Do not allow debris to enter the sewer system.

#### 1.4 RESTORATION OF PAVEMENT

- A. General: All paved areas cut or damaged during construction shall be replaced with materials of equal thickness to match the existing undisturbed areas, except where specific resurfacing requirements are called for in the Contract Documents or in the permit requirements of the agency issuing the permit. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.
- B. Temporary Resurfacing: Place temporary surfacing promptly after backfilling and maintain such surfacing in a satisfactory condition for the period of time before proceeding with the final restoration.
- C. Permanent Resurfacing: Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in neat straight lines. All pavement restoration shall be constructed to finished grades compatible with undisturbed adjacent pavement.
- D. Restoration of Sidewalks or Driveways: Wherever sidewalks, curbs and gutters, or driveways have been removed for construction purposes, place suitable temporary sidewalks, curbs and gutters, or driveways promptly after backfilling and maintain them in satisfactory condition for the period of time before the final restoration has been made.

#### 1.5 EMERGENCY WORK

- A. General: At all times have adequate personnel, materials, and equipment available at short notice to protect adjoining property, maintain, or make emergency repairs. If during the progress of the Contract, the Contractor's construction crews should be absent from the location of the work at a time when any failure or faulty condition of the Contractor's work requires emergency action in the public interest, the City shall have the right to make repairs and corrections as required with its own forces at the Contractor's expense.
- B. Contact Information: Furnish the Project Manager with names and telephone numbers of at least three (3) persons to contact in case of emergencies; these

persons shall be authorized to perform such work as deemed necessary by the Project Manager.

#### 1.6 PRECONSTRUCTION SITE DOCUMENTATION

- A. Prevention of Damage: Use such methods and take adequate precautions to prevent damage to existing buildings, structures, and other improvements during the prosecution of the work.
- B. Joint Examination: After the Contract is awarded and before the commencement of work, the Project Manager will arrange for a joint examination of the work, as applicable, which might be damaged by the Contractor's operations
- C. Scope of Examination: The examination will include the exterior of existing buildings, structures, and other improvements located within twenty-five (25) feet of the construction excavation. Examination will be made jointly by authorized representatives of the Contractor, the City, and property owners under the supervision of the Project Manager. The scope of each examination will include, but is not limited to, written and photographic recording of cracks in structures, settlement, leakage, and the like.
- D. Photos and Videos: Take photos and videos during the joint examination review. Provide digital photos and videos to the Project Manager within thirty (30) consecutive days of the date taken.
- E. Use of Records and Photographs: Any and all records and photographs are intended for use as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations. They are for the protection of the adjacent property owners, the Contractor, and the City and will be a means of determining whether and to what extent damage, resulting from the Contractor operations, occurred during the Contract Work.
- F. Requirements for Photographs and Videos: Refer to [Section 01 32 00 – Construction Progress Documentation](#).

#### **PART 2 - PRODUCTS**

NOT USED

#### **PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 56 10**

## **SECTION 01 56 39 - LANDSCAPE PRESERVATION AND TREE PRUNING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Preservation of all existing shrubs, groundcovers, vines, and lawn to remain in place.
- B. Preservation of trees, care, and pruning of trees to remain in place.
- C. Trimming of tree (limbs and tree roots) as may be required to construct the improvements.
- D. The work shall include the provision of all labor, materials, equipment, temporary irrigation systems, and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the work specified.

#### **1.2 JOB CONDITIONS**

- A. The Contractor will be held responsible for any damage to trees or other plants, which are to remain during construction, including limb or branch breakage, tearing of bark along trunk or excessive root damage. Large roots greater than 6" in diameter and 12" below ground level shall not be cut without the Project Arborist's approval.

#### **1.3 QUALIFICATION**

- A. All tree pruning and removal performed shall be executed by a company having, in full-time employment, an Arborist certified by the Western Chapter of the International Society of Arboriculture. Certification must be verified, and the Arborist must be directly responsible for decisions made, and should visit the work sites daily when trimming of trees and roots is to be performed.
- B. Pruning shall be performed to the standards of the International Society of Arborists Pruning guidelines, and to ANSI A-300.
- C. Tree pruning shall not occur without first securing a pruning permit. Permit applications shall be submitted to City.
- D. Tree removal shall not occur without first securing a tree Removal Permit. For regulations on size description, application procedure and fees, the Contractor shall contact the City.

#### 1.4 APPLICABLE PUBLICATIONS

- A. Trees and Building Sites: Official Publication of the International Society of Arboriculture.
- B. Arboriculture: The care of trees and shrubs by Dr. Richard Harris

#### 1.5 SUBMITTALS

- A. Contractor shall review and document all existing conditions around the project site with detailed photos and submit a digital copy to the Engineer and as record of existing conditions prior to the start of construction.
- B. Contractor shall verify the irrigation system to all existing planting areas to remain is fully automated and operational. Submit documentation in writing to the Engineer.
- C. Contractor shall review and document all existing irrigation systems to remain around the project site with a report notifying the Engineer of any deficiencies and/ or failures that may impact the health of the existing landscape to be preserved. Submit documentation in writing to the Engineer .

### **PART 2 - PRODUCTS**

None

### **PART 3 - EXECUTION**

#### 3.1 LANDSCAPE PRESERVATION

- A. Contractor to notify the Engineer of any and all work with impact existing irrigation services to areas within the property. Contractor shall coordinate irrigation controller schedules and services with the City's maintenance personnel.
- B. Contractor shall provide irrigation water to all adjacent landscape areas impacted by the construction of work. Temporary irrigation systems, hand watering, truck watering or other means may be required to provide water to plant material and lawn zones during the duration of work. All costs related to such work shall be borne by the contractor at no additional cost to the contract.
- C. Any landscape irrigation or planting which is impacted, damaged or destroyed during construction shall be fully replaced with equipment and plant material matching in size and type by the contractor at no additional cost to the contract to the satisfaction of the Engineer.

### 3.2 TREE PROTECTION

- A. At sites where the excavation has taken place near trees to remain, and many living roots remain exposed to the air, the Contractor shall cover the exposed roots within 2 hours with sand, soil, moist burlap or other means acceptable to the Project Arborist.
- B. Construction materials, debris, and supplies shall not be stored within the drip line or protective fencing area under any tree.
- C. Vehicles shall not be parked within the drip line or protective fencing area.
- D. Woodchips or another cushioning surface material approved by the Project Arborist shall be placed over areas where roots are present and construction traffic occurs.
- E. Where called for on the plans, place fences or other approved protective barriers around trees to be saved.

### 3.3 TREE PRUNING

- A. Tree pruning shall be performed to balance the crown and eliminate hazards. The main work performed shall be to reduce the sail effect through thinning, reducing end weights, shortening long heavy limbs, removing deadwood, weak limbs and sucker growth. Limbs shall be pruned back to an appropriate lateral branch.
- B. All final cuts shall be made at the outer edge of the branch collar. The pruning work shall be performed in a safe and proper manner, adhering to CAL-OSHA and ANSI Standards
- C. The Contractor shall be responsible for the preservation of all public and private property. Pruning includes the cutting of limbs, cleanup, removal and disposal of cuttings and debris. Elm logs must be properly disposed of per State Quarantine. Work shall be performed by a two-person crew with one climber, one ground person, a dumping chipper truck and chipper, and any other necessary saws, lines, tools and safety equipment. The work area shall have appropriate cones and signs for safe pedestrian and vehicle traffic.

### 3.4 ROOT PRUNING

- A. Tree roots greater than 3" in diameter and less than 12" below ground level shall not be cut without approval of the Project Arborist.
- B. Roots shall be cut clearly, as far from the trunk of the tree as possible. Root pruning shall be to a depth of 18".

- C. Root pruning shall be performed using a Vermeer Root Cutting Machine. Alternate equipment or techniques must be approved by the Project Arborist.
- D. Root pruning shall be completed prior to base or subgrade preparation, or to any excavation adjacent to the tree.

**END OF SECTION 01 56 39.1**

## SECTION 01 57 23 – STORM WATER POLLUTION PREVENTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: requirements for temporary utilities, support facilities, storm water pollution prevention, erosion control, traffic control, support, and security and protection facilities.
- B. Projects that have a soil disturbance of one acre or greater are subject to the State Water Resources Control Board's (SWRCBs) Construction General Permit. The appropriate Legally Responsible Person (LRP), or approved representative must obtain coverage by filing the Permit Registration Documents (PRDs) prior to commencement of any construction activity. A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared by a Qualified SWPPP Developer (QSD) and submitted to the City prior to issuance of a grading permit. Contractor shall comply with all requirements of SWRCBs Construction General Permit Order No. 2009-0009-DWQ, and amended Orders 2010-0014-DWQ, and 2012-0006-DWQ.
- C. Projects that are less than one acre and are Caltrans related (State Highway Projects) are required to have a Water Pollution Control Plan (WPCP) prepared in accordance with Caltrans' standard WPCP template.
- D. Projects that are less than one acre and are not Caltrans related are required to have an Erosion and Sedimentation Control Plan prepared and submitted to the City for approval prior to issuance of a grading permit.

#### 1.2 REFERENCES:

- A. California Stormwater Quality Association (CASQA) has developed a standard SWPPP template for traditional Risk 1,2, and 3 projects that is prevalent in California and can be downloaded from [www.CASQA.org](http://www.CASQA.org). (Note: An annual subscription is required to access to access the CASQA construction portal.)
- B. SWPPP: The Stormwater Pollution Prevention Plan (SWPPP) shall be designed to comply with California's General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ (NPDES No. CAS000002) and 2012-0006-DWQ, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity (herein after referred to as General Permit) issued by the State Water Resources Control



Board (State Water Board). In accordance with the General Permit, Section XIV, designed to address the following:

1. Pollutants and their sources, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity are controlled.
2. Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated.
3. Site Best Management Practices (BMPs) are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard.
4. Calculations and design details as well as BMP controls are complete and correct.
5. Stabilization BMPs will be installed to reduce or eliminate pollutants after construction is completed.

### 1.3 SUBMITTALS

- A. Notice of Intent (NOI): The Legally Responsible Person shall file the Notice of Intent (NOI) and submit all PRDs to the SWRCB prior issuance of a grading permit. For City Capital Improvement Projects, the Contractor shall file the NOI and submit all PRDs to the SWQRB on behalf of the City. Contractor to obtain the Waste Discharge Identification Number (WDID #) on behalf of the City, or as otherwise directed by the City Engineer.
- B. SWPPP:
  1. Contractor shall submit SWPPP for Project Manager's review within ten (10) calendar days after award of project.
  2. The Contractor shall submit a site-specific Storm Water Pollution Prevention Plan (SWPPP) prepared by a Qualified SWPPP Developer (QSD) the Contractor shall amend the SWPPP when required, prepare a Construction Site Monitoring Plan (CSMP), and perform water pollution control work under the oversight of a Qualified SWPPP Practitioner (QSP), as specified in the General Permit. The Contractor shall identify an individual to be a Data Submitter (DS) for this contract. All reports and data that must be submitted to the State Water Resources Control Board will be uploaded by the Contractor's DS to the Stormwater Multi-Application and Report Tracking System (SMARTS) website for certification to the state by the City Legally Responsible Person (LRP) or their Approved Signatory (A/S).
  3. The QSD, QSP, and DS designated by the Contractor may be different individuals.
  4. Storm Water Pollution Prevention Plan (SWPPP):  
The Contractor shall prepare and submit a site-specific Storm Water Pollution Prevention Plan (SWPPP) to the City Engineer for approval. The SWPPP shall be prepared and certified by a Qualified SWPPP Developer

(QSD) holding one of the certifications or registrations listed in Section VII of the Construction General Permit. Within seven (7) working days after contract award, the Contractor shall submit two (2) printed copies of the SWPPP and Site Map and one electronic copy in electronic file (.pdf) format to the Project Manager for review. The Contractor shall allow five (5) working days for the Project Manager's review. If revisions are required, the Project Manager will provide comments, and the Contractor shall revise and resubmit the SWPPP and Site Map in printed and electronic form within five (5) working days of receipt of the Project Manager's comments. Within three (3) working days of receipt of the City Engineer's approved SWPPP, the Contractor shall submit three (3) paper copies of the approved SWPPP to the City Engineer. Once the City Engineer has approved the SWPPP for the project, the Contractor may proceed with construction activities requiring coverage under the General Permit.

5. **WDID Number:** The Contractor shall not perform work that may cause water pollution until the state has issued a WDID number for the project. The City Engineer's review and approval of the SWPPP shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements. Working days shall not be counted if the controlling item of work cannot be performed during the initial preparation and review of the SWPPP and Site Map and between the date that the approved SWPPP has been received by the City Engineer, and the date the City Engineer has notified the Contractor that a WDID number has been assigned to the project.
6. **Approved SWPPP:** The Contractor shall keep a copy of the approved SWPPP at the job site at all times during construction. The SWPPP shall be made available when requested by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Project Manager.

C. **WPCP**

1. **General:** Contractor shall submit WPCP for City review within ten (10) calendar days after award of project.
2. **Water Pollution Control Plan:**  
The Contractor shall prepare and submit a site-specific Water Pollution Control Plan (WPCP) to the Project Manager and Construction for approval. Within seven (7) working days after contract award, the Contractor shall submit two (2) printed copies of the WPCP and Site Map and one electronic copy in electronic file (.pdf) format to the Project Manager for review. The Contractor shall allow five (5) working days for the Project Manager's review. If revisions are required, the Project Manager will provide comments, and the Contractor shall revise and resubmit the WPCP and Site Map in printed and electronic form within five (5) working days of receipt of

the Project Manager's comments. Within three (3) working days of receipt of the Project Manager's approved WPCP, the Contractor shall submit three (3) paper copies of the approved WPCP to the Project Manager. Once the Project Manager has approved the WPCP for the project, the Contractor may proceed with construction activities.

The Contractor shall keep a copy of the approved WPCP at the job site. The WPCP shall be made available when requested by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Project Manager.

#### 1.4 WATER POLLUTION CONTROL DRAWING/EROSION CONTROL PLAN

- A. General: Contractor shall include a Water Pollution Control Drawing (WPCD) / Erosion and Sediment Control Plan (ESCP) as a part of the SWPPP/WPCP. Revisions and Amendments to the WPCDs shall be prepared and uploaded to SMARTS by Contractor's QSP and/or QSD.
- B. For any State Highway projects, Contractor shall provide a Water Pollution Control Drawing as required by Caltrans. Contractor to provide an Erosion and Sedimentation Control Plan to the Engineering Division for review and approval prior to issuance of a grading permit.
- C. Deficiencies: The Contractor shall construct, inspect, maintain, remove, and dispose of the water pollution control measures. If the Contractor, the Contractor's QSP, or the City Engineer and/or his representative identifies a deficiency in the implementation of the approved SWPPP/WPCP, the deficiency shall be corrected immediately, and at a minimum of 72 Hours. The deficiency shall be corrected before the onset of precipitation. If the Contractor fails to correct the deficiency by the 72-hour timeframe or before the onset of precipitation, the Project Manager may correct the deficiency and deduct the cost of correcting deficiencies from payments. If the Contractor fails to conform to the provisions of this section, the Project Manager may order the suspension of work until the project complies with the requirements of the Construction General Permit and this section.
- D. Weather Forecasts: The Contractor shall monitor the National Oceanic and Atmospheric Administration (NOAA) weather forecast on a daily basis during the contract. The Contractor shall perform SWPPP/WPCP Inspections according to the Risk Level. The Contractor will provide soil stabilization and sediment control practices whenever there is a 50% probability of rain within 48 hours as predicted by the NOAA. The Contractor shall maintain soil stabilization and sediment control materials on site to protect disturbed soil areas throughout the life of construction project.

## 1.5 IMPLEMENTATION REQUIREMENTS

- A. QSP: The Contractor shall designate in writing a Qualified SWPPP Practitioner (QSP) who shall be responsible for non-storm water and storm water visual observations and inspections, and for ensuring that all BMP required by the SWPPP/WPCP and General Construction Permit are properly implemented and maintained. The QSP shall meet the training and certification requirements in the Construction General Permit.
- B. SWPPP Requirements: All measures required by the SWPPP/WPCP shall be implemented concurrent with the commencement of construction. No construction may start without all BMPs in place. Pollution practices and devices shall be followed or installed as early in the construction schedule as possible with frequent upgrading of devices as needed as construction progresses to protect water quality at all times.
- C. Inspection and Maintenance: The Contractor's Qualified SWPPP Developer (QSD) shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of the General Permit and the Special Provisions, and Contractor's QSP shall monitor the water pollution control practices identified in the General Permit and SWPPP as follows:
  - 1. Visual Inspections, Quarterly Non-storm water discharge
  - 2. Minimum of Weekly Visual Inspections of all Best Management Practices (BMP) that need maintenance to operate effectively, that have failed or that could fail to operate as intended.
  - 3. BMP Inspections, Baseline Pre-storm event
  - 4. Rain Event Action Plan (REAP)
  - 5. BMP Inspections, 24-Hours during extended rain events
  - 6. BMP Inspections, Post-storm event.
- D. The QSP shall oversee the maintenance of the water pollution control practices. The QSP shall document all visual inspection activities with written reports according to the requirements of the Construction General Permit. The format of the reports shall be approved by the Project Manager.
- E. A copy of all written reports documenting implementation of the CSMP shall be submitted to the Project Manager within 48 hours of finishing the inspection and shall remain on site during construction.
- F. Reporting Requirements: If the Contractor identifies discharges into surface waters or drainage systems causing or potentially causing pollution, or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the Project Manager. The Contractor shall submit a written report to the Project Manager within 24 hours of the discharge, notice or order. The report shall include the following information:
  - 1. The date, time, location, nature of the operation, type of discharge; and the cause of the notice or order.

2. The water pollution control practices used before the discharge, or before receiving the notice or order.
  3. The date of placement and type of additional or altered water pollution control practices placed after the discharge, or after receiving the notice or order.
  4. A maintenance schedule for affected water pollution control practices.
- G. Annual Report: The Contractor shall complete and submit to the City Engineer an Annual Report, as required by the current State Water Board Industrial General Permit. The Contractor shall submit the Annual Report prior to acceptance of the project. Contractor shall submit the annual report to the SWRCB directly on SMARTS.

#### 1.6 COMPLETION OF WORK

- A. Maintenance: Clean-up shall be performed as each portion of the work progresses. All refuse, excess material, and possible pollutants shall be disposed of in a legal manner off-site and all temporary and permanent BMP devices shall be in place and maintained in good condition.
- B. Records: At completion of work, inspect installed BMP devices, and present the currently implemented SWPPP/WPCP with all backup records to the Project Manager.
- C. BMPs: Contractor must remove all construction materials, temporary facilities, temporary BMPs, equipment and construction related materials from the site.
- D. NOTICE OF TERMINATION (NOT): A Notice of Termination (NOT) must be submitted by the Contractor to the City Engineer for electronic submittal by the LRP via SMARTS to terminate coverage under the General Permit. The NOT must include a final Site Map and representative photographs of the project site that demonstrate final stabilization has been achieved. The NOT shall be submitted to the City Engineer within 10 days of completion of construction. The NOT will be reviewed and submitted to SMARTS by the City Engineer within 90 days of completion of construction. The Regional Water Board will consider a construction site complete when the conditions of the General Permit, Section II.D have been met. Notice of Termination should be filed by the Contractor via the SMARTS system. The City will allow the Contractor to enter data in SMARTS on the City's behalf.

#### 1.7 QUALITY ASSURANCE

- A. Performance: Perform work in accordance with SWPPP/WPCP. Maintain one copy of document on jobsite.

- B. Quality Control and Assurance: Train all employees and subcontractors in these subjects:
  - 1. Material pollution prevention and control
  - 2. Waste management
  - 3. Non-storm water management
  - 4. Identifying and handling hazardous substances
  - 5. Potential dangers to humans and the environment from spills and leaks or exposure to toxic or hazardous substances
- C. Training Requirements: Training must take place before starting work on this job. New employees must receive the complete training before starting work on this job. Conduct weekly meetings to discuss and reinforce spill prevention and control; material delivery, storage, use, and disposal; waste management; and non-storm water management procedures.

#### 1.8 PRE-INSTALLATION CONFERENCE

- A. Timing: Convene a conference one week prior to commencing work at the site
- B. Attendance: Require attendance of parties directly affecting the work of this Section.
- C. Agenda: Review requirements of the SWPPP/WPCP.

#### 1.9 PERFORMANCE REQUIREMENTS

- A. General: The SWPPP/WPCP is a minimum requirement. Revisions and modifications to the SWPPP/WPCP are acceptable only if they maintain levels of protection equal to or greater than originally specified.
- B. Requirements: Read and be thoroughly familiar with all of the requirements of the SWPPP/WPCP.
- C. Compliance: Inspect and monitor all work and storage areas for compliance with the SWPPP/WPCP prior to any anticipated rain.
- D. Corrective Measures: Complete any and all corrective measures as may be directed by the regulatory agency.
- E. Penalties: Contractor to pay any fees and be liable for any other penalties that may be imposed by the regulatory agency for non-compliance with SWPPP during the course of work.
- F. Costs: Contractor to pay all costs associated with the implementation of the requirements of the SWPPP/WPCP in order to maintain compliance with the Permit. This includes installation of all Housekeeping BMPs, General Site and

Material Management BMPs, Inspection requirements, maintenance requirements, sampling, monitoring, reporting and all other requirements specified in the SWPPP/WPCP and as required by the General Permit, local, state and federal regulations.

#### 1.10 MATERIALS:

- A. General: All temporary and permanent storm water pollution prevention facilities, equipment, and materials as required by or as necessary to comply with the SWPPP/WPCP as described in the current California Stormwater Quality Association (CASQA) BMP Handbook.

#### 1.11 STORM WATER POLLUTION PREVENTION PLAN

- A. Plan Preparation and Compliance
  1. The Contractor shall conform to Section 13, Water Pollution Control, of the State Standard Specifications and the Special Provisions.
  2. The Contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) and the necessary Project Registration Documents to be digitally filed with the California State Water Resources Control Board (SWRCB) through the Stormwater Multi-Application and Report Tracking System (SMARTS database). The Contractor will be responsible to provide the Permit Registration Documents (PRDs) to the City; the QSD will submit the PRDs for the WDID number through SMARTS. The SWPPP shall be prepared based upon the most current California Stormwater Quality Association (CASQA) standard SWPPP Template. The Contractor shall perform the role of “Qualified SWPPP Developer” (QSD) and shall be responsible for all formal amendments to the SWPPP. The Contractor shall also perform the role of “Qualified SWPPP Practitioner” (QSP) and shall be responsible for all field SWPPP implementation, monitoring, sampling, and reporting. The completed SWPPP shall be created by the Contractor as necessary to reflect the necessary sequence and staging of field operations.
  3. The SWPPP shall conform to SWRCB Order 2009-0009-DWQ (“The Construction General Permit” or “CGP”), San Francisco Bay Regional Water Quality Control Board Order R2-2009-0074 (“Municipal Regional Stormwater NPDES Permit” or “MRP”), Provisions in Section 13, Water Pollution Control, of the State Standard Specifications, the details, operating procedures, and maintenance guidelines of the California Regional Water Quality Control Board San Francisco Bay Region’s Guidelines for Construction Projects (Guidelines), the California Regional Water Control Board San Francisco Bay Region’s Erosion and Sediment Control Field Manual (Manual), the project plans and the Special Provisions. The SWPPP shall be deemed to fulfill the requirements set forth in Section 13 of the State Standard Specifications for development and submittal of a Water Pollution Control Program.

4. Prior to the Notice to Proceed (with field activities), the State Project Registration Documents (PRDs) will have been filed digitally through SMARTS, and confirmation from the SWRCB will have been received authorizing coverage of this project under the CGP. Construction cannot commence until a WDID has been received.
- B. Risk Based Contractor Requirements and City Responsibilities (Applicable for all project risk levels/types) – The following minimum items shall be included within the SWPPP, as prepared by the Contractor
1. Risk Level Determination (to be performed by Contractor)
  2. WDID Number (to be obtained by Contractor through coordination with City)
  3. Certification by City “Legally Responsible Party” (LRP) (to be provided by City)
  4. Placeholder for Contractor SWPPP training throughout construction
  5. Name and contact information of Contractor QSD (to be provided by Contractor)
  6. Name and contact information of Contractor QSP (to be provided by Contractor)
  7. Schedule of Construction and Deployment of BMPs for each phase of work (to be provided by Contractor)
  8. Description of minimum year round sediment control measures per Order 2009-009- DWQ
  9. Dates and description of all formal SWPPP amendments (to be prepared by Contractor)
  10. Description of Construction Site Monitoring Plan (CSMP) per Order 2009-009-DWQ (to be done by Contractor) including, but not limited to the following:
    - a. Sampling preparation,
    - b. Collection,
    - c. Quality assurance and quality control,
    - d. Sample labeling,
    - e. Collection documentation,
    - f. Sample shipping,
    - g. Chain of custody,
    - h. Sample numbering,
    - i. Precautions from the construction site health and safety plan, and
    - j. Providing and maintaining a function rain gauge at all times.
  11. Minimum required monitoring activities:
    - a. Post storm event (0.5” or greater) visual discharge inspection (within 48 hours).
    - b. Sampling for non-visible pollutants:
      - Take one or more sample during any breach, spill, malfunction, or leakage that could discharge non visible pollutants into stormwater.
      - Samples taken must be large enough to accurately categorize site conditions.
      - Samples taken must be within the first 2 hours of rain events



- that occur during scheduled business hours that produce runoff.
  - Samples shall be analyzed for pollutants in accordance with
  - warrant as necessary for protection of surface waters.
  - An uncontaminated (control) sample must be taken as a basis of comparison.
  - Samples must be received by the laboratory within 48 hours of physical sampling. The Contractor must use containers provided by the laboratory.
  - c. Quarterly inspections for non-stormwater discharges.
12. Minimum scheduled BMP inspections with appropriate documentation:
- a. Weekly, on a year round basis, throughout the duration of construction.
  - b. Daily (once every 24 hours) BMP inspection during extended storm events.
  - c. Inspect drainage areas and BMPs within 48 hours of predicted rainfall event (0.5" or greater).
13. Intent of compliance with the following analytical methods and sampling protocol:
- a. Standard Methods for the Examination of Water and Wastewater (American Public Health Association).
  - b. 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants."
  - c. Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan.
14. Potential sources of non-visible pollutants
15. Description of all minimum source control measures, "good housekeeping", and non stormwater management per Order 2009-009-DWQ
16. Other measures as necessary for Order 2009-009-DWQ
- C. Risk Based Contractor Requirements and City Responsibilities (Applicable to Risk Level 2/LUP Type 2 or higher)
- 1. All requirements for Risk Level 1/Type 1 above
  - 2. Description of applicable Numeric Action Levels for pH and turbidity (to be included in SWPPP by Contractor)
    - a. pH –levels must be maintained within a range of 6.5-8.5.
    - b. Turbidity – 250 NTU maximum.
  - 3. Description of additional provisions within the CSMP for stormwater effluent monitoring and reporting and non-stormwater discharges (to be included within SWPPP by Contractor):
    - a. Numeric Action Level (NAL) sampling:
      - Water quality grab samples shall be taken at a minimum 3 times a day during each rain event of ½ an inch or more, where runoff occurs. The grab samples shall be representative of the flow and

- characteristic of the discharges. The contractor shall forward grab sampling results to the City within 24 hours of when they are taken.
- All discharge points must be sampled, including the one considered to be the “worst case.” Discharge from a silt fence or sheet flow area shall be considered one discharge point.
  - All points of run on. A sheet flow area shall be considered one point of run on.
  - Sampling to comply with analytical methods and protocol described in EPA Test Method 180.1 or Standard Method 2130 for turbidity sampling, ASTM D1293- 99(2005) for pH sampling, and Standard Methods for the Examination of Water and Wastewater (American Public Health Association).
- c. Sampling for non-stormwater discharges.
4. Description of requirement to create and implement of “Rain Event Action Plans” for each of the following phases of construction (REAPs to be prepared by Contractor’s QSP):
    - a. Grading and Land Development,
    - b. Streets and Utilities,
    - c. Vertical Construction,
    - d. Final Landscaping and Stabilization,
    - e. Inactive Construction Status.
    - f. The Contractor shall create and implement Rainfall Event Action Plans for inclusion within approved SWPPP at least 48 hours prior to any likely (forecast by National Weather Service as 50% or greater chance) precipitation event.
  5. Description of year round effective erosion control measures to supplement minimum sediment control measures within active, inactive, and completed areas. Erosion control measures shall be provided to the extent necessary for compliance with Order 2009-009- DWQ.
  6. Description of additional Annual Reporting Requirements (Annual reporting information to be prepared by Contractor for review and approval of City prior to submittal):
    - a. Creation and submittal of NAL exceedance reports, if applicable,
    - b. Creation and submittal of sampling logs for pH and turbidity.
- D. Risk Based Contractor Requirements and City Responsibilities (Applicable to Risk Level 3/LUP Type 3 only)
1. All requirements for Risk Level 2 projects described above.
  2. Description of Required Compliance with State Board criteria for technology-based numeric effluent limitations for discharge of pH and turbidity (Description of requirements and physical achievement provided by Contractor):
    - a. For Projects that employ Advanced Treatment Systems (ATS) - Maximum 10 NTU Daily Weighted Average & Maximum 20 NTU for any single sample, applicable for events up to 24 hour events of ½ inches<sup>1</sup>. The ATS system must be able to treat this volume within a maximum 72-hour

- period.
- b. For Projects that do not employ ATS - Maximum 500 NTU for any single sample, applicable for events up to 24 hour events up to ½ inches<sup>2</sup>.
  - c. Project discharges must maintain pH within a range of 6.0 to 9.0.
3. Description of additional provisions within the CSMP (description of monitoring provided by Contractor, additional monitoring performed by Contractor):
    - a. Receiving water monitoring, if applicable, based upon the standards of Order 2009- 009-DWQ.
    - b. Bioassessment, if applicable, based upon the standards of Order 2009-009-DWQ.
    - c. Sampling for Suspended Sediment Concentration, if applicable, based upon the standards of Order 2009-009-DWQ. Sampling to comply with analytical methods and protocol described within ASTM Designation: D 3977 for suspended sediment concentration (SSC).
    - d. Inspection of ATS facilities, if applicable. Sampling of ATS discharge points.
  4. Placeholder for Creation of ATS Plan, if applicable, consisting of the following (to be provided by Contractor):
    - a. ATS Operation and Maintenance Manual for All Equipment.
    - b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).
    - c. ATS Health and Safety Plan.
    - d. ATS Spill Prevention Plan.
  5. Description of Additional annual reporting requirements (Description provided by Contractor, Annual Reporting information to be prepared by Contractor for review and approval of City)
    - a. Creation and submittal of NEL violation reports, if applicable within 6 hours of occurrence. Reports and related corrective action measures to be reviewed and approved by City prior to submittal to Regional Board
    - b. Completed ATS records, if applicable.

## **PART 2 - PRODUCTS**

### **2.1 BEST MANAGEMENT PRACTICE (BMP) PRODUCTS**

- A. Shall be as specified in the most current CASQA BMP Handbook.
- B. SWPPP as prepared by Qualified SWPPP Developer (QSD)
- C. Risk Level Determination
- D. Notice of Intent/Notice of Substantial Completion

- E. Shall include but is not limited to sampling, reports and other miscellaneous items as determined by the State of California and all pertaining regional and local permits.

### **PART 3 - EXECUTION**

#### **3.1 EROSION AND SEDIMENTATION CONTROL**

- A. Temporary erosion and sediment control work shall consist of applying erosion control materials to embankment slopes, excavation slopes and other areas designated on the plans, installing silt fence, inlet protection, gravel bags, headwall protection and stabilized construction entrance ways, or other measures as specified in the project SWPPP/WPCP or necessary for compliance with the CGP.
- B. All temporary erosion and sediment control for the project shall conform to the provisions in Section 13, Water Pollution Control, of the State Standard Specifications and the Special Provisions. All permanent erosion and sediment control for the project shall conform to the provision in Section 21, Erosion Control, of the State Standard Specifications and the Special Provisions.

#### **3.2 INSTALLATION**

- A. Construction Requirements
  - 1. The Contractor shall design, implement and maintain the SWPPP/WPCP for the project in full compliance with the SWRCB Order 2009-009-DWQ to control the discharge of storm water pollutants. The Contractor shall perform the monitoring and reporting required to comply with all the state regulations regarding the SWPPP/WPCP for the project. All monitoring, sampling, and reporting information collected by the Contractor shall be subject to the review of the City prior to uploading through the SMARTS database.
- B. Storm Water Pollution Prevention Plan and Water Pollution Control Plan
  - 1. The SWPPP/WPCP shall identify construction activities that may adversely affect the quality of storm water discharges associated with the project and shall identify water pollution control measures, hereinafter referred to as control measures, to be constructed, implemented, and maintained in order to reduce, to the maximum extent feasible, storm water discharges from the construction site both during and after construction is completed under this contract.
  - 2. The Contractor's "QSD" shall amend the SWPPP/WPCP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems,

whenever there is a change in disturbed area, and/or or when deemed necessary by the City. The SWPPP/WPCP shall be amended if, at any time, the implementation of the SWPPP/WPCP is not effectively achieving the objective of compliance with the CGP. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initial SWPPP/WPCP, which are required on the project to control water pollution effectively. Amendments to the SWPPP/WPCP shall be closely coordinated with the Contractor's Qualified SWPPP Practitioner (QSP) within five (5) working days. In emergency situations that require immediate changes at the project site, the Contractor's QSP shall implement the necessary measures and notify the Project Manager and Contractor's QSD of the changes.

3. The Contractor shall give immediate notice to the Project Manager of any planned changes in construction activity that may result in non-compliance with the Special Provisions or the CGP.
4. By the last day of each month, the Contractor shall submit an affidavit to the Project Manager certifying conformance with the SWPPP/WPCP. The monthly partial payment may be withheld if the affidavit is not received and accepted by the Project Manager. If at any time the project is in non-compliance with the SWPPP/WPCP or the CGP, the Contractor shall submit a written report to the Project Manager immediately upon identifying the non-compliance. The report shall specify the time and nature of the non-compliance and include a course of action to correct the deficiency.
5. The Contractor shall keep a copy of the State of California Construction Activity General Permit (SWRCB Order No. 2009-009-DWQ), the SWPPP/WPCP, and any approved amendments at the project site. The SWPPP/WPCP shall be made available upon request of any representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or any City representative. Public requests for copies of the SWPPP/WPCP shall be directed to the Project Manager.

C. Erosion and Sediment Control

1. The facilities shown on the SWPPP/WPCP are designed to effectively control erosion and sediment on a year-round basis.
  - a. Construction operations shall be carried out in such a manner that erosion and water pollution will be minimized. Contractor shall comply with state and local laws concerning pollution abatement.
  - b. Contractor shall be responsible for monitoring erosion and sediment control measures prior, during, and after storm events. Monitoring and sampling (as applicable) shall follow the protocol described in the CGP and Project SWPPP/WPCP.
  - a. Extreme care shall be taken when hauling any earth, sand, gravel, stone, debris, paper, or any other substance over any public street, alley or other public place. Occurrences of material blown, spilled, or tracked over and upon said public or adjacent private property are

prohibited and shall be immediately remedied. Discharge of debris is prohibited. Non-stormwater discharge is prohibited, except as specified in SWRCB Order 2009-009-DWQ. Discharge of hazardous substances is prohibited.

- b. Inlet protection shall be installed at open inlets to prevent sediment from entering the storm drain system. Inlets not used in conjunction with erosion control are to be blocked to prevent entry of sediment.
  - c. All paved areas shall be kept clear of earth material and debris. The site shall be maintained so as to prevent sediment-laden runoff to any storm drainage system, including existing drainage swales and watercourse, to the extent necessary for compliance with applicable numeric action or effluent levels specified in the CGP and Project SWPPP/WPCP.
  - d. Contractor shall install and maintain construction entrances prior to commencement of grading. All construction vehicle traffic entering onto the paved roads must cross stabilized construction entrance ways. Entrance ways may be constructed of two inch to six-inch drain rock, metal grating, or metal cattle-guard, or equivalent material, or may include vehicle wash stations as needed, in sufficient quantity and size to prevent tracking of mud and debris from the construction site. Tracking of mud or debris onto public streets, or onto adjacent public or private property, is prohibited and shall be removed immediately as required by the City.
  - e. Grading operations which leave denuded slopes shall be protected with erosion control measures within 14 days of completion or suspension of activity. If hydroseeding is not used or is not effective within this 14-day period, then other immediate methods shall be implemented, such as erosion control blankets, blown straw, or a three step application of 1) seed, mulch, fertilizer, 2) blown straw, and 3) tackifier and mulch.
  - f. Sanitary facilities shall be maintained on the site in a manner to prevent inadvertent discharge or leakage of sanitary wastes into the storm drain system either by placing sanitary facilities in locations that do not drain to the storm drain system or by providing secondary containment systems to capture leaked wastes.
  - g. Contractor shall provide dust control as required by the appropriate federal, state and City requirements and the City Standard Specifications.
  - h. The erosion and sediment control plan may not cover all the situations that may arise during construction due to unanticipated field conditions. Variations and additions may be made to the plan in the field. That Contractor's QSP shall notify the Contractor's QSD of any field changes.
- D. Maintenance: The SWPPP/WPCP shall include a plan for maintenance that shall include at a minimum.
1. Immediate repair of damage caused by soil erosion or construction.

2. Inspection of sediment traps, berms, rills, gullies, and swales before, during, and after each storm event or predicted rainfall in accordance with the CGP and project SWPPP/WPCP. This also includes repair or cleaning as needed.
  3. Removal of sediment from sediment traps and restoration to original dimensions when sediment has accumulated to a depth of one foot. Sediment removed from trap shall be deposited in a suitable area and in such a manner that it will not erode.
  4. Regular cleaning of gravel bag inlet protection so that sediment depth never exceeds a maximum of three inches.
- E. Risk Based Contractor Requirements and City Responsibilities (Applicable for all project risk levels/types) – The following minimum items shall be performed by the Contractor during field implementation of the Project SWPPP/WPCP throughout the duration of construction until final Notice of Termination
1. Coordinate and conduct periodic SWPPP/WPCP and Erosion and Sediment Control training throughout construction
  2. Update schedule of construction and deployment of BMPs for each phase of work on an as-needed basis
  3. Physically install and maintain minimum year-round sediment control measures per Order 2009-009-DWQ
  4. Perform and file all formal SWPPP/WPCP amendments. All SWPPP/WPCP amendments to be reviewed and approved by the City and the Contractor's QSD prior to submittal.
  5. Physically perform and implement all measures found within the SWPPP/WPCP Construction Site Monitoring Plan (CSMP) per Order 2009-009-DWQ including, but not limited to the following:
    - a. Sampling preparation,
    - b. Collection,
    - c. Quality assurance and quality control,
    - d. Sample labeling,
    - e. Collection documentation,
    - f. Sample shipping,
    - g. Chain of custody,
    - h. Sample numbering,
    - i. Precautions from the construction site health and safety plan, and
    - j. Providing and maintaining a function rain gauge at all times.
  6. Minimum required monitoring activities:
    - a. Post storm event (0.5" or greater) visual discharge inspection (within 48 hours).
  7. Sampling for non-visible pollutants:
    - a. Take one or more sample during any breach, spill, malfunction, or leakage that could discharge nonvisible pollutants into stormwater.
      - Samples taken must be large enough to accurately categorize site conditions.

- Samples taken must be within the first 2 hours of rain events that occur during scheduled business hours that produce runoff.
  - Samples shall be analyzed for pollutants in accordance with an appropriate pollutant source assessment, or as conditions warrant as necessary for protection of surface waters.
  - An uncontaminated (control) sample must be taken as a basis of comparison.
  - Samples must be received by the laboratory within 48 hours of physical sampling. The Contractor must use containers provided by the laboratory.
- b. Quarterly inspections for non-stormwater discharges.
8. Minimum scheduled BMP inspections with appropriate documentation:
- a. Weekly, on a year-round basis, throughout the duration of construction.
  - b. Daily (once every 24 hours) BMP inspection during extended storm events.
  - c. Inspect drainage areas and BMPs within 48 hours of predicted rainfall event (0.5" or greater).
9. Compliance with the following analytical methods and sampling protocol:
- a. Standard Methods for the Examination of Water and Wastewater (American Public Health Association).
  - b. 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants."
  - c. Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan.
10. Identify and eliminate potential sources of non-visible pollutants
11. Implementation of all minimum source control measures, "good housekeeping", and non-stormwater management per Order 2009-009-DWQ
12. Other measures as necessary for Order 2009-009-DWQ
- F. Risk Based Contractor Requirements and City Responsibilities (Applicable to Risk Level 2/LUP Type 2 or higher)
- 1. All requirements for Risk Level 1/Type 1 above
  - 2. Maintain tolerance of site discharge within applicable Numeric Action Levels for pH and turbidity
    - a. pH –levels must be maintained within a range of 6.5-8.5.
    - b. Turbidity – 250 NTU maximum.
  - 3. Numeric Action Level (NAL) sampling:
    - a. Water quality grab samples shall be taken at a minimum 3 times a day during each rain event of ½ an inch or more, where runoff occurs. The grab samples shall be representative of the flow and characteristic of the discharges. The contractor shall forward grab sampling



- results to the City within 24 hours of when they are taken.
- b. All discharge points must be sampled, including the one considered to be the “worst case.” Discharge from a silt fence or sheet flow area shall be considered one discharge point.
  - c. All points of run on. A sheet flow area shall be considered one point of run on.
  - d. Sampling to comply with analytical methods and protocol described in EPA Test Method 180.1 or Standard Method 2130 for turbidity sampling, ASTM D1293- 99(2005) for pH sampling, and Standard Methods for the Examination of Water and Wastewater (American Public Health Association).
4. Sampling for non-stormwater discharges
  5. Create and physically implement of “Rain Event Action Plans” for each of the following phases of construction:
    - a. Grading and Land Development,
    - b. Streets and Utilities,
    - c. Vertical Construction,
    - d. Final Landscaping and Stabilization,
    - e. Inactive Construction Status.
  6. The Contractor shall create and implement Rainfall Event Action Plans for inclusion within approved SWPPP/WPCP at least 48 hours prior to any likely (forecast by National Weather Service as 50% or greater chance) precipitation event.
  7. Physically implement and maintain year-round effective erosion control measures to supplement minimum sediment control measures within active, inactive, and completed areas. Erosion control measures shall be provided to the extent necessary for compliance with Order 2009-009-DWQ.
  8. Maintain and compile documents to meet Annual Reporting Requirements (Annual reporting information to be prepared by Contractor for review and approval of City prior to submittal):
    - a. Creation and submittal of NAL exceedance reports within 48 hours, if applicable, based upon review and approval of City.
    - b. Creation and submittal of sampling logs for pH and turbidity.
- G. Risk Based Contractor Requirements and City Responsibilities (Applicable to Risk Level 3/LUP Type 3 only)
1. All requirements for Risk Level 2 projects described above.
  2. Maintain physical compliance with State Board criteria for technology-based numeric effluent limitations for discharge of pH and turbidity
  3. For Projects that employ Advanced Treatment Systems (ATS) - Maximum 10 NTU Daily Weighted Average & Maximum 20 NTU for any single sample, applicable for events up to 24-hour events of ½ inches<sup>3</sup>. The ATS system must be able to treat this volume within a maximum 72-hour period.

4. For Projects that do not employ ATS - Maximum 500 NTU for any single sample, applicable for events up to 24-hour events up to ½ inches<sup>4</sup>.
5. Project discharges must maintain pH within a range of 6.0 to 9.0.
6. Perform additional provisions within the CSMP:
  - a. Receiving water monitoring, if applicable, based upon the standards of Order 2009- 009-DWQ.
  - b. Bioassessment, if applicable, based upon the standards of Order 2009-009-DWQ.
  - c. Sampling for Suspended Sediment Concentration, if applicable, based upon the standards of Order 2009-009-DWQ. Sampling to comply with analytical methods and protocol described within ASTM Designation: D 3977 for suspended sediment concentration
  - d. Inspection of ATS facilities, if applicable. Sampling of ATS discharge points.
7. Creation and implementation of ATS Plan, if applicable, consisting of the following:
  - a. ATS Operation and Maintenance Manual for All Equipment.
  - b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).
  - c. ATS Health and Safety Plan.
  - d. ATS Spill Prevention Plan.
8. Maintain and compile additional annual reporting requirements (Annual Reporting information to be prepared by Contractor for review and approval of City prior to submittal)
  - a. Creation and submittal of NEL violation reports, if applicable within 6 hours of occurrence. Reports and related corrective action measures to be reviewed and approved by City prior to submittal to Regional Board
  - b. Completed ATS records, if applicable.

### 3.3 STREET SWEEPING

- A. Street sweeping: Street sweeping will be implemented everywhere where sediment is tracked from the project site onto public roads. Sweeping will be done during all construction activities to control tracking of sediments as required as per the guidelines provided in the SWPPP document and as directed in this section.

### 3.4 DUST CONTROL

- A. Contractor's Responsibility: Use equipment that will generate the least amount of dust. Provide dust control at all times including Saturdays, Sundays, and holidays as ordered by the Project Manager. Whenever the Contractor, in the opinion of

the Project Manager, is negligent in controlling dust, the Project Manager may direct attention to the existence of a dust hazard and instruct the Contractor to immediately alleviate the dust hazard. The Contractor shall be responsible for any damage cause by dust generated as a result of its operations.

- B. Street Vacuum/Sweeper: Have a commercial standard street vacuum/sweeper operational and in operation during each working day. The street vacuum/sweeper shall be able to pick up sand, gravel, dust, and debris, and other things, shall minimize dust generation, and shall also be available during the day and shall sweep as outlined below and as directed by the Project Manager.
- C. Sweeping: If the Contractor is performing work that generates dust and debris then during the day (including weekends and holidays) the sweeper shall sweep the project area (full length, width, and all lanes) twice a day sometime between 9:00a.m. and 11:00a.m. and also between 2:00p.m. and 4:00p.m. Hardscape surfaces (including pavers, sidewalks, and areas inaccessible by a mechanical sweeper) shall have dirt, dust, and debris removed by hand sweeping. If the Contractor fails to fulfill the responsibilities of this Section the City will perform or contract with others to perform the work and all costs incurred to the City shall be withheld from future payments to the Contractor.
- D. Additional Sweeping: Clean the sidewalk and gutter as many times as needed to make sure the sidewalk and gutter are out of dirt, debris and small rocks at all times. Be prepared to sweep surfaces immediately at the request of the Project Manager should it be deemed necessary for public safety and to avoid damage to properties. If streets are not satisfactorily cleaned within 12 hours from verbal or written notice by City personnel, the City will hire an independent sweeping company and deduct the cost for such work from payments due to the Contractor.
- E. Payment for Dust Control and Clean Up: Shall be included in the prices paid for Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WCPC) as shown in the Bid Schedule or considered incidental to the items most closely related to when there is no bid item. This Item shall be considered as full compensation for all labor, materials, tools, equipment and incidentals and for doing the work of Dust Control and Clean Up and no additional compensation shall be made therefor.

### 3.5 EMERGENCY EROSION AND SEDIMENT CONTROL

- A. Shall consist of any measures not addressed in the SWPPP/WPCP that the Project Manager or QSD deems necessary for compliance with the CGP including, but not limited to all erosion control measures necessary to prevent degradation to water quality.
- B. Sediment Control including unforeseen measures not addressed in the Storm Water Pollution Plan pay item in accordance with the National Pollution Discharge Elimination System (NPDES), the City of Pittsburg and the Plans and

Specifications and to the satisfaction of the Project Manager. Work under this item shall be considered as extra work paid for on a force account basis.

**END OF SECTION 01 57 23**

**SECTION 01 60 00 – PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

**1.2 DEFINITIONS**

- A. Products:
  - 1. General: Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 2. Named Products: Items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
  - 3. Materials: Components shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
  - 4. Equipment: Product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

**1.3 QUALITY ASSURANCE**

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

**1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. General: Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
  - 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to [Section 01 25 00 - Substitution Procedures](#).

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF PRODUCTS:**

- A. General: Refer to [Section 01 70 00 – Execution](#).
- B. Product Handling: Assure that Work is manufactured and/or fabricated in ample time to not delay construction progress. Transport, handle, store and protect products in accordance with manufacturer's instructions.

**END OF SECTION 01 60 00**

**SECTION 01 70 00 – EXECUTION****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section includes requirements for field engineering, examination, preparation, execution, cleaning, and protecting installed construction.
- B. Field Engineering: Provide such field engineering services as are required for proper completion of the Work including, but not limited to:
  - 1. Establishing and maintaining lines and levels.
  - 2. Structural design of shores, forms, and similar items provided by the Contractor as part of the means and methods of construction.

**1.2 QUALITY ASSURANCE**

- A. Workers: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specific requirements and the methods needed for proper performance of the work of this Section.

**1.3 SUBMITTALS**

- A. Comply with [Section 01 33 00 - Submittal Procedures](#).
- B. Upon request of the Project Manager, submit the following:
  - 1. Engineering qualifications of persons proposed to be engaged for field engineering services.
  - 2. Documentation verifying accuracy of field engineering work.
  - 3. Certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance with requirements of the Contract Documents. Documentation shall require surveyor's certification stamp.

**1.4 REFERENCE POINTS**

- A. In addition to the procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
  - 1. Locate and protect control points before starting work on the site.
  - 2. Preserve permanent reference points during progress of the Work.
  - 3. Do not change or relocate reference points or items of the Work without specific approval from the Project Manager.

4. Notify and advise the Project Manager within twenty-four (24) hours when a reference point is lost or destroyed, or requires relocation because of other changes in the Work:
  - a. Upon direction of the Project Manager, require the field engineer to replace reference stakes and/or markers.
  - b. Locate such replacements according to the original survey control.

## **PART 2 - PRODUCTS**

NOT USED

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.

### **3.2 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer-required or manufacturer-recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

### **3.3 EXECUTION**

- A. Comply with manufacturer's installation instructions, performing each step-in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.
- B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Project Manager before proceeding.



- C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
  - 1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
  - 2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
  - 3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Project Manager for final decision.
- E. Allow for expansion of materials and/or movement.
- F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
  - 1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
  - 2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.
- G. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for particular application indicated.
  - 1. Refer questionable mounting heights choices to Project Manager for final decision.
  - 2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.
- I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

### 3.4 CLEANING

- A. Maintain Project Site, surrounding areas and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
- B. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project Site clean and ready for occupancy.
- C. Hazards Control:
  - 1. Conduct cleaning and disposal operation in accord with legal requirements.

2. Do not burn or bury rubbish and waste materials on Project Site.
3. Do not dispose of volatile wastes in storm or sanitary drains.
4. Store volatile wastes in covered metal containers, and remove from premises daily.
5. Prevent accumulation of wastes which create hazardous conditions.
6. Provide adequate ventilation during use of volatile or noxious substances. Ventilation shall be other than ventilation system.

D. Materials:

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
2. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

E. During Construction:

1. Execute cleaning daily to ensure Project Site, Owner's premises, adjacent and public properties are maintained free from accumulations of waste materials and rubbish.
2. Wet down dry materials and rubbish to control dust.
3. At reasonable intervals during progress of Work, clean Project Site and public properties, and dispose of waste materials, debris and rubbish.
4. Provide on Project Site dump containers for collection of waste materials, debris and rubbish. Waste containers shall not be used for construction waste.
5. Remove waste materials, debris and rubbish from Owner's premises and legally dispose of off Owner's property.
6. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials.

### 3.5 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual Specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.
- C. Prohibit traffic from landscaped areas.

**END OF SECTION 01 70 00**

**SECTION 01 71 13 – MOBILIZATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes but not limited to:
1. mobilization and demobilization;
  2. preparatory work and activities those necessary for the movement of personnel, equipment, supplies, and incidentals to the job site;
  3. for the establishment of all offices, building, trailers, and other facilities necessary for work on the project;
  4. submittals, bonding and insurance requirements;
  5. public notifications in English and Spanish;
  6. contacting and notifying the utility companies;
  7. fabricating and installing project identification signs;
  8. private property owner agreement for storage facilities;
  9. and for all other work and activities which must be performed or costs incurred prior to beginning work on the various contract items on the project site.

**1.2 REFERENCES**

- A. Cal/OSHA – California Division of Occupation Safety and Health
- B. Underground Services Alert (USA)

**1.3 SUBMITTALS**

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Measurement and Payment:
1. When mobilization is included as a bid item, measurement will be made as a percentage of the costs incurred according to the list submitted except that not more than 75% of the bid price shall be paid prior to the final estimate for payment being due, said remaining 25% paid upon completion of cleanup and removal and demobilization with final payment.
  2. When the contract does not include a contract pay item for mobilization, full compensation for any necessary mobilization required shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefore.

3. The contract price paid for mobilization shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in mobilization and demobilization including the items listed in Part 1.1 of this Section as specified herein, and no additional compensation shall be made therefor.
4. Mobilization shall be considered as a non-adjustable contract item. Any contract change orders shall be considered as including full compensation for mobilization.

## **PART 2 - PRODUCTS**

NOT USED

## **PART 3 - EXECUTION**

### **3.1 MOBILIZATION**

- A. Mobilization shall consist of preparatory work and activities listed in Part 1.1 above.
- B. The Contractor shall insure that adequate existing sanitation facilities are available or the Contractor shall provide and maintain adequate sanitation facilities. All wastes and refuse from sanitary facilities provided by the Contractor's operations shall be disposed of away from the site in accordance with all laws and regulations pertaining thereto.
- C. Mobilization shall also include demobilization upon completion of work and cleanup of the site.
- D. The contractor shall provide all labor, materials, equipment and incidentals to prepare the site for the timely start and efficient completion of all work. This includes obtaining all necessary licenses and permits, providing required submittals including but not limited to a detailed project schedule.
- E. Mobilization shall also include notifications to all existing utility companies as shown on the Drawings as first order of work.

**END OF SECTION 01 71 13**

## SECTION 01 71 23 – CONSTRUCTION SURVEYING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes but not limited to:
  - 1. Control Line Survey
  - 2. Pothole Survey
  - 3. Survey Monument Referencing
  - 4. Construction Staking
  - 5. Quality Control Survey
  - 6. As-built GPS Survey
- B. All surveying work shall be performed under the responsible charge of a land surveyor licensed in the State of California.

#### 1.2 REFERENCES

- A. Cal/OSHA – California Division of Occupation Safety and Health
- B. Underground Services Alert (USA)

#### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. [Section 02 21 13 - Survey Monuments](#).

### PART 2 - PRODUCTS

NOT USED

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. All work shall be done in accordance with Chapter 12 of the Caltrans Surveys Manual, these Special Provisions, the Contract Plans, and as directed by the Engineer.
- B. Contractor shall provide all the project construction surveying and all costs related to establishing a control line, pothole surveying, construction staking, documenting all changes to plans, providing quality control surveying, performing an as-built survey and submitting AutoCAD files of the as-built information. All construction

surveying shall be performed under the direction of a Professional Land Surveyor licensed in the State of California. The Contractor shall be responsible for all land surveying and shall be responsible for replacing control points or survey monuments lost or damaged during the course of construction

### 3.2 CONTROL LINE SURVEY

- A. Prior to any construction surveying contractor will allow for field surveying and office surveying to check the field control shown on the Drawings, and to set construction control points. This survey will be a stand-alone move-in specifically to verify control points. Work includes: collect CAD files from City, submit signed CAD release forms, go to field and tie-in control points, compare the x,y,z of the field data with the x,y,z on the CAD files, establish additional new field control points for construction, and submit CAD file of the existing and new control analysis to engineer for review. All project construction surveying shall be based on this established control line.

### 3.3 POTHOLE SURVEY

- A. For Projects requiring pothole survey by a Licensed Land Surveyor, during the potholing excavation and exposure of the existing utility, the Contractor's licensed Land Surveyor shall perform a topographic survey of the existing grade, top of pipe of the existing utilities, location of the utility on the project coordinate system. Contractor shall document the outside diameter of the pipe and the pipe material. Contractor shall submit the pothole survey with the above specified information in an AutoCAD Drawing file to the City engineer. CAD point descriptions to include the type of exposed pipe and diameter (example: "12" water")

### 3.4 SURVEY MONUMENT REFERENCING

- A. For Survey Monument Referencing, refer to [Section 02 21 13 - Survey Monuments](#).

### 3.5 CONSTRUCTION STAKING

- A. The Contractor shall submit a AutoCAD files to the engineer three (3) working days prior to any staking operation. AutoCAD files will show the calculated survey points with CAD elevations and CAD descriptions as part of the calculated topographic shots. Cut sheets in-lieu of this requirement will not be accepted. CAD points must include the elevations in CAD.
- B. Construction staking shall be defined as: "Markings set in the field by a CA Licensed Land Surveyor, prior to construction, with horizontal coordinates and vertical dimensions to the items identified below. All field markings shall be completed under the direction of Land Surveyor licensed by the State of

California.” The Contractor shall be responsible for replacing established survey points lost or damaged during the course of construction.

- C. The list below includes some but not limited to items to be surveyed/staked.
1. Curb/Curb & Gutter - Top of curb, flow line and lip of gutter at begin of curve, end of curve, every 25' and at all changes in direction.
  2. Flushed concrete curb at begin of curve, end of curve, every 25' and at all changes in direction.
  3. Concrete pavers borders
  4. Concrete paving parking
  5. Concrete paving intersection
  6. Curb ramps (beginning, end, mid-point, back corners)
  7. Truncated dome pavers
  8. Concrete Expansion Joints
  9. Trees
  10. Irrigation Meter and Boxes
  11. Traffic Signal Poles and Boxes
  12. Storm Drainage Inlets and other drainage structures
  13. Trench drains
  14. Curb drains
  15. Storm Drainage Piping Inverts every 25' and at all changes in direction
  16. Storm Drainage Manhole Inverts
  17. Sanitary Sewer Piping Inverts every 25' and at all changes in direction
  18. Sanitary Sewer Manhole Inverts
  19. Sanitary Sewer Cleanout
  20. Sanitary Sewer Laterals
  21. Water Main Piping Inverts every 25' and at all changes in direction
  22. Water Main offsets
  23. Water Valves
  24. Air Release Valves
  25. Blow off
  26. Water Meters
  27. Fire Hydrants
  28. Joint Trench every 25' and at all changes in direction
  29. Utility Vaults
  30. Street light pull boxes
  31. Pedestrian Lighting
  32. Street Lighting
  33. Edges of bands a planter curbs
  34. Concrete band
  35. Corners of Concrete at AC paving limits
  36. Bottom and top of concrete speed table slopes
  37. Parking strip ticks (one stake each)
  38. Parking meter (one stake each)
  39. Handicap parking (8 Stakes)
  40. Bench

41. News rack & corral (3 stakes each)
42. Midblock arbor, park road arbor (12 stakes each)
43. Bike rack
44. Trash receptacle
45. Fixed bollard, retractable bollard
46. Downspout storm lateral connection. Staking calculations to be adjusted based on field verified building drain locations exposed during demolition.
47. Other staking requirements as described in the Special Provisions.

### 3.6 QUALITY CONTROL SURVEY

- A. These survey verifications shall occur one (1) working days prior to pouring concrete. Submit AutoCAD file of the quality control survey to the Engineer one (1) working days prior to pouring concrete curbs and foundations. AutoCAD survey files will show the topographic survey points with elevations and descriptions. Descriptions and elevations will be on the CAD points and not on a separate cut sheet. Contractor will replace any curbs, street lights and pole foundations not checked prior to pouring concrete.
- B. No concrete shall be poured until each quality control survey item described below has been approved by the Engineer, based on survey CAD file provided by contractor's surveyor. Prior to pouring concrete or proceeding beyond subgrade.
- C. Listed below are the project elements which require quality control survey and CAD submittal reviews prior to concrete pouring.
  1. Curbs and Curb & Gutter: After the curb forms are set, the contractor's licensed land surveyor shall survey the top of curb form every 25' and at key conforms.
  2. Subgrade for Street Paving: Field survey and certify the top of aggregate base design grades every 50 feet along the centerline of each lane or on corners of a 12'x50' grid in a parking lot for projects greater than or equal to 5,000 square feet of asphalt concrete. Submit certification signed by a Licensed Land Surveyor.

### 3.7 AS-BUILT SURVEY

- A. After the trench excavation and pipe installation, the Contractor's licensed land surveyor shall perform a topographic survey of the top of pipes for the utility lines and invert of pipe for all gravity pipes every 25', and at all changes in direction both horizontal and vertical, water valves, tees, water services, fire hydrants and at all manhole. This survey verification shall occur 3 days prior to backfilling trench. AutoCAD files will show the calculated survey points with elevations and descriptions.



- B. Contractor shall be responsible for documenting all changes to the plans. The Contractor/Developer shall provide the as-built survey in .dwg file (tied to NAD83 California State Planes, Zone III) format in AutoCAD 2017 or later version electronically and stored in a USB flash drive. The Contractor/Developer shall deliver one full set (22x34) of hard copy certified by the License Land Surveyor.
- C. A CAD drawing and coordinates data sheet shall be submitted to the Project Manager for approval. This task must be performed by a registered professional land surveyor licensed in the state of California. Data shall be tied to NAD83 California State Planes, Zone III, US Foot. The elevations shall be based on NAVD88 datum. This survey shall be delivered to the City's Engineer of Record. This survey shall be used for final as-built record drawings and calculations of the final quantity.
- D. The topographic survey for the as-built information shall be performed by a Professional Land Surveyor licensed in the State of California. After the trench excavation, pipe installation and approval from the inspector, the Contractor's licensed Land Surveyor shall perform a topographic/As-Built survey of all items described above in Submittals. Surveying will be of the actual pipe, conduit and/or finished facility. As-Built survey shall indicate the actual pipe material installed.

### 3.8 AS-BUILT GPS SURVEY

- A. Contractor shall be responsible for the GPS "As-Built" Survey, following the completion of construction, for the location and depth of installed underground utility lines, coordinates of manholes, manhole rim elevations, manhole invert elevations, manhole depths, utility boxes, manhole covers and similar appurtenances. A CAD drawing and coordinates data sheet shall be submitted to the project manager for approval. This task must be performed by a registered professional land surveyor licensed in the state of California. Data shall be tied to California State Plan Coordinate System.

**END OF SECTION 01 71 23**

## SECTION 01 73 29 – CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. General: This section includes requirements for cutting and patching.

#### 1.2 QUALITY ASSURANCE

- A. Installers: Employ skilled and experienced installers to perform cutting and patching.

#### 1.3 SUBMITTALS

- A. Written Request: Submit written request in advance of cutting or altering elements affecting:
  - 1. Structural integrity of element.
  - 2. Integrity of weather-exposed or moisture-resistant elements.
  - 3. Efficiency, maintenance, or safety of element.
  - 4. Visual qualities of sight-exposed elements.
  - 5. Work of Owner or separate contractor.
- B. Request Requirements: Project name and location; description of all affected work; explanation of necessity for cutting, alteration or excavation; impact on the work of the Owner or any separate contractor, or on the structural or weatherproof integrity of the building; description of proposed work, including scope of cutting, patching, alteration, or excavation, products proposed to be used, trades who will complete the work, and extent of refinishing to be done; alternatives to cutting and patching; cost proposal, when applicable; written permission from any separate contractor whose work will be affected.
- C. Product Substitutions: Should conditions of Work or schedule indicate change of products from original installation, submit request for substitution as specified in [Section 01 25 00 - Substitution Procedures](#).
- D. Field Observation: Submit written notice to Project Manager designating date and time work will be uncovered.

### PART 2 - PRODUCTS

NOT USED

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. General: Inspect existing conditions; include elements subject to damage or movement during cutting and patching.
- B. After Uncovering Work: Inspect conditions affecting the installation of products, or performance of Work.
- C. Unsatisfactory Conditions: Report unsatisfactory or questionable conditions to the Project Manager in writing; do not proceed with work until Project Manager has provided further instructions.

**3.2 PREPARATION**

- A. Temporary Support: Provide as necessary to assure structural value or integrity of affected portion of Work.
- B. Protection:
  - 1. Provide devices and methods to protect other portions of the Project from damage.
  - 2. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching, and maintain excavations free from water.

**3.3 PERFORMANCE**

- A. Cutting and Patching: Execute cutting, fitting, and patching, including excavation and fill if required, to complete Work and to:
  - 1. Fit the several parts together, to integrate with other Work.
  - 2. Uncover Work to install or correct ill-timed Work.
  - 3. Remove and replace defective and nonconforming Work.
  - 4. Remove samples of installed Work for testing.
  - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- B. Methods: Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing. Cut masonry and concrete materials using masonry saw or core drill.
- C. Restoration: Restore Work with new products according to requirements of Contract Documents. In the case of failure to protect existing or new work, Contractor shall be responsible for costs to repair damage and for restoring the work.

- D. Penetrations: Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- E. Refinishing: Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
- F. Hazardous Conditions: Identify hazardous substances or conditions exposed during the Work to Project Manager for decision or remedy.

**END OF SECTION 01 73 29**

## SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Description: Provide Construction Waste Management including salvaging, recycling, and disposing of nonhazardous construction waste, as shown and specified per Contract Documents.

### PART 2 - PRODUCTS

#### 2.1 WASTE MANAGEMENT PLAN

- A. General: Develop plan, consisting of waste identification and construction methods employed to reduce the amount of waste generated, including separate sections for demolition and construction waste, to re-use and recycle minimum 75% of construction waste materials generated by the Work. Indicate quantities by weight or volume; use same units of measure throughout waste management plan.
- B. Quality Requirements: Refer to [Section 01 42 00 - References](#) for reference standards, applicable codes and definitions, and to the following:
  - 1. American National Standards Institute (ANSI): ANSI 10.2 - Safety Code for Building Construction.
  - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
  - 3. California Building Code (CBC): California Green Building Standards Code (CALGreen), latest edition: Title 24, Part 11.
  - 4. California Department of Resources Recycling and Recovery (CalRecycle):
    - a. General: Sustainable Building Guidelines.
    - b. Recycling and Recovery: Construction and Demolition Debris Recycling guidelines.
  - 5. California Occupational Safety and Health Administration (CalOSHA): Construction Safety Orders; 29 CFR, PART 1926 Safety and Health Regulations for Construction.
  - 6. Construction & Demolition Recycling Association (CDRA): Standards and guidelines.
  - 7. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. General: Review Waste Management Plan procedures and identify locations established for salvage, recycling, and disposal. Designate and label specific areas on the site for separating materials to be salvaged, recycled, reused, donated, and sold.

**3.2 IMPLEMENTATION**

- A. City of Pittsburg Construction & Demolition (C&D) Recycling and Waste Management requires at least 65% job-site waste materials diverted from the landfill.
- B. For newly constructed buildings, demolition projects and all locally permitted additions and alterations to non-residential buildings or structures, Contractor shall submit the C&D Debris Waste Management Plan (WMP) showing diverting from landfills at least 65% of the construction materials generated by the project.
- C. Contractor may deliver all approved recycling materials such as wood, metal, plastics, concrete, roofing, cardboard, dirt, sheetrock, tires, appliances, mattresses, box springs, propane tanks, and electronic waste to Contra Costa Waste Service also known as Recycling Center & Transfer Station (RCTS), located at 1300 Loveridge Road, Pittsburg, California. All materials shall be weighed at the RCTS. For any material code of "CD" (Construction & Demolition Material Processing), 100% diversion rate will be applied to receipts indicating the material code "CW" (Clean Wood), "CG" (Clean Green), or "CR" (Clean Roofing).
- D. Recycled Materials: Separate recyclable waste from other waste materials, trash, and debris. Provide properly marked containers or bins for controlling recyclable waste until they are removed from Project site. Store materials away from construction area, off the ground and protect from the weather; do not store within drip line of remaining trees. Transport recyclable waste off Owner's property to recycling receiver or processor.
- E. Disposal: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Burning and burying of materials is not allowed.
- F. Contractor shall submit the following WMP and Water Assessment table forms.



CITY OF PITTSBURG  
65 Civic Avenue  
Pittsburg, CA 94565

**CONSTRUCTION AND DEMOLITION DEBRIS  
WASTE MANAGEMENT PLAN (WMP)**

For City Use Only	
Project No.	_____
Date	_____ Fee \$ _____
Deposit Amount \$	_____
<input type="checkbox"/>	Approved WMP
<input type="checkbox"/>	Approved Infeasibility Exemption
<input type="checkbox"/>	Denied _____
<input type="checkbox"/>	Further information required _____
Staff Initials	_____

The City of Pittsburg C&D Recycling and Waste Management requirement states that at least 75% diversion of job-site waste materials from the landfill. In order to process the application request, the following form must be completed, signed and submitted with an application fee.

- WMP Application Approval Request       WMP Infeasibility Exemption Request

Property Owner Name/Ph.# \_\_\_\_\_  
 Job-site Address: \_\_\_\_\_  
 Contractor/Project Manager: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone Number: \_\_\_\_\_  
 Cellular Phone Number: \_\_\_\_\_  
 Fax Number: \_\_\_\_\_

\_\_\_\_\_  
Property Owner's Signature / Date

\_\_\_\_\_  
Contractor/Project Manager's Signature / Date

1. Briefly state how materials will be sorted for recycling and/or salvage on the job site. See *Waste Assessment Table on back page*. Attach additional pages if necessary. \*If no materials are targeted for recycling or salvage, please state why.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. Will this project require the use of sub-contractors?     Yes     No    If yes, briefly state how you plan to inform and ensure participation by the sub-contractors of your job-site recycling and waste management responsibility.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Complete Other Side →**

**WASTE ASSESSMENT TABLE**

- I. BEFORE START OF PROJECT: Identify the type of materials to be recycled, salvaged or disposed from the job-site in **Section I** of the Waste Assessment table. Identify the handling procedure, hauler and/or destination of each material type.
- II. UPON COMPLETION OF PROJECT: **Section II** is to be filled out with supporting documentation upon completion of project. Indicate the material **types and quantities** recycled, salvaged or disposed from this job-site. Official weight tags must be submitted with this completed report identifying 1) job site address, 2) weight of load(s), 3) material type(s) and 4) if materials were recycled, salvaged or disposed.

Material Type ↓	Section I Identify materials (✓)			Handling procedure, hauler or final destination of materials* (See #1)	Section II Quantity of each material (lbs)			City Use Only Acceptable weight tag(s) (staff initials)
	Recycle	Salvage	Landfill		Recycled	Salvaged	Landfilled	
Asphalt & Concrete								
Brick, Tile								
Building materials-doors, windows, fixtures, cabinets								
Cardboard								
Dirt/Clean Fill								
Drywall								
Carpet padding/ Foam								
Plate/window Glass								
Scrap Metals (steel, aluminum, brass, copper, etc.)								
Unpainted Wood & Pallets								
Yard Trimmings (brush, trees, stumps, etc.)								
Other:								
Garbage								
<b>TOTALS</b>								% Recycled

FOR CITY USE ONLY – PROJECT COMPLETION (version 11-08)

Full Compliance   
  Good Faith Effort to Comply   
  Non-Compliance  
 Return of Deposit   
  Yes   
  No   
 Amount \$ \_\_\_\_\_   
 Staff Signature \_\_\_\_\_ / \_\_\_\_\_   
 Date \_\_\_\_\_

**END OF SECTION 01 74 19**



**SECTION 01 77 00 – CLOSEOUT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section describes contract closeout procedures including:
  1. Removal of temporary construction facilities
  2. Substantial completion
  3. Final completion
  4. Final cleaning
  5. Miscellaneous Project Record Submittals
  6. Release of claims

**1.2 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES**

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion Inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities.
- C. Restore permanent facilities used during construction to specified condition.

**1.3 SUBSTANTIAL COMPLETION**

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
  2. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
  3. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
- B. Advise the Project Manager of pending insurance changeover requirements.
- C. Submit warranty bonds, final certifications, and similar documents.
- D. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

- E. Submit record drawings in PDF or hard copies in addition to CAD files, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
- F. Deliver tools, spare parts, extra stock, and similar items.
- G. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
- H. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
- I. Complete final cleanup requirements, including touchup painting.
- J. Touch up and otherwise repair and restore marred, exposed finishes.
- K. Inspection Procedures: On receipt of a request for inspection, the Project Manager will either proceed with inspection or advise the Contractor of unfilled requirements. The Project Manager will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
- L. The Project Manager will repeat inspection when requested and assured that the Work is substantially complete.
- M. Results of the completed inspection will form the basis of requirements for final acceptance.

#### 1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
- B. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
- C. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
- D. Submit a certified copy of the Project Manager's final inspection list of items to be completed or corrected, endorsed and dated by the Project Manager. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Project Manager.

- E. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
  - F. Submit consent of surety to final payment.
  - G. Submit a final liquidated damages settlement statement.
  - H. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - I. Re-inspection Procedure: The Project Manager will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Project Manager.
    - 1. Upon completion of re-inspection, the Project Manager will prepare a certificate of final acceptance. If the Work is incomplete, the Project Manager will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
    - 2. If necessary, re-inspection will be repeated.
  - J. Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2-inch 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Provide two (2) paper copies and a PDF. Mark appropriate identification on front and spine of each binder. Include the following types of information:
    - 1. Emergency instructions.
    - 2. Spare parts list.
    - 3. Copies of warranties.
    - 4. Wiring diagrams.
    - 5. Recommended "turn-around" cycles.
    - 6. Inspection procedures.
    - 7. Shop Drawings and Product Data.
    - 8. Fixture lamping schedule.
- 1.5 FINAL CLEANING
- A. Execute final cleaning prior to final inspection.
  - B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
  - C. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment operated during construction, clean ducts, blowers and coils of units operated without filters during construction.

- D. Employ skilled workers for final cleaning.
- E. Clean Site; mechanically sweep paved areas.
- F. Remove waste and surplus materials, rubbish, and construction facilities from Site.

#### 1.6 MISCELLANEOUS PROJECT RECORD SUBMITTALS

- A. Refer to Special Provisions or other Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Project Manager for City's records.

#### 1.7 RELEASE OF CLAIMS

- A. Contract will not be closed out and final payment will not be made, subject to provisions of Section 7100 Public Contract Code until all pertinent aspects of [Division 00 - General Conditions](#) regarding undisputed/settled amounts are completed per requirements elsewhere in the Special Provisions and/or Specifications and executed by Contractor and City.
- B. Contractor shall submit the following Agreement and Release of Any and All Claims Form.



CITY OF PITTSBURG  
65 Civic Avenue  
Pittsburg, CA 94565

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

This Agreement and Release of Claims ("Agreement and Release"), made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the City of Pittsburg ("City"), and \_\_\_\_\_ ("Contractor"), whose place of business is at \_\_\_\_\_.

RECITALS

1. City and Contractor entered into Contract No. \_\_\_\_\_ in the City of Pittsburg, County of Contra Costa, State of California.
2. The Work under Contract No. \_\_\_\_\_ has been completed.

Now, therefore, it is mutually agreed between City and Contractor as follows:

AGREEMENT

3. Contractor will not be assessed liquidated damages except as detailed below:

Original Contract Sum	\$ _____
Modified Contract Sum	\$ _____
Payment to Date	\$ _____
Liquidated Damages	\$ _____
Payment Due Contractor	\$ _____

4. Subject to the provisions of this Agreement and Release, City shall forthwith pay to Contractor the sum of \$ \_\_\_\_\_ Dollars and \_\_\_\_\_ Cents under Contract No. \_\_\_\_\_, less any amounts withheld under the Contract or represented by any "Stop Notice" on file with City as of the date of such payment.
5. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against City arising from the performance of work under Contract No. \_\_\_\_\_. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against , City of Pittsburg, and all their respective directors, agents, officers, volunteers, consultants (including, but not limited to, Project Construction Manager and Architect/Engineer), employees, inspectors, assignees and transferees except for the Disputed Claims set forth in Paragraph 6, and continuing obligations described in Paragraph 8, below.



**CITY OF PITTSBURG**  
 65 Civic Avenue  
 Pittsburg, CA 94565

6. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

<u>Claim No.</u>	<u>Date Submitted</u>	<u>Description of Claim</u>	<u>Amount of Claim</u>
------------------	-----------------------	-----------------------------	------------------------

7. Consistent with California Public Contract Code, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 4, above, Contractor hereby releases and forever discharges City, all its respective directors, agents, officers, volunteers, employees, inspectors, assignees and transferees from any and all liability, claims, demands, actions or causes of action of whatever kind or nature arising out of or in any way concerned with the work under the Contract.
8. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.
9. Contractor shall immediately defend, indemnify and hold harmless City of Pittsburg, and all its respective directors, agents, officers, volunteers, consultants, employees, inspectors, assignees and transferees from any and all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities that may be asserted against them by any of Contractor's suppliers and/or subcontractors of any tier and/or any suppliers to them for any and all labor, materials, supplies and equipment used, or contemplated to be used in the performance of Contract No. \_\_\_\_\_, except for the Disputed Claims set forth in Paragraph 6, above.
10. Contractor hereby waives the provisions of California Civil Code, Section 1542, which provides as follows:
 

A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him, must have materially affected his settlement with the debtor.
11. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable, and if any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, city, municipal or other law, ruling or regulations, then such provision, or part thereof shall remain in force and effect only to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.
12. All rights of City shall survive completion of the Work or termination of Contract, and execution of this Release.



**CITY OF PITTSBURG**  
65 Civic Avenue  
Pittsburg, CA 94565

\*\*\* CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING \*\*\*

CITY OF PITTSBURG

CONTRACTOR

BY: \_\_\_\_\_ BY: \_\_\_\_\_

Date: \_\_\_\_\_ Date: \_\_\_\_\_

**END OF SECTION 01 77 00**

## SECTION 01 78 00 – CLOSEOUT SUBMITTALS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section describes contract closeout submittals including:
1. Project record documents
  2. Project guarantee
  3. Warranties

#### 1.2 PROJECT RECORD DOCUMENTS

- A. Project Record Documents required include:
1. Marked-up copies of Contract Drawings
  2. Marked-up copies of Shop Drawings
  3. Project Record Drawings
  4. Marked-up copies of Special Provisions, Specifications, Addenda and Change Orders
  5. Marked-up Project Data submittals
  6. Record Samples
  7. Field records for variable and concealed conditions
  8. Record information on Work that is recorded only schematically
  9. GPS As-built Survey
  10. Warranty Bonds
- B. Specific Project Record Documents requirements that expand requirements of this Section are included in the individual Sections of Divisions 2 through 48 (when provided).
- C. General Project closeout requirements are included in [Section 01 77 00 - Closeout Requirements](#).
- D. Maintenance of Documents and Samples:
1. Store Project Record Documents and samples in the field office apart from Contract Documents used for construction.
  2. Do not permit Project Record Documents to be used for construction purposes.
  3. Maintain Project Record Documents in good order, and in a clean, dry, legible condition.
  4. Make documents and samples available at all times for inspection by Architect and Project Manager.



- E. City will provide one set of reproducibles and one set of the construction drawing prints and one project manual for the Contractor's use and copying during construction.
- F. Mark-up Procedure: During the construction period, maintain a set of Contract Drawings and Shop Drawings for Project Record Document purposes.
  - 1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
    - a. Dimensional changes to the Drawings
    - b. Revisions to details shown on the Drawings
    - c. Depths of foundations below the first floor
    - d. Locations and depths of underground utilities
    - e. Revisions to routing of piping and conduits
    - f. Revisions to electrical circuitry
    - g. Actual equipment locations
    - h. Duct size and routing
    - i. Locations of concealed internal utilities
    - j. Changes made by Change Order
    - k. Details not on original Contract Drawings
  - 2. Mark completely and accurately Project Record Drawing prints of Contract Drawings or Shop Drawings, whichever is the most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
  - 3. Mark Project Record Drawing sets with red ink; use other colors to distinguish between changes for different categories of the Work at the same location.
  - 4. Mark important additional information which was either shown schematically or omitted from original Drawings.
  - 5. Note construction change directive numbers; alternate numbers; Change Order numbers and similar identification.
  - 6. Responsibility for Mark-up: Where feasible, the individual or entity who obtained Project Record Drawing data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on Project Record Drawings.
    - a. Accurately record information in an understandable and legible drawing technique.
    - b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.
- G. Preparation of Transparencies: Prior to inspection for Certification of Substantial Completion, review completed marked-up Project Record Drawings with the Project Manager. When authorized, prepare a full set of correct reproductables of Contract Drawings and Shop Drawings.

1. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.
  2. Refer instances of uncertainty to the Project Manager for resolution.
  3. Review of Reproducible: Before copying and distributing, submit corrected reproducibles and the original marked-up prints to the Project Manager for review. When acceptable, the Project Manager will initial and date each transparency, indicating acceptance of general scope of changes and additional information recorded, and of the quality of drafting.
    - a. Reproducibles and the original marked-up prints will be returned to the Contractor for organizing into sets, printing, binding, and final submittal.
  4. Copies and Distribution: After completing the preparation of reproducible Project Record Drawings, print one hard copy and a PDF of each Drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.
    - a. Organize and bind original marked-up set of prints that were maintained during the construction period in the same manner.
    - b. Organize Project Record Drawings reproducibles into sets matching the print sets. Place these sets in durable tube-type drawing containers with end caps.
- H. Distribution of Marked-Up Drawings and Transparencies: Submit the marked-up Project Record Drawings sets, reproducibles, and one copy to the Project Manager for City's records.
- I. Project Record Special Provisions and Specifications:
1. During the construction period, maintain one copy of the Project Manual, including addenda and modifications issued, for Project Record Document purposes.
  2. Mark the Project Record Manual to indicate the actual installation where the installation varies substantially from that indicated in Specifications and Modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installation that would be difficult to identify or measure and record later.
    - a. In each Special Provisions and Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
    - b. Record the name of the manufacturer, supplier and installer, and other information necessary to provide a record of selections made and to document coordination with Project Record Product Data submittals and maintenance manuals.

- c. Note related Project Record Product Data, where applicable, for each principal product specified, indicate whether Project Record Product Data has been submitted in maintenance manual instead of submitted as Project Record Product Data.
  3. Upon completion of mark-up, submit Project Record Manual to the Project Manager for City's records.
- J. Project Record Product Data:
  1. During the construction period, maintain one copy of each Project Record Product Data submittal for Project Record Document purposes.
    - a. Mark Project Record Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Project Record Product Data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.
    - b. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
    - c. Note related Change Orders and mark-ups of Project Record Drawings, where applicable.
    - d. Upon completion of mark-up, submit a complete set of Project Record Product Data to the Project Manager for City's records.
    - e. Where Project Record Product Data is required as part of maintenance manuals, submit marked-up Project Record Product Data as an insert in the manual, instead of submittal as Project Record Product Data.
- K. Material, Equipment and Finish Data:
  1. Provide data for primary materials, equipment and finishes as required under each Special Provisions/Specification section.
  2. Submit one set prior to final inspection, bound in 8-1/2 inches by 11 inches three-ring binders with durable plastic covers and a PDF; provide typewritten table of contents for each volume.
  3. Arrange by Special Provisions/Specification division and give names, addresses, and telephone numbers of subcontractors and suppliers. List:
    - a. Trade names.
    - b. Model or type numbers.
    - c. Assembly diagrams.
    - d. Operating instructions.
    - e. Cleaning instructions.
    - f. Maintenance instructions.
    - g. Recommended spare parts.
    - h. Product data.
- L. Miscellaneous Project Record Submittals:
  1. Refer to other Special Provisions/Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete

miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Project Manager for City's records. Field records documenting elevations and locations of completed improvements shall require Contractor-retained State of California Licensed surveyor's certification stamp. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:

- a. Field records on excavations and foundations
- b. Field records on underground construction and similar work
- c. Survey showing locations and elevations of underground lines
- d. Invert elevations of drainage piping
- e. Surveys establishing building lines and levels
- f. Authorized measurements utilizing unit prices or allowances
- g. Records of plant treatment
- h. Ambient and substrate condition tests
- i. Certifications received in lieu of labels on bulk products
- j. Batch mixing and bulk delivery records
- k. Testing and qualification of tradespersons
- l. Documented qualification of installation firms
- m. Load and performance testing
- n. Inspections and certifications by governing authorities
- o. Leakage and water-penetration tests
- p. Fire resistance and flame spread test results
- q. Final inspection and correction procedures

M. GPS As-built Survey: Refer to [Section 01 71 23 - Construction Surveying](#) for As-Built GPS Survey.

N. Periodic Review:

1. Make additions to the Project Record Documents as they occur.
2. Make the Project Record Documents available to the Project Manager for periodic review. The Project Manager's review of the current status of Project Record Documents is a requisite to approval of requests for progress payment.
3. Prior to submitting each request for progress payment, secure the Project manager's approval of the current status of the Project Record Documents.
4. Prior to submitting request for final Payment, submit the final Project Record Documents to the Project Manager for approval.

O. Submittal: At the completion of Project, deliver record documents to Project Manager.

### 1.3 PROJECT GUARANTEE

A. Requirements for Contractor's guarantee of completed Work are included in [Division 00 - General Conditions](#). Contractor shall guarantee Work done under Contract against failures, leaks or breaks or other unsatisfactory conditions due to defective equipment, materials or workmanship, and perform repair work or replacement required, at

Contractor's sole expense, for period of one year, unless otherwise subject to any special warranty periods of longer duration, from date of Final Acceptance.

- B. Neither recordation of final acceptance nor final certificate for payment nor provision of the Contract nor partial or entire use or occupancy of premises by City shall constitute acceptance of Work not done in accordance with Contract Documents nor relieve Contractor of liability in respect to express warranties or responsibility for faulty materials or workmanship.
- C. City may make repairs to defective Work as set forth in paragraph 10.C.3 of [Division 00 - General Conditions](#), if, within five (5) working days after mailing of written notice of defective work to Contractor or authorized agent, Contractor shall neglect to make or undertake repair with due diligence; provided, however, that in case of leak or emergency where, in opinion of City, delay would cause hazard to health or serious loss or damage, repairs may be made without notice being sent to Contractor, and Contractor shall pay cost thereof.
- D. If, after installation, operation or use of materials or equipment to be furnished under Contract proves to be unsatisfactory to Project Manager, City shall have right to operate and use materials or equipment until it can, without damage to City, be taken out of service for correction or replacement. Period of use of defective materials or equipment pending correction or replacement shall in no way decrease guarantee period required for acceptable corrected or replaced items of materials or equipment.
- E. Nothing in this Section shall be construed to limit, relieve or release Contractor's, subcontractors' and equipment suppliers' liability to City for damages sustained as result of latent defects in equipment caused by negligence of suppliers' agents, employees or subcontractors. Stated in another manner, warranty contained in the Contract Documents shall not amount to, nor shall it be deemed to be, waiver by City of any rights or remedies (or time limits in which to enforce such rights or remedies) it may have for defective workmanship or defective materials under laws of this State pertaining to acts of negligence.

#### 1.4 WARRANTIES

- A. Execute Contractor's submittals and assemble warranty documents executed or supplied by subcontractors, suppliers, and manufacturers.
  - 1. Provide table of contents and assemble in 8-1/2 inches by 11 inches three-ring binder with durable plastic cover.
  - 2. Assemble in Special Provisions/Specification Section order.
  - 3. Submit material prior to final application for payment.
  - 4. For equipment put into use with City's permission during construction, submit within ten (10) working days after first operation.

5. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten (10) working days after acceptance, listing date of acceptance as start of warranty period.
  6. Warranties are intended to protect City against failure of work and against deficient, defective and faulty materials and workmanship, regardless of sources.
  7. Limitations: Warranties are not intended to cover failures which result from the following:
    - a. Unusual or abnormal phenomena of the elements
    - b. Vandalism after substantial completion
    - c. Insurrection or acts of aggression including war.
- B. Related Damages and Losses: Remove and replace Work which is damaged as result of defective Work, or which must be removed and replaced to provide access for correction of warranted Work.
- C. Warranty Reinstatement: After correction of warranted Work, reinstate warranty for corrected Work to date of original warranty expiration or to a date not less than ninety (90) days after corrected Work was done, whichever is later.
- D. Replacement Cost: Replace or restore failing warranted items without regard to anticipated useful service lives.
- E. Warranty Forms: Submit drafts to Project Manager for approval prior to execution. Forms shall not detract from or confuse requirements or interpretations of Contract Documents.
- F. Warranty shall be countersigned by manufacturers.
- G. Where specified, warranty shall be countersigned by subcontractors and installers.
- H. Rejection of Warranties: City reserves right to reject unsolicited and coincidental product warranties which detract from or confuse requirements or interpretations of Contract Documents.
- I. Term of Warranties: For materials, equipment, systems and workmanship warranty period shall be one-year minimum from date of final completion of entire Work except where:
  1. Detailed specifications for certain materials, equipment or systems require longer warranty periods.
  2. Materials, equipment or systems are put into beneficial use of City prior to Final Completion as agreed to in writing by Project Manager.
- J. Warranty of Title: No material, supplies, or equipment for Work under Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees

upon completion of all work to deliver premises, together with improvements and appurtenances constructed or placed thereon by Contractor, to City free from any claim, liens, security interest, or charges, and further agrees that neither Contractor nor any person, firm, or corporation furnishing any materials or labor for any Work covered by Contract shall have right to lien upon premises or improvement or appurtenances thereon. Nothing contained in this Paragraph, however, shall defeat or impair right of persons furnishing materials or labor under bond given by Contractor for their protection or any rights under law permitting persons to look to funds due Contractor in hands of City.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**END OF SECTION 01 78 00**

## SECTION 02 21 13 – SURVEY MONUMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes furnish and install Cast-in-place Portland Cement Survey Monuments and all appurtenant work.
- B. Related Requirements:
  - 1. [Section 03 30 00 – Utility Cast-in-place Concrete](#)
  - 2. [Section 31 23 16 – Utility Trenching](#)

#### 1.2 REFERENCE STANDARDS

- A. ASTM International:
  - 1. ASTM A48 – Specifications for Gray Iron Castings
- B. Caltrans Standard Specifications
  - 1. Section 55 – Steel Structures
  - 2. Section 78-2 – Survey Monuments

#### 1.3 COORDINATION

- A. Coordinate placement of concrete formwork and placement of form accessories.

#### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data on bronze survey markers, frame and covers.

#### 1.5 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.



**PART 2 - PRODUCTS**

## 2.1 FRAME AND COVER

- A. Monument frame and cover shall be gray iron castings conforming to ASTM A48, Class 30B, designed for a 15,000 lb. wheel load. Monument cover shall be marked "Monument". Cover shall be non-rocking and will fit in its frame.
- B. Monument Frame and Cover shall be Chrisp Company Casting Part No.9279 or 9277M, Phoenix Iron Works 2501or approved equal.

## 2.2 BRONZE SURVEY MARKER

- A. Bronze survey marker shall be 2-1/2 inch domes disk with stem and appropriate survey information as specified on the Drawings.
- B. Brass Survey markers are not acceptable unless they are lead-free.

## 2.3 FORMING TUBE

- A. Tubes for forming Portland cement concrete collar and monument shall be non-metallic type of the size and dimensions shown on the Drawings.

## 2.4 PORTLAND CEMENT CONCRETE

- A. Portland Cement Concrete for collars and footings shall conform with [Section 03 30 00 – Utility Cast-in Place Concrete.](#)

## 2.5 HOT MIX ASPHALT

- A. Hot Mix Asphalt concrete around monuments shall be in conformance with [Section 32 12 16 – Asphalt Paving.](#)

**PART 3 - EXECUTION**

## 3.1 GENERAL

- A. [Section 01 70 00 - Execution](#): Requirements for installation examination.
- B. Monuments shall not be installed until the asphalt paving has been completed.
- C. Concrete, form tube, bronze survey marker, frame and cover, and asphalt paving shall be installed as shown on the Drawings.

- D. Cast the monuments in place in neat holes using forming tubes.
- E. Thoroughly consolidate the concrete and cure it by the water method per Section 90-1.03B (2) Water Method of State Standard Specifications.
- F. Locate the monument such that the point being referenced falls within 1/2-inch from the center of the disk when the disk is placed in the center of the monument.
- G. Place the survey marker disk before the concrete reaches its initial set. Firmly embed the disk in the concrete.
- H. If base and surfacing are not shown around a monument, fill any space around it with earth. Water and tamp the earth into place.
- I. Surplus excavated material shall become the property of the Contractor and the Contractor shall be responsible for disposal of excess excavated material.
- J. The Concrete collar shall be circular – 8 inches in diameter around the frame and cover and shall be covered with a minimum of two (2) inches of asphalt concrete paving to level with the adjacent surfacing.

### 3.2 EXISTING MONUMENT PROTECTION

- A. All existing survey monuments and benchmarks shall be protected, unless otherwise shown on the Drawings. Upon discovery of a survey monument not identified and located by the City, immediately:
  - 1. Stop work near the monument
  - 2. Notify the Project Manager
- B. Do not resume work near the monument until authorized by the Project Manager.
- C. Monuments placed by Surveyors must be preserved, in accordance with State Business & Professions Code section 8771.
- D. The Contractor shall exercise caution when working around monuments so as not to disturb them. During milling, grinding, excavation or other operations, the Contractor shall work around survey monuments unless specifically otherwise indicated on the Plans. If a monument is disturbed or damaged during adjusting, milling or other operations, the Contractor shall be responsible for all costs associated with the reestablishment of the monument including but not limited to surveying performed by a Licensed Surveyor and filing documents with County and constructing the new monument.
- E. The existing monument consisting of a concrete core and brass tack, nail or other marking device located inside of a survey monument cover with frame, shall not be disturbed until the contractor's Licensed Land Surveyor has established of

reference points to preserve the location of the monument, in accordance with State Business & Professions Code section 8771.

- F. Any survey monument disturbed shall be replaced in accordance with the State Business & Professions Code section 8771 and Contra Costa County Standard Drawings CA40. The Contractor shall be responsible for all costs associated with the reestablishment of the monument including but not limited to surveying performed by a Licensed Surveyor and filing documents with County and constructing the new monument.
- G. Contractor shall prepare corner record, submit corner record to the County Surveyors and submit acceptance of monument to the Project Manager.

### 3.3 CONCRETE PROTECTION

- A. The Contractor shall protect all concrete against injury until final acceptance by the City.

**END OF SECTION 02 21 13**

**SECTION 02 41 00 - DEMOLITION****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. Section Includes but not limited to:
1. Demolition & Permits
  2. Removal and Disposal
  3. Recycling & Salvaging

## 1.2 REFERENCES &amp; RELATED WORK SPECIFIED ELSEWHERE

- A. Bay Area Air Quality Management District (BAAQMD) – <http://www.baaqmd.gov/>
1. Regulation 11 (Hazardous Pollutants) and Rule 2 (Asbestos Demolition, Renovation, and Manufacturing).
- B. CALGreen Construction Waste Management Requirements
1. [https://www.calrecycle.ca.gov/lgcentral/library/canddmodel/instruction/new\\_structures](https://www.calrecycle.ca.gov/lgcentral/library/canddmodel/instruction/new_structures)
- C. California Occupational Safety and Health (Cal/OSHA)
1. General Requirements
- D. Commercial
1. USA Underground Service Alert
- E. Division 1
1. General Requirements

## 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. The Contractor shall submit to the City a haul route for approval, prior to commencing any work. Truck traffic movement is limited between the hours of 9am to 3pm, unless approved by the Project Manager.
- C. Before disposing of any demolished material prior to any work
1. Submit a written agreement from the property owner
    - a. For the use of the property
    - b. absolving the City from responsibility in connection with the property.
  2. Obtain authorization to start

- D. Before Contract acceptance, submit a document signed by the owner of the material disposal site stating that the Contractor has complied with the Contractor-Owner agreement.
- E. Demolition Schedule: The Contractor shall submit a complete coordination schedule for demolition work including shut-off and continuation of utility services prior to start of the work. The schedule shall indicate proposed methods and operations of facility demolition, and provide a detailed sequence of demolition and removal work to ensure uninterrupted operation of occupied areas.
- F. All affected private properties will receive door hanger notices two (2) weeks prior to any utility shutoffs or frontage demolition and improvements.

#### 1.4 JOB SITE CONDITIONS

- A. The Contractor shall visit the site and inspect the existing facilities. The City assumes no responsibility for actual condition of facilities to be demolished.
- B. Contractor shall use all means necessary to prevent the spread of dust during performance of the work. Thoroughly moisten all surfaces as required to prevent the generation of dust. No washing of streets is permitted.
- C. All liquid, and slurry generated during pavement sawcutting shall be collected and removed from the site. These liquids shall not be washed into the area storm drainage system.
- D. Contractor shall remove hazardous materials as described per the Project Asbestos and Lead Inspection Report.
- E. The Contractor prior to the commencement of the demolition or renovation, thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos, including Category I and Category II nonfriable Asbestos Containing Materials (ACM).
- F. The Contractor must also provide the Environmental Protection Agency (EPA) with a 10 working day advance notice for any disturbance of Regulated Asbestos-Containing Material (RACM) greater than 160 square feet or 260 lineal feet, and as specified in Code of Federal Regulations (CFR) Title 40, Chapter I, Subchapter C, Part 61, Subpart M, Section 61.145.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.

## **PART 2 - PRODUCTS**

NOT USED

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Notify anyone to be affected by demolition and construction activities including but not limited to: all schools, residences, businesses, garbage collection (Pittsburg Disposal Service-a Garaventa company), utility companies (PG&E-Gas Distribution, PG&E Gas Transmission, PG&E-Electric, AT&T, Comcast, Verizon, Chevron Pipeline Co, Shell Pipeline Co, Kinder Morgan, Calpine etc.), Delta Diablo (Sewer District), BART, County Connection (bus transit agency), the Owner, etc. at least ten (10) working days prior to commencing the work of this section.
- B. Site Inspection:
  - 1. Prior to all work of this section, carefully inspect the site and all objects designated to be removed and to be preserved.
  - 2. Locate all existing active utility lines traversing the site and determine the requirements for their removal and/or protection.
- C. Clarification:
  - 1. The Drawings do not purport to show all objects existing on the site.
  - 2. Before commencing the work of this section, verify with the Owner all objects to be removed and all objects to be preserved
- D. Scheduling:
  - 1. Schedule all work in a careful manner with all necessary consideration for neighbors, operation of the existing facilities, and the public.
  - 2. Avoid interference with the use of, and passage to and from, residences and adjacent facilities.
- E. Protection of Utilities: Preserve in operating condition all active utilities traversing the site and designated to remain.

### **3.2 WATER POLLUTION CONTROL**

- A. Water sprinkling, temporary enclosures, chutes and other suitable methods shall be used to limit dust and dirt rising and scattering in the air. The Contractor shall comply with all government regulations pertaining to environmental protection.

- B. The Contractor shall use equipment that will generate the least amount of dust. The Contractor shall provide dust control at all times including Saturdays, Sundays, and holidays unless directed otherwise by the Project Manager.
- C. Whenever the Contractor, in the opinion of the Project Manager, is negligent in controlling dust, the Project Manager may direct attention to the existence of a dust hazard and instruct the Contractor to immediately alleviate the dust hazard. The Contractor shall be responsible for any damage cause by dust generated as a result of the Contractor's operations.
- D. The Contractor shall have a commercial standard street vacuum/sweeper operational and in operation during each working day. The street vacuum/sweeper shall be able to pick up sand, gravel, dust, and debris, and other things, shall minimize dust generation, and shall also be available during the day and shall sweep as outlined below and as directed by the Project Manager.
- E. If the Contractor is performing work that generates dust and debris then during the day (including weekends and holidays) the sweeper shall sweep the project area (full length, width, and all lanes) twice a day sometime between 9:00a.m. and 11:00a.m. and also between 2:00p.m. and 4:00p.m. Hardscape surfaces (including pavers, sidewalks, and areas inaccessible by a mechanical sweeper) shall have dirt, dust, and debris removed by hand sweeping. If the Contractor fails to fulfill the responsibilities of this section, the City will perform or contract with others to perform the work and all costs incurred to the City shall be withheld from future payments to the Contractor.
- F. The Contractor shall clean the sidewalk and gutter as many times as needed to make sure the sidewalk and gutter are out of dirt, debris and small rocks at all times. The Contractor shall be prepared to sweep surfaces immediately at the request of the Project Manager, should the Project Manager deem it necessary for public safety and to avoid damage to properties. If streets are not satisfactorily cleaned within 12 hours from verbal or written notice by City personnel, the City will hire an independent sweeping company and deduct the cost for such work from payments due to the Contractor.
- G. Water shall not be used in a manner that creates hazardous or objectionable conditions such as ice, flooding, or pollution.
- H. The site shall be kept neat and orderly during the demolition to the maximum extent practical.
- I. Public right-of-way and private property shall be kept free of debris at all times.
- J. Stockpiles of demolished items or materials shall be removed from the site on a daily basis or stored in waste containers which shall be emptied on a weekly basis or as conditions require in order to manage the accumulation of waste.
- K. Accumulations of flammable materials shall not be permitted.

### 3.3 PROTECTION

- A. Safe passage of persons around area of demolition shall be provided in accordance with all safety and regulatory requirements. Operations shall be conducted to prevent damage to adjacent buildings, structures, other facilities, people and property. Safe passage provided by Contractor will be ADA complaint.
- B. Interior and exterior shoring, bracing, or supports shall be provided to prevent movement, settlement or collapse of structures to be demolished and to adjacent facilities to remain.
- C. Existing landscaping materials, structures, and appurtenances which are not to be demolished shall be protected and maintained as necessary.
- D. The Contractor shall protect and maintain conduits, drains, sewers, pipes and wires that are not to be demolished.
- E. Use all means necessary to protect existing objects designated to remain or to be preserved must remain operational during installation of the replacement pipeline. In the event of damage, immediately notify the Owner and make all repairs and replacements necessary for approval by the Owner at no additional cost to the Owner.

### 3.4 SURFACE DEMOLITION

- A. All asphalt concrete and all Portland cement concrete curbs, gutters, sidewalks, access ramps and driveways shall be saw-cut at the nearest scoreline or deep joint and removed entirely to the saw-cut limits.
- B. Where adjacent pavement or concrete is broken or damaged sufficiently to prohibit a sound replacement the entire damaged section shall be removed to the limits determined by the Project Manager.
- C. Asphalt concrete, sidewalk, concrete curb, and gutter materials to be demolished shall be broken up and removed from the site by the Contractor at no additional cost to the City.
- D. Where shown on the Drawings, the Contractor shall remove required pavement section including base material. Subsoil removal is also included where required to achieve design subgrade.

### 3.5 DEMOLITION BELOW THE SURFACE

- A. Existing structures, pavement slabs and structural sections to be abandoned shall be demolished to an elevation three feet below finished grade. Their



bottoms (if any remain) shall be broken thoroughly to prevent entrapment of water and all voids backfilled with suitable backfill

- B. Demolition areas and voids resulting from demolition of structures below the surface shall be completely filled.
- C. All fill, compaction, and holes created by demolition work shall be backfilled with imported clean fill. Lay fill down in layers not exceeding 6" thickness and compact per the earthwork specifications. Grade the site to drain to the nearest storm drainage system without any low points.
- D. All fill and compaction surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as shown on the Drawings.
- E. Pipes to be demolished that require no future connection shall be removed to the extent required, sealed and capped. Pipe sections shall be removed either by sawcutting, removing a complete pipe section to an existing joint, or other adequate means which results in a clean joint.
- F. The Contractor shall demolish or dismantle and remove all items that are noted for demolition and removal in the Contract Documents and that will interfere with the planned construction, or as otherwise directed by the Project Manager.
- G. The Contractor shall demolish or dismantle and remove all abandoned conduits or structures that are encountered during the prosecution of the work and which interfere with the construction of the work upon the approval of the Project Manager.

### 3.6 REMOVAL OF EXISTING WATER AND SEWER-SERVICES

- A. The Contractor shall submit to the City for approval a detailed sequence and method of work for staking, abandonment of existing sewer services, water services, water meters, boxes, and cleanouts. The submittal shall include an overview and general sequence of work; time and dates for each removal; and method and procedure for each removal.
- B. ABANDONMENT OF SEWERS:
  - 1. Contractor shall request an encroachment permit with Delta Diablo (District) for abandoning any existing sanitary sewer lateral pipes.
- C. ABANDONMENT OF WATER LINES:
  - 1. For service lines less than 4" diameter:
    - (a) Contractor shall pothole, cut out at the main, remove the corporation stop and saddle, and install a minimum 12" full circle 316 stainless steel repair clamp with 316 accessories around the pipe.

- (b) Abandon unused existing water service lines in place, if at least 18" below grade to the Project Manager's satisfaction.
2. Contact City Water Department in writing 48 hours in advance of abandonment, to check the condition of the existing services prior to abandonment.

D. GENERAL ABANDONMENT:

1. When salvage materials are shown on the Drawings; salvage and arrange the existing facilities (i.e., meters, manhole covers, manhole frames, etc.) to be dropped off at the City's Corporation Yard by prior arrangement.
2. Properly remove or abandon in place unused existing City utility service lines discovered that were left in place by others.
3. Contact utility companies for removal, abandonment, adjustment or relocation of their facilities.
4. Contractor is responsible for verifying the location of any existing utilities.
5. Abandonment of pipes will include filling pipe with slurry as specified in Section 19-3.02G – Controlled Low-Strength Material of the State Standard Specification and capping the pipes at the ends.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. See [Section 01 74 19 – Construction Waste Management and Disposal](#) for disposal, salvaging and recycling of demolished materials.
- B. Demolition and removal of debris shall be conducted to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the City. Alternate routes shall be provided to circumvent closed or obstructed traffic ways.
- C. The Contractor shall comply with all pertinent regulations of Cal/OSHA and local codes and practices.
- D. All existing materials that are designated to be salvaged shall be removed, cleaned and hauled to the City Corporation Yard, unloaded and stockpiled unless otherwise directed by the Project Manager.
- E. Site debris, rubbish and other materials resulting from demolition operations shall become the property of the Contractor and shall be removed by the Contractor at the Contractor's expense. The proper and legal disposal of demolished materials shall be the responsibility of the Contractor. All disposal sites and recycling facilities shall be approved by the City prior to initiation of the Work.
  1. Concrete debris shall be transported to a recycler of such materials.
  2. Hazardous materials shall be handled and disposed of in accordance with all applicable laws, codes, and regulations.

3.8 PATCHING AND REPAIRING

- A. The Contractor shall provide patching, replacing, repairing and refinishing of damaged areas or damaged adjacent facilities involved in the demolition.
- B. New concrete shall match the existing adjacent surfaces, in kind, or of better quality, to the satisfaction of the Project Manager, at no cost to the City or to the owners of the facilities.

3.9 CLEAN UP

- A. During and upon completion of work the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris and dust and shall leave areas affected by work in a clean, approved condition.
- B. The Contractor shall clean adjacent structures and facilities of dust, dirt and debris caused by demolition, as directed by the Project Manager, and return adjacent areas to condition existing prior to start of work.
- C. The Contractor shall clean and sweep daily all street and roads affected by its operation.

**END OF SECTION 02 41 00**

**SECTION 03 30 00 – UTILITY CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes Utility Cast-in-Place Concrete for Following Items:
1. Concrete pads around Utility facilities
  2. Miscellaneous concrete footings for signs, street lighting, retaining walls, fence posts.
  3. Thrust blocks.
  4. Manhole Base.
  5. Concrete aprons around water valves and manholes
  6. Concrete Cap for shallow cover:
  7. Retaining Walls
  8. Survey Monuments
  9. Electrical or Communications Duct Banks
  10. Drainage Inlets
  11. Concrete Headwalls
- B. Related Requirements:
1. [Section 31 23 16 – Utility Trenching](#)
  2. [Section 33 05 13 - Manholes and Structures](#)
  3. [Section 33 12 13 - Water Service Connections](#)
  4. [Section 33 11 13 – Water Distribution Piping](#)
  5. [Section 33 12 16 - Water Distribution Valves](#)
  6. [Section 33 12 19 - Water Distribution Fire Hydrants](#)
  7. [Section 33 31 13 - Sanitary Sewer Piping](#)
  8. [Section 33 41 13 - Storm Drainage Piping](#)

**1.2 REFERENCE STANDARDS**

- A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
  2. ACI 305R - Guide to Hot Weather Concreting.
  3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
  4. ACI 308.1 - Specification for Curing Concrete.
  5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
1. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  2. ASTM C33 - Standard Specification for Concrete Aggregates.

3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
6. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
7. ASTM C150 - Standard Specification for Portland Cement.
8. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
9. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
10. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
11. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
12. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
13. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
14. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
15. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
16. ASTM C685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
17. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
18. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
19. ASTM C1017 - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
20. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
21. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
22. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
23. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
24. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
25. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
26. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
27. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
28. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

29. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
30. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
31. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
32. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
33. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

C. California Department of Public Health:

1. Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1 (2010)

D. Caltrans Standard Specifications

1. Section 51 – Concrete Structures
2. Section 90 – Concrete

E. Bay Area Air Quality Management District:

1. BAAQMD Rule 8-51 - Adhesive and Sealant Applications.

### 1.3 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data on mix design, joint devices, attachment accessories, and admixtures.
- C. Design Data:
1. Submit concrete mix design for each concrete strength.
  2. Submit separate mix designs if admixtures are required for following:
    - a. Hot and cold weather concrete Work.
    - b. Air entrained concrete Work.

3. Identify mix ingredients and proportions, including admixtures.
4. Identify chloride content of admixtures and whether or not chlorides were added during manufacture.

D. Delivery Tickets: Provide delivery tickets at the time of delivery of each load of concrete. Each delivery ticket shall be accompanied by batch tickets automatically produced by the batching equipment, indicating quantities of each ingredient. Each delivery ticket shall, in addition, state the mix number, total yield in cubic yards, date and the time of day, to the nearest minute, corresponding to when the batch was loaded, when it was dispatched, when it arrived at the job, and the time that unloading began.

## 1.5 CLOSEOUT SUBMITTALS

A. [Section 01 78 00 – Closeout Submittals](#): Requirements for submittals.

## 1.6 QUALITY ASSURANCE

A. Comply with ACI 305R when pouring concrete during hot weather in [Section 32 13 13 - Concrete Surface Improvements](#) of the City Standard Specifications.

B. Comply with ACI 306.1 when pouring concrete during cold weather and as specified in [Section 32 13 13 - Concrete Surface Improvements](#) of the City Standard Specifications.

C. Acquire cement and aggregate from one source for Work.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Concrete:

1. Cement:

- a. Comply with ASTM C150, Type II - Moderate Sulfate Resistant.
- b. Type: Portland.

2. Fine and Coarse Aggregates:

- a. Conform to the requirements of Section 90-1.02C, "Aggregates", of the State Standard Specifications.

3. Water:

- a. Conform to Section 90-1.02D, "Water" of the State Standard Specifications.
- b. Potable

B. Admixtures:

1. Air Entrainment: Conform to the requirements of Section 90-1.02E(3), "Air-Entraining Admixtures" of the State Standard Specifications.
2. Chemical: Conform to the requirements of Section 90-1.02E(2), "Chemical Admixtures" of the State Standard Specifications.
3. Supplementary Cementitious Materials – Fly Ash: Conform to the requirements of Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications.
4. Supplementary Cementitious Materials – Slag: Conform to the requirements of Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications

## 2.2 CONCRETE MIX

- A. Concrete shall conform to Section 90, "Concrete" of the State Standard Specifications.
- B. Minimum 28-day compressive strength is **4,000 psi**.
- C. Concrete shall contain not less than 564 pounds of cementitious material per cubic yard, except for Cast-in-place Pipe.
- D. Ready-Mixed Concrete: Mix and deliver concrete according to ASTM C94.

## 2.7 CONSISTENCY

- A. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. Unless otherwise specified the slump for all concrete shall be in 4 inches maximum.
- B. Retempering of concrete will not be permitted

## 2.8 MIXING AND TRANSPORTING

- A. All concrete shall be mixed in mechanically operated mixers.
- B. Ready-mix concrete shall meet the requirements as to materials, batching, mixing, transporting and placing as specified herein and in accordance with ASTM C94.



- C. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one-half hours after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. If the completion of delivery and discharge exceeds the above requirements, concrete shall be rejected and shall not be used for the project.
- D. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
- E. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.
- F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the Project Manager.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, bolts, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

#### **3.2 PREPARATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Previously Placed Concrete:
  - 1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
  - 2. Remove laitance, coatings, and unsound materials.
- C. In locations where new concrete is doweled to existing work, scan for existing rebar locations, drill the holes 1/4-inch larger than the nominal dowel diameter in existing concrete to avoid existing rebar, clean and prepare the holes in

accordance with the anchoring system manufacturer's instructions and thoroughly saturate with water, have all free water removed, and be dried to a saturated surface dry condition, coat the surface of the dowel, place epoxy inside the holes and insert steel dowels as specified per Section 51-1.03E(4) of the State Standard Specification. Cure epoxy at least three (3) days or until the dowels are completely encased in epoxy. Replace dowels that fail to bond or are damaged.

- D. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- E. Remove water from areas receiving concrete before concrete is placed.
- F. Thoroughly moisten forms, subgrade and earth surfaces with water immediately before placing concrete. An approved form release agent may be used in lieu of water for the forms. These surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.
- G. Hardened concrete surfaces upon or against which concrete is to be placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface to a minimum 1/4-inch amplitude for good bond. Before new concrete is placed, the joint surfaces shall be cleaned of all laitance, loose or defective concrete and foreign material. Any water shall be removed from the surface of construction joints before the new concrete is placed.
- H. Interruptions in placing concrete will not be allowed without the written approval of the City. The Contractor shall submit its proposed method of joint construction to the City for review and approval. When interruption of concrete placement operations has been approved the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent work.
- I. All reinforcement, anchor bolts, sleeves, inserts and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the City before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.
- J. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, shall be the responsibility of Contractor.
- K. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

### 3.3 PLACING

- A. Placing of concrete shall conform to the requirements of Section 51-1.03D, "Placing Concrete", of the State Standard Specification and the requirements of this Section. All concrete which does not conform to the requirements of this Section shall be removed from the work.
- B. Concrete shall not be dropped through reinforcement steel into any form deeper than three (3) feet. In such cases, hoppers and, if necessary, vertical ducts of canvas, rubber or metal shall be used for placing concrete. In no case shall the free fall of concrete exceed three (3) feet below the ends of ducts, chutes or buggies.
- C. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet and care shall be taken to avoid inclined layers. Each layer shall be placed while the previous layer is still soft. The surface of the concrete shall be level whenever a run of concrete is stopped. The temperature of concrete when it is being placed shall be in conformance with [Section 32 13 13 - Concrete Surface Improvements](#) of the City Standard Specifications.

### 3.4 PUMPING OF CONCRETE

- A. If the pumped concrete does not produce satisfactory end results as determined by the Project Manager, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

### 3.5 CONSOLIDATION

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted in general conformance with Section 51-1.03D, "Placing Concrete," of the Caltrans Standard Specifications.

### 3.6 FINISHING CONCRETE SURFACES

- A. Exposed surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface.
- B. No treatment is required after form removal except for curing, repair of defective concrete and treatment of surface defects.
- C. After proper and adequate vibration and tamping, all exposed un-formed surfaces of pads and slabs, shall be brought to a uniform surface with suitable tools. The finish for all unformed concrete surfaces shall be a soft broom finish.

### 3.7 CURING

- A. All exposed concrete top surfaces of pads, shall be cured in conformance with [Section 32 13 13 - Concrete Surface Improvements](#) of the City Standard Specifications.

### 3.8 PROTECTION

- A. The Contractor shall protect all concrete against injury until final acceptance by the City. Holes left by form-tying and other minor imperfections as defined herein shall be repaired in an approved manner with cement grout in conformance with [Section 03 60 00 - Grouting](#).

### 3.9 FIELD QUALITY CONTROL

- A. [Section 01 45 00 - Quality Control](#): Requirements for inspecting and testing.
- B. Patching:
  - 1. Allow Project Manager to inspect concrete surfaces immediately upon removal of forms.
  - 2. Honeycombing or Embedded Debris in Concrete:
    - a. Not acceptable.
    - b. Notify the Project Manger upon discovery.
  - 3. Patch imperfections according to ACI 301 when directed by the Project Manager.
- C. Defective Concrete:
  - 1. Description: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.
  - 2. Repair or replacement of defective concrete will be determined by the Project Manager.
  - 3. Do not patch, fill, touch up, repair, or replace exposed concrete except upon express direction of the Project Manager for each individual area.

**END OF SECTION 03 30 00**

**SECTION 05 70 00**  
**DECORATIVE METAL**

**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. The scope of work outlined in this Section includes the following items of work, as detailed in these Contract Specifications, as shown on the Contract Drawings or reasonably implied therefrom and is not limited to the following items:
1. Gate A
  2. Gate B
  3. Gate C
  4. Handrails

**1.02 RELATED REQUIREMENTS**

- A. These Contract Specifications are part of the Contract Drawings and shall include but not be limited to all anchors, shapes, plates, adhesives, grouts, materials, labor, fabrication, finishing, falsework and formwork required for placement and installation, welding, hardware, anchors, plates, edges, sleeves, shapes, adhesives, grouts, , labor, materials, equipment, reasonable incidentals, and services necessary for the execution of the Work installed complete in place.
- B. Refer to all other sections, determine the extent and character of related work, and coordinate all work to produce a complete, properly constructed product.

**1.03 RELATED SECTIONS**

- |    |                  |                                |
|----|------------------|--------------------------------|
| A. | Section 03 30 00 | Utility Cast-in-Place Concrete |
| B. | Division 26      | Electrical                     |
| C. | Section 32 11 23 | Aggregate Baes Courses         |
| D. | Section 32 13 13 | Concrete Surface Improvements  |

**1.04 REFERENCES**

- A. Aluminum Association (AA)

1. AADAF45 Designation System for Aluminum Finishes
- B. ASTM International (ASTM):
1. ASTM A123 Zinc (Hot Galvanized) coatings on Products fabricated from rolled, pressed and forged shapes, plates, bars, and strip.
  2. ASTM A153 Zinc coating (Hot Dip) on iron and steel hardware.
  3. ASTM A386 Zinc coating (Hot Dip) on assembled steel products.
  4. ASTM A36 Structural Steel.
  5. ASTM A53 Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
  6. ASTM A108 Steel Bars, Carbon, Cold-Finished, Standard Quality.
  7. ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
  8. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  9. ASTM A307 Carbon Steel Externally Threaded Standard Fasteners.
  10. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
  11. ASTM A563 Carbon and Alloy Steel Nuts.
- C. American Welding Society (AWS):
1. AWS A2.0 Standard Welding Symbols.
  2. AWS A5 Welding Rods, Electrodes, and Filler Metals Series
  3. AWS A5.11 Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding

4. AWS B2.1.014 Standard Welding Procedure Specification (WPS) for Shielded Metal Arc Welding of Carbon Steel to Austenitic Stainless Steel
  5. AWS B2.1.010 Standard Welding Procedure Specification (WPS) for Gas Tungsten Arc Welding of Carbon Steel to Austenitic Stainless Steel
  6. AWS D1.1 Standard Welding code.
  7. AWS D1.2/D1.2M Structural Welding Code- Aluminum
  8. AWS D10.4 Recommended Practices for Welding Austenitic Chromium- Nickel Stainless Steel Piping and Tubing
- D. American National Standards Institute (ANSI):
1. ANSI B 18.22.1 Plane Washers.
  2. ANSI B 18.23.1 Beveled Washers.
- E. California Code of Regulations (CCR):
1. CCR Title 8, General Safety Order.
  2. CCR Title 24, California Building Standards Code
- F. Steel Structure Painting Council (SSPC)
- G. National Association of Architectural Metals Manufacturers (NAAMM)
1. NAAMM AMP-500 Metals Finishes Manual for Architectural and Metal Products

## 1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00 – Contractor Submittals for Shop Drawings, Product Data, and Samples for submittal requirements and procedures.
- B. Samples: Provide 12” length minimum sample size of each product type with the final color, and finish represented.
- C. Shop Drawings: Indicate profiles, edge and joint conditions, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.

1. Reflect all field dimensions of curbs and openings on the shop drawings.
  2. Provide fabrication and construction installation details of Gates and Handrails
  3. Provide shop drawings for Gates and Handrails including but not limited to all layouts, elevations, grease fittings, details and engineering for framing, fasteners, finishing, and foundations
- D. Product Data: Submit manufacturers' product data and installation instructions of manufactured items and for miscellaneous hardware items associated with site decorative metalwork.
- E. Welder's Certifications: Submit under provisions of Division 1, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Manufacturer's Certificate: Certify that size and type of anchor bolts, expansion anchors, and studs for connection to concrete and concrete block are suitable for the type of substrate and intended purpose.

#### **1.06 QUALITY CONTROL AND ASSURANCE**

- A. References:
1. American Society of Testing and Materials (ASTM)
  2. American Welding Society (AWS)
  3. American Institute of Steel Construction (AISC)
- B. Field measurement: Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Engineer all conditions, which prevent proper execution of this work.
- C. Shop assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordination of installation.
- D. Work Quality:
1. Shop and field work shall be performed by mechanics, craftspersons, artisans, and workers skilled and experienced in the fabrication and installation of the site decorative metalwork involved.



**PART 2 - PRODUCTS****2.01 GENERAL**

- A. For fabrication of exposed metal work, use only materials which are smooth and free of surface blemishes including pitting, roughness, seam marks, roller marks, and trade names. Do not use materials which have stains and discolorations.
- B. For exposed items of work which include plain flat surfaces in width of more than 50 times the metal thickness, provide sheet stock from mill which has been stretcher leveled to highest standard of flatness commercially available.
- C. Dissimilar Materials: Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of asphalt varnish or a coat of zinc molybdate primer to prevent galvanic or corrosive action.

**2.02 MATERIALS**

- A. Steel: ASTM A606-4, ASTM A588 and ASTM A242.
  - 1. All bolt hardware for steel shall be High-Strength Bolts: ASTM A325, Type 3
  - 2. All washers for steel shall be ASTM F436/F436M
  - 3. All inserts for Type 3 hardware shall be Stainless Steel.
- B. Steel shapes: conform to ASTM A36.
- C. Steel tubing:
  - 1. ASTM A500, Grade B.
  - 2. ASTM A501.
- D. Steel pipe: conform to ASTM A53, Grade B. Schedule 40.
- E. Steel plate: conform to ASTM A283, Grade A.
- F. Malleable iron castings: conform to ASTM A47.
- G. Welding rods: conform to requirements of AWS for intended use.
- H. Bolts, Nuts, and Washers: ASTM A325 and A307, galvanized as follows:
- I. For A307 items: Zinc electroplated per ASTM B633.

- J. Touch-up for galvanized surfaces: All State #321 Galvanizing Powder (30% tin, 30% zinc, 40% lead and flux).
- K. Miscellaneous material: as indicated or specified.
- L. Expansion Anchors: Where anchors are not included in the concrete or masonry construction, provide stainless steel expansion type anchors with matching stainless steel bolts or studs with nuts, of sizes as indicated or required to meet installation conditions. Provide stainless steel washers under all bolt heads and nuts. Expansion bolts will not be permitted for use on concrete curbs or along the edge of concrete or a concrete joint.
  - 1. Proprietary type designed for intended use (only where indicated).
    - a. ITT Phillips Drill Division Red Head Hedge or Sleeve Anchor.
    - b. Ramset Fastener Systems Ramdrill.
    - c. Hilti Co. Kwik Bolt II as applicable.
  - 2. Bolt Size: Per manufacturer for each application unless indicated otherwise. See certification requirements, above in Submittals.
  - 3. Embed Anchors: ASTM A36, galvanized
- M. Welding Materials: AWS D1.1; type required for materials being welded.
- N. Shop and Touch-Up Primer
  - 1. Tnemec Co., No.P10-99 Metal Primer.
  - 2. Rust-Oleum Co., No 769 Demo-Proof Red Primer.
  - 3. Porter International 260FD.
- O. Touch-Up Primer for Galvanized Surfaces: MS DOD-P21035, high zinc dust content paint.
- P. Temporary Falsework, Form work, Supports, Staying and Spacing: As required by project conditions for installation.
- Q. Shims and Leveling Devices: As required by project conditions.

## **2.03 FABRICATION**

- A. Obtain all parts, accessories, fittings, brackets, light fixtures, connections, clips, and incidental pieces required for the coordination and complete fabrication of Decorative Metal work prior to the start of fabrication.

- B. Shop Assembly: Preassemble items in shop to greatest possible extent to minimize splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordination of installation.
- C. Site decorative metalwork shall be fabricated by firms or shops experienced and skilled in the custom fabrication of architectural decorative metalwork. Form and fabricate the work as indicated and as required to meet installation conditions. Verify dimensions on site prior to shop fabrication.
- D. Fabricate items with joints tightly fitted and secured.
- E. Weld all shop connections. Welds shall be smooth, continuous beads, free to excessive roughness and spatter. Cap all ends. Vent for galvanization in locations which shall not collect rain water and are hidden from view upon final assembly. Grind surface welds smooth and flush to match and blend with parent metal surfaces.
- F. All edges and corners shall be radiused and smooth with no sharp points.
- G. Bends in tubes or pipes shall be precision-formed to a smooth continuous radius by skilled workers, true to detail. Butt joints shall have tight-fitting internal pipe sleeve or dowel.
- H. Butt joints in stainless steel pipe or tube railings shall not be welded. Instead, railing joints shall have internal, tight-fitting stainless steel sleeve, secured with tamper-resistant, counter-sunk stainless steel fasteners, located at the railing bottom. Butt joints in railings shall be precision- manufactured to provide tight hairline joints, slightly eased at edges to eliminate burrs and sharp edges. Provide for expansion and contraction at joints when railings exceed runs of 40 feet in length.
- I. Exposed Mechanical Fastenings: Flush countersunk stainless steel screws or bolts; concealed where possible; consistent with design of component, except where specifically noted otherwise.
- J. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise. Where items are to be embedded in concrete or masonry, provide welded-on anchors or lugs as indicated or required
- K. Assemble to give ample strength and stiffness.
- L. Scribe and fit for best appearance where exposed.
- M. Shop Fabricate Grilles and frames to the greatest extent possible in the sizes as indicated. Unless otherwise indicated, provide each grille as a single unit.

Do not exceed the manufacturer's recommended size and layout for units that are removed for maintenance and cleaning.

- N. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide pieces with hairline joints spliced together.
- O. Stainless steel welded connections shall be made in accordance with applicable requirements of AWS. Welding shall be performed in the shop unless otherwise indicated. Welded joints shall be ground and dressed smooth to match adjacent surfaces and so that the shape and profile of the item welded is maintained and so that the weld seam is invisible in the finished work. Welds shall be ground and polished to match finish.
- P. Comply with NAAMM'S Metals Finishes Manual for Architectural and Metal Products.

#### **2.04 FINISHES**

- A. All Steel and ferrous metal items exposed to the weather and moisture, gratings, and items specifically indicated, shall be galvanized after fabrication by the hot-dip process in accordance with ASTM A123. Weight of the zinc coating shall conform to the requirements specified under "Weight of Coating" in ASTM A123. Provide high-quality galvanizing in conformance with ASTM A385.
- B. Where steel components are indicated to be painted, comply with priming and painting requirements of Section 2.05.
- C. All stainless steelwork, No. 4 brush finish with consistent direction

#### **2.05 PAINT**

- A. Prep cleaners, and Etch Primer or other surface pre-treatments, where recommended by manufacturer of paint to prepare galvanized surfaces in accordance with SSPC-SP7, shall be included by the Contractor.
- B. Non-fade, resistant to discoloration and delaminate as a result of ultraviolet light or heat. Exact identification of paints to be noted on shop drawings or paint sample submittal. Paints shall be evenly applied and without pinholes, scratches, orange peeling, application marks, etc. Provide standard matte finish for applicable sign surfaces.
  - 1. MFR: Sherwin Williams or approved equal
    - a. SuperPaint
- C. Primer:

1. MFR: Sherwin Williams or approved equal
  - a. Pro Industrial Pro-Cryl Universal Acrylic Primer
- D. Cold Galvanized Paint
  1. Low VOC 90% Zinc Rich primer
    - a. MFR: Aervoe or approved equal

## **2.06 INCIDENTALS**

- A. Miscellaneous items as required to fabricate and provide operational gates including all hardware, anchors, chain, reflective tape, and zerk fittings.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify all field dimensions, curbs, elevations, and that field conditions are acceptable and are ready to receive work. Notify the Engineer in writing of any discrepancies.
- B. Beginning of installation means erector accepts existing conditions.
- C. Examine and verify all formwork to be straight and true
- D. Examine and verify all work is to dimensions shown on the Shop Drawings.

### **3.02 INSTALLATION**

- A. Install Gates and Handrails as indicated and in accordance with the approved Shop Drawings, using workers skilled and experienced in the installation of the type of work involved. Install items plumb and level, accurately fitted, free from distortion or defects and securely and rigidly attached to supporting construction and as detailed.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. All welding shall conform to requirements of the Committee for Standard Tests for Welds of the American Welding Society. All welding shall be electric arc process. Welds exposed in finish work shall be filled out flush, ground and dressed. Welders for structural shall be certified.
- D. Verify that field conditions are acceptable and are ready to receive work.

- E. Connections and anchors shall be adequate to sustain normal loads which may be imposed, securely welded or bolted, conforming to AISC standards. Excess length of bolts where exposed to view to be cut off and ground smooth. Use spacer washers when fastening through finish materials.
- F. Field welding of rails, flanges and posts shall not be allowed. Where required properly prepare area and use approved materials and method to provide durable, long lasting protection against rust.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- H. Install Gates and Handrails true and horizontal, perpendicular, or at the required angle, as the case may be, level and square, with angles and edges parallel with related lines of the building or structure.
- I. Field welding, where required, shall conform with requirements specified herein for shop welding under "Fabrication." All welds shall be ground and polished smooth to match adjacent finish surfaces.

### **3.03 FINISHING**

- A. All metal work shall be hot dip galvanized.
- B. Prepare all galvanized metal to receive primer in accordance with the manufacturer's requirements.
- C. All Metal work shall be shop finished, cleaned, etched, primed and painted in accordance with the manufacturers standard specifications.
- D. Repair or touch up of Paint shall be done in accordance with the Manufacturer's specifications.
- E. Structures which have a final galvanized finish only, but require Cold Galvanization, shall be fully finished with Cold Galvanizing paint for a uniform appearance of the entire structure. Structures which are adjacent to each other shall match in final finish.
- F. Graffiti resistant coating of all exterior exposed faces of the Park Entry Sign shall be factory applied in accordance with the manufacturer's requirements.

### **3.04 DEFECTIVE WORK**

- A. Metal work which does not meet the Contract Specifications or Contract Drawings shall be considered defective work.
- B. Color and finish of all metal work shall match. Inconsistent color, and finishing shall be considered defective work.

- C. All joints shall be straight, true, and butt tight. Joints which are not straight or exhibit gaps shall be considered defective work.
- D. Metal work which has poor welding, holds water, does not match grading, is of poor finish, has poor scoring depth, not plumb, not square, not flush, consistent even radius, or otherwise deemed non acceptable shall be considered defective work.
- E. Finishing shall be smooth, even, consistent, matching and without runs, orange peel, chips, cracks, and free of defect.
- F. Defective work shall be repaired or replaced by the contractor at no added expense to the Contract.
  - 1. The contractor shall provide a submittal for the means and methods of repair to the Engineer for review and approval. The Engineer's authorization for the Contractor to repair defective work does not provide an acceptance of defective work. All final repair work that does not meet the approval of the Engineer shall be rejected, removed and replaced at no additional cost to the contract.
  - 2. Repaired or Replaced work shall match existing work. Work which does not match may require full removal and replacement of all work.
  - 3. All labor, materials, equipment, incidentals, and work related to the repairs or replacement of work shall be done at no additional cost to the Contract.

### **3.05 WARRANTY**

- A. Warranty: 1 year including against rust.

**END OF SECTION 05 70 00**

**SECTION 12 93 00 - SITE FURNISHINGS AND ACCESSORIES****PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. The scope of work outlined in this Section includes the following items of work, as detailed in these Contract Specifications, as shown on the Contract Drawings or reasonably implied therefrom and is not limited to the following items:
  - 1. Boulder
  - 2. Filter Fabric
  - 3. Park Sign
  - 4. Soccer Corner Kick
  - 5. Soccer Goal
  
- B. Related Work:
  - 1. Section 32 11 23: Aggregate Base Courses
  - 2. Section 32 13 13: Concrete Surface Improvements
  - 3. Section 32 90 00: Landscape Work

**1.2 RELATED REQUIREMENTS**

- A. These Contract Specifications are part of the Contract Drawings and shall include all labor, materials, equipment, reasonable incidentals, and services necessary for the execution of the Work installed complete in place.
  
- B. Refer to all other sections, determine the extent and character of related work, and coordinate all work to produce a complete, properly constructed product.

**1.3 SUBMITTALS**

- A. Prepare submittals in accordance with Section 01 33 00, "Submittal Procedures".
  
- B. Submit shop drawings where noted to the Engineer for approval before installing any manufactured items. Plans shall include dimensions, color, finish, structural design (custom items), and connection details.
  
- C. Submit catalog cuts, samples and manufacturers literature of all manufactured items in this section to the Engineer for approval before installation.
  - 1. Provide color samples, brushouts, or charts for all items. Final colors to be selected by the Engineer and a sample submitted for approval.

**1.4 DELIVERY, STORAGE, AND HANDLING:**



- A. Deliver, store, and handle furnishings to prevent damage and deterioration.
- B. Stack assembled items off the ground.

#### 1.5 PROJECT CONDITIONS:

- A. Provide sleeves, anchors, inserts, bolts, clips, and other items furnished under this Section and built in with work of other trades.
- B. No work shall be installed until finish, color samples and shop drawings for the work have been reviewed and approved in writing by the Engineer and final grading and surfacing is completed.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURED ITEMS

- A. Filter Fabric:
  - 1. Product shall be 100% polyester nonwoven needle-pinched engineering geotextile fabric; Mirafi 140N or approval equal. Weight: min. 3.5 oz./sq. yd. Install with 12" overlap on all seams.
- B. Park Sign: per plans.
- C. Soccer Corner Kick: per plans.
- D. Soccer Goal
  - 1. Color White with retractable wheels per plans.

### 2.2 MISCELLANEOUS MATERIALS

- A. Boulder: per plans.
- B. All other materials for site elements shall be as specified on the plans and these specifications or as required by the mfr for installation.
- C. All hardware shall be Anti-Theft stainless steel or as provided by mfr.
- D. Epoxy
  - 1. Hilti HIT RE-500 or approved equal

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. Examination: Verify that conditions are satisfactory for installation of each item of site elements. If unsatisfactory conditions exist, do not begin installation until such conditions have been corrected.
- E. Assemble and install site furnishings in accordance with approved shop drawings and manufacturer's printed instructions.
- F. Perform fitting required for installation. Set the work accurately in location, alignment, and elevation free of rack, measured from established lines and levels. Assembled furnishings shall be firm, rigid, free of rattle, and provide maximum protection against tampering and vandalism.
- G. Boulder
  - 1. Install per plans and detail.
- H. Filter Fabric
  - 1. Install per manufacturer's specifications and detail.
- I. Park Sign
  - 1. Install per manufacturer's shop drawings, approved submittal, specifications and detail.
- J. Soccer Corner Kick
  - 1. Install per manufacturer's specifications and detail.
- K. Soccer Goal
  - 1. Install per manufacturer's specifications and detail.

### 3.2 GUARANTEE

- A. At completion of project, Contractor shall provide City with written guarantee from each manufacturer identifying the nature of warranty for each product component.
  - 1. Provide warranty manuals in accordance with Section 01 77 00, "Closeout Procedures".
- B. Contractor shall provide City with pdf manuals identifying each piece of equipment on manufacturer's recommended maintenance program including, but not limited to, daily, weekly, and monthly check lists.
  - 1. Provide maintenance manuals in accordance with Section 01 77 00, "Closeout Procedures".

- C. Contractor to provide City with minimum of two (2) mfr repair kits of each type and color of paint used on apparatus with recommended surface preparation and application guidelines.

**END OF SECTION 12 93 00**

**SECTION 26 00 00 - ELECTRICAL BASIC REQUIREMENTS****PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A Work included in 26 00 00, Electrical Basic Requirements applies to Division 26, Electrical work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of electrical systems for proposed project.
- B Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.
- C Definitions:
  - 1. Provide: To furnish and install, complete and ready for intended use.
  - 2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
  - 3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
  - 4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
  - 5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.

**1.2 RELATED SECTIONS**

- A Contents of Section applies to Division 26, Electrical Contract Documents.

- B Related Work:
  - 1. Additional conditions apply to this Division including, but not limited to:
    - a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
    - b. Drawings
    - c. Addenda
    - d. Owner/Architect Agreement
    - e. Owner/Contractor Agreement
    - f. Codes, Standards, Public Ordinances and Permits

### 1.3 REFERENCES AND STANDARDS

- A References and Standards per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, individual Division 26, Electrical Sections and those listed in this Section.
- B Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:
  - 1. State of California:
    - a. CBC - California Building Code
    - b. CEC - California Electrical Code
    - c. CEC T24 - California Energy Code Title 24
    - d. CFC - California Fire Code
    - e. CMC - California Mechanical Code
    - f. CPC - California Plumbing Code
    - g. CSFM - California State Fire Marshal
- C Reference standards and guidelines include but are not limited to the latest adopted editions from:
  - 1. ABA - Architectural Barriers Act
  - 2. ADA - Americans with Disabilities Act
  - 3. ANSI - American National Standards Institute
  - 4. APWA - American Public Works Association
  - 5. ASCE - American Society of Civil Engineers
  - 6. ASHRAE Guideline 0, the Commissioning Process
  - 7. ASTM - ASTM International
  - 8. CFR - Code of Federal Regulations
  - 9. ETL - Electrical Testing Laboratories
  - 10. FCC - Federal Communications Commission
  - 11. IBC - International Building Code

12. IEC - International Electrotechnical Commission
13. IEEE - Institute of Electrical and Electronics Engineers
14. IES - Illuminating Engineering Society
15. ISO - International Organization for Standardization
16. MSS - Manufacturers Standardization Society
17. NEC - National Electric Code
18. NECA - National Electrical Contractors Association
19. NEMA - National Electrical Manufacturers Association
20. NETA - National Electrical Testing Association
21. NFPA - National Fire Protection Association
22. OSHA - Occupational Safety and Health Administration
23. UL - Underwriters Laboratories Inc.

D See Division 26, Electrical individual Sections for additional references.

#### 1.4 SUBMITTALS

A See Division 01, General Requirements for Submittal Procedures as well as individual Division 26, Electrical Sections.

B Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Architect. Deviations will be returned without review.

- a. Provide separate submittals for power system study (per Specification Section 26 05 73) and electrical equipment (for example, switchboards and panelboards).
  - b. Provide separate submittals for lighting control cutsheets, and for lighting control shop drawings.
3. Product Data: Provide manufacturer's descriptive literature for products specified in Division 26, Electrical Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.
  - a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
  - b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 26, Electrical specification Sections for specific items required in product data submittal outside of these requirements.
  - c. See Division 26, Electrical individual Sections for additional submittal requirements outside of these requirements.
5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
6. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer's comments. Identify Engineer's comments and provide an individual response to each of the Engineer's comments. Cloud changes in the submittals and further identify changes which are in response to Engineer's comments.
7. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Division 01 and in Structural documents.

8. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 26, Electrical Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals. Electric motors are supplied and installed by Division 23 unless otherwise specified. During shop drawing stage of the project, verify correct disconnect sizes, conductor sizes, etc., and bring any discrepancies to the attention of the Mechanical trade. Be responsible for any modifications to electrical equipment or installations as a result of equipment incompatibility discovered after shop drawing review.
9. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
10. Substitutions and Variation from Basis of Design:
  - a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
  - b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.
11. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 26, Electrical specification Sections for additional requirements for shop drawings outside of these requirements.
  - a. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.
12. Samples: Provide samples when requested by individual Sections.



13. Resubmission Requirements:
  - a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
  - b. Resubmit for review until review indicates no exception taken or "make corrections as noted".
14. Operation and Maintenance Manuals, Owner's Instructions:
  - a. Submit, at one time, electronic files (PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.
    - 1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
    - 2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment.
    - 3) Include Warranty per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
    - 4) Include product certificates of warranties and guarantees.
    - 5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub assemblies.
    - 6) Include commissioning reports.
    - 7) Include copy of startup and test reports specific to each piece of equipment.
    - 8) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's

- hourly rates.
- b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 26 00 00, Electrical Basic Requirements, Demonstration.
  - c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.
15. Record Drawings:
- a. Maintain at site at least one set of drawings for recording "As-constructed" conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed electrical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
  - b. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.
  - c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD Files and drawings upon substantial completion.
  - d. See Division 26, Electrical individual Sections for additional items to include in record drawings.

## 1.5 QUALITY ASSURANCE

- A Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.
- B Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

- C Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e. distribution equipment, duct banks, light fixtures, etc.) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.
- D Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.
- E Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.
- F Provide products that are UL listed.

#### 1.6 WARRANTY

- A Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

#### 1.7 COORDINATION DOCUMENTS

- A Prior to construction, prepare and submit coordinated layout drawings (composite drawings), to coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, lights, cable tray and electrical services with architectural and structural requirements, and other trades (including plumbing, fire protection, electrical, ceiling suspension, and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e roofing, ceiling, finishes) and structural systems as submitted,

including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

- B Prepare Drawings as follows:
  - 1. Drawings in CAD Format. CAD format release equal to design documents. Drawings to be same sheet size and scale as Contract Drawings and indicate location, size and elevation above finished floor of equipment and distribution systems.
  - 2. Review and revise, as necessary, section cuts in Contract Drawings after verification of field conditions.
  - 3. Incorporate Addenda items and change orders.
  - 4. Provide additional coordination as requested by other trades.
- C Advise Architect in event conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.
- D Submit final Coordination Drawings with changes as Record Drawings at completion of project.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

### **2.2 STANDARDS OF MATERIALS AND WORKMANSHIP**

- A Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL or ETL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.
- B Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.
- C Hazardous Materials:
  - 1. Comply with local, State of California, and Federal regulations relating to hazardous materials.

2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

### **PART 3 - EXECUTION**

#### **3.1 ACCESSIBILITY AND INSTALLATION**

- A Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B Install equipment requiring access (i.e., junction boxes, light fixtures, power supplies, motors, etc.) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in passageways, doorways, scuttles or crawlspaces which would impede or block the intended usage.
- C Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.
- D Earthwork:
  1. Confirm Earthwork requirements in Contract Documents. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
    - a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork Sections. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.

- b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
  - c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.
- E Plenums:
- 1. In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.
- F Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- G Provide miscellaneous supports/metals required for installation of equipment and conduit.

### 3.2 SEISMIC CONTROL

- A Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 26 Electrical Sections.
- B General:
- 1. Earthquake resistant designs for Electrical (Division 26) equipment and distribution, i.e. power distribution equipment, generators, UPS, etc. to conform to regulations of jurisdiction having authority.
  - 2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
  - 3. Provide stamped shop drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for conduit and equipment. Submit shop drawings along with equipment submittals.
  - 4. Provide stamped shop drawings from licensed Structural Engineer of seismic flexible joints for conduit crossing building expansion or seismic joints. Submit shop drawings along with seismic bracing details.

5. Provide means to prohibit excessive motion of electrical equipment during earthquake.

### 3.3 REVIEW AND OBSERVATION

- A Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:
  1. Underground conduit installation prior to backfilling.
  2. Prior to covering walls.
  3. Prior to ceiling cover/installation.
  4. When main systems, or portions of, are being tested and ready for inspection by AHJ.
- C Final Punch:
  1. Prior to requesting a final punch visit from the Engineer, request from Engineer the Electrical Precloseout Checklist, complete the checklist confirming completion of systems' installation, and return to Engineer. Request a final punch visit from the Engineer, upon Engineer's acceptance that the electrical systems are ready for final punch.
  2. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

### 3.4 CUTTING AND PATCHING

- A Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements in Division 01, General Requirements, comply with individual Division 26, Electrical Sections and the following:
  1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).

2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and/or walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

### 3.5 EQUIPMENT SELECTION AND SERVICEABILITY

- A Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

### 3.6 DELIVERY, STORAGE AND HANDLING

- A Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
  1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Products and/or materials that become damaged due to water, dirt, and/or dust as a result of improper storage and handling to be replaced before installation.
  2. Protect equipment to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

### 3.7 DEMONSTRATION

- A Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, and individual



## Division 26, Electrical Sections.

- B Upon completion of work and adjustment of equipment, test systems and demonstrate to Owner's Authorized Representative, Architect, and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- C Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

## 3.8 CLEANING

- A Confirm Cleaning requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B Upon completion of installation, thoroughly clean electrical equipment, removing dirt, debris, dust, temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

## 3.9 INSTALLATION

- A Confirm Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B Install equipment and fixtures in accordance with manufacturers' installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
- C Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

- D Provide miscellaneous supports/metals required for installation of equipment.

### 3.10 PAINTING

- A Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
  1. Ferrous Metal: After completion of work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces (i.e., hangers, hanger rods, equipment stands, etc.) with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
  2. In Electrical Room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
  3. See individual equipment Specifications for other painting.
  4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
  5. Conduit: Clean, primer coat and paint interior/exterior conduit exposed in public areas with two coats paint suitable for metallic surfaces. Color selected by Architect.
  6. Covers: Covers such as manholes, vaults and the like will be furnished with finishes which resist corrosion and rust.

### 3.11 ACCEPTANCE

- A Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
  1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
    - a. Cleaning
    - b. Operation and Maintenance Manuals
    - c. Training of Operating Personnel
    - d. Record Drawings
    - e. Warranty and Guaranty Certificates
    - f. Start-up/Test Document and Commissioning Reports

3.12 FIELD QUALITY CONTROL

- A Confirm Field Quality Control requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
  
- B Tests:
  - 1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
  - 2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.13 LETTER OF CONFORMANCE

- A Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that Electrical items were installed in accordance with manufacturers' recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

**END OF SECTION**

**SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND  
CABLES**

**PART 1 - GENERAL**

1.1 SUMMARY

- A Work Included:
  - 1. Lugs and Pads
  - 2. Wires and Cables
  - 3. Connectors

1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Cable insulation test reports in project closeout documentation.

1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

## 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Lugs and Pads:
  - 1. Anderson
  - 2. IlSCO
  - 3. Panduit
  - 4. Thomas & Betts
  - 5. 3M
  - 6. Or approved equivalent.
  
- B Wires and Cables:
  - 1. General:
    - a. General Cable
    - b. Okonite
    - c. Southwire
    - d. Encore Wire
    - e. Or approved equivalent.
  
- C Connectors:
  - 1. Anderson Power Products
  - 2. Burndy
  - 3. IlSCO
  - 4. 3M
  - 5. Thomas & Betts
  - 6. Or approved equivalent.

2.2 LUGS AND PADS

- A Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.
- B Copper Pads: Drilled and tapped for multiple conductor terminals.
- C Lugs: Compression type for use with stranded branch circuit or control conductors; mechanical type for use with solid branch and feeder circuit conductors.

2.3 WIRES AND CABLES

- A Building Wires:
  - 1. Copper: Soft-drawn with conductivity of not less than 98 percent IACS at 20 degrees C (68 degrees F). 600 volt rated throughout. Conductors 12 AWG and 10 AWG, solid. Conductors 8 AWG and larger, stranded. 12 AWG minimum conductor size. Minimum insulation rating of 90 degrees C. Insulation Type: THHN/THWN-2.
- B Phase color to be consistent at feeder terminations; A-B-C, top to bottom, left to right, front to back.

C Color Code Conductors as Follows:

PHASE	208 VOLT WYE	480 VOLT
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray or White w/colored strip
Ground	Green	Green

- D MC Cable: Not allowed.
- E AC Cable (Armored Cable): Not allowed.
- F NMB Cable: Not allowed.
- G Service Entrance Cable: Copper conductor, 600 volt insulation, triple rated for RHH, RHW-2 and USE-2.

## 2.4 CONNECTORS

- A Split bolt connectors not allowed.
- B Conductor Branch Circuits: Wire nuts with integral spring connectors for conductors 12 AWG through 8 AWG. Push-in type connectors where conductors are not required to be twisted together are not acceptable.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A Install per manufacturer instructions and CEC.
- B Field Quality Control:
  1. Test conductor insulation on feeders of 100 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.
  2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit test reports with project closeout documents.
  3. Inspect and test in accordance with NETA Standard ATS, except Section 4.
  4. Perform inspections and tests listed in NETA Standard ATS, Section 7.3.2.

### 3.2 LUGS AND PADS

- A Thoroughly clean surfaces to remove all dirt, oil, grease or paint.
- B Use torque wrench to tighten per manufacturer's directions.

### 3.3 WIRES AND CABLES

- A General:

1. Do not install or handle thermoplastic insulated wire and cable in temperatures below -10 degrees C (14 degrees F). Do not handle thermoset insulated wire and cable in temperatures below -40 degrees C (-40 degrees F). All wire and cable must be acclimated to temperatures above freezing for no less than 24 hours prior to installation.
  2. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
  3. Install conductors with care to avoid damage to insulation.
  4. Do not apply greater tension on conductors than recommended by manufacturer during installation.
  5. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFCI circuit breakers or GFCI receptacles.
  6. Conductor Size and Quantity:
    - a. Install no conductors smaller than 12 AWG unless otherwise shown.
    - b. Provide required conductors for a fully operable system.
    - c. Power Circuits: No. 12 AWG minimum, except as follows:
      - 1) No. 10 AWG for 20A, 120V circuits longer than 70 ft.
      - 2) No. 8 AWG for 20A, 120V circuits longer than 100 ft.
    - d. When exact run lengths are determined for all branch circuits, and prior to installation of the conductors, ensure that the maximum voltage drop, based on 80 percent of the circuit protective device, does not exceed 3 percent. Increase wire size from #12AWG, if necessary, to ensure that the 3 percent voltage drop is not exceeded.
  7. Provide dedicated neutrals (one neutral conductor for each phase conductor) in all 120V circuits.
- B Conductors in Cabinets:
1. Cable and tree wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets.
  2. Tie and bundle feeder conductors in wireways of panelboards.
  3. Hold conductors away from sharp metal edges.
- C Homeruns:
1. Do not change intent of branch circuit homeruns without approval. Homeruns for 20A branch circuits may be combined to a maximum of six current carrying conductors including neutral conductors in homeruns. Apply derating factors as required per NEC. Increase conductor size as needed.



- D Identify wire and cable under the provisions of Section 26 05 53, Identification for Electrical Systems. Identify each conductor with its panel and circuit number as indicated.
- E Exposed cable is not allowed.

### 3.4 CONNECTORS

- A Install to assure a solid and safe connection.
- B Select hand twist connectors for wire size and install tightly on conductors.
- C Install compression connectors using methods and tools recommended by the manufacturer.
- D Do not install stranded conductors under screw terminals unless compression lugs are installed.
- E Do not connect wiring without UL listed connectors that are listed for the purposes.

**END OF SECTION**

## **SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A Work Included:
  - 1. Grounding Electrodes
  - 2. Connectors and Accessories
  - 3. Grounding Conductor
  - 4. Grounding Test Well

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Test reports of ground resistance for service and separately derived system grounds.

#### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. Comply with the requirements of ANSI/NFPA 70.

1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A Grounding Electrodes:
  - 1. Erico
  - 2. Thomas & Betts
  - 3. Talley
  - 4. Or approved equivalent.
- B Connectors and Accessories:
  - 1. Burndy Hyground Compression System
  - 2. Erico/Cadweld
  - 3. Amp Ampact Grounding System
  - 4. Pipe Grounding Clamp:
    - a. Burndy GAR Series
    - b. O Z Gedney
    - c. Thomas & Betts
    - d. Or approved equivalent.
- C Grounding Conductor
  - 1. General Cable
  - 2. Okonite
  - 3. Southwire
  - 4. Or approved equivalent
- D Grounding Test Well

1. Erico
2. Harger
3. Thompson
4. Or approved equivalent

## 2.2 GROUNDING ELECTRODES

- A Ground Rods: Copper-clad steel, minimum 3/4-inch diameter, 10-feet long, tapered point, chamfered top.

## 2.3 CONNECTORS AND ACCESSORIES

- A Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors.
- B Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe.

## 2.4 GROUNDING CONDUCTOR

- A Grounding Electrode Conductor: Soft-draw bare stranded copper for wire sizes larger than #10 AWG Bare. Solid copper for wire sizes #10 AWG and smaller.
- B Equipment Grounding Conductor: Green insulated, insulation type to match that of associated feeder or branch circuit wiring, size as indicated on drawings.

## 2.5 GROUNDING TEST WELL

- A Grounding Well:
1. Well Pipe: 8-inch diameter by 12-inch long clay tile pipe with belled end.
  2. Well Cover: Cast iron with legend "GROUND" embossed on cover. Provide lip on bottom of cover, sized to match interior pipe diameter to hold cover in place.

# PART 3 - EXECUTION

## 3.1 GENERAL INSTALLATION REQUIREMENTS

- A Verify site conditions prior to beginning work.

- B Bond Sections of service equipment enclosure to service ground bus.
- C Separately Derived Systems: Ground each separately derived system per NEC Article 250.
- D Corrosion inhibitors: Apply a corrosion inhibitor to contact surfaces when making grounding and bonding connections. Use corrosion inhibitor appropriate for protecting a connection between metals used.
- E Grounding system resistance to ground not to exceed 5 ohms. Make necessary modifications or additions to grounding electrode system for compliance. Submit final tests to assure that this requirement is met.
- F Resistance of grounding electrode system: measure using a four-terminal fall-of-potential method as defined in IEEE 81. Take ground resistance measurements before electrical distribution system is energized and in normally dry conditions, not less than 48 hours after last rainfall. Take resistance measurements of separate grounding electrode systems before systems are bonded together below grade. Combined resistance of separate systems may be used to meet required resistance, but specified number of electrodes must still be provided.
- G Inspect and test in accordance with NETA Standard ATS, Except Section 4.
- H Perform inspections and tests listed in NETA Standard AB, Section 7.13.

### 3.2 GROUNDING ELECTRODES INSTALLATION

- A Ground Rod Electrode:
  - 1. Verify that final backfill and compaction have been completed before driving rod electrodes.
  - 2. Bond #6 grounding electrode conductor to driven ground rods as indicated on Drawings.
  - 3. Tap at center ground rod and extend grounding electrode conductor to service grounding bus. Install grounding electrode conductor to service grounding bus in rigid PVC conduit for physical protection where grounding electrode conductor passes through concrete floor or other concrete structure.
- B Bond together metal siding not attached to grounded structure; bond to grounding electrode system.

### 3.3 CONNECTORS AND ACCESSORIES INSTALLATION

- A Install per manufacturer's instructions.

### 3.4 GROUNDING CONDUCTOR INSTALLATION

#### A Raceways:

1. Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger equipment grounding conductor is included with circuit, use grounding bushing with lay-in lug.
2. Connect metal raceways, which terminate within an enclosure but without mechanical connection to enclosure, by grounding bushings and ground conductor to grounding bus.
3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.
4. Install equipment grounding conductor, code size minimum unless noted on drawings, in metallic and nonmetallic raceway systems.

#### B Feeders and Branch Circuits:

1. Provide continuous green insulated copper equipment grounding conductors for feeders and branch circuits.
2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment grounding conductors for feeders and branch circuits sized in accordance with the latest adopted edition of NEC Article 250, Table 250-122.

- C Bond boxes, cabinets, enclosures and panelboard equipment grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.

### 3.5 GROUNDING TEST WELL INSTALLATION

- A Provide grounding test well with cover at each rod location. Install test well pipe top flush with finished grade.
- B Install per manufacturer's instructions

**END OF SECTION**

## SECTION 26 05 33 - RACEWAYS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Rigid Metal Conduit (RMC)
  - 2. Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Metal Conduit
  - 3. Liquidtight Flexible Metal Conduit (LFMC)
  - 4. Electrical Polyvinyl Chloride (PVC) Conduit
  - 5. Conduit Fittings
  
- B Provide a complete system of conduit and fittings, with associated couplings, connectors, and fittings, as shown on Drawings and described in these Specifications.

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.
  
- B In addition, reference the following:
  - 1. Section 26 05 34, Boxes

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

## 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## 1.8 DEFINITIONS

- A Raceway system is defined as consisting of conduit, tubing, duct, and fittings including but not limited to connectors, couplings, offsets, elbows, bushings, expansion/deflection fittings, and other components and accessories. Complete electrical raceway installation before starting the installation of conductors and cables.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Rigid Metal Conduit (RMC):
  1. Allied Tube & Conduit
  2. Beck Manufacturing Inc.
  3. Picoma
  4. Wheatland Tube Company
  5. Or approved equivalent.
- B Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit:
  1. Allied Tube & Conduit
  2. Thomas & Betts Corporation
  3. Robroy Industries
  4. O'kote Inc.



5. Or approved equivalent.

C Liquidtight Flexible Metal Conduit (LFMC):

1. AFC Cable Systems Inc.
2. Electri-Flex Company
3. International Metal Hose
4. Or approved equivalent.

D Electrical Polyvinyl Chloride (PVC) Conduit:

1. AFC Cable Systems Inc.
2. Electri-Flex Company
3. International Metal Hose
4. JM Eagle
5. Or approved equivalent.

E Conduit Fittings:

1. Bushings:
  - a. Insulated Type for Threaded Raceway Without Factory Installed Plastic Throat Conductor Protection:
    - 1) Thomas & Betts 1222 Series
    - 2) O-Z Gedney B Series
    - 3) Or approved Equivalent.
2. Raceway Connectors and Couplings:
  - a. Thomas & Betts Series
  - b. O-Z Gedney Series
  - c. Or approved Equivalent.

## 2.2 RIGID METAL CONDUIT (RMC)

- A UL 6, ANSI C80.1. Hot dipped galvanized steel conduit after thread cutting.
1. Fittings: NEMA FB2.10.

## 2.3 POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID METAL CONDUIT

- A Description: UL 6, ANSI C80.1, and NEMA RN 1; rigid steel conduit with external PVC coating.
1. PVC Coating: Minimum 40 mils in thickness.
- B Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

## 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A Description: UL 360, inner core made from spiral wound strip of heavy gauge, hot dipped galvanized low carbon steel. 3/4-inch through 1-1/4-inch trade sizes to have a square lock core and contain an integral bonding strip of copper. 1-1/2-inch and larger to have fully interlocked core. Jacket material to be moisture, oil and sunlight resistant flexible PVC.
- B Fittings: NEMA FB 2.20.

## 2.5 ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT

- A Description: UL 651, NEMA TC 2; Schedule 40 PVC.
- B Fittings: NEMA TC 3.

## 2.6 CONDUIT FITTINGS

- A Bushings:
  - 1. Insulated type for threaded raceway connectors without factory-installed plastic throat conductor protection.
  - 2. Insulated grounding type for threaded raceway connectors.
- B Raceway Connectors and Couplings:
  - 1. Steel connectors, couplings, and conduit bodies, hot-dip galvanized.
  - 2. Connector locknuts to be steel, with threads meeting ASTM tolerances. Locknuts to be hot-dip galvanized.
  - 3. Connector throats (EMT, flexible conduit, metal clad cable and cordset connectors) to have factory installed plastic inserts permanently installed. For normal cable or conductor exiting angles from raceway, the cable jacket or conductor insulation to bear only on plastic throat insert.
  - 4. Steel gland, Tomic or Breagle connectors and couplings are recognized for this Contract as having acceptable raceway to fitting electrical conductance.
  - 5. Set screw connectors and couplings, without integral compression glands, are recognized for this Contract as not having acceptable raceway to fitting electrical conductance. A ground conductor sized per this Specification must be included and bonded within raceway assembly utilizing this type connector or coupling.

**PART 3 - EXECUTION****3.1 GENERAL INSTALLATION REQUIREMENTS**

- A Finished Surfaces: Schedule raceway installation to avoid conflict with installed wall and ceiling surfaces. If unavoidable, coordinate work and repairs with Architect.
- B Conduit Size:
1. Minimum Size: 3/4-inch for power and control, unless otherwise noted.
- C Underground Installations:
1. More than 5-feet from Foundation Wall: Use PVC.
  2. Within 5-feet from Foundation Wall: Use PVC coated RMC.
  3. In or Under Slab on Grade: Use PVC.
  4. Minimum Size: 1-inch.
- D Provide two pull strings/tapes in empty conduits. Types:
1. Utility Company Conduit: Polyester measure/pulling tape, Greenlee 4436 or approved equivalent. Coordinate exact requirements with utility company.
  2. Feeders: Polyester measure/pulling tape, Greenlee 4436 or approved.
  3. Branch Circuits and Low Voltage: Greenlee Poly Line 431 or approved.
  4. If fish tape is used for pulling line or low voltage wiring, fiberglass type to be used. Metal fish tapes will not be allowed.
  5. Secure pull string/tape at each end.
  6. Provide caps on ends of empty conduit to be used in future.
  7. Label both ends of empty conduits with location of opposite end.
- E Elbows: Use PVC coated RMC for underground installations.
- F Verify that field measurements are as shown on Drawings.
- G Plan locations of conduit runs in advance of the installation and coordinate with ductwork, plumbing, ceiling and wall construction in the same areas.
- H Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, and walls. Penetrations are acceptable only when the following occurs:
1. Where shown on the Structural Drawings.

2. As approved by the Structural Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
- I Verify routing and termination locations of conduit prior to rough-in.
- J Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.
- K Install raceways securely, in neat and workmanlike manner, as specified in NECA 1, Standard Practices for Good Workmanship in Electrical Construction.
- L Install steel conduit as specified in NECA 101, Standard for Installing Steel Conduits.
- M Install nonmetallic conduit in accordance with manufacturer's instructions.
- N Inserts, anchors and sleeves.
1. Coordinate location of inserts and anchor bolts for electrical systems prior to concrete pour.
  2. Coordinate location of sleeves with consideration for other building systems prior to concrete pour.
- O Conduit Supports:
1. Arrange supports to prevent misalignment during wiring installation.
  2. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
  3. Group related conduits; support using conduit rack. Construct rack using steel channel. Provide space on each for 25 percent additional conduits.
  4. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
  5. Do not attach conduit to ceiling support wires.
- P Flexible metal conduit length not-to-exceed 6-feet, 3-feet in concealed walls. Provide sufficient slack to reduce the effect of vibration.
- Q Install conduit seals at boundaries where ambient temperatures differ by 10 degrees F or more as shown on the drawings. Install seals on warm side of partition.
- R Seal raceways stubbing up into electrical equipment. Plug raceways with conductors with duct-seal. Cap spare raceways and plug PVC raceway products with plastic plugs as made by Underground Products, or equal, shaped to fit snugly into the stubup.

- S Seal raceways penetrating an exterior building wall to prevent moisture and vermin from entering into the electrical equipment.
- T Use suitable caps on spare and empty conduits to protect installed conduit against entrance of dirt and moisture.
- U Keep 277/480 volt wiring independent of 120/208 volt wiring. Keep power wiring independent of communication system wiring.
- V Arrange conduit to maintain headroom and present neat appearance.
- W Do not install conduits on surface of building exterior, along vapor barrier, across roof, on top of parapet walls, or across floors, unless otherwise noted on drawings.
- X Install continuous conduit and raceways for electrical power wiring and signal systems wiring.
- Y Below Grade Conduit:
  - 1. Use PVC, PVC coated RMC.
  - 2. Provide watertight conduit sleeves and rubber seals for conduit entering building below grade, Link-Seal system by Thunderline Corporation or approved equivalent.
- Z Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- AA Maintain adequate clearance between conduit and piping.
- BB Cut conduit square using saw or pipecutter; deburr cut ends.
- CC Bring conduit to shoulder of fittings; fasten securely.
- DD Use conduit hubs to fasten conduit to cast boxes in damp and wet locations.
- EE Install no more than the equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.
- FF Use hydraulic one shot bender to fabricate elbows for bends in metal conduit larger than 2-inch size.
- GG Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

- HH Above grade raceway to freestanding electrical equipment: Where electrical equipment is mounted outside a building and connected to the building's electrical system with above grade raceway (example: switchgear connected to pull box), use liquid-tight flexible metallic conduit to avoid conduit damage due a seismic event.
- II Conduit Terminations for Signal Systems: Provide a plastic bushing on the end of conduit used for signal system wiring.
- JJ Feeders: Do not combine or change feeder runs.
- KK Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.

### 3.2 RIGID METAL CONDUIT (RMC) INSTALLATION

- A Outdoor Locations Above Grade: RMC.
- B Damp Locations: RMC.
- C In areas exposed to mechanical damage: RMC.
- D For security conduits installed exposed and subject to tampering: RMC.

### 3.3 POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID METAL CONDUIT INSTALLATION

- A Use PVC coated RMC 36-inch radius ells for power service conduits and 48-inch radius ells for telephone service conduits.

### 3.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) INSTALLATION

- A Use PVC coated liquidtight flexible metallic conduit for motors and equipment connections subject to movement or vibration and subjected to any of following conditions: Exterior location, moist or humid atmosphere, corrosive environments, water spray, oil, or grease.
- B Install 12-inch minimum slack loop on liquidtight flexible metallic conduit.

### 3.5 ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT INSTALLATION

- A Install in accordance with manufacturer's instructions.
- B Provide equipment grounding conductor in PVC conduit runs containing power conductors.
- C Underground Installation:
  - 1. Areas subject to vehicular traffic: Schedule 80 PVC.
  - 2. Utility primary and secondary conduit: Schedule 80 PVC.
  - 3. Other underground applications: Schedule 40 PVC, except where prohibited by the NEC or local codes.
- D Convert PVC conduit to Rigid Metal Conduit (RMC) prior to emerging from underground, concrete encasement, or concrete slab.
- E Provide expansion fittings to compensate for expansion and contraction per NEC 352.44.
- F PVC elbows are not acceptable. Use PVC coated RMC.
- G Trim cut ends inside and outside to remove rough edges.
- H Provide bushings when entering a box, fitting or other enclosure.

### 3.6 CONDUIT FITTINGS INSTALLATION

- A Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal metal conduit with metal thread primer. Rigid conduit connections to be threaded, clean and tight (metal to metal). Threadless connections are not permitted for RMC.
- B Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- C Use set screw type fittings only in dry locations. When set screw fittings are utilized provide insulated continuous equipment ground conductor in conduit, from overcurrent protection device to outlet.

- D Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2-inches in diameter.
- E Use threaded type fittings in wet locations, and damp or rain-exposed locations where conduit size is greater than 2-inches.
- F Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes that have feeders 60 amperes and greater.
- G Condulets and Conduit Bodies:
  - 1. Do not use condulets and conduit bodies in conduits in feeders 100 amp and larger.
- H Provide rigid conduit coupling flush with surface of slab or wall for conduit stubbed in concrete slab or wall to serve electrical equipment or an outlet under table or to supply shop tool, etc. Provide plug where conduit is to be used in future.

**END OF SECTION**



## SECTION 26 05 34 - BOXES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Outlet Boxes
  - 2. Pull and Junction Boxes
  
- B Provide electrical boxes and fittings for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts and other necessary components.

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.
  
- B In addition, reference the following:
  - 1. Section 26 05 33, Raceways
  - 2. Section 26 05 53, Identification for Electrical Systems

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A Outlet Boxes:
  - 1. Hubbell
  - 2. Thomas & Betts
  - 3. Eaton/Crouse-Hinds
  - 4. Or approved equivalent.
- B Pull and Junction Boxes:
  - 1. Eaton/Crouse-Hinds
  - 2. Hoffman
  - 3. Or approved equivalent.

2.2 OUTLET BOXES

- A Luminaire Outlet: 4-inch octagonal box, 1-1/2-inches deep with 3/8-inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.
- B Masonry Boxes: Outlets in concrete.
- C Construction: For interior locations, provide galvanized steel outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. All surface mounted outlet boxes are to be drawn. Welded boxes are not acceptable.

- D Accessories: Provide outlet box accessories for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

### 2.3 PULL AND JUNCTION BOXES

- A Construction: Provide ANSI 61 gray polyester powder painted sheet steel junction and pull boxes, with screw-on covers; of type shape and size, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.
- B Location:
  - 1. Provide junction boxes and pull boxes to facilitate installation of conductors and limiting accumulated angular sum of bends between boxes, cabinets and appliances to 270 degrees.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1, Standard Practice of Good Workmanship in Electrical Construction.
- B Secure boxes rigidly to substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- C Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NEC. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- D Set wall mounted boxes at elevations to accommodate mounting heights shown on Architectural Elevations.
- E Electrical boxes are shown on drawings in approximate locations unless dimensioned.
  - 1. Adjust box locations up to 10-feet if required to accommodate intended purpose.
- F Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture

Protection.

- G Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- H Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12-inches of box.
- I Box Color Coding and Marking: Reference Section 26 05 53, Identification for Electrical Systems.
- J Adjust boxes to be parallel with building lines. Boxes not plumb to building lines are not acceptable.
- K Install knockout closures in unused box openings.
- L Clean interior of boxes to remove dust, debris, and other material.
- M Clean exposed surfaces and restore finish.

### 3.2 OUTLET BOXES INSTALLATION

- A Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- B Use gang box where more than one device is mounted together. Do not use sectional box.
- C Use gang box with plaster ring for single device outlets.
- D Adjust flush-mounting outlets to make front flush with finished wall material.

### 3.3 PULL AND JUNCTION BOXES INSTALLATION

- A Install pull boxes and junction boxes in unfinished areas only.
- B Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

**END OF SECTION**

## **SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A Work Included:
  1. Equipment Nameplates
  2. Device Labels
  3. Wire Markers
  4. Underground Warning Tape

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals not required for this Section.

#### 1.5 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.
  2. Manufacturer's standard products of categories and types required for each application as referenced in other Division 26, Electrical Sections. Where more than a single type is specified for application, provide single selection for each product category.

3. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices unless otherwise indicated.

## 1.6 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Equipment Nameplates:
  1. B & I Nameplates
  2. Intellicum
  3. JBR Associates
  4. Or approved equivalent.
- B Device Labels:
  1. Kroy
  2. Brady
  3. Or approved equivalent.
- C Wire Markers:
  1. Brady
  2. Panduit
  3. Sumitomo
  4. Or approved equivalent.
- D Underground Warning Tape:
  1. Allen Systems
  2. Brady
  3. Or approved equivalent.

### 2.2 EQUIPMENT NAMEPLATES

- A Engraved phenolic plastic, laminate, minimum 1/16-inch thick in the size indicated, with beveled edge border matching letter color. Federal specification LP-387A. All upper case letters in engraver standard letter style of the size and wording indicated. Punched for mechanical fastening, except where adhesive

mounting is necessary due to substrate. Embossed tape style labels are not acceptable.

**B Color:**

1. Normal (Utility): White letters on black background.

**C Letter Size:**

1. Use 1/2-inch letters minimum for identifying major equipment and loads, including switchboards, distribution panels, etc.
2. Use 1/4-inch or 1/2-inch letters minimum for identifying panels, breakers, transformers, disconnects, etc.
3. Use 3/16-inch minimum for identifying source, voltage, current, phase, wire configurations, and short circuit current rating (SCCR).

**D Fasteners:** Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

**E The Architect, Engineer, Commissioning Agent and Owner reserve the right to make modifications to the nameplates as necessary.**

**F Locations:**

1. Switchboards, distribution panels, branch panels.
2. Main breakers and distribution breakers in switchboards, and distribution panels.
3. Equipment including, but not limited to, motor controllers, disconnects, and VFDs.
4. Low-voltage equipment enclosures including, but not limited to, lighting control panels.
5. Distribution transformers.

## 2.3 DEVICE LABELS

**A Extra strength, laminated adhesive tape with 3/16-inch black letters on clear background. Embossed tape/punch tape style labels are not acceptable.**

**B Junction Boxes:** Label to show system identification, source circuit, or raceway origin. In finished areas, utilize device label. In unfinished areas or above ceilings, use of permanent ink marker is acceptable.

**C Panel and circuit designation written in permanent marker on the back of the plate and inside all back-boxes and junction boxes.**

## 2.4 WIRE MARKERS

- A Description: Vinyl-cloth self-adhesive type wire markers.
- B Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, junction boxes, and each load connection.
- C Power and Lighting Circuits: Branch circuit or feeder number as indicated on drawings and source panel.
- D Control Circuits: control wire number indicated on schematic and interconnection diagrams on drawings.

## 2.5 UNDERGROUND WARNING TAPE

- A Description: 6-inch wide inert polyethylene plastic tape, 4-mil thick, detectable type, colored per APWA recommendations unless otherwise noted with suitable warning legend describing buried electrical lines.

# **PART 3 - EXECUTION**

## 3.1 GENERAL INSTALLATION REQUIREMENTS

- A Coordinate designations used on Drawings with equipment nameplates and device labels.
- B Install nameplates and labels parallel to equipment lines.
- C Identify empty conduit and boxes with intended use.
- D Provide typewritten branch panel schedules with protective clear transparent covers accounting for every breaker installed. Use actual room designations assigned by name or number near completion of the work, and not the designations shown on drawings.

## 3.2 EQUIPMENT NAMEPLATES

- A Degrease and clean surfaces to receive nameplates.



- B Secure equipment nameplates to equipment front using self-tapping stainless steel screws.
- C Secure equipment nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D Provide master nameplate at each incoming utility service to identify the following (each on a separate line):
  - 1. Serving Utility Transformer (ex. Utility Service #1).
  - 2. Project.
  - 3. Serving Utility Company.
  - 4. Consulting Engineering Firm of Record.
  - 5. Month and Year of Completion.
  - 6. Voltage, Phase, and Wire Configuration.
- E Switchboards, distribution panels and branch panels to include name, source, voltage, current, phase, wire configuration, and short circuit current rating (SCCR). Transformers to include source, KVA, and secondary voltage, phase, and wire configuration.
- F Provide nameplates for branch panelboards identifying name on front door. On inside of door provide nameplate as noted above. Verify with Architect/Owner if nameplate on outside of door is required.
- G Provide a second label at branch panelboards listing the means of identification of branch circuit conductors. This identification legend to consist of the color code used for each voltage system (208Y/120V and 480Y/277V). Include identification of both voltage systems on each label, regardless of the voltage of the panelboard to which the label is affixed. Comply with requirements of NEC 210.5.
  - 1. See Specification Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables, for required conductor color code for this project.

### 3.3 DEVICE LABELS

- A Reference 3.01, General Installation Requirements.
- B Install per manufacturer's instructions and recommendations.
- C Degrease and clean surfaces to receive labels. Fingers to be regularly cleaned of grease and debris to prevent fingerprints on labels. Labels installed dirty or with fingerprints to be replaced at no cost to Owner.

### 3.4 WIRE MARKERS

- A Reference 3.01, General Installation Requirements.
- B Install per manufacturer's instructions and recommendations.
- C Provide wire markers on each conductor for power, control, and circuits.

### 3.5 UNDERGROUND WARNING TAPE

- A Reference 3.01, General Installation Requirements.
- B Install per manufacturer's instructions and recommendations.
- C Identify underground raceways using underground warning tape. Install one continuous tape per underground raceway at 6- to 8-inches below finish grade. Where multiple underground raceways are buried in a common trench and exceeds 16-inch width, install multiple warning tapes not over 10-inches apart (edge to edge) over the entire group of underground raceways.

**END OF SECTION**

## **SECTION 26 05 73 - ELECTRICAL DISTRIBUTION SYSTEM STUDIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A Work Included:
  - 1. Protective Devices
  - 2. Short Circuit Study
  - 3. Selective Coordination Study
  - 4. Arc Flash Risk Assessment
  - 5. Arc Flash Labels
  
- B Scope of Work: Provide short circuit analysis, selective coordination study, arc flash risk assessment, and load flow/voltage-drop analysis to provide the following:
  - 1. Settings for adjustable trip breakers;
  - 2. Arc flash labeling on panelboards and switchboards per NFPA 70E;
  - 3. Demonstrate with choice of overcurrent protection and trip settings that code-required selective coordination is provided for all required systems indicated in this Section.

#### **1.2 RELATED SECTIONS**

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.
  
- B In addition, reference the following:
  - 1. Section 26 22 00, Low Voltage Transformers
  - 2. Section 26 24 13, Switchboards
  - 3. Section 26 24 16, Panelboards
  - 4. Section 26 28 00, Overcurrent Protective Devices

#### **1.3 REFERENCES AND STANDARDS**

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
  
- B In addition, meet the following:

1. IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
2. IEEE 399, Recommended Practice for Industrial and Commercial Power Systems Analysis.
3. IEEE 1584, Guide for Performing Arc Flash Calculation.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition provide:
1. Power system studies required under this Section with submittals for electrical equipment, including overcurrent protective devices.
  2. Electrical equipment ordered prior to submittal of power system studies are not compliant with these specifications, and are subject to removal and replacement at no cost to Owner where not in compliance with Code and Contract Documents for selective coordination.
    - a. Provide written verification with Stamp or Seal and signature of preparing Engineer.
  3. Provide samples of NFPA 70E compliant arc flash hazard labeling for electrical equipment.

#### 1.5 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
1. Study Preparer Qualifications: Qualified engineer of switchgear manufacturer or approved professional engineer.
    - a. Experienced in preparation of studies of similar type and magnitude.
    - b. Familiar with software analysis products specified.
  2. Computer Software for Study Preparation: Use latest edition of commercially available software utilizing specified methodologies.
    - a. Acceptable Software Products:
      - 1) EasyPower
      - 2) Operation Technology, Inc; ETAP.
      - 3) SKM Systems Analysis, Inc; Power Tools for Windows.
    - b. The above manufacturers are known to be acceptable for study purposes. At the completion of the study, provide an electronic

EasyPower file of the project to the Owner/Engineer. The file is to include all files required to edit and evaluate the electronic model, including libraries, one-lines, scenarios, TCC curves and all reports.

3. Contractor Responsibility: Provide project-related data needed by study preparer, including equipment, wire sizes, insulation types, conduit types, actual circuit lengths and available fault currents from utility. Provide information in a timely matter to allow studies to be completed prior to release of equipment.

## 1.6 WARRANTY

- A Warranty of materials and workmanship as required by 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A Analyze specific electrical and utilization equipment (according to NEC definition), actual protective devices to be used, and actual feeder lengths to be installed.
  1. Scope of Studies: New distribution wiring and equipment, from primary source to buses, branch circuit panelboards and equipment rated 50A or larger at utilization voltage.
  2. Primary Source, for Purposes of Studies: Utility company transformer secondary.
  3. Study Methodology: Comply with requirements and recommendations of NFPA 70, IEEE 399, and IEEE 242.
  4. Report: State methodology and rationale employed in making each type of calculation; identify computer software package(s) used.
- B One-Line Diagrams: Prepare schematic drawing of electrical distribution system, with electrical equipment and wiring to be protected by protective devices; identify nodes on diagrams for reference on report that includes:
  1. Calculated fault impedance, X/R ratios, utility contribution, and short circuit values (asymmetric and symmetric) at main switchboard bus and downstream devices containing protective devices.
  2. Breaker and fuse ratings.
  3. Identification of each bus, with voltage.
  4. Conduit materials, feeder sizes, actual lengths, and X/R ratios.

## 2.2 PROTECTIVE DEVICES

- A Provide protective devices of ratings and settings as required so that protective device closest to fault will open first.
- B Replace existing protective devices to achieve specified performance.
- C Analyze and determine ratings and settings of protective devices to minimize damage caused by fault and so that protective device closest to fault will open first.
  - 1. Required Ratings and Settings: Derive required ratings and settings of protective devices in consideration of upstream protective device settings and optimize system to ensure selective coordination.
  - 2. Identify any equipment that is underrated.
  - 3. Identify specified protective devices that will not achieve required protection or coordination but with minor changes can be made to do so; provide such modified devices at no additional cost to Owner and identify them on submittals as "revised in accordance with Protective Device Coordination Study"; minor changes include different trip sizes in same frame, time curve characteristics of induction relays, CT ranges, etc.
  - 4. Identify specified protective devices that will not achieve required protection or coordination and cannot be field adjusted to do so, and for which adequate devices would involve change to contract sum.
  - 5. In all cases where adequate protection or coordination cannot be achieved at no extra cost to Owner, provide a discussion of alternatives and logical compromises for best achievable coordination.
  - 6. Do not order, furnish, or install protective devices that do not meet performance requirements unless specifically approved by Engineer.
- D Protective Device Rating and Setting Chart: Summarize in tabular format required characteristics for each protective device based on analysis; include:
  - 1. Device identification.
  - 2. Relay CT ratios, tap, time dial, and instantaneous pickup.
  - 3. Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
  - 4. Fuse rating and type.
  - 5. Ground fault pickup and time delay.
  - 6. Input level and expected response time at two test points that are compatible with commonly available test equipment and ratings of protective device.

7. Highlight devices that as furnished by Contractor will not achieve required protection.

E Specified equipment has been designed and selected to achieve specified performance; ensure that equipment actually installed provides that performance.

F In addition to requirements specified elsewhere, provide overcurrent protective devices having ratings and settings in accordance with results of system studies.

### 2.3 SHORT CIRCUIT STUDY

A Calculate fault impedance to determine available 3-phase short circuit and ground fault currents at each bus and piece of equipment during normal conditions, alternate operations, emergency power conditions, and other operations that could result in maximum fault conditions.

1. Show fault currents available at key points in system down to fault current of 1,000 A at 208 V and 480V.
2. Include motor contributions in determining momentary and interrupting ratings of protective devices.
3. Primary Fault Level Assumptions: Obtain data from utility company.

### 2.4 PROTECTIVE DEVICE STUDY

A Protective Device Rating and Setting Chart: Summarize in tabular format required characteristics for each protective device based on analysis; include:

1. Device identification.
2. Relay CT ratios, tap, time dial, and instantaneous pickup.
3. Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
4. Fuse rating and type.
5. Ground fault pickup and time delay.
6. Input level and expected response time at two test points that are compatible with commonly available test equipment and ratings of protective device.
7. Highlight devices that as furnished by Contractor will not achieve required protection.

## 2.5 SELECTIVE COORDINATION STUDY

- A Selective coordination required for all Normal and Emergency systems.
- B For all overcurrent devices in systems requiring coordination, perform an organized time-current analysis of each protective device in series from individual device back to source, under normal power conditions.
  - 1. Graphically illustrate that adequate time separation exists between series devices, including upstream primary device.
  - 2. Plot specific time-current characteristics of each protective device on log-log paper.
  - 3. Organize plots so that upstream devices are clearly depicted on one sheet.
  - 4. Also show following on curve plot sheets:
    - a. Device identification.
    - b. Voltage and current transformer ratios for curves.
    - c. 3-phase and 1-phase ANSI damage curves for each transformer.
    - d. No-damage, melting, and clearing curves for fuses.
    - e. Cable damage curves.
    - f. Transformer inrush points.
    - g. Maximum short circuit cutoff point.
    - h. Simple one-line diagram for portion of system that each curve plot illustrates.
    - i. Software report for each curve plot, labeled for identification.
- C Devices to coordinate down to 0.1 seconds.

## 2.6 ARC FLASH RISK ASSESSMENT

- A Calculate arc flash incident energy (AFIE) levels and flash protection boundary distances to determine required level of personal protective equipment (PPE) at each bus and piece of equipment during normal conditions, emergency power conditions, and other operations that could result in maximum arc flash incident energy levels.
  - 1. Show flash protection boundary distance.
  - 2. Include incident energy levels.



## 2.7 ARC FLASH LABELS

- A Provide label compliant with NFPA 70E guidelines indicating personal protective equipment (PPE) recommended for servicing of electrical equipment while energized, as well as calculated incident energy levels and arc flash protective boundary distance.

## **PART 3 - EXECUTION**

### 3.1 FIELD QUALITY CONTROL

- A Provide services of qualified field engineer and necessary tools and equipment to test, calibrate, and adjust installed protective devices to conform to requirements determined by coordination analysis.
- B Adjust installed protective devices having adjustable settings to conform to requirements determined by coordination analysis.
- C Submit report showing final adjusted settings of protective devices.

### 3.2 ELECTRICAL POWER SYSTEM STUDIES

- A Short Circuit Analysis Study:
  1. Provide complete short circuit study, equipment interrupting and withstand evaluation. Study to include complete electrical distribution system, including contributions from normal source of power without alternative sources of power. Include complete low voltage distribution systems as specified in this Section.
  2. Study Basis: thoroughly cover normal and alternative operation modes that can produce maximum fault conditions, including simultaneous motor contributions.
  3. Perform study in accordance with applicable ANSI/IEEE Standards.
  4. Study Input Data: Utility company short circuit single and three phase contribution, and X/R ratio; resistance and reactance components of each feeder, busway and branch impedance; motor and generator contributions; applicable circuit parameters and contribute to short circuit duty.
  5. Calculate short circuit momentary duties and interrupting duties on basis of maximum available fault current at each switchboard, panelboard, dry-

type transformer primary and secondary and other significant locations throughout system affected by available fault current (including large equipment, disconnects, control panels, uninterruptible power supplies, etc.).

6. Perform equipment evaluation study to determine adequacy of overcurrent protection devices by tabulating and comparing short circuit ratings of these devices with available fault current. Notify Owner in writing where problem areas or inadequacies appear in electrical equipment.
7. Study Report: In bound final report, include sheets listing tabulated information from study, including feeder impedances, motor, utility impedances and fault contributions, and resulting short circuit current including asymmetrical, symmetrical, three, five and eight cycle fault current levels, and line-to-neutral and three-phase-bolted-fault current levels at each calculated point in electrical distribution system.

#### B Selective Coordination Study

1. Perform time-current coordination analysis with aid of computer software intended for this purpose. Include determination of settings, ratings, or types for overcurrent protective devices supplied.
2. Where necessary, make an appropriate compromise between system protection and service continuity with service continuity considered more important than system protection.
3. Provide sufficient number of computer generated log-log plots to indicate degree of system protection and coordination by displaying time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
4. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
  - a. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
  - b. Terminate device characteristic curves at a point reflecting maximum symmetrical fault current to which the device is exposed.
  - c. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
  - d. No more than 3 devices per TCC.
  - e. Plot the following listed characteristic curves, as applicable:

- 1) Power utility's overcurrent protective device.
  - 2) Low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
  - 3) Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
  - 4) Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
  - 5) Cables and conductors damage curves.
  - 6) Ground-fault protective devices.
  - 7) Circuit breakers in each panelboard, one of each type and rating.
5. Selective coordination of devices by use of manufacturer's tested combination data is acceptable. Devices to be shown on time current curves as required and specifically noted as a tested combination to the appropriate available fault.
  6. Study includes separate, tabular computer printout containing suggested device settings of adjustable overcurrent protective devices, equipment where device is located, and device number corresponding to device on system one-line diagram.
  7. Provide computer generated system one-line diagram which clearly identifies individual equipment buses, bus numbers, device identification numbers and maximum available short-circuit current at each bus when known.
  8. Discussion Section which evaluates degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
  9. Call significant deficiencies in protection and/or coordination to attention of Engineer and recommendations made for improvements as soon as they are identified.
  10. Contractor responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in timely manner to allow time-current analysis to be completed prior to final installation.

C Arc Flash Risk Assessment:

1. Perform arc flash risk assessment with aid of computer software intended for this purpose.
2. Perform arc flash risk assessment in conjunction with short-circuit analysis and time-current coordination analysis.
3. Submit results of assessment in tabular form, and include device or bus name, bolted fault and arcing fault current levels, flash protection

boundary distances, personal-protective equipment classes and AFIE levels.

4. Perform analysis under worst-case arc flash conditions, and final report describes, when applicable, how these conditions differ from worst-case bolted fault conditions.
5. Arc flash risk assessment includes recommendations for reducing AFIE levels and enhancing worker safety.
6. Proposed vendor demonstrates experience with arc flash risk assessment by submitting names of at least ten actual arc flash risk assessments it has performed in past year.
7. Proposed vendor demonstrates capabilities in providing equipment, services, and training to reduce arc flash exposure and train workers in accordance with NFPA 70E and other applicable standards.
8. Proposed vendor demonstrates experience in providing equipment labels in compliance with CEC and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

**END OF SECTION**

## **SECTION 26 08 05 - ELECTRICAL ACCEPTANCE TESTING**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A Work included: Testing, evaluation, and calibration of:
  - 1. Power Distribution Equipment
- B Test procedures specified in this Section are in addition to those specified in other Sections of Division 26, Electrical.

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. Acceptance Testing Criteria: Latest edition of Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, published by NETA.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Quality Assurance Submittal: Submit proof of qualification that Testing Firm meets all requirements set forth in this Section. Refer to 1.05 Quality Assurance, below.
  - 2. Test Reports:
    - a. Maintain written record of tests.

- b. At completion of project, assemble and certify a final test report. Document testing and performance compliance with NETA recommended forms, parameters, and level of detail. Submit report to Architect prior to final acceptance to include:
  - 1) Summary of Project
  - 2) Description of Equipment Tested
  - 3) Visual Inspection Report
  - 4) Description of Tests
  - 5) Test Results
  - 6) Conclusions and Recommendations

## 1.5 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  1. Qualifications of Testing Firm:
    - a. Corporately independent testing organization which can function as an unbiased testing authority, professionally independent of manufacturers, suppliers and installers of equipment or systems evaluated by testing firms.
    - b. Independent organization as defined by a NETA Level II ETT certified testing agency in compliance with NETA Level II ETT certified testing requirements and practices.
    - c. Regularly engaged in testing of electrical materials, devices, appliances, electrical installations and systems for purpose of preventing injury to persons or damage to property and other equipment.
    - d. Engaged in testing practices for minimum of five years.
    - e. Use only full-time technicians, regularly employed by firm for testing services. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians and line workers may assist, but may not perform testing or inspection services.
  2. Certifications:
    - a. Comply with NETA Level II ETT certified testing agency criteria for accreditation of testing laboratories. Full membership in NETA constitutes proof of such criteria.
    - b. Lead, on site, technical person currently certified by NETA in Electrical Power Distribution System Testing.

- c. Instruments used by testing firm to evaluate electrical performance meet NETA Specifications for Test Instruments.

## 1.6 PERFORMANCE REQUIREMENTS

- A Retain services of recognized independent testing firm for purpose of performing inspections and tests as specified.
- B Independent test firm providing report direct to Architect.
- C Material, equipment, labor and technical supervision to perform tests and inspections provided by testing firm.
- D Intent of these tests to assure that electrical equipment, Contractor or Owner supplied, is operational within industry and manufacturer's tolerances and is installed in accordance with design Specifications.
- E Tests and inspections determine suitability for energization.
- F Supply to independent testing organization complete sets of approved shop drawings, coordination study (provided by Contractor's equipment supplier under Contractor's direction), setting of adjustable devices and other information requested by testing agency.

## 1.7 SCOPE OF WORK

- A Provide testing, evaluation, and calibration of the following:
  - 1. Dry Type Transformers
  - 2. Low Voltage Circuit Breakers (greater than 100 amp)
  - 3. Switchboards
  - 4. Panelboards
  - 5. Grounding Systems
- B Test cable, equipment and systems listed above to assure proper installation, setting, connections, and functioning in accordance with the Drawings, Specifications, and the manufacturer's recommendations. It is the intent that field testing be extensive, and complete as specified, to provide positive assurance of totally correct installation and operation of equipment.
- C Furnish necessary test equipment to satisfactorily perform tests specified.

## **PART 2 - PRODUCTS**

### **2.1 POWER DISTRIBUTION EQUIPMENT**

- A The testing agency provides test equipment.
- B Care and Precautions:
  - 1. Contractor responsible for any damage to equipment or material due to improper test procedures or test apparatus handling. Replace or restore to original condition any damaged equipment or material.
  - 2. Provide and use safety devices such as rubber gloves and blankets, protective screen, barriers and danger signs to adequately protect and warn personnel in the vicinity of the tests.
  - 3. Use test equipment that is calibrated and certified traceable to the National Bureau of Standards. Certification Date: No later than 6 months.

## **PART 3 - EXECUTION**

### **3.1 FIELD QUALITY CONTROL**

- A Tests:
  - 1. Contractor's Responsibilities:
    - a. Perform routine insulation resistance, continuity and rotation tests for distribution and utilization equipment prior to and in addition to tests performed by testing firm.
    - b. Notify testing firm when equipment becomes available for acceptance tests. Coordinate work to expedite project scheduling.
  - 2. Testing Firm's Responsibilities:
    - a. Notify Architect prior to commencement of any testing.
    - b. Report directly to Architect any systems, material or installation found defective on basis of acceptance tests.
    - c. Provide auxiliary portable power supply necessary for conducting tests.

### **3.2 REPLACEMENT OF DEFECTIVE MATERIAL OR EQUIPMENT**

- A Repair or replace any material or equipment found defective or cannot pass the tests specified in this Section at no additional cost to the Owner.



- B Complete correction of defective material or equipment and retesting within the Contract period.
- C If the equipment or material cannot pass the second test, remove the defective equipment and replace it with equivalent equipment that meets the requirements of the Specifications. Such replacement at no additional cost to the Owner.

### 3.3 ADJUSTING

- A Final Settings: Testing firm responsible for implementing final settings and adjustments on protective devices and tap changes in accordance with Architect's specified values.

**END OF SECTION**

## **SECTION 26 08 10 - BUILDING LIGHTING ACCEPTANCE TESTING AND DOCUMENTATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A Work Included:
  - 1. Duties of the Team
  - 2. Time Schedule
  - 3. Acceptance Testing - Phase I - Documentation
  - 4. Acceptance Testing - Phase II - Inspection and Testing
  - 5. Acceptance Testing - Phase III - Certification
  
- B This Section describes the acceptance testing and documentation of the lighting system(s) and outlines the duties and responsibilities of the contracting team for acceptance testing.
  
- C Supply the acceptance requirements to products, equipment and systems provided under this Division, where indicated on Drawings, and where required by California Title 24 requirements.
  
- D Engage the services of a firm specializing in commissioning of lighting systems or submit contractor qualifications for review by architect where testing and documentation is to be performed by contractor.

#### **1.2 RELATED SECTIONS**

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### **1.3 REFERENCES AND STANDARDS**

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.6 COMMISSIONING TEAM

- A Form the Commissioning Team of:
  1. Electrical Contractor's Representative
  2. Lighting Controls Manufacturer's Representative
  3. Inspector of Record
  4. Owner's Staff Representative

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

3.1 DUTIES OF THE TEAM

- A The duties of the Team are as outlined in the California Title 24 requirements and summarized below:
  1. Plan, organize and implement the acceptance testing process and within 1 month of the award of the contract, submit the names and addresses of the Testing team member(s).
  2. The acceptance testing team to submit a complete description of the testing procedures and systems to be tested to the architect for review.
  3. The acceptance testing team to coordinate tests of systems and equipment and assemble documentation related to tests. Submit documentation relative to tests and proposed procedures to design engineer for review prior to submitting documentation to Authority Having Jurisdiction (AHJ). Team responsible for performing data analysis, calculation of performance indices and cross-checking of results with the requirements of California Title 24 and the Contract documents. The

installing contractor or agent responsible for testing and documentation to record their State of California Contractor's license number or their State of California Professional Registration License number on each Certificate of Acceptance for submittal.

4. Responsible for submitting Certificate of Acceptance including paper and electronic copies of measurements and monitoring results and supporting documentation to the AHJ. Where AHJ questions results or requires additional testing, complete additional testing and provide required documentation at no additional cost to the Owner.

### 3.2 TIME SCHEDULE

- A Determine the time period of the commissioning of the systems by the general contractor and acceptance testing team. It is important to note that AHJ will not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the California Title 24 standards.

### 3.3 ACCEPTANCE TESTING - PHASE I - DOCUMENTATION

- A Team to assemble documentation showing lighting fixture locations, lighting control device locations, control sequences and notes.
- B Per California Title 24 requirements, team to provide record drawings to building Owner within 90 days of receiving a final occupancy permit (reference other specification Sections for requirements on record drawings.)
- C Per California Title 24 requirements, team to provide operating and maintenance manuals to the building Owner (reference other specification Sections for requirements on operation and maintenance manuals.)

### 3.4 ACCEPTANCE TESTING - PHASE II - INSPECTION AND TESTING

- A Team to review the installation, perform acceptance testing and document results for the following systems:
  1. Occupancy Sensors
  2. Automatic Time Switch Controls
- B Review of installation to confirm lighting fixtures and lighting controls are properly located, identified, calibrated, and set points and schedules

programmed per contract document requirements.

### 3.5 ACCEPTANCE TESTING - PHASE III - CERTIFICATION

- A Team to document operating and maintenance information, complete installation certificate, and indicate test results on the Certificate of Acceptance, and submit the Certificate to the AHJ prior to receiving final occupancy permit.
- B Team to submit NRCA-LTI and NRCA-LTO forms as required by California Title 24 requirements.

### 3.6 ACCEPTANCE TESTS AND DOCUMENTATION

- A Reference State of California requirements for specific testing procedures and documentation requirements. Contractor is responsible for reviewing and complying with standards as required by Division 01, General Requirements and Section 26 00 00, Electrical Basic Requirements as well as State and governmental standards related to this work.
- B Reference California Title 24, 2022 Nonresidential Compliance Manual and Documents for specific testing procedures and documentation requirements. Contractor is responsible for reviewing and complying with these standards. The detailed requirements can be found at:  
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency>.

**END OF SECTION**

**SECTION 26 09 25 - DIGITAL LIGHTING CONTROLS****PART 1 - GENERAL**

## 1.1 SUMMARY

## A Work included:

1. General Performance
2. Lighting Control Panel with Relays and Timeclock
3. Exterior Rated Enclosure
4. Room Network (DLM Local Network)
5. Configuration Tools
6. Network Bridge
7. Segment Manager
8. Source Quality Control

## B System Description and Operation:

1. The Lighting Control and Automation system as defined under this section covers the following equipment:
  - a. Configuration Tools: Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device/room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow send and receive of room variables and store of occupancy sensor settings. Computer software also customizes room settings.
  - b. Room Network - Digital Lighting Management (DLM) Local Network: Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
  - c. Network Bridge: Provides BACnet MS/TP-compliant digital networked communication between rooms, panels, and the Segment Management or building automation system (BAS).
  - d. Segment Manager: Provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.

## 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

- A References and Standards per Division 01, General Requirements and Section 26 00 00, Electrical Basic Requirements.

1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Layout of sensors indicating their sensing distribution on reproducible Architectural Floor Plans.
  - 2. Shop Drawings: Provide wiring diagrams indicating low voltage and line voltage wiring requirements for occupancy sensors, and each digital lighting control system shown on the electrical drawings.
  - 3. Closeout Submittals:
    - a. Sustainable Design Closeout Documentation: Lighting Control System Manufacturer to provide Enhanced Start-up documentation that details the start-up procedure being performed including a process to follow, details on tests performed and an area that documents any test results.

1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. Manufacturer: Minimum 10 years experience in manufacture of architectural lighting controls.
  - 2. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.
  - 3. Lighting Control System Components: Listed by UL specifically for the required loads. Provide evidence of compliance upon request.

4. Training: Provide minimum 4-hour training session to Owner's Authorized Representatives at a time approved by Owner after Owner has received approved operation and maintenance manuals. Training to include discussion of operation, adjustment, and replacement of sensors, and control.
5. Prepare and complete report of test procedures and results. Submit these test procedures and results to Owner.

## 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Wattstopper DLM Series
- B Or approved equivalent.
- C Basis of Design: Occupancy sensor layout on Drawings are designed based on Wattstopper product line. Approved manufacturers listed below are allowed on condition of meeting specified conditions including complete sensor coverage of area controlled and switching of luminaires in area controlled. Provide additional sensors and room controllers as needed to provide same level of functionality as shown on Drawings. Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.

### 2.2 GENERAL PERFORMANCE

- A Power failure recovery - All devices return to their previous light level prior to power loss.
- B All programmable devices with integral power failure memory to maintain settings for a minimum of 10 hours during power loss.
- C Wall station and sensor replacement accomplished without programming.



## 2.3 LIGHTING CONTROL PANEL

- A The LC8 panel provides zone-based control of up to eight channels, or zones, of interior and exterior lighting. Zones respond to control signals from the system clock, to automatically turn lighting on and off. The LC8 panel uses interchangeable relay modules, that can be selected to suit project needs. Relay options include the LCSP-2 dual single-pole module and LCDP-1 double-pole module. Provide all relays and timeclock devices as needed for a complete system per SOO.
- B The LC8 includes a touchscreen interface for all programming and status feedback, and unique pre-programmed scenarios simplify setup. Exterior lighting can be controlled based on sunrise and sunset via the astronomic clock. Accessory switches provide manual control or after-hours override in conjunction with a blink warn feature.
- C The lighting control panel shall provide for up to 16 unique seven-day schedules, plus a holiday schedule, via the back-lit touchscreen interface that offers context-sensitive on-screen help. Pre-programmed control scenarios include: schedule and/or astronomic-on/off, or manual-on/schedule-off.

## 2.4 ROOM NETWORK (DLM LOCAL NETWORK)

- A The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Digital room devices connect to the network using CAT 5e cables with RJ-45 connectors which provide both data and power to room devices. Features of the DLM local network include:
  1. Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
  2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
  3. Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.

## 2.5 CONFIGURATIONS TOOLS

- A A configuration tool facilitates optional customization of DLM local networks, and is used to set up open loop daylighting sensors. A wireless configuration tool features infrared communications, while PC software connects to each local network via a USB interface.
- B Features and functionality of the wireless configuration tool to include:
1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
  2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
  3. Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers, and buttons on digital wall switches.
  4. Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.
  5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting.
  6. Adjust or fine-tune daylighting settings established during auto-commissioning, and input light level data to complete commissioning of open loop daylighting controls.

## 2.6 NETWORK BRIDGE

- A The network bridge connects a DLM local network to a BACnet-compliant network for communication between rooms, panels and a segment manager or BAS. Each local network is to include a network bridge component to provide a connection to the local network room devices. The network bridge is to use industry standard BACnet MS/TP network communication.
1. Provide Plug n' Go operation to automatically discover all room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning is to be required for set up of the network bridge on the local network.
  2. The network bridge is to automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. Standard BACnet objects are to be provided as follows:
    - a. Read/write the normal or after hours schedule state for the room.
    - b. Read the detection state of the occupancy sensor.

- c. Read/write the On/Off state of loads.
- d. Read/write the dimmed light level of loads.
- e. Read the button states of switches.
- f. Read total current in amps, and total power in watts through the room controller.
- g. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings.
- h. Activate a preset scene for the room.
- i. Read/write daylight sensor fade time and day and night setpoints.
- j. Read the current light level, in footcandles, from interior and exterior photosensors and photocells.
- k. Read/write wall switch lock status.

## 2.7 SEGMENT MANAGER

- A The Digital Lighting Management system is to include at least one segment manager to manage network communication. It is to be capable of serving up a graphical user interface via a standard web browser. Each segment manager is to have support for one segment networks as required and allow for control of a maximum of 120 local networks (rooms) and/or lighting control panels per segment network.
- B Operational features of the segment manager to include the following:
  - 1. Connection to PC or LAN via standard Ethernet TCP/IP.
  - 2. Easy to learn and use graphical user interface, compatible with Internet Explorer 11 or equal browser.
  - 3. Log in security capable of restricting some users to view-only or other limited operations.
  - 4. Automatic discovery of all DLM devices on the segment network(s). Commissioning beyond activation of the discovery function is not to be required.
  - 5. After discovery, all rooms and panels to be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
  - 6. Ability to view and modify room device operational parameters. It is to be possible to set device parameters independently for normal hours and after hours operation.
  - 7. Ability to set up schedules for rooms and panels. Schedules to automatically set controlled zones or areas to either a normal hours or after hours mode of operation.

8. Ability to group rooms and loads for common control by schedules, switches or network commands.
9. Provide seamless integration with the BAS via BACnet IP.

## 2.8 SOURCE QUALITY CONTROL

- A Perform full-function testing on all completed assemblies at end of line.
- B Diagnostics and Service - Tiered control scheme for dealing with component failure that minimizes loss of control for occupant.
  1. Bus Failure: Lights go to emergency level for safety.
  2. Failure of One Sensor Type: Ballast still controllable via other sensors.
  3. Ballast Failure: Only impacts one fixture - remainder of system operates as programmed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A Install equipment in accordance with manufacturer's installation instructions and Contract Documents.
- B Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.
- C Verify with manufacturer's representative that sensors and photocells are laid out in compliance to manufacturer's published sensing distribution. Provide additional sensors for complete coverage of space being sensed.
- D Do not install equipment until following conditions can be maintained in spaces to receive equipment:
  1. Ambient temperature: 32 degrees F to 104 degrees F.
  2. Relative Humidity: Maximum 90 percent, non-condensing.
- E Lighting control system must be protected from dust during installation.
- F Prior to applying continuous dimming daylighting controls, maintain LED lighting at full output for a minimum of 100 hours. If this is not done, replace lamps and drivers of affected luminaires at no cost to Owner.

### 3.2 STARTUP AND PROGRAMMING

- A Provide factory-certified field service engineer to ensure proper system installation and operation under following parameters:
  - 1. Qualifications for Factory-Certified Field Service Engineer:
    - a. Minimum experience of two years training in the electrical/electronic field.
    - b. Certified by the equipment manufacturer on the system installed.
  - 2. Site Visit Activities:
    - a. Verify connection of power feeds and load circuits.
    - b. Verify connection of controls.
    - c. Verify system operation control by control, circuit by circuit.
    - d. Obtain sign-off on system functions.
    - e. Demonstrate and educate Owner's Authorized Representative on system capabilities, operation and maintenance.
  
- B Tech Support: Provide factory direct technical support hotline 24 hours per day, seven days per week.

### 3.3 FIELD QUALITY CONTROL

- A Manufacturer Services:
  - 1. Aim and Focus Visit: Facility Representative to coordinate on-site meeting with Lighting Control System Manufacturer and Lighting Design Consultant to make required lighting adjustments to the system for conformance with the Lighting Design Consultant's original design intent.

### 3.4 CLOSEOUT ACTIVITIES

- A On-Site Walk Through: Lighting Control System Manufacturer to provide a factory certified Field Service Engineer to demonstrate system functionality to the Commissioning Agent.
  
- B Test lighting controls to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with Drawings and Specifications. Provide functional testing of sequences of operation to ensure operation in accordance with Drawings and Specifications. Provide complete report of test procedures and results to engineer and insert approved copy into project closeout documents.

- C Testing Includes:
1. Occupant sensing automatic controls.
  2. Automatic time a controls for exterior lighting.

**END OF SECTION**

## SECTION 26 22 00 - LOW-VOLTAGE TRANSFORMERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Two-Winding Transformers

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. UL 1561: Dry-Type General Purpose and Power Transformers.
  - 2. NEMA ST 20, Dry-Type Transformer for General Applications.
  - 3. IEEE C57.110, Recommended Practice for Establishing Transformer Capability when Supplying Nonsinusoidal Load Currents.
  - 4. CFR, Title 10, Chapter II, Sub-chapter D, Part 431, Subpart K, Energy Conservation Standards. Department of Energy (DOE) Efficiency Standards, effective Jan. 1, 2016.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Product Data: Provide data showing dimensions, weights, primary/secondary voltage, phase, connection types, frequency, rating, impedance, temperature rise, efficiency, coil material, enclosure type, K factor, and sound levels.
  - 2. Test Reports: Indicate results of factory testing as defined within this Section.

3. Operation Data: Include instructions for normal operation.
4. Maintenance Data: Include instructions for routine maintenance and testing requirements.

### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

### 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  1. Provide factory production testing per applicable standards.
    - a. NEMA ST-20.
    - b. 10 CFR Part 431 Part K Appendix A.
  2. Test each model design and submit the following reports on request.
    - a. Applied potential test
    - b. Induced voltage test
    - c. Impedance voltage and load loss test
    - d. Voltage ratio test
    - e. No load and excitation current test
    - f. Short circuit test, BIL (Basic Impulse Insulation Level) test
    - g. Partial discharge test
    - h. Sound level test
    - i. Temperature rise test

### 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Schneider Electric/Square D
- B Eaton



- C ABB/General Electric
- D Siemens
- E Powersmiths
- F Or approved equivalent.
- G Basis of Design: Schneider Electric/Square D. Manufacturers listed are allowed on condition of meeting specified conditions including available space for equipment and Code required working clearances. Remove and replace equipment installed that does not meet these conditions at no cost to Owner.

## 2.2 TWO-WINDING TRANSFORMERS

- A Description: Factory assembled, air cooled dry type transformer. Efficiency compliant with Federal Code 10 CFR Part 431 and DOE 2016 efficiency requirements. NEMA TP-1 efficiency levels are not acceptable.
- B Primary Voltage: 480 volts, 3 phase.
- C Secondary Voltage: 208Y/120 volts, 3 phase.
- D Windings: Copper.
- E Insulation system and average winding temperature rise for rated kVA as follows:
  - 1. 16-500 kVA: Class 220 with 115 degrees C rise.
- F Maximum Winding Temperature: Do not exceed 30 degrees C rise above 40 degrees C ambient at warmest point at full load.
- G Winding Taps:
  - 1. Transformers 15 kVA and Larger: NEMA ST 20.
- H Conductor Termination Lugs: Compression.
- I Sound Levels: NEMA ST 20.
- J Basic Impulse Level: 10 kV.
- K Impedance: 3 to 5 percent, unless otherwise noted on Drawings. Minimum reactance 2 percent.

- L Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- M Mounting:
  - 1. 16-75 kVA: Suitable for floor mounting.
- N Coil Conductors: Continuous windings with terminations brazed or welded.
- O Transformer Enclosure: NEMA ST 20.
  - 1. Exterior: Type 3R.
  - 2. Ventilated.
  - 3. Provide lifting eyes or brackets.
- P Isolate core and coil from enclosure using vibration-absorbing mounting pads.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A Set transformers plumb and level.
- B Use flexible conduit, 2-feet minimum length with slack, for connections to transformer case. Make conduit connections to side panel of enclosure.
- C Provide grounding and bonding in accordance with Section 26 05 26, Grounding and Bonding of Electrical Systems.
- D Clearance: Minimum 6-inches clear on sides and back. Front clearance per NEC 110.26. Maintain minimum clearance from combustible materials per NEC. Comply with manufacturers recommendations.
- E Exterior Installations: Weather resistant enclosure.
  - 1. Provide 8-inches diameter by 24-inches (above and below grade) concrete filled steel bollards where subject to vehicular traffic.
  - 2. Where grouped with switchgear refinish as required so that transformers and switchgear match in color.
- F Unacceptable Humming and Noise Levels: Revise installation as required to achieve a noise level less than or equal to those defined in NEMA ST-20 for associated transformer size or replace with a new unit with an acceptable sound level.

- G Provide Concrete Housekeeping Pad:
  - 1. Exterior Pads: Provide concrete pads of 2,500 to 3,000 PSI concrete reinforced with 8 gauge wire fabric or No. 6 reinforcing bars on 12-inch centers. Provide 10-inch thick base of gravel below pad for support. Pad extends 6-inches on all sides from exterior most prominent dimension. Provide 3/4-inch by 10-foot ground rod at each corner bonded to No. 2 AWG bare copper grounding conductor, bonded to transformer and concrete reinforcement.
  - 2. Housekeeping pads provided under provisions of Division 03, Concrete.
- H Provide arc flash labels per Section 26 05 73, Electrical Distribution System Studies.

### 3.2 FIELD QUALITY CONTROL

- A Perform field inspection, testing, and adjusting.
- B Perform inspections and tests listed in accordance with manufacturers requirements. In addition including following:
  - 1. Perform turns ratio tests at tap positions.
  - 2. Verification that as-left tap connections are as specified.
  - 3. Perform excitation-current tests on each phase.
  - 4. Measure resistance of each winding at each tap connection.
  - 5. Overpotential test on high- and low-voltage windings-to-ground.
- C Check for damage and tight connections prior to energizing transformers.

### 3.3 ADJUSTING

- A Measure primary and secondary voltages and make appropriate tap adjustments.

**END OF SECTION**

## SECTION 26 24 13 - SWITCHBOARDS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Switchboards

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.
- B In addition, reference the following:
  - 1. Section 26 05 73, Electrical Distribution System Studies.
  - 2. Section 26 28 00, Overcurrent Protective Devices.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. UL 891, Standards for Switchboards.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Product Data: For each type of switchboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
  - 2. Shop Drawings: For each switchboard and related equipment.
    - a. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show

tabulations of installed devices, equipment features, and ratings.

Include the following:

- 1) Enclosure types and details for types other than NEMA 250, Type 1.
  - 2) Bus configuration, current, and voltage ratings.
  - 3) Short-circuit current rating of switchboard and overcurrent protective devices.
  - 4) Descriptive documentation of barriers specified for electrical insulation and isolation.
  - 5) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- b. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and Maintenance Manuals:
- a. After completion of work and start-up of the equipment at the project site, deliver to the Owner's Authorized Representative operation instructions, maintenance manuals and drawings presenting full details for care and maintenance of each type of equipment provided under this Contract. Number of copies in accordance with Division 01.
  - b. Each copy to contain the operating and maintenance information and parts lists for equipment provided under this Contract. When necessary, provide supplemental drawings to show system operation and servicing maintenance points. For electrical components, provide wiring and connection diagrams. Include instructions required to accomplish specified operation and functions. Data to be neat, clean and legible.
  - c. Switchboard drawings and wiring diagrams to be included and up to date at the completion of start-up and system acceptance by the Owner. Drawings and wiring diagrams to include any field modifications or changes to reflect actual as-installed conditions.
  - d. In general, the manual to include, but not necessarily be limited to, the following:
    - 1) Switchboard Elevation and One Line.
    - 2) AC and DC Schematic and Physical Component Layout Drawings.
    - 3) Remote Interface Drawing.
    - 4) Bill of Material.
    - 5) Description of Operation.
  - e. Provide manuals in accordance with Division 01 adequately labeled with the project name and location and the contents indexed.

1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A Switchboards
  1. Basis of Design: Eaton
  2. ABB/General Electric
  3. Siemens
  4. Schneider Electric/Square D
  5. Or approved equivalent.
  
- B Manufacturers listed above are allowed on condition of meeting specified conditions including available space for equipment, Code required working clearances, and amps interrupting capacity (AIC) per short circuit study in Section 26 05 73, Electrical Distribution System Studies. Prior to submitting bid, manufacturer to provide documentation to Engineer verifying specific conditions, including those mentioned above, can be met. Remove and replace electrical equipment installed, at no cost to the Owner, that does not meet these conditions.

2.2 SWITCHBOARDS

- A Description: NEMA PB 2 freestanding switchboard with electrical ratings and configurations as indicated and specified.

- B Integrated Equipment Rating: Provide fully rated integrated equipment rating greater than the available fault current. Series rated switchboards are not acceptable. Reference drawings for available fault current. If drawings do not have available fault current shown, then coordinate with serving electrical utility. Final rating based on the protective device study completed under the provisions of Division 26, Electrical Distribution System Studies.
- C Enclosure to be suitable for having 100 percent rated circuit breakers installed and applied at 100 percent. Enclosure to meet minimum size and ventilation requirements set forth on the 100 percent circuit breaker or must be UL tested for 100 percent rating of the circuit breaker.
- D Bus Material: Copper, standard size.
- E Ground Bus: Extend length of switchboard, 50 percent of phase bus capacity.
- F Neutral Bus: 100 percent rated, full length of switchboard.
- G Lugs: Mechanical type for copper conductors.
- H Molded Case Circuit Breakers: Integral thermal and instantaneous magnetic trip in each pole.
  - 1. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
  - 2. Include shunt trip where indicated.
- I Solid-State Molded Case Circuit Breakers: With electronic sensing, timing and tripping circuits for adjustable current settings; UL listed.
  - 1. Ground fault trip, ground fault sensing integral with circuit breaker.
  - 2. Instantaneous trip.
  - 3. Adjustable short time trip.
  - 4. Adjustable long time delay.
  - 5. Adjustable short time delay.
  - 6. Adjustable short time pickup.
  - 7. Stationary mounting.
  - 8. Include shunt trip where indicated.
- J Metering Transformer Compartment: For utility company's use; compartment size, bus spacing and drilling, door, and locking and sealing requirements in accordance with utility company's requirements.
- K Utility Pull Section:
  - 1. Width as shown on Drawings. Depth and height to match switchboard.

2. Arrange as shown on Drawings.
- L Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.
- M Pull Box: Removable top and sides, same construction as switchboard.
1. Size as shown on Drawings.
  2. Provide insulating, fire-resistive bottom with separate openings for each circuit to pass into switchboard.
- N Enclosure: NEMA Type 3R - Outdoor.
1. Align sections as shown on Drawings.
  2. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.
  3. Removable front covers: Screw attached.
  4. Provide removable hinge pins on hinged doors.
  5. Provide full height barriers between sections.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL INSTALLATION REQUIREMENTS**

- A Provide concrete housekeeping pad. Extend 6-inches beyond switchboard width and depth dimensions. Minimum 3-inches above finished floor. Install plumb and level.
- B Verify that field measurements are as indicated on Shop Drawings.
- C Install in a neat and workmanlike manner and in location shown on Drawings, according to NEMA PB 2.1.
- D Adjust all operating mechanisms for free mechanical movement.
- E Tighten bolted bus connections in accordance with manufacturer's instructions.
- F Reference Section 26 08 05, Electrical Acceptance Testing for testing requirements.



### 3.2 SWITCHBOARDS INSTALLATION

- A Shop inspect and test switchboard according to NEMA PB 2.
- B Make completed switchboard available for inspection at manufacturer's factory prior to packaging for shipment. Notify Owner at least 7 days before inspection is allowed.
- C Install switchboard in accordance with manufacturer's installation instructions.
- D Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- E Provide arc flash labels.
- F Provide engraved nameplates per Section 26 05 53, Identification of Electrical Systems.
- G Perform field inspection and testing.
- H Perform inspections and tests listed in NETA STD ATS, Section 7.1.
- I Measure, using a Megger, insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each, at minimum test voltage of 1000 Vdc; minimum acceptable value for insulation resistance is 1 megohm.
- J Check tightness of accessible bolted bus joints using calibrated torque wrench per manufacturer's recommended torque values.
- K Physically test key interlock systems to check for proper functionality.
- L Adjust circuit breaker trip and time delay settings to values indicated.
- M Adjust circuit breaker trip and time delay settings to values as instructed by Engineer.
- N Clean exterior and interior of switchboard in accordance with manufacturers installation instructions.
- O Vacuum construction dust, dirt, and debris out of switchboard interior.
- P Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

**END OF SECTION**

## SECTION 26 24 16 - PANELBOARDS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Power Distribution Panelboards
  - 2. Panelboards

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.
- B In addition, reference the following:
  - 1. Section 26 05 73, Electrical Distribution System Studies.
  - 2. Section 26 24 13, Switchboards.
  - 3. Section 26 28 00, Overcurrent Protective Devices.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. UL 67, Standards for Panelboards.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Product Data: For each type of panelboard, overcurrent protective device, surge protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
  - 2. Shop Drawings: For each panelboard and related equipment.

- a. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
  - 1) Enclosure types and details for types other than NEMA 250, Type 1.
  - 2) Bus configuration, current, and voltage ratings.
  - 3) Short-circuit current rating of panelboards and overcurrent protective devices.
  - 4) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- b. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and Maintenance Manuals:
  - a. After completion of work and start-up of the equipment at the project site, deliver to the Owner's Authorized Representative operation instructions, maintenance manuals and drawings presenting full details for care and maintenance of each type of equipment provided under this Contract. Number of copies in accordance with Division 01.
  - b. Each copy to contain the operating and maintenance information and parts lists for equipment provided under this Contract. When necessary, provide supplemental drawings to show system operation and servicing maintenance points. For electrical components, provide wiring and connection diagrams. Include instructions required to accomplish specified operation and functions. Data to be neat, clean and legible.
  - c. Panelboard drawings and wiring diagrams to be included and up to date at the completion of start-up and system acceptance by the Owner. Drawings and wiring diagrams to include any field modifications or changes to reflect actual as-installed conditions.
  - d. In general, the manual to include, but not necessarily be limited to, the following:
    - 1) Panelboard Elevation and One Line.
    - 2) AC and DC Schematic and Physical Component Layout Drawings.
    - 3) Remote Interface Drawing.
    - 4) Bill of Material.
    - 5) Description of Operation.

### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

### 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

### 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A Power Distribution Panelboards:
  1. Basis of Design: Eaton
  2. ABB/General Electric
  3. Siemens
  4. Schneider Electric/Square D
  5. Or approved equivalent.
- B Panelboards:
  1. Basis of Design: Eaton
  2. ABB/General Electric
  3. Siemens
  4. Schneider Electric/Square D
  5. Or approved equivalent.
- C Manufacturers listed above are allowed on condition of meeting specified conditions including available space for equipment, Code required working clearances, and amps interrupting capacity (AIC). Prior to submitting bid, manufacturer to provide documentation to Engineer verifying specific conditions, including those mentioned above, can be met. Remove and replace electrical equipment installed, at no cost to the Owner, that does not meet these

conditions.

## 2.2 POWER DISTRIBUTION PANELBOARDS

- A Description: NEMA PB 1 Type 3R or as indicated on drawings, circuit breaker type.
- B Integrated Equipment Rating: Provide fully rated integrated equipment rating greater than the available fault current. Series rated panelboards are not acceptable. Reference drawings for available fault currents. If drawings do not have available fault current shown, then coordinate with serving electrical utility. Final rating based on the protective device study completed under the provisions of Division 26, Electrical Distribution System Studies.
- C Panelboard Bus: Non-reduced copper, ratings as indicated on drawings. Bus bar with suitable electroplating (tin) for corrosion control at connection. Provide copper ground bus in each panelboard.
- D Lugs: Mechanical type for copper conductors. All device terminals/lugs shall be rated for a minimum of 75 degrees C to facilitate the use of 75 degrees C conductor ampacity rating.
- E Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.
- F Molded Case Circuit Breakers with Current Limiters: With replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole; UL listed.
- G Solid-State Molded Case Circuit Breakers: With electronic sensing, timing and tripping circuits for adjustable current settings; UL listed.
  - 1. Ground fault trip, ground fault sensing integral with circuit breaker.
  - 2. Instantaneous trip.
  - 3. Adjustable short time trip.
  - 4. Adjustable long time delay.
  - 5. Adjustable long time pickup.
  - 6. Adjustable short time delay.
  - 7. Adjustable short time pickup.
  - 8. Stationary mounting.
  - 9. Include shunt trip where indicated.
- H Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

- I Fully equip unused spaces for future devices, including manufacturer required connections and mounting hardware.
- J Cabinet Front: Surface type door-in-door construction, metal directory frame, finished in manufacturer's standard gray enamel.
- K Surge Protective Device: Provide for emergency distribution systems equipment as required per NEC Article 700.8.

## 2.3 PANELBOARDS

- A Description: Panelboards 400 amps or less. NEMA PB1, Type 3R or as indicated on drawings, circuit breaker type. Maximum enclosure depth: 6-inches for surface mounted, 5-3/4-inches for flush mounted.
- B Maximum Width: 20-inches.
- C Integrated Equipment Rating: Provide fully rated integrated equipment rating greater than the available fault current. Series rated panelboards are not acceptable. Reference drawings for available fault current. If drawings do not have available fault current shown, then coordinate with serving electrical utility. Final rating based on the protective device study completed under the provisions of Division 26, Electrical Distribution System Studies.
- D Panelboard Bus Non-Reduced: Copper, ratings as indicated on drawings. Bus bar with suitable electroplating (tin) for corrosion control at connection. Provide copper ground bus in each panelboard.
- E Lugs: Mechanical type for copper conductors. All device terminals/lugs shall be rated for a minimum of 75 degrees C to facilitate the use of 75 degrees C conductor ampacity rating.
- F Provide double lugs and/or feed-through lugs for feed through feeders.
- G Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for poles; UL listed. Pre-drill bus for bolt-on breakers.
  - 1. Type SWD for lighting circuits.
  - 2. Type HACR for air conditioning equipment circuits.
  - 3. Class A ground fault interrupter circuit breakers where scheduled.
  - 4. Class B ground fault equipment protection circuit breakers for heat trace and other circuits as required by Code. Provide shunt trip circuit breakers

where scheduled; provide wiring to remote trip switch/contacts as indicated on Drawings.

5. Do not use tandem circuit breakers.
- H Solid-State Molded Case Circuit Breakers: With electronic sensing, timing and tripping circuits for adjustable current settings; UL listed.
1. Ground fault trip, ground fault sensing integral with circuit breaker.
  2. Instantaneous trip.
  3. Adjustable short time trip.
  4. Adjustable long time delay.
  5. Adjustable long time pickup.
  6. Adjustable short time delay.
  7. Adjustable short time pickup.
  8. Stationary mounting.
  9. Include shunt trip where indicated.
- I Accessories: Provide where indicated: shunt trip and Class A ground fault circuit interrupter (GFCI).
- J Cabinet Front: Provide flush or surface mounting as shown on the schedules, drawings, or otherwise noted. Cabinet front with concealed hinged front cover door-in-door construction, metal directory frame with heavy clear plastic protector, flush lift latch and lock, two keys per panel all keyed alike.
- K Provide boxes with removable blank end walls and interior mounting studs. Provide interior support bracket for ease of interior installation.
- L Furnish surface mounted cabinet boxes without knockouts.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL INSTALLATION REQUIREMENTS**

- A Install panelboards in accordance with NEMA PB 1.1, NECA 1 and manufacturer's installation instructions.
- B Install panelboards level and plumb. Install recessed panelboards flush with wall finishes.
- C Height: 6-feet 6-inches to top of panelboard; install panelboards taller than 6-feet 6-inches with bottom no more than 4-inches above floor.
- D Provide filler plates for unused spaces in panelboards.



- E Provide typed circuit directory for each branch circuit panelboard. Include all "spaces" and "spares." Revise directory to reflect circuiting changes and as-installed conditions. Use final Owner designated room names and numbers, and not designations shown on drawings.
- F Provide engraved plastic nameplates per Section 26 05 53, Identification for Electrical Systems.
- G Provide arc flash labels.
- H Provide concrete housekeeping pad for floor-mounted distribution panelboards. Extend 6-inches beyond distribution panel width and depth dimensions. Minimum 3-inches above finished floor. Install plumb and level.
- I Provide permanent identification number in or on panelboard dead-front adjacent to each breaker pole position. Horizontal centerline of numbers to correspond with centerline of circuit breaker pole position.
- J Paint:
  - 1. Standard factory finish unless noted otherwise.
  - 2. Panelboards located in finished interior areas in view of building occupants; paint to match adjacent wall surface. Color and paint preparation as specified by Architect. Covers to be painted off wall, then installed over dried, painted wall surface.
- K Provide handle guards on each circuit supplying obviously constant loads such as fire alarm, security, lighting controls, refrigerators and freezers, fire protection, etc.
- L Provide interior wiring diagram, neutral wiring diagram, UL label, and short circuit rating on interior or in booklet format inserted in sleeve inside panel cover.
- M Perform inspections and tests in accordance with manufacturer's requirements.
- N Thoroughly clean exterior and interior of each panelboard in accordance with manufacturer's installation instructions.
- O Vacuum construction dust, dirt, and debris out of each panelboard.
- P Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

- Q Reference Section 26 08 05, Electrical Acceptance Testing for testing requirements.

### 3.2 POWER DISTRIBUTION PANELBOARDS INSTALLATION

- A Provide handle tie to branch circuit breakers of multiwire branch circuits for simultaneous disconnection of circuits. Handle tie will be identified for use with circuit breakers provided. Reconfigure assigned circuits as necessary so that circuit breakers associate with multiwire branch circuits are physically adjacent, record changes in panelboard schedules and circuiting plans for record drawings.
- B Shunt Trip Circuit Breakers: Provide wiring to remote trip switch/contacts as indicated on Drawings.
- C Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

### 3.3 PANELBOARDS INSTALLATION

- A Provide handle tie to branch circuit breakers of multiwire branch circuits for simultaneous disconnection of circuits. Handle tie will be identified for use with circuit breakers provided. Reconfigure assigned circuits as necessary so that circuit breakers associate with multiwire branch circuits are physically adjacent, record changes in panelboard schedules and circuiting plans for record drawings.
- B Shunt Trip Circuit Breakers: Provide wiring to remote trip switch/contacts as indicated on Drawings.
- C Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

**END OF SECTION**

## SECTION 26 27 13 - ELECTRICAL METERING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Utility Metering Equipment

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Product Data: List of components for power monitoring, including dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes. Attach copies of Submittals for effected products (such as switchboards and switchgear) that describe power monitoring features to coordinate Product Data related to power monitoring.
  - 2. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
    - a. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
    - b. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators,

and other devices to be used. Describe characteristics of network and other data communication lines.

- c. Wiring Diagrams: Detail specific wiring to suit Project. Coordinate nomenclature and presentation with a block diagram, and differentiate between manufacturer-installed and field-installed wiring.
3. Closeout Documentation: Documentation that details the start-up procedure being performed including a process to follow, details on tests performed, and an area that documents any test results.

#### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

#### 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements Division 01, General Requirements.

#### 1.8 COORDINATION

- A Coordinate features of distribution equipment and power monitoring components to form an integrated interconnection of compatible components.
  1. Match components and interconnections for optimum performance of specified functions.
  2. Coordinate Work of this Section with BAS to indicate and record designated alarms registered in power monitoring displays.
    - a. Coordinate power monitoring components so metered electrical load and demand values and associated summary and trend reports specified in this Section are made accessible to the BAS system.
    - b. Log and store data from power monitoring system to facilitate production of monthly reports associated with the facility.
    - c. Provide capacity to maintain logged data for a minimum of ten years. Provide auto archive capability and locally accessible storage.

- B Coordinate Work of this Section with that in Sections specifying distribution components that are monitored by power monitoring equipment.
- C Coordinate a communication link with BAS to meet input requirements of BAS integrator and gateway equipment provided as part of BAS installation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A Manufacturers:
  - 1. Utility Metering Equipment
    - a. Meter Base:
      - 1) Circle AW.
      - 2) Or approved equivalent.
    - b. Metering Equipment Enclosure:
      - 1) ABB/General Electric
      - 2) Schneider Electric/Square D
      - 3) Eaton Electrical
      - 4) Siemens
      - 5) Or approved equivalent.

### **2.2 UTILITY METERING EQUIPMENT**

- A Meter Base: Flush mounted meter socket enclosure. Provide meter base(s) for energy/demand and reactive energy/demand bases as required by serving electric utility.
- B Terminal Cabinet: Provide terminal cabinet that meets serving utility company's requirements. Construct as an integral part of main distribution switchboard.
- C Provide fault withstand rating greater than utility determined available fault current.
- D C.T. Enclosure: Provide enclosure that meets serving utility company's requirements. Construct as an integral part of main distribution switchboard.

### **PART 3 - EXECUTION**

#### **3.1 UTILITY METERING INSTALLATION**

- A Meter Bases: Locate to provide acceptable access for meter reading and maintenance. Locate to minimize risk of physical damage.
- B Metering Equipment: Install current transformers supplied by serving electric utility.
- C Verify utility requirements prior to bidding and provide associated work required by local utility including but not limited to:
  - 1. Service underground primary including conduit, pull cord, excavation and backfill.
  - 2. Underground pull vaults.
  - 3. Transformer pads, and vaults.
  - 4. Secondary service lateral raceways.
  - 5. Grounding of transformers.
  - 6. Service metering equipment.

**END OF SECTION**

## **SECTION 26 28 00 - OVERCURRENT PROTECTIVE DEVICES**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A Work Included:
  - 1. Molded Case Circuit Breakers

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Product data and instantaneous let-through current curves and average melting time current curves for fuses supplied to project.
  - 2. Product data and time/current trip curves for circuit breakers supplied to project.

#### 1.5 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements apply to this Section.

1.6 WARRANTY

- A Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A Molded Case Circuit Breakers:
  1. Eaton Electrical
  2. ABB/General Electric
  3. Siemens
  4. Schneider Electric/Square D
  5. Or approved equivalent.

2.2 MOLDED CASE CIRCUIT BREAKERS

- A 1-, 2- or 3-pole bolt-on, single handle common trip, 600VAC or 250VAC as indicated on Drawings.
- B Overcenter toggle-type mechanism, quick-make, quick-break action. Trip indication is by handle position.
- C Calibrate for operation in 40 degrees C ambient temperature.
- D 15 to 150 Amp Breakers: Permanent trip unit containing individual thermal and magnetic trip elements in each pole.
- E 151 to 400 Amp Breakers: Adjustable magnetic trip elements. Provide push-to-trip button on cover of breaker for mechanical tripping.
- F Greater than 401 Amp: Electronic trip type with adjustments for long-time, instantaneous, and short-time functions.



### **PART 3 - EXECUTION**

#### **3.1 GENERAL INSTALLATION REQUIREMENTS**

- A Coordination:
  - 1. Obtain and review the submitted product data for equipment furnished by the Owner, and furnished under other Divisions of this contract, particularly under Divisions 22 and 23.
  - 2. Confirm the equipment nameplate maximum overcurrent protection (MOCP) and make accommodations and adjustments to overcurrent protective devices as necessary to coordinate with the nameplate rating.
- B Install all items in accordance with manufacturers written instructions.

#### **3.2 MOLDED CASE CIRCUIT BREAKERS INSTALLATION**

- A Provide testing of ground fault interrupting breakers.
- B Provide circuit breakers, as specified and on Drawings, for installation in panelboards, individual enclosures or combination motor starters.
- C Provide ground fault interrupter circuit breakers for equipment in damp or wet locations.
- D Provide device on handle to lock breaker in "ON" position for breakers feeding time switches, night lights and similar circuits required to be continuously energized.
- E Shunt Trip Circuit Breakers: Provide wiring to remote trip switch/contacts as indicated on Drawings.

**END OF SECTION**

## SECTION 26 51 00 - LIGHTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A Work Included:
  - 1. Luminaires
  - 2. LED Drivers
  - 3. Lamps
  - 4. Lighting Poles
- B Provide wiring for complete and operating lighting system.

#### 1.2 RELATED SECTIONS

- A Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

#### 1.3 REFERENCES AND STANDARDS

- A References and Standards as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. NECA 500 - Commercial Lighting.
  - 2. UL 8750 - Light Emitting Diode (LED) equipment for use in lighting products.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. Submit product data for:
    - a. LED Luminaires: Electrical ratings, dimensions, mounting, material, clearances, terminations, wiring, connection diagram, LM-79 photometric data, LM-80 lumen depreciation data.

- b. LED Drivers
  - c. Lamps
  - d. Lighting Poles
2. Submittal Cutsheets: Highlight, circle or otherwise graphically indicate which option(s) are being selected for the products submitted. Cutsheets that are not edited to indicate which products and options are submitted for this project or that list only catalog numbers to identify submitted options are not acceptable.
  3. Specified manufacturers are approved to submit bid. However, inclusion does not relieve manufacturer from supplying product as described.
  4. Provide the following operating and maintenance instructions as required by Section 26 00 00, Electrical Basic Requirements:
    - a. Luminaires
    - b. LED Drivers
    - c. Lamps
    - d. Lighting Poles

#### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

#### 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  1. Provide luminaires acceptable to code authority for application and location installed.
  2. Comply with applicable ANSI standards.
  3. Comply with applicable NEMA standards.
  4. Provide luminaires and lampholders that comply with UL standards and have been listed and labeled for location and use indicated by a testing agency acceptable by the AHJ (e.g., UL, ETL, and the like).
  5. Comply with CEC as applicable to installation and construction of luminaires.
  6. Comply with fallout and retention requirements of CBC for diffusers, baffles, and louvers.
  7. Provide LED luminaires from the same manufacturer and manufacturing LED source batch for similar applications (e.g., all LED downlights from a

single manufacturer and batch, all linear LED products from single manufacturer and batch).

## 1.7 WARRANTY

- A Warranty as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.
- B In addition, provide:
  - 1. LED Luminaire Manufacturer's Warranty: Not less than 5 years for luminaire based on date of substantial completion. Includes normal cost of labor to replace luminaire. Replacement luminaire will match physical dimensions, physical appearance, chromaticity, lumen output and photometric characteristics of original installed equipment.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A Luminaires:
  - 1. Reference description and manufacturers in Luminaire Schedule on Drawings.
  - 2. Or approved equivalent.
- B LED Drivers:
  - 1. Indoor Drivers:
    - a. eldoLED Series
    - b. Advance/Philips
    - c. Osram Sylvania
    - d. Or approved equivalent.
  - 2. Outdoor Drivers:
    - a. Advance/Philips
    - b. Osram Sylvania
    - c. LG
    - d. Or approved equivalent.
- C Lamps:
  - 1. LED (Light Emitting Diode) Lamps:
    - a. Nichia
    - b. Cree
    - c. Osram Sylvania

- d. GE Lumination
  - e. Or approved equivalent.
  - 2. Unless specific manufacturer not shown on this list is indicated in the Luminaire Schedule.
  - 3. Special types as indicated in Luminaire Schedule.
  - 4. Or approved equivalent.
- D Lighting Poles:
- 1. Reference description and manufacturers in Luminaire Schedule on Drawings.
  - 2. Or approved equivalent.

## 2.2 LUMINAIRES

- A Luminaires: Reference description and manufacturers in Luminaire Schedule on Drawings.
- B Where recessed luminaires are installed in cavities intended to be insulated, provide IC rated luminaires or other code approved installation.
- C UL label luminaires installed under canopies, roof or open porches, and similar damp or wet locations, as suitable for damp or wet location.
- D Finishes:
- 1. Manufacturer's standard finish (unless otherwise indicated) over corrosion resistant primer.
  - 2. Exterior Finishes: As detailed in Luminaire Schedule or on Drawings. Refer cases of uncertain applicability to Architect for resolution prior to release for fabrication.
- E Light Transmitting Components:
- 1. Plastic diffusers, molded or extruded of 100 percent virgin acrylic.
  - 2. Prismatic acrylic, extruded, flat diffusers, 0.125-inch overall thickness, unless otherwise noted.
- F LED Luminaires:
- 1. UL listing of luminaire includes drivers, transformers, enclosures, rated wire, communications devices and accessories needed for a complete and functional system.
  - 2. LM-79: Testing and measurement of absolute photometry, chromaticity (CCT) and luminaire power. Report provided by DOE certified independent testing laboratory. CCT as specified in Luminaire Schedule.

3. Standards: ANSI C78.377, LM-79 and LM-82 compliant for performance characteristics, photometry, colorimetry, efficacy and thermal characteristics.
4. LM-80 + TM-21: Testing and measurement, and statistical prediction of LED lamp life. Report provided by DOE certified independent testing laboratory.
5. LEDs in one module/luminaire: Supplied from same batch/bin and fall within 3-step MacAdam Ellipse, or as described in Luminaire Schedule, whichever is the more stringent requirement.
6. Provide luminaires with integral LED thermal management system (heat sinking).
7. Luminaires to be equipped with an LED driver that accepts 120V through 277V, 50Hz to 60Hz (universal). Component-to-component wiring within the luminaire will carry no more than 80 percent of rated current and be listed by UL for use at 600VAC at 302 degrees F/150 degrees C or higher. Plug disconnects to be listed by UL for use at 600VAC, 15A or higher.
8. Provide luminaires with individual LED arrays/modules and drivers that are accessible and replaceable from exposed side of the luminaire.

## 2.3 LED DRIVERS

### A General:

1. Performance: Meet dimming range called out in Luminaire Schedule, free from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experienced in a commercial environment. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
2. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
3. Minimum efficiency of 85 percent, power factor greater than or equal to 0.90, compliance with reduction of hazardous substances (RoHS). Rated for operating temperature range of area in which driver is installed.
4. Limit inrush current to minimize breaker tripping.
  - a. Base specification: NEMA 410 standard for inrush current for electronic drivers.
  - b. Preferred Specification: Meet or exceed 30 milliamp-squared-seconds at 277VAC for up to 50 watts of load and 75 amps at 240 microseconds at 277VAC for 100 watts of load.

5. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.
6. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
7. Total Harmonic Distortion less than 10 percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD at no point in the dimming curve allows imbalance current to exceed full output THD.
8. Support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:
  - a. Adjustment of forward LED voltage, supporting 3V through 55V.
  - b. Adjustment of LED current from 150mA to 1.4A at the 100 percent control input point in increments of 1mA.
  - c. Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.
9. Operate for a (+/- 10 percent) supply voltage of 120V through 277VAC at 60Hz.
10. UL Recognized under the component program and modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.
11. Ability to provide no light output when the analog control signal drops below 0.3 V, or the DALI/DMX digital signal calls for light to be extinguished and consume 0.5 watts or less in this standby. Control dead band between 0.3V and 0.65V included to allow for voltage variation of incoming signal without causing noticeable variation in luminaire to luminaire output.

**B Light Quality:**

1. Over the entire range of available drive currents, driver to provide step-free, continuous dimming to black from 100 percent to 0.1 percent and 0 percent relative light output, or 100 percent to 1 percent light output and step to 0 percent where indicated. Driver to respond similarly when raising from 0 percent to 100 percent.
  - a. Driver must be capable of 20 bit dimming resolution for white light LED drivers or 15 bit resolution for RGBW LED drivers.
2. Driver must be capable of configuring a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels.
3. Drivers to track evenly across multiple luminaires at all light levels, and must have an input signal to output light level that allows smooth adjustment over the entire dimming range.
4. Driver and luminaire electronics to deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At

all points within the dimming range from 100 percent to 0.1 percent luminaire will have:

- a. LED dimming driver to provide continuous step-free, flicker free dimming similar to incandescent source.
- b. Base specification: Based on IEEE PAR1789, minimum output frequency should be greater than 1250 Hz.
- c. Preferred specification: Flicker index to be equal to incandescent, less than 1 percent at all frequencies below 1000 Hz.

C Control Input:

1. Provide control protocol to match lighting control system specified for use with luminaire.
2. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers:
  - a. Meet IEC 60929 Annex E for General White Lighting LED drivers.
  - b. Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
  - c. Meet ESTA E1.3 for RGBW LED drivers.

## 2.4 LAMPS

A Provide lamps for luminaires.

B Provide lamp catalogued for specified luminaire type.

C Incandescent Lamps: Not allowed unless noted in Luminaire Schedule.

D LED (Light Emitting Diode):

1. LED manufacturer will include, but not be limited to, light source, luminaire, power supply and control interface with added components as needed for complete and functioning system.
  - a. Comply with ANSI chromaticity standard for classifications of color temperature. See Luminaire Schedule for specified LED lamp color and color temperature. UL or ETL listed and labeled.
  - b. Luminaire testing per IESNA LM-79 and LM-80 procedures.
  - c. Lamp life for white LEDs: 50,000 plus hours with lamp failure occurring when LED produces 70 percent of initial rated lumens.
  - d. Lamp life for color LEDs: 30,000 plus hours with lamp failure occurring when LED produces 50 percent of its initial rated lumens.
  - e. LED Drivers: Reverse polarity protection, open circuit protection, require no minimum load. Minimum 80 percent efficiency. Class A



- noise rating.
- f. Dimming: LED system capable of full and continuous dimming.
- g. Correlated Color Temperature (CCT): See Luminaire Schedule for selection of color temperature for each luminaire. Ranges given below reflect maximum allowable tolerances for color temperature range for each nominal CCT.
  - 1) Nominal CCT:
    - (a) 4000 K (3985 ± 275)
  - 2. Special types as indicated in Luminaire Schedule.

## 2.5 LIGHTING POLES

- A Provide exterior light poles, with concrete bases, which are structurally supportive of pole under design loading.
- B Provide exterior poles clean and scratch free with base bolt covers to match pole and luminaire finish.
- C Provide poles and pole bases rated for a minimum of 100 MPH, unless otherwise noted. Wind EPA loading for quantity and type of luminaire it supports with a 1.3 gust factor.
- D Provide poles with gasketed handholes, stainless steel tamper resistant hardware, anchor bolts and ground lugs.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A Install per manufacturer's written installation instructions and requirements.
- B Install luminaires securely, in neat and workmanlike manner.
- C Install luminaires of types indicated where shown and at indicated heights in accordance with manufacturer's written instructions and with recognized industry practices to ensure that luminaires comply with requirements and serve intended purposes.
- D Wiring:
  - 1. Recessed luminaires to be installed using flexible metallic conduit with luminaire conductors spliced to branch circuit conductors in nearby accessible junction box over ceiling. Junction box fastened to building

- structural member within 6-feet of luminaire.
  - 2. Luminaires for lift out and removal from ceiling pattern without disconnecting conductors or defacing ceiling materials.
  - 3. Flexible connections where permitted to exposed luminaires; neat and straight, without excess slack, attached to support device.
- E Relamp luminaires which have failed lamps at substantial completion.
- F Replace LED drivers deemed as excessively noisy by Architect, Engineer, or Owner.
- G Install accessories furnished with each luminaire.
- H Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- I Bond products and metal accessories to branch circuit equipment grounding conductor.
- J Install specified lamps in each emergency lighting unit, exit sign, and luminaire.
- K Where manufactured wiring assemblies are used, ensure that wiring assembly manufacturer sends components to appropriate luminaire manufacturer for respective installation of proper components.
- L Coordination:
  - 1. Coordination of Conditions: Coordinate ceiling construction, recessing depth and other construction details prior to ordering luminaires for shipment. Refer cases of uncertain applicability to Architect for resolution prior to release of luminaires for shipment. Where luminaires supplied do not match ceiling construction, replace luminaires at no cost to Owner.
  - 2. Electrical drawings are schematic, identifying quantity and type of luminaires used and their approximate location, but are not to be used for dimensional purposes. Reference architectural drawings for exact locations, including mounting heights.
  - 3. Provide lighting indicated on Drawings with luminaire of the type designated and appropriate for location.
  - 4. Provide LED luminaires with driver compatible to lighting control system as shown in drawings and as specified.
  - 5. Where remote drivers are required, ensure adequate accessibility to driver. Upsize conductors between luminaire and driver to accommodate voltage drop.
- M Field Quality Control:

1. Perform field inspection in accordance with Division 01, General Requirements.
2. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

N Cleaning:

1. Clean electrical parts to remove conductive and deleterious materials.
2. Remove dirt and debris from enclosures.
3. Clean paint splatters, dirt, dust, fingerprints, and debris from luminaires.
4. Clean photometric control surfaces as recommended by manufacturer.
5. Clean finishes and touch up damaged finishes per by manufacturer's instructions.

O Demonstrate luminaire operation for minimum of two hours.

### 3.2 LUMINAIRES

- A Install per manufacturer's written installation instructions and requirements.
- B Avoid interference with and provide clearance from equipment. Where indicated locations for luminaires conflict with locations for equipment, change locations for luminaire by minimum distance necessary as directed by Architect.
- C Adjusting:
1. Aim and adjust luminaires as indicated.
  2. Align luminaires that are not straight and parallel/perpendicular to structure.

### 3.3 LED DRIVERS

- A Install lamps per manufacturer's installation instructions and requirements.
- B Protect 0-10V input from line voltage mis-connection, and so it will be immune and the output unresponsive to induced AC voltage on the control leads.

### 3.4 LIGHTING POLES

- A Install lighting poles per manufacturer's installation instructions and requirements.
- B Exterior Luminaire Supports:

1. Provide concrete bases for pole-mounted lighting units and bollard lights at locations shown on site plan drawing(s). Provide concrete bases as shown on drawings or as recommended by manufacturer if not shown on drawings. Minimum base height above grade in automobile areas is 30-inches. Install luminaire poles plumb.
2. Install pole concrete bases in undisturbed or compacted soil. Where soil is disturbed provide backfill and compaction per Division 31, Earthwork requirements.

**END OF SECTION**

**SECTION 27 00 00 - COMMUNICATIONS BASIC REQUIREMENTS****PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A Work included in 27 00 00, Communications Basic Requirements applies to Division 27, Communications work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of communications systems for proposed project.
- B Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.
- C Definitions:
  - 1. Provide: To furnish and install, complete and ready for intended use.
  - 2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
  - 3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
  - 4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
  - 5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.
  - 6. Entrance Facility (EF): Area or location that contains entrance point (demarcation) cable and associated equipment for telecommunication services entering the building.
  - 7. Main Point of Entry (MPOE): Area or location where service providers terminate and handoff to customer owned premise cabling system.

8. Main Telecommunications Room (MTR): Location that services as the main distribution point for client/Owner telecommunications system. The MTR connects to each TR and the MPOE. MTR should not be accessible by the service providers. In most cases the MTR is a private space.
9. Telecommunications Room (TR): Area or location containing telecommunications equipment, cable terminations and cross-connect wiring. Three applications serviced by TRs are horizontal cable connections, backbone system interconnection and entrance facilities. The TR provides facilities (space, power, grounding, etc.) for housing telecommunications equipment. TR may contain a MC, IC or HC and a demarcation point or an interbuilding entrance facility.
10. Interbuilding Cable: Backbone cable associated with connecting buildings together in a multibuilding or campus environment.

## 1.2 RELATED SECTIONS

- A Contents of Section applies to Division 27, Communications Contract Documents.
- B Related Work:
  1. Additional conditions apply to this Division including, but not limited to:
    - a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
    - b. 27 00 00 - Communications
    - c. 27 05 28 Pathways for Communications Systems
    - d. Drawings
    - e. Addenda
    - f. Codes, Standards, Public Ordinances and Permits

## 1.3 REFERENCES AND STANDARDS

- A References and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 27, Communications Sections and those listed in this Section.
- B Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:
  1. State of California:
    - a. CBC - California Building Code
    - b. CEC - California Electrical Code

- c. CEC T24 - California Energy Code Title 24
  - d. CFC - California Fire Code
  - e. CMC - California Mechanical Code
  - f. CPC - California Plumbing Code
  - g. CSFM - California State Fire Marshal
- C Reference codes, standards and guidelines include but are not limited to the latest adopted editions from:
- 1. ABA - Architectural Barriers Act
  - 2. ADA - Americans with Disabilities Act
  - 3. ANSI - American National Standards Institute
    - a. ANSI/TIA-526-7-A Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
    - b. ANSI/TIA-568.0-D - Generic Telecommunications Cabling for Customer Premises
    - c. ANSI/TIA-568.1-D - Commercial Building Telecommunications Infrastructure Standard
    - d. ANSI/TIA-568.2-D - Balanced Twisted-Pair Telecommunications Cabling and Components Standard
    - e. ANSI/TIA-568.2-D-2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2
    - f. ANSI/TIA-568.3-D - Optical Fiber Cabling Components Standard. Commercial Building Telecommunications Cabling Standard
    - g. ANSI/TIA-568.3-D-1 - Optical Fiber Cabling Components Standard.
    - h. ANSI/TIA-569-E - Commercial Building Standard for Telecommunications Pathways and Spaces
    - i. ANSI/TIA-598-D - Optical Fiber Cable Color Coding
    - j. ANSI/TIA-598-D-1 - Optical Fiber Color Coding in Cable Addendum 1, additional Colors for Elements 3-16
    - k. ANSI/TIA-598-D-2 - Optical Fiber Cable Color Coding Addendum 2, Jacket Color for OM5 Indoor Fiber Cables
    - l. ANSI/TIA-606-C - Administration Standard for Commercial Telecommunications Infrastructure
    - m. ANSI/TIA-J-STD-607-D - Generic Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
    - n. TIA-758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard
  - 4. APWA - American Public Works Association
  - 5. ASCE - American Society of Civil Engineers
  - 6. ASHRAE - Guideline 0, the Commissioning Process
  - 7. ASIS INTL - American Society for Industrial Security International
  - 8. ASTM - ASTM International

9. AVIXA - Producer of InfoComm and international trade organization representing the audiovisual industry
10. BICSI - Building Industry Consulting Service International
  - a. BICSI TDMM - Telecommunications Distribution Methods Manual, 14th Edition
  - b. BICSI OSPDRM - Outside Plant Design Reference Manual, 6th Edition
11. CFR - Code of Federal Regulations
12. EPA - Environmental Protection Agency
13. ETL - Electrical Testing Laboratories
14. FCC - Federal Communications Division
15. IBC - International Building Code
16. IEC - International Electrotechnical Commission
17. IEEE - Institute of Electrical and Electronics Engineers
18. IFC - International Fire Code
19. ISO - International Organization for Standardization
20. NEC - National Electric Code
21. NEMA - National Electrical Manufacturers Association
22. OSHA - Occupational Safety and Health Administration
23. TIA - Telecommunications Industry Association
24. UL - Underwriters Laboratories Inc.

#### 1.4 SUBMITTALS

- A See Division 01, General Requirements for Submittal Procedures.
- B Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.
- C In addition:
  1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
  2. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail. For electronic format, provide one file per division containing one bookmarked PDF file



- with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.
3. Catalog cut sheets and information directly related to each individual item being submitted. Identification of items must contain the physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish. Clearly indicate on each sheet what is being submitted on with red rectangles and red arrows.
  4. Product Data: Provide manufacturer's descriptive literature for products specified in Division 27, Communications Sections.
  5. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and Drawings.
    - a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
    - b. Provide a red rectangle around part number and description with corresponding red arrow pointing to the item/material being submitted.
      - 1) Submit one submittal per specification section in Division 27. As stated above, identify all items being submitted for approval prior to installation.
    - c. Include technical data, installation instructions, and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 27, Communications specification Sections for specific items required in product data submittal outside of these requirements.
    - d. See Division 27, Communications individual Sections for additional submittal requirements outside of these requirements.
  6. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.

7. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer's comments. Identify Engineer's comments and provide an individual response to each of the Engineer's comments. Cloud changes in the submittals and further identify changes which are in response to Engineer's comments.
8. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support to meet the AHJ terms of satisfaction. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components.
9. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 27, Communications Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
10. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
11. Substitutions and Variation from Basis of Design:
  - a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
  - b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals." For any product marked "or approved equivalent," a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.
12. Shop Drawings:
  - a. Provide coordinated Shop Drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 27, Communications

- specification Sections for additional requirements for Shop Drawings outside of these requirements.
- b. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.
  - c. Provide Shop Drawings indicating all elevations for proposed layouts of equipment on all walls and for each rack elevation. This is required to obtain approval prior to installations. No work will be accepted prior to the approval process. Contractor shall submit for all wall elevations and rack elevations per these specifications and as illustrated on the drawings. If a conflict exists, contractor shall bring it to the attention of the owner and work to a satisfactory solution that meets the terms of satisfaction.
    - 1) Contents shall include all walls, racks where contractor proposes to install submittal material and equipment.
13. Samples: Provide samples when requested by individual Sections.
14. Resubmission Requirements:
- a. Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Changes made for the resubmittal will be indicated in a cover letter with reference to page(s) changed and will reference response to comment. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
  - b. Resubmit for review until review indicates no exception taken, or "make corrections as noted."
  - c. When submitting Drawings for Engineers re-review, clearly indicate changes on Drawings and "cloud" any revisions. Submit a list describing each change.
15. Operation and Maintenance Manuals, Owner's Instructions:
- a. Submit, at one time, electronic files (native/searchable PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.
    - 1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
    - 2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide

- routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: batteries, lamp lenses, speakers and filters.
- 3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Sections.
  - 4) Include product certificates of warranties and guarantees.
  - 5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and subassemblies.
  - 6) Include copy of burn-in and test reports specific to each piece of equipment.
  - 7) Include copy of software/appliance programming.
  - 8) Include commissioning reports.
  - 9) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.
- b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Submit copy of material used for Owner instruction. Field instruction per Section 27 00 00, Communications Basic Requirements Article titled "Demonstration."
  - c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.
16. Record Drawings:
- a. Maintain at site at least one set of drawings for recording "as-constructed" conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed communication items. Include items changed by field orders, supplemental instructions, and constructed conditions.
  - b. Record Drawings are to include equipment and connection schedules that accurately reflect "as constructed or installed" for project.

- c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line Drawings created from CAD Files in version/release equal to Contract Drawings. Submit CAD Files and Drawings upon substantial completion.
- d. Invert elevations and dimensioned locations for incoming utilities and site raceways below grade extending to 5-feet outside building line.
- e. See Division 27, Communications individual Sections for additional items to include in Record Drawings.

## 1.5 QUALITY ASSURANCE

- A Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.
- B Whenever this Specification calls for material, workmanship, arrangement, or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.
- C Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., conduit) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.
- D Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.
- E Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.
- F Provide products that are UL listed.
- G Contractor Qualifications:

1. Minimum of five years' experience in the design, installation, testing and maintenance of communications systems.
2. Must employ at least one full time BICSI certified Registered Communications Distribution Designer (RCDD) who is involved in reviewing work performed by contractor on this project.
3. Installation Technicians must be BICSI certified for copper and fiber optic installations that are current and in good standing with BICSI. Provide roster of communications technicians and verifiable certifications for this project.
4. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
5. Be able to provide project references for three projects, including scope of Work, project type, Owner/user contact name and telephone number.
6. The contractor selected for this project must be certified by the manufacturer of the approved products and utilize these components for completion of work.
7. Provide Manufacturer certifications for each respective technician that will be working on the project. All technicians must be manufacturer certified to install, terminate, and test horizontal and backbone cabling.

#### 1.6 WARRANTY

- A Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- B Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

#### 1.7 COORDINATION DOCUMENTS

- A Prior to construction, prepare and submit coordinated layout Drawings (composite drawings), to coordinate installation and location of ductwork, grilles, diffusers, piping, fire sprinklers, plumbing, lights, and electrical services. Composite Drawings show services on single sheet. Key Drawings to structural column identification system. Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including plumbing, HVAC, fire protection, electrical, ceiling suspension,

and ceiling tile systems, etc.), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

- B Prepare Drawings as follows:
  - 1. Drawings in CAD format. CAD format release equal to design documents. Drawings to be same sheet size and scale as Contract Drawings and indicate location, size and elevation above finished floor of equipment and distribution systems.
  - 2. Review and revise, as necessary, section cuts in Contract Drawings after verification of field conditions.
  - 3. Incorporate addenda items and change orders.
  - 4. Provide additional coordination as requested by other trades.
- C Advise Architect in event conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.
- D Submit final Coordination Drawings with changes as Record Drawings at completion of project.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A Articles, fixtures, and equipment of a kind to be standard product of one manufacturer, including but not limited to cable, outlets, patch panels, equipment connection cords and wall plates.

### **2.2 STANDARDS OF MATERIALS AND WORKMANSHIP**

- A Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL or ETL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.
- B Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

- C Hazardous Materials:
  - 1. Comply with local, State of California, and Federal regulations relating to hazardous materials.
  - 2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
  - 3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

### **PART 3 - EXECUTION**

#### **3.1 ACCESSIBILITY AND INSTALLATION**

- A Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- B Install equipment requiring access (i.e., amplifiers, taps, zone controllers, volume controls, and storage devices) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.
- C Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.
- D Earthwork:
  - 1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
    - a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork divisions. Contact utilities and locate existing



utilities prior to excavation. Repair any work damaged during excavation or backfilling.

- b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
- c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E Firestopping:

1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
  - a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

- F Plenums: In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

### 3.2 SEISMIC CONTROL

- A Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 27 Communications Sections.

B General:

1. Earthquake resistant designs for Communications (Division 27) equipment and distribution, i.e. cabinets and racks, ceiling assemblies, raceways, ladder racking, etc. to conform to regulations of jurisdiction having authority.
2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.

3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for cabinets, racks, major equipment and overhead raceways. Engineer to design and provide stamped Shop Drawings cabinets, racks, major equipment and overhead raceway. Submit Shop Drawings along with equipment submittals.
4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.
5. Provide means to prohibit excessive motion of communications equipment during earthquake.

### 3.3 REVIEW AND OBSERVATION

- A Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- B Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:
  1. Underground conduit installation prior to backfilling.
  2. Prior to ceiling cover/installation.
  3. When main systems, or portions of, are being tested and ready for inspection by AHJ.
- C Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

### 3.4 CUTTING AND PATCHING

- A Confirm Cutting and Patching Requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
  1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to

- proposed penetration(s).
2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftsmen of each respective trade in conformance with appropriate Division of Work.
  3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
  4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
  5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

### 3.5 EQUIPMENT SELECTION AND SERVICEABILITY

- A Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

### 3.6 DELIVERY, STORAGE AND HANDLING

- A Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
  1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.
  2. Protect all equipment and conduit to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

### 3.7 DEMONSTRATION

- A Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- B Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Authorized Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- C Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

### 3.8 CLEANING

- A Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.
- B Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

### 3.9 INSTALLATION

- A Confirm Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

- B Install equipment and devices in accordance with manufacturer's installation instructions, plumb and level and firmly secured to mounting surfaces. Maintain manufacturer's recommended clearances.
- C Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test operation and demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.
- D Provide miscellaneous supports/metals required for installation of equipment.

### 3.10 PAINTING

- A Confirm Painting requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 27, Communications Sections and the following:
  1. Ferrous Metal: After completion of communications work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in telecommunications rooms, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
  2. In a telecommunications room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect. Fire rated plywood backboards to receive two coats of fire retardant paint on all six sides; color to be white.
  3. See individual equipment Specifications for other painting.
  4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
  5. Conduit: Clean, primer coat and paint interior conduit exposed in finished areas with two coats paint suitable for metallic surfaces. Color selected by Architect.
  6. Covers: Covers such as handholes, maintenance holes, vaults, pullboxes and the like will be furnished with finishes which resist corrosion and rust. Covers shall be identified with 'Communications'. It is the contractor's responsibility to proactively seek and obtain approval with Owner prior to purchasing and prior to installation for terms of satisfaction.

### 3.11 ACCEPTANCE

- A Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific

requirements, comply with individual Division 27, Communications Sections and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
  - a. Testing Reports, as outlined in their respective Division sections
  - b. Cleaning
  - c. Operation and Maintenance Manuals
  - d. Training of Operating Personnel
  - e. Record Drawings, including cabling identifications, symbols, and locations
  - f. Warranty and Guaranty Certificates, including extended manufacturer's warranties
  - g. Start-up/test Documents and Commissioning Reports

### 3.12 FIELD QUALITY CONTROL

A Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Operation and Maintenance Manuals. All cabling test results shall be included.
2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

### 3.13 LETTER OF CONFORMANCE

A Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that Communications items were installed in accordance with manufacturer's recommendations, and UL listings and approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

**END OF SECTION**

## **SECTION 27 05 28 - PATHWAYS FOR COMMUNICATIONS SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A Work Included:
  - 1. Conduit Pathways
    - a. Rigid Metal Conduit and Fittings
    - b. Electrical Metallic Tubing and Fittings
    - c. PVC Conduit
  - 2. Conduit Accessories
  - 3. Penetration Sealing Systems
  - 4. Vaults and Hand Holes
  - 5. Flexible Fabric Innerduct
  
- B This Section specifies the requirements to provide communications conduit pathways, boxes, cable trays, innerduct and fittings.

#### **1.2 RELATED SECTIONS**

- A Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.
  
- B Related Work:
  - 1. Additional conditions apply to this Division including, but not limited to:
  - 2. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements
  - 3. 27 00 00 Communications Basic Requirements
  - 4. Drawings
  - 5. Addenda
  - 6. Codes, Standards, Public Ordinances and Permits

#### **1.3 REFERENCES AND STANDARDS**

- A References and Standards as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

#### 1.4 SUBMITTALS

- A Submittals as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B Provide plan drawings showing completions and as-built corrections which indicate type, size, placement, routing and/or length for pathway and cable tray components; e.g., vaults or maintenance holes, handholes, conduit, boxes, enclosures, etc.
- C In addition, provide:
  - 1. Shop drawings detailing items provided under this Section:
    - a. Vault cover assigned designators
    - b. Duct entry schedule
    - c. Pulling iron working load
    - d. ASTM load designation and percentage increase in live load for impact
    - e. Vault Section weights.
    - f. Rebar and piling support details.

#### 1.5 UNIT PRICE – MEASUREMENT AND PAYMENT

- A Section 01 22 00 - refer to this section for measurement and payment procedures for this specification section.

#### 1.6 QUALITY ASSURANCE

- A Quality assurance as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B In addition, meet the following:
  - 1. Installer will have documented experience in the placement of specified vaults.

#### 1.7 WARRANTY

- A Warranty of materials and workmanship as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.



## 1.8 DEFINITIONS

- A Conduit: Round raceway.
- B Conduit Body: Separate portion of a conduit or tubing system that provides access through removable cover(s) to the interior of the system at a junction of two or more sections of the system or at a terminal point of the system.
- C Pathway: Physical infrastructure (e.g., conduit, cable tray, raceway) used to facilitate the placement of information and communications technology (ICT), or electronic safety and security (ESS) cabling media.
- D Vaults or Maintenance Holes: Precast vaults or Maintenance Holes (MH) are located in various areas including landscape, hardscape, pedestrian sidewalks, incidental traffic, and full traffic instances.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A Conduit Pathways
  1. Rigid Metal Conduit and Fittings:
    - a. Sealing Fittings:
      - 1) Crouse-Hinds
      - 2) Or approved equivalent.
  2. Electrical Metallic Tubing and Fittings:
    - a. Allied Tube and Conduit
    - b. Wheatland Tube
    - c. Appleton
    - d. Or approved equivalent.
  3. PVC Conduit
    - a. Contractor chosen manufacturer shall be submitted for approval.
- B Conduit Accessories:
  1. Duct Spacers:
    - a. Carlon
    - b. Allied Tube and Conduit
    - c. Or approved equivalent.
  2. Expansion/Deflection Fittings:
    - a. Appleton

- b. Emerson
  - c. Or approved equivalent.
- 3. Pull String: Polyolefin pull line, tensile strength of 200-lbs.
  - a. Gardner Bender
  - b. Greenlee
  - c. Ideal
  - d. Klein Tools
  - e. Or approved equivalent.
- 4. Pull Tape: Woven 3/4-Inch polyester pull tape, 2,500-lb tensile strength, pre-lubrication to reduce coefficient of friction, imprinted with footage markings.
  - a. Gardner Bender
  - b. George-Ingraham
  - c. Greenlee
  - d. Ideal
  - e. Klein Tools
  - f. Mule Tape
  - g. Or approved equivalent.
- 5. Duct Plugs:
  - a. Carlon
  - b. Jack Moon
  - c. TE Connectivity
  - d. Vikimatic
  - e. Or approved equivalent.

C Penetration Sealing Systems:

- 1. Duct Seal, Conduit Sealing, and Firestopping.
  - a. Ideal
  - b. STI
  - c. Or approved equivalent

D Vaults and Hand Holes

- 1. Jensen Precast
- 2. Oldcastle Infrastructure
- 3. Or approved equivalent.

E Flexible Fabric Innerduct:

- 1. Maxcell

2.2 CONDUIT PATHWAYS

A Pathways: Labeled and/or listed as acceptable to the AHJ as suitable for the use intended.

B Table 1: Product Identification:

Product Designation	Product Type
RGS	Rigid Galvanized Steel
CRS	PVC Externally Coated RGS
EMT	Galvanized Steel Tubing
PVC	Polyvinylchloride Conduit
LMC	Liquidtight Metal Conduit
LNC	Liquidtight Nonmetal Conduit

C The product identification codes used for the Communications Raceways and Boxes in Part 2, Products, are summarized in Table 1.

D Bitumastic material or plastic tape.

2.3 RIGID METAL CONDUIT AND FITTINGS

A Conduit:

1. Type RGS: Rigid galvanized steel.
2. Type CRS: PVC externally coated conduit; rigid steel conduit with external PVC coating and internal galvanized surface.

B Fittings and Conduit Bodies: In-line straight-through, threaded, galvanized steel fittings and Type C conduit bodies only; do not use bends or tees, e.g., Lbs.

1. Bonding and Grounding Locknuts and Wedges: Malleable iron with set screws and lug screws.
2. Insulated Bushing: Malleable iron with integral insulated throat, rated for 150 degrees C.
3. Bonding and Grounding Bushing: Malleable iron with integral insulated throat, rated for 150 degrees C, with solderless lugs or lug screws.
4. Sealing Fittings: Threaded type conduit seal fittings and sealing compound suitable for hazardous location installations in accordance with CEC:
  - a. Crouse-Hind retrofit sealing fitting EYSR.
  - b. Crouse-Hind CHICO A sealing compound.

C All conduits must be proofed using a mandrel.

## 2.4 ELECTRICAL METALLIC TUBING AND FITTINGS

- A Type EMT: Electrogalvanized steel tubing.
- B Fittings and Conduit Bodies:
  - 1. In-line straight-through steel or malleable iron fittings and Type C conduit bodies only; do not use bends or tees, e.g. LBs.
  - 2. Wet Areas: Steel compression-type couplings and nipples.
  - 3. Dry Areas: Set screw-type couplings and nipples.
  - 4. Bonding Locknuts:
    - a. Malleable iron with set screws and lug screws.
    - b. Insulated Bushing: Malleable iron with integral insulated throat, rated for 150C.
    - c. Bonding and Grounding Bushing: Malleable iron with integral insulated throat, rated for 150C, with solderless lugs or lug screws.
- C All conduits must be proofed by using a mandrel.
- D Polyvinylchloride (PVC) Conduit
  - 1. Schedule 40
    - a. PVC Schedule 40 type conduit fittings shall be the same manufacturer as conduit. All plastic conduit and fittings shall have solvent-weld connections and shall provide a watertight joint.
    - b. Straight sections of single bore PVC Schedule 40 conduit can be manually bent to form curves with a radius 40 feet or greater.
    - c. All field formed long radius bends must be able to pass a 12-inches long by 3 5/8-inch wide solid 'slug' or 'mouse' mandrel.
    - d. All conduit must be proofed using a mandrel

## 2.5 CONDUIT ACCESSORIES

- A Duct Spacers:
  - 1. Nonmetallic base and intermediate duct spacers with locking keyways designed specifically for use with nonmetallic conduit; e.g., Carlon SNAP-LOC duct spacers for 4-inch diameter conduit with 1-1/2-inch separation.
  - 2. Base Spacer: S288NHN.
  - 3. Intermediate Spacer: S289NHN.
- B Expansion/Deflection Fittings: Similar to Crouse-Hinds XD expansion/deflection coupling or Appleton DF Series deflection and expansion coupling.

- C Pull String: Measuring and pulling string constructed of synthetic fiber with plastic jacket and footage markings.
- D Pull Tape: Measuring and pulling tape constructed of synthetic fiber with plastic jacket, printed with accurate sequential footage marks.
  - 1. George-Ingraham 1/2-inch tape 9216-JK.
  - 2. Mule Tape.
  - 3. Or approved equivalent
- E Duct Plugs:
  - 1. Aboveground Conduit Openings: Tapered PVC plugs with tab for pull tape.
    - a. Carlon 4-inch PVC plugs with pull tab, P258NT
    - b. Or approved equivalent.
  - 2. Underground or Underslab Conduit Openings: Removable screw tight compression type duct plugs with wing-nut and corrosion resistant hardware.
    - a. Vikimatic 4-inch
      - 1) Part Number 40D402U. Use appropriate part number according to duct size.

## 2.6 PENETRATION SEALING SYSTEMS

- A Firestopping: Provide fire barrier penetration sealing materials as specified in Division 07, Firestopping Section.
- B Duct Water Seal: Products suitable for closing underground and entrance duct openings, where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure, e.g., SEMCO PR 851.

## 2.7 VAULTS AND HAND HOLES

- A Vaults will be precast, reinforced concrete Sections (top, base and where required, extension Sections) with knockouts or duct terminators PVC end bells or Carlon (utility vault Term-A-Duct) for main conduit entrances with recessed keyways and subsidiary duct entrances.
- B Concrete inserts will be set in interior surfaces of walls of each Section to provide for cable rack mounting. Base Section will be equipped with pulling-in irons located opposite each main cable entrance.

- C Concrete:
  - 1. Conforms to ASTM C478.
  - 2. Compressive Strength: 5000-PSI minimum at 28 days.
  - 3. Air Content: 4 percent minimum.
  - 4. Cementitious Materials: Minimum of 564-lbs/cu yd.
  - 5. Coarse Aggregates: ASTM C33. Sound, Crushed, Angular Granite Stone only. Smooth or rounded stone will not be used.
  - 6. Fine Aggregates: ASTM C33. Free from organic impurities.
  - 7. Chemical Admixtures: ASTM C494. Calcium chloride or admixtures containing calcium chloride will not be used.
  - 8. Air Entraining Admixtures: ASTM C260.
  - 9. Reinforcing Steel: ASTM A615 grade 60 deformed bar, ASTM A82 wire, or ASTM A185 welded wire fabric
  
- D Lift Loops:
  - 1. ASTM A416 steel strand.
  - 2. Lifting loops made from deformed bars are not allowed.
  
- E Flexible Joint Sealants:
  - 1. Butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO-198, Type B-Butyl Rubber and maximum of 1 percent volatile matter.
  - 2. Suitable for application temperatures between 10 and 100 degrees F.

## 2.8 VAULT AND HAND HOLE COMPONENTS

- A Lifting inserts, holes and devices to comply with OSHA Standard 1926.704. Size lift holes and inserts for precision fit with lift devices and will not penetrate through structure wall. Precast manufacturer will provide lifting devices.
  
- B Internally seal joints between tongue and groove; additionally, seal around external perimeter of the joint as follows:
  - 1. External seals to consist of polyethylene backed flat butyl rubber sheet no less than 1/16-inch thick and 6-inches wide applied to outside perimeter of joint.
  - 2. Internal seals to consist of plastic or paper-backed butyl rubber rope no less than 14 feet long and having cross-sectional area no less than annular space times height of joint.
  - 3. At option of Contractor, internal seals on round joints may consist of O-ring gasket conforming to ASTM C443, installed according to Precast Manufacturer's recommendation.

- C Precast base Sections will be cast monolithically without construction joints or with approved galvanized or PVC water stop cast in the cold joint between base slab and walls.
- D Wall and inside slab finish resulting from casting against forms standard for industry will be acceptable. Form ties through the wall are not allowed. Exterior slab surfaces below grade will have float finish. Small surface holes, normal color variations, normal form joint marks and minor depressions, chips and spalls will be tolerated. Dimensional tolerances will be as set forth in appropriate references.
- E Conduit openings will not extend into corners of structures but may extend across joint with Engineer's approval.
- F Knockout panel dimensions will be as required by structural design at their maximum burial depth using design loads specified.
- G Design components in accordance with ACI, ASTM C890 and the following loads:
  - 1. Horizontal load on walls and knockout panels will be load of 32,000 plus a live lateral surcharge due to HS20-44 traffic load of 32,000 LBS.
  - 2. Vertical load on below grade adaptor slabs and tops will be fill height of 20-feet assuming soil unit weight of 100 lbs/ft, plus live HS20 traffic load.
  - 3. Vertical load on covers supported around perimeter will be live HS20 traffic load.
- H Rectangular sub-grade components to be designed and manufactured in conformance with ASTM C913 and as follows:
  - 1. Joints between precast components will be keyways or tongue and groove. Joints to accept cast iron frames will be flat and no less than 5-inches wide.
  - 2. Construct access vault structures to sizes and elevations shown on Drawings.
  - 3. Maintenance Hand Holes and Vaults and Hardware:
    - a. Each maintenance hole will be provided with one galvanized 3/4-inch rebar x 16-inches wide bolt-on ladder, mounting pads and mounting hardware. Rungs will be at 12-inches centers. Side rails will be 2-inches x 5/16-inches flat bar.
    - b. Each maintenance hole entrance will be supplied with one galvanized 3/4-inch x 16-inches wide bolt-on maintenance hole step.
- I Pull-In Irons:

1. Each wall of each vault will have a 7/8-inch hot-dipped galvanized pull-in iron centered under the new and future duct line openings. Pull-in irons will be McGraw-Edison, Joslyn, or Oliver.

J Vault Cable Rack Hardware:

1. Cable Rack: Chance #1225
2. Cable Rack Hooks: Chance #1231
3. Cable Rack Insulators: Chance #1121
4. Or approved equivalent

K Grade Rings:

1. Rings, covers and frames will be Class 35 gray iron. Covers and frames will be equal to Neenah Foundry #R-1530 manhole frame Type B non-rocking lid.
2. Or approved equivalent.

L Epoxy Gels:

1. 2-component, solvent-free, moisture-insensitive, high modulus, high strength, structural epoxy paste adhesive.
2. Or approved equivalent.
3. Must meet requirements of ASTM C-881, Type I and II, Grade 3, Class B and C, epoxy resin adhesive.

M Sizing:

1. Furnish 4-feet wide by 5-feet long by 4-feet deep for Vaults.
2. Furnish 3-feet wide by 3-feet long by 3-feet Deep for Hand Holes.
3. Furnish all racking hardware for securing service loops and routing cabling along walls
4. Vaults and hand holes shall be heavy traffic rated for HS20-44 roads, when located in roads, parking lots, sidewalks, common gathering areas. Shall be parking lot heavy rated at a minimum, when located in parking lots.

N Covers

1. Manufactured from metal casting, conforming to ASTM A48-83.
2. Class 35B gray cast iron, with machine finished flat bearing surface.
3. Covers/Lids shall be marked by permanent means with "COMMUNICATIONS"
4. Permanent marking can be engraved or welded onto the surface of covers or lids.

O Vault Components:

1. Pull-In Irons:



- a. McGraw-Edison
  - b. Joslyn
  - c. Oliver
  - d. Or approved equivalent.
2. Vault Cable Rack Hardware:
    - a. Chance
    - b. Or approved equivalent.

P Grade Rings and LID COLLARS: Grade Rings and Collars, if required shall be coordinated with civil and other disciplines so the covers/lids finish at the desired height for safety reasons (HS20-44).

1. Shall be heavy traffic rated.
  - a. Heavy Traffic rated for roads when located within roads.
  - b. Heavy Traffic rated for parking lots when located in parking lots.
2. Manufactures
  - a. Neenah Foundry
  - b. Jensen Precast
  - c. Old Castle

## 2.9 FLEXIBLE FABRIC

A Indoor, Plenum-rated three-cell 4-inch fabric innerduct with pull string. Listed for its intended use.

1. 4-Inch Flexible Fabric, with preinstalled 1250-lb pull tape in each cell, melting point of 419 degrees, halogen-free.
  - a. Manufacturer: Maxcell.
    - 1) Part Numbers:
      - (a) MXE86383: 3 Cell, Non-plenum.
      - (b) MXED86383: 3 Cell, Detectable.
        - (1) 1.5-inch diameter maximum cable capacity.
      - (c) MXP4003BK####: 3 Cell, Plenum.
      - (d) MXP43SSBK: 3 Cell, Self-Supporting.
        - (1) 1.75-inch diameter maximum cable capacity.
2. Installation Swivels
  - a. Must be used for underground cable pulling applications. Swivels are precision machined from high strength stainless steel for durability and reusability.
    - 1) Equipped with a Clevis pin, corrosion resistant and reusable.
    - 2) Model Numbers, sizes and pulling load capacities:
      - (a) MXCIK11: 0.875-inch, 2500-lbs.
      - (b) MXCSW600: 0.625-inch, 600-lbs.

3. Self-Inflating Sealing Bag
  - a. MaxBag is designed to create a seal between the underground cable conduit and the cable(s) for telecommunications or other uses. Pull the cord to automatically inflate using internal gas capsule. Creates a barrier against silt, dirt/mud, debris and rodents into and out of buried conduit.
    - 1) Maximum internal pressure is near 43.5 psi.
  - b. MaxBag configurations support 2-, 3- and 4-inch conduit applications.
    - 1) MXCB2: 2.48-inch diameter
    - 2) MXCB3: 3.54-inch diameter
    - 3) MXCB4: 4.33-inch diameter
4. Reusable Termination Bag
  - a. Conforms to the shape of cables placed within to reduce the wasted space associated with rigid innerduct. Reusable termination bags can provide an airtight seal in innerduct diameters ranging from 2-inches to 5-inches. The inflatable ADE/V sealing elements are made of a laminated foil. The sealing element is placed in the duct around cables and inflated to the required air pressure via a durable metal tire valve, completely sealing the innerduct. The sealing element may be easily removed by releasing the air pressure, again via the tire valve. This allows incremental cable deployments.
    - 1) Extremely low leakage rate of 2.7 mbarl/year.
    - 2) Service life of 20 years against gas diffusion.
    - 3) Up to 16 feet water column (7 psi).
    - 4) Chemicals from pH2 to pH12.

Part Number	Description	Innerduct Diameter (Inch)	Duct Sealing Range Occupancy Optimal Diameter (Inch)	Duct Sealing Range Occupancy Minimal Diameter (Inch)
MXCRTBVL50	Sealing element for temperature range 5°F to +86°F Duct 0 ~ 2 in	2	1.3	0
MXCRTBVL80	Sealing element for temperature range 5°F to +86°F Duct 0 ~ 2.92 in.	3	2.2	0
MXCRTBVL100	Sealing element for temperature range 5°F to +86°F Duct 0 ~ 3.93 in.	4	2.9	0

MXCRTBVL125	Sealing element for temperature range 5°F to +86°F Duct 0 ~ 4.92 in.	5	3.5	0.7
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**PART 3 - EXECUTION**

**3.1 GENERAL INSTALLATION REQUIREMENTS**

- A Workmanship:
  - 1. Provide, condition, apply, install, connect and test manufactured products, materials, equipment and components in accordance with the manufacturer's specifications and printed instructions.
  - 2. The installation of system components to be carried out under the direction of qualified personnel. Appearance to be considered as important as mechanical and electrical efficiency. Workmanship to meet or exceed industry standards.
  - 3. Place support for raceways, cable trays, conduit, EZ-Path, backboards, equipment racks and cabinets.
  
- B Protection During Construction: Protect products from the effects of moisture, corrosion and physical damage during construction. Except during installation activity in a section, keep openings in conduit, tubing and wireway capped with manufactured seals during construction.
  
- C Concrete Sleeves: Conduits routed perpendicular through floors, walls, or other concrete structures to pass through cast-in-place conduit sleeve openings wherever possible, or appropriate size holes to be bored to accommodate the installation of conduit sleeves. The size and location of the holes to not impair the structure's integrity.
  - 1. Concrete Boring: Bore a hole in the concrete with a diameter of 1/2 to 1-inch larger than the conduit sleeve to be installed. Grout around the conduit sleeve and finish to match existing surroundings.
  - 2. Conduits that rise vertically through a slab to be stubbed 4-inches above the floor and capped pending future use.
  
- D Drywall/Gypsum Board Sleeves: Install insulating throat bushings on both ends of conduit sleeves placed in fire-rated walls using drywall construction.
  
- E Where conduit enters a structure through a concrete roof or membrane waterproofed wall or floor:
  - 1. Provide a watertight seal.

2. With Concrete Encasement: Install watertight entrance seal device on the accessible side.
  3. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.
  4. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.
- F Provide continuous sleeving through walls, floors and ceilings separating each telecom outlet from its respective MTR/TR room, using sleeve conduit size as required per Standards. Restore penetrations through rated assemblies to original fire rating per NFPA and local codes.
- G Locate sleeves as shown on Drawings. Where sleeves are not shown on Drawings, install sleeves above suspended ceilings and locate to minimize length of pathway for future cable from telecom outlet to MTR/TR rooms.
- H Where sleeves are routed between rooms with floating ceilings, extend conduits horizontally 2-feet over edge of floating ceiling to avoid exposed cabling from being seen at floor level.
- I Make floor penetrations no more than 4-inches from wall. Install conduit stubs to extend 4-inches from floor base. Cap conduits for protection.
- J Provide removable heat-expanding pillows at fire barrier penetrations as specified in Firestopping section and described as Firestop Material Type 7 (indicated as FSM-7).
- K Grounding: Provide ground connections and bonding continuity between raceway and wire basket runway sections, boxes, enclosures, cabinets and fittings as required per code and industry standard.
- L Provide plenum rated products, components and accessories for installation in plenums.
- 3.2 CONDUIT PATHWAYS
- A Install per manufacturer's written instructions and recommendations.
- B Raceway Identification Banding:
1. Degrease and clean surfaces to receive tape labels.
  2. The angular sum of all conduit bends between pull points, hand holes and vaults, shall not exceed 180-degrees.

### 3.3 RIGID METAL CONDUIT AND FITTINGS

- A Install per manufacturer's written instructions and recommendations.
- B Conduit Type:
  - 1. Install the following types of circular communications raceway in the locations listed unless otherwise indicated on the Drawings.
    - a. Exterior, Exposed Including Roof: Rigid steel conduit.
- C Conduit Bends, Sweeps and Pull Points:
  - 1. Make changes in direction of communications conduit runs with sweeps of the longest possible radius.
  - 2. Make sweeps in parallel or banked runs of conduits, 2-inches and larger in diameter, from the same center or centerline so that sweeps are parallel and of neat appearance.
  - 3. Field-Made Bends and Sweeps:
    - a. Use an acceptable hickey or conduit-bending machine.
    - b. Do not heat metal raceways to facilitate bending.
    - c. Before installing 4-inch field-made sweeps in duct banks, pull a 3-1/2-inch diameter by 12-inch long mandrel through duct sections to verify circularity and sweep radius.
  - 4. Minimum Inside Bend Radius for Communications Conduit Bends, Sweeps, Boxes and Fittings:
    - a. One-inch conduit, 11-inches
    - b. Two-inch conduit, 21-inches
    - c. Three-inch conduit, 36-inches
    - d. Four-inch conduit, 48-inches
    - e. Other sizes, 10 times the inside diameter of the conduit.
  - 5. Do not install boxes, bends, elbows, tees, conduit bodies and other conduit fittings, which do not provide for the minimum inside cable bend radius specified in paragraph E above.
    - a. Conduit Bodies: In-line straight-through Type C conduit fittings can be used as pull boxes for conduit up to a maximum of 2-inches ID. Other conduit fittings, which include direction changes such as E, L, LB, LR, LL, LRT, TA, TB and X, are not allowed.
    - b. Refer design or installation conflicts with these requirements to the Architect.
  - 6. All conduits shall have protective bushings. Clean and deburr all edges before installing protective bushings. for interior applications and duct sealing for exterior applications.
  - 7. All conduits shall have fire stopping on both ends for interior applications.

8. All conduits shall have duct sealing for exterior applications.
9. All conduits shall be labeled with a destination label marking that is machine generated and fixed to conduits.

D Aboveground Conduit Installation:

1. Support conduit installed in aboveground interior and exterior locations at a maximum of 7-feet on center.
2. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
3. Securely attach aboveground conduit under the provisions of this Section.
4. Only conduit servicing elevator equipment can be installed through elevator shafts or equipment rooms. These conduits may only enter the room and go directly to the equipment being supplied.
5. Keep power wiring independent of communication system wiring.
6. Arrange conduit to maintain headroom and present neat appearance.
7. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors, unless otherwise noted on drawings.
8. Exposed conduits are permitted only in the following areas:
  - a. Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished material.
  - b. Existing walls that are concrete or block construction.
  - c. Where specifically noted on drawings.
  - d. Route exposed conduit parallel and perpendicular to walls, tight to finished surfaces and neatly offset into boxes.
9. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block area passage's intended usage.
10. Keep conduits a minimum of 12-inches away from steam or hot water radiant heating lines (at or above 104 degrees F) or 3-inches away from waste or water lines.
11. Run exposed and concealed conduits parallel or perpendicular to walls, structural members, or intersections of vertical planes to provide a neat appearance. Follow surface contours as much as possible.
12. No section of conduit located within buildings to exceed 100-feet in length between pull points and/or pull boxes.
13. Expansion/Deflection Joints:
  - a. Where indicated on the Drawings, provide specific purpose expansion/deflection fittings for conduit crossing building expansion/deflection joints in structures or concrete slabs. Expansion fittings to have copper bonding jumper.
  - b. For PVC conduit, provide expansion/deflection joints for 25 degrees F maximum temperature variation. Install in accordance with



5 to 8 cables	1-1/2-inch conduit
9 to 12 cables	1-1/2-inch conduit
13 to 19 cables	2-inch conduit
20 cables and Above	Use multiple runs of conduit from surface raceway based on above table

C Conduit Type:

1. Install the following types of circular communications raceway in the locations listed unless otherwise indicated on the Drawings.
  - a. Interior Dry Locations, Exposed: EMT with set screw fittings.
  - b. Interior Dry Locations, Concealed (Not Embedded in Concrete): EMT with set screw fittings.
  - c. Interior Wet Locations: EMT with compression fittings.

D Conduit Bends and Sweeps:

1. Make changes in direction of communications conduit runs with sweeps of the longest possible radius.
2. Make sweeps in parallel or banked runs of conduits, 2-inches and larger in diameter, from the same center or centerline so that sweeps are parallel and of neat appearance.
3. Field-Made Bends and Sweeps:
  - a. Use an acceptable hickey or conduit-bending machine.
  - b. Do not heat metal raceways to facilitate bending.
  - c. Before installing 4-inch field-made sweeps in duct banks, pull a 3-1/2-inch diameter by 12-inch long mandrel through duct sections to verify circularity and sweep radius.
4. The angular sum of the bends between pull points and/or pull boxes shall not exceed 180 degrees.
5. Minimum Inside Bend Radius for Communications Conduit Bends, Sweeps, Boxes and Fittings:
  - a. One-inch conduit, 11-inches
  - b. Two-inch conduit, 21-inches
  - c. Three-inch conduit, 36-inches
  - d. Four-inch conduit, 48-inches
  - e. Other sizes, 10 times the inside diameter of the conduit.
6. Do not install boxes, bends, elbows, tees, conduit bodies and other conduit fittings, which do not provide for the minimum inside cable bend radius specified in paragraph E above.
  - a. Conduit Bodies: In-line straight-through Type C conduit fittings can be used as pull boxes for conduit up to a maximum of 2-inches ID. Other conduit fittings, which include direction changes such as E, L, LB, LR, LL, LRT, TA, TB and X, are not allowed.



- b. Refer design or installation conflicts with these requirements to the Architect.

### 3.5 CONDUIT ACCESSORIES

- A Install per manufacturer's written instructions and recommendations.
- B Duct Spacers: Install per manufacturer's recommendation.
- C Expansion/Deflection Fittings: Install per manufacturer's recommendation.
- D Pull Tape: Install per manufacturer's recommendation.
- E Duct Plugs: Install per manufacturer's recommendation.

### 3.6 PENETRATION SEALING SYSTEMS

- A Install per manufacturer's written instructions and recommendations.
- B Seal conduit entering structures at the first vault, box and outlet to prevent the entrance of gases, liquids, or rodents into the structure.
  - 1. Empty Conduits: Removable screw tight duct plugs.
  - 2. Innerduct Installed: Suitable duct water seal between conduit and innerduct. Manufactured seals in empty innerduct.
  - 3. Cable Installed: Suitable duct water seal between conduit and cable, or between innerduct and cable.

### 3.7 VAULTS AND HAND HOLES

- A In ground vaults shall be provided with the sizes indicted on drawings.
  - 1. All conduits enter and exit on opposite ends. No perpendicular entry or exits on the sides.
  - 2. No more than 180-degrees of bend between accessible pull points.
  - 3. Contractor provide heavy duty traffic rated collars and lids for vaults in drive aisles, streets, side walks and adjacent to sidewalks.
- B Identification
  - 1. Engrave the word 'COMMUNICATIONS' on all vault covers/lids. Welding is acceptable where applicable.
  - 2. Each vault cover/Lid must have a unique identifier, approved by consulting engineer and owner. Submit for approval before installation and acceptance review.

- C Weatherproofing
  - 1. Shall be watertight and seal to prevent liquid, gas, and rodents from entering the vaults, hand holes, conduits and buildings
  - 2. All conduits shall be sealed with putty type duct seal or mechanically fastened duct plugs designed for this purpose.
    - a. Duct seal shall permit the re-entry and reuse of conduits and putty sealant.
    - b. Contractor furnish duct plugs for all unused conduits entering and exiting the vault duct bank system, to include duct plugs in the unused conduits on the building entry side.

### 3.8 FLEXIBLE FABRIC INNERDUCT

- A Install per manufacturer's written instructions and recommendations.
- B Provide innerduct for all fiber optic cables for the entire length of the cable run.
- C Furnish pullstring for each pocket of flexible fabric.
  - 1. When installing flexible fabric in pullboxes and vaults, tie off pull strings so they cannot be lost or accidentally made unusable
- D During innerduct pulling, avoid excessive tension which can damage the innerduct. Inspect innerduct following placement and replace damaged sections.
- E Following installation, visually inspect innerduct, remove burrs at openings and, if necessary, clean innerduct interior.
- F Use factory pulling eye to prevent twisting of innerduct and cable.

### 3.9 GENERAL INSTALLATION REQUIREMENTS

- A Requirements for Precast Concrete Vaults: Coordinate delivery of precast concrete vault and hand hole components to jobsite with manufacturer. Handling of materials will be done in accordance with ASTM C891 and manufacturer's recommendations. Handle and store components on job site using methods that will prevent damage.
- B Cleaning Vaults and Hand Holes: Vaults and Hand Holes will be clean and left free of debris, silt and rocks from installation work.

### 3.10 VAULTS AND HAND HOLES

- A Excavate to required depth and remove materials that are unstable or unsuitable for good foundation. Prepare level, compacted foundation extending 6-inches beyond base. Some vaults may be piling supported. Check structural drawings and details.
- B Set base plumb and level.
- C Provide minimum 18-inches of pea gravel below pull vault and hand holes for stability and drainage.
- D Thoroughly clean bells and spigots to remove dirt and other foreign materials that may prevent sealing. Unroll butyl sealant rope directly against spigot or keyway. Leave protective wrapper attached until sealant is entirely unrolled. Do not stretch. Overlap from side to side, not top to bottom
- E When recommended by manufacturer, fill void between horizontal joint surfaces with sand cement grout around the outside perimeter.
- F After joining Sections, apply butyl sealant sheet around outside perimeter of joint.
- G Lift holes leaving less than 2-inches of wall thickness will be plugged from outside using sand cement mortar then covered with butyl rubber sheet. Lift holes penetrating wall will be additionally sealed with epoxy gel on interior.
- H Set frames or tops to required elevation sealing joints with butyl sealant rope and sheet.
- I Provide pulling-in irons opposite and above each conduit entrance.
- J Provide cable racks in each vault and hand holes for support of conductors.
- K Provide 3/4-inch by 10-foot copper ground rod at each vault.

### 3.11 VAULT AND HAND HOLES COVERS

- A Reference 3.01, General Installation Requirements and 3.18, Vaults and hand holes above.
- B Install per manufacturer's instructions and recommendations.

3.12 PRECAST VAULT AND HAND HOLES CONCRETE MATERIALS

- A Reference 3.01, General Installation Requirements and 3.18, Vaults, above.
- B Install per manufacturer's instructions and recommendations.

3.13 VAULT AND HAND HOLES COMPONENTS

- A Reference 3.01, General Installation Requirements and 3.18, Vaults, above.
- B Install per manufacturer's instructions and recommendations.

**END OF SECTION**

**SECTION 31 05 13 – CLEARING & GRUBBING, EXCAVATION, AND EARTHWORK****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Clearing and Grubbing
2. Excavation
3. Earthwork
4. Grading and Compaction
5. Subsoil materials – Import Fill and Select Fill
6. Topsoil materials.
7. Bedrock Excavation
8. Cut and Fill Slopes
9. Commercial Lime Slurry Treatment

## B. Related Sections:

1. [Section 01 74 00 – Construction Waste Management and Disposal](#)
2. [Section 31 23 16 – Utility Trenching.](#)
3. [Section 32 90 00 – Landscape Work.](#)
4. Project Geotechnical report; bore hole locations and findings of subsurface materials if applicable.

## 1.2 REFERENCES

## A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

## B. City of Pittsburg - Environmental Services Department

## C. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

## D. California Building Code – Appendix J - Grading

## E. State Standard Specifications:

1. Section 14 – Environmental Stewardship
2. Section 17 - General
3. Section 19 – Earthwork

## F. Geotechnical Report dated March 17, 2023 by BSK Associates (File No. G00000268).

## 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Samples: Submit results of the soil samples by a certified testing laboratory prior to importing onto the site for approval by the Project Manager.
- C. Materials Source: Submit name of imported materials source.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

## 1.4 QUALITY ASSURANCE

- A. Furnish each subsoil material from single source throughout the Work.

**PART 2 - PRODUCTS**

## 2.1 SUSTAINABILITY CHARACTERISTICS

- A. Materials and Resources Characteristics:
  1. Regional Materials: Furnish materials extracted, processed, and manufactured within 250 miles of jobsite.

## 2.2 SUBSOIL MATERIALS

- A. Select Fill Material:
  1. Subsoil material is on-site excavated material meeting the requirements of the appurtenant Geotechnical Report.
  2. Graded
  3. Non-hazardous
  4. Free of lumps larger than three (3) inches, rocks larger than two (2) inches, organic matter, frozen or other deleterious materials and debris.

5. Selected material encountered in excavation within the right of way shall be used for finishing the top portion of the roadbed, constructing shoulders, structure backfill; as shown on the Drawings; as specified in the Technical Specifications, or as directed by the Project Manager.

B. Import Fill Material:

1. Subsoil material imported from sources outside the project site meeting the requirements of the appurtenant Geotechnical Report.
2. Graded
3. Non-hazardous
4. Free of lumps larger than three (3) inches, rocks larger than two (2) inches, organic matter, frozen or other deleterious materials and debris.
5. Unless otherwise specified, the Contractor shall obtain from the owners the right to procure material, pay all royalties and other charges involved, and bear all expense of developing the sources, including rights of way for hauling.
6. No import fill material shall be delivered to the site until approved by the Project Manager. Approval of import fill material shall be based on the testing of representative samples submitted by the contractor meeting the appurtenant Geotechnical Report and approved by the Project Manager. Such representative samples shall be submitted to the Project Manager not less than 15 days prior to commencing the work.
7. Imported fill, delivered to the site, that significantly differs from the submitted samples shall be subject to rejection. Rejected materials shall be removed from the site at the Contractor's expense
8. Approval of a particular import fill material shall constitute approval of only that portion of the proposed borrow source represented by the submitted sample.
10. Except as otherwise permitted, borrow pits and other excavation areas shall be excavated in such manner as will afford adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed, local borrow pits shall be neatly trimmed and left in such shape as will facilitate accurate measurement after the excavation is completed.

2.3 FILL MATERIALS:

The following import fill parameters may be used for small City sidewalk and pavement rehabilitation projects; or for site improvements less than 5,000 square feet excluding any buildings or structures and do not have a geotechnical report included:

- A. Fill material shall conform to the following as determined by ASTM C 117 and ASTM C 136:

1. Maximum particle size 3 inches
2. Percent passing 1-inch sieve 90-100 percent
3. Percent passing No. 200 sieve less than 20 percent

- B. Imported non-expansive fill shall consist of a well-graded, slightly cohesive soil with relatively impervious characteristics when compacted.
- C. Plasticity Index for acceptable import fill materials shall be a maximum of 12 when determined by the procedure set forth in ASTM D 4318.
- D. The liquid limit shall not exceed 30 percent as determined by the procedures set forth in ASTM D 4318.
- E. Import fill material shall have an R-value of 25 or greater as determined by ASTM D 2844.

## 2.4 TOPSOIL MATERIALS

- A. Topsoil shall be imported top soil as specified in [Section 32 90 00 "Landscape Work"](#) and Project Specifications.
- B. Topsoil excavated within the limits of the project meeting the requirements shown in Section 32 90 00, "Landscape Work", and as shown in the Project Specifications will be considered as a material only for the purpose of backfilling areas to be planted.

## 2.5 SOURCE QUALITY CONTROL

- A. [Section 01 45 00 – Quality Control](#): Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil and Topsoil Materials: Perform in accordance with ASTM D1557, and A.
- C. When tests indicate materials do not meet specified requirements, provide alternate materials and retest.
- D. Furnish materials of each type from same source throughout the Work.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Call USA not less than three (3) working days before performing Work that can be marked by USA in a timely manner.



- B. Request underground utilities to be located and marked within and surrounding construction areas.
- C. Identify required lines, levels, contours and datum.
- D. Notify utility companies to remove and relocate utilities where shown on the Drawings.
- E. Protect utilities indicated to remain from damage.
- F. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- G. Protect benchmarks or monuments, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- H. The ground shall be prepared to received select fill by removing vegetation, topsoil and other unsuitable materials, scarifying the ground to provide a bond with the fill material, and compacting the fill at optimum moisture content.

### 3.2 CLEARING AND GRUBBING

- A. Clearing and grubbing shall be per Section 17-2, "Clearing and Grubbing", of the State Standard Specifications.
- B. Clear and grub before performing earthwork in an area.
- C. Do not injure standing trees, plants, and improvements shown to be protected.
- D. Clear and grub the entire length of the job site to the following widths:
  - 1. 5 feet outside of excavation and embankment slope lines where slopes are not rounded
  - 2. Outside limits of slopes where slopes are rounded
  - 3. 5 feet outside of structures
  - 4. 2 feet outside of slope lines for ditches and channels with a bottom width of less than 12 feet
  - 5. 5 feet outside of slope lines for ditches and channels with a bottom width of 12 feet or more
- E. Clearing and grubbing shall consist of removing all objectionable material from within the limits of the project. The limits of clearing and grubbing shall be of sufficient area and depth to complete the work shown on the Drawings or as described herein in.
- F. Clear all construction areas above original ground of the following to a minimum depth of eight (8) inches below subgrade or eight (8) inches below original

ground, or as required by the appurtenant geotechnical report, whichever is lower:

1. all vegetation such as trees, logs, upturned stumps, roots of downed trees, brush, grass, and weeds and
2. other objectionable material including concrete, masonry, and debris.

G. No burning of materials is allowed.

H. The site shall be stripped and cleared of all vegetation, debris, and organic-laden top soil as required by the appurtenant Geotechnical Report.

I. Trees within the limits of work including any traffic control work beyond the limits of work and within the area of influence shall be evaluated by the City or; a City approved Landscape Architect or certified Arborist to assess protection measures. No trees will be removed until they have been tagged, numbered and a written release for the tree has been issued by the City.

J. Tree which are designated to be removed, shall be excavated and removed 60" down or to the bottom of the root ball, whichever is shallower, to remove the tree trunk, roots, and backfill with fill material and compact as required in this section, unless specified otherwise on the Drawings.

K. Grub all construction areas to a depth of at least 0.50 feet, necessary to remove all existing tree stumps, roots, buried logs and other objectionable material, unless noted otherwise on the Plans. In embankment areas where the grading plane is 2 feet or more above original ground, cut off trees, stumps, and roots not more than 1 foot above original ground, except, remove trees, stumps, and roots completely where work includes any of the following:

1. Structure construction
2. Pile construction
3. Subdrainage trench excavation
4. Removal of unsuitable material
5. Cutting into slopes of original hillsides, old or new fill
6. Utility line construction

### 3.3 EXCAVATION

A. Work under this section shall consist of performing all operations necessary to excavate earth and rock, regardless of character and subsurface conditions, from the roadway prism or adjacent thereto, to excavate all materials, of whatever nature, necessary for the construction of foundations for structures and other facilities; to excavate drainage and irrigation ditches; to excavate drainage channels; to excavate selected material and import material for use as specified; to construct embankments including the placing of selected fill or import fill material in connection therewith as specified; to place backfill for structures, and other facilities; to backfill trenches and depressions resulting from the removal of

obstructions; to backfill holes, pits and other depressions; to remove and replace unsuitable material; to excavate and grade road approaches, driveways, sidewalks, curb ramps, curb and gutters, plazas, parking lots, and connections; to construct protection dikes; to remove unstable material, slide material which has come into the graded area, and material which has slipped from embankments; all as shown on the plans and as specified in these Specifications and the Technical Specifications and as directed by the Project Manager; and furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work that may be required to construct and maintain the project facilities, except excavation, trenching and backfilling for pipe, culverts, utility systems, and other subsurface pipes. Excavation, trenching and backfilling for pipe, culverts, utility systems, and other subsurface pipes is specified in [Section 31 23 16 – Utility Trenching](#) of the City Standard Specifications.

- B. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- C. Stockpile excavated material meeting requirements for subsoil fill materials and topsoil materials approved by the Project Manager.
- D. If practicable and unless processing of material is required, haul selected material directly from the excavation to its final position in the roadway prism and compact it in place.
- E. Excavate to the described or authorized grade. If the Contractor over excavates, backfill with an authorized material and compact it at the Contractor's own expense.
- F. Do not excavate wet subsoil unless directed by the Project Manager.
- G. The temporary slope of cut surfaces shall be no steeper than is safe for the intended use, and shall not be more than one-unit vertical in two units horizontal (50-percent slope) unless approved by the Project Manager or appurtenant geotechnical report.
- H. Archaeological Resources: Contractor shall conform to Section 14, "Environmental Stewardship", of the State Standard Specifications. If archaeological resources are discovered within or near construction limits, do not disturb the resources and immediately:
  - 1. Stop all work within a 60-foot radius of the discovery
  - 2. Secure the area
  - 3. Notify the Project Manager.
- I. City will investigate the discovery. Do not move archaeological resources or take them from the job site. Do not resume work within the radius of discovery until authorized.

- J. Environmentally Sensitive Areas (ESA): If an ESA is shown on the Drawings, the boundaries are approximate. Do not enter an ESA unless authorized. If an ESA is breached, immediately:
1. Stop all the work within 60 feet of the ESA boundary
  2. Secure the area
  3. Notify the Project Manager

If an ESA is damaged, the Project Manager determines the necessary remediation and the party to perform the work. The City deducts the cost for this work from the Contractor bid price.

- K. Notify the Project Manager when buried man-made objects are encountered in an excavation as part of the excavation work and wait for direction from Project Manager unless shown on the plans for removal. All surplus material shall be disposed offsite.
- L. Remove excess excavated materials, subsoil and topsoil not intended for reuse, from site.
- M. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.
- N. When hauling is done over highways or City streets, and when directed by the Project Manager the loads shall be trimmed and all material removed from shelf areas of vehicles in order to eliminate spilling of material. If directed by the Project Manager, the loads shall be watered down or covered after trimming to eliminate dust.
- O. Excavation shall include the satisfactory removal and disposition of all materials not classified as rock excavation.
- P. Earth and rock, regardless of character and subsurface conditions, shall be excavated to the lines and grades as established by the plans.
- Q. All existing materials that are designated to be salvaged shall be removed, cleaned and hauled to the City Corporation Yard, unloaded and stockpiled, by the Contractor unless otherwise directed by the Project Manager.
- R. Existing pipes to be abandoned shall be filled with slurry, minimum of thirty (30) feet from either ends of the pipe and capped with concrete at the ends.
- S. Existing structures, pavement slabs, and structural sections to be abandoned shall be demolished to an elevation three (3) feet below finished grade, unless specified otherwise on the Drawings. The bottom (if any remains) shall be broken thoroughly to prevent entrapment of water and all voids backfilled with suitable backfill.

- T. Operations shall be conducted in such a manner that existing street, facilities, utilities, railroad tracks and other non-street facilities which are to remain in place will not be damaged.
- U. The Contractor, at his expense, shall furnish and install-sheet piling, cribbing, bulkheads, shores or whatever means may be necessary to adequately support material carrying such facilities, or to support the facilities themselves, and shall maintain such supports until they are no longer needed. Temporary pavements, facilities, utilities and installations shall also be protected until they are no longer required. When temporary supports and other protective means are no longer required, they shall become the property of the Contractor and shall be removed and disposed of from the job site
- V. Prior to placing import fill material, all areas to receive fill shall be scarified and compacted. Unless otherwise stated in the appurtenant Geotechnical report, the area shall be scarified to a minimum of twelve (12) inches, material shall be moisture conditioned by wetting or drying to optimum moisture content, and compacted.
- W. The contractor shall notify the project manager if bedrock is encountered during excavation activities and perform grading work as described in the project deductive alternate plans. Earthwork quantities not excavated/filled shall be reconciled as credits.

### 3.4 ROCK EXCAVATION

- A. Rock excavation shall include excavating, grading, and disposing of materials classified as rock and shall include the satisfactory removal and disposition of rock 1/2 cubic yard or more in volume.
- B. No blasting is allowed.
- C. Bedrock Rippability/Excavatability
  - a. Cuts up to about 45 feet deep are planned for this project. Such cuts will result in deep cuts within bedrock. A seismic refraction survey (refer to Appendix C of the Geotechnical Report) was performed as part of the investigation to estimate depth to bedrock and evaluate bedrock rippability (i.e., excavatability). Although the bedrock encountered in the borings is predominantly highly weathered claystone and sandstone and can generally be excavated using conventional earthwork equipment, such as trenchers and backhoes, moderately weathered and strongly cemented sandstone and conglomerate zones will be more difficult to excavate, especially in confined spaces, such as trench or drilled pier excavations. Therefore, contractor should expect that more specialized earthwork equipment, such as dozers, excavators, hydraulic hammer attachments, and more powerful drilling equipment will be needed, particularly where deep cuts are planned.

### 3.5 GRADING

- A. Grading shall consist of placing fill materials on site to contours and elevations with select fill or import fill materials.
- B. Place fill material in continuous layers of maximum loose lifts of 8 inches (0.67 feet) and compact in accordance with schedule shown in this section, unless otherwise shown on the appurtenant Geotechnical Report.
- C. Properly moisture condition fill materials per the Geotechnical Report.
- D. Construct slopes to the lines and grades shown on the Drawings.
- E. Slope grade away from the building minimum 2% slope for a minimum distance of 10 feet, unless noted otherwise.
- F. Make grade changes gradual. Blend slopes into level areas.
- G. Round the tops of excavation slopes and ends of excavation.
- H. Maintain completed slopes. Repair any slopes damaged by erosion.
- I. Repair or replace items indicated to remain that are damaged by excavation or filling.
- J. Identify any site low points which need positive drainage and make adjustments with approval from Project Manager prior to pouring concrete.
- K. Protection of existing slopes using erosion control measures as required in [Section 01 57 23 – Storm Water Pollution Prevention](#).
- L. [Cut/Fill Transition Zones](#)
  - a. [Significant amounts of cuts and fills are planned for the project, particularly within the proposed sports fields. Cut/fill transitions, particularly at transitions between cuts within the bedrock, can lead to significant differential settlement if not properly mitigated. Therefore, all cut areas shall be overexcavated a minimum of 3 feet below finished subgrade elevation within the sports fields, exterior flatwork, pavers, and pavements and a minimum of 5 feet below foundations. The overexcavation shall extend a minimum of 5 feet laterally beyond the cut limits, where feasible. The overexcavated zone shall then be backfilled with properly compacted engineered fill according to the requirements of the Geotechnical Report . The overexcavated material can be re-used as engineered fill provided it meets the fill requirements of the Geotechnical Report](#)

[To further reduce the potential for significant cut/fill differential settlement, we recommend using a higher compaction requirement for the portion of fills deeper](#)

(i.e., thicker) than 7 feet as recommended in the “Site Preparation and Grading” section of this report.

#### M. Slurry or Commercial Lime Slurry Treatment

a. Quicklime treatment of the in-situ soils (if used) shall be performed using high calcium or dolomitic quicklime.

b. The quicklime treatment operation shall be conducted in general accordance with Section 24 of the Caltrans Standard Specifications, 2018 edition. The lime treatment shall be a premixed commercial lime slurry or a lime slurry prepared on site using a minimum of 5 percent quicklime by dry unit weight of soil and an in-situ dry unit weight of 110 pounds per cubic feet. Quicklime treatment typically consists of spreading the required amount of quicklime slurry over the area to be treated, followed by initial mixing of the quicklime slurry within the soil section to be treated. This initial mixing is then allowed to sit for a period of at least 24 hours or longer to permit the resulting chemical reaction to break down the material and change it chemically. Following this “mellowing” period, the soil-quicklime section is re-mixed and additional water, if needed, is added. It is important that adequate water be added before final mixing to ensure complete

hydration of the quicklime and to bring the soil moisture content to at least 3 percent above the optimum moisture content before compaction takes place.

c. After the quicklime-treated pad/subgrade is compacted, it shall be allowed to harden (cure) until loaded dump trucks and other construction equipment can operate on it without rutting the surface. Throughout this curing period, the surface of the quicklime-treated soil should be kept moist to aid in strength gain.

Alternatively, the quicklime-treated surface shall be covered with the 6 inches of capillary break or aggregate base material.

d. It is very important that the general steps outlined above be performed in a manner that introduces sufficient water to the soil-quicklime mix to allow the quicklime to thoroughly hydrate and react chemically with the soil subgrade. Likewise, it is equally important that proper curing of the quicklime-treated section take place.

e. Lime delivery trucks shall have their cargo sealed at the source facility and the seals shall have serial numbers matching the bill of lading. The seals shall only be broken at the project site and in the presence of a representative of the Geotechnical Engineer.

### 3.6 TOLERANCES

A. Section 01 45 00 – Quality Control: Tolerances.

- B. Immediately before placing subsequent layers of material, prepare the grading plane such that the grading plane:
  - 1. Does not vary more than 0.05 foot above or below the grade established by the Engineer where Hot Mix Asphalt (HMA) or aggregate base are to be placed.
  - 2. Does not extend above the grade established by the Engineer where concrete base or pavement is to be placed.
  - 3. Beneath structural approach slabs or the thickened portion of sleeper slabs do not extend above the grade established by the Engineer.
  - 4. At any point is within 0.05 foot above the grade established by the Engineer if the material to be placed on the grading plane is paid by the cubic yard.

### 3.7 COMPACTION

- A. Relative compaction specifications apply to material whether in an excavation or an embankment.
- B. The moisture content of material to be compacted to at least 95 percent must be such that the specified relative compaction is attained, unless specified otherwise in the appurtenant Geotechnical Report.
- C. Unless otherwise specified in the Geotechnical Report compact earthwork to a relative compaction of at least 95 percent for at least a depth of:
  - 1. 0.5 foot below the grading plane for the width between the outer edges of shoulders
  - 2. 2.5 feet below the finished grade for the width of the traveled way including any parking lots or other vehicular areas; to extend plus two (2) feet on each side.
- D. All fill material shall be compacted to at least 90 percent of maximum density as determined by ASTM D1557, Modified Proctor, beyond the depth specified above in 3.7.C, unless otherwise shown in the appurtenant Geotechnical Report.

### 3.8 STOCKPILING

- A. Stockpile materials on site at locations indicated on the plans or as designated by Project Manager.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.



- F. Stockpile unsuitable or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of. Dispose unsuitable or hazardous material within 48 hours of removal.

### 3.9 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.
- B. Leave unused materials in neat, compact stockpile.
- C. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

### 3.10 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

**END OF SECTION 31 05 13**

**SECTION 31 23 16 – UTILITY TRENCHING****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. The work of this Section includes all saw cutting, utility trenching, earthwork and removal of surface material as required for construction of the utility trenches. Such earthwork shall include, but may not necessarily be limited to, the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work, which shall include, but not necessarily be limited to, the furnishing, placing, and removing of sheeting, shoring and bracing necessary to safely support the sides of all excavations; all pumping, ditching, draining and other required measures for the removal or exclusion of water from the excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; restoration of surface, pavement markings, the disposal of excess excavated materials; borrow of materials to make up deficiencies for fills; and all other incidental earthwork.
2. All utility lines not owned by the City shall be designed and constructed in accordance with the rules and regulations of serving utilities. All utilities shall be installed prior to placement of the wearing surface of the street. It shall be the responsibility of the Contractor to conform to these provisions.
3. All broken concrete, pavement, base and other material and unsuitable and surplus excavated material shall be removed, hauled off the site and disposed of by the Contractor at a location obtained by the Contractor and approved by the Project Manager all at no additional cost to the City; said costs and fees shall be considered as included in the prices bid.
4. All materials regardless of character and subsurface conditions shall be excavated to the depths indicated or specified. During excavation, suitable trench material that will be used as backfill shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins, or shall be separately stockpiled. All excavated materials not required or unsuitable for backfill shall be disposed of outside the Right-of-Way as specified in Section 5-1.20B(4) "Contractor-Property Owner Agreement" of the State Standard Specifications

5. All hazardous materials shall be handled in accordance with all regulatory agency requirements and as specified in Section 14-11.03, "Hazardous Waste Management", of the State Standard Specifications. Contractor-generated hazardous waste shall be disposed of outside the Right-of-Way as specified in Section 14-11.06B, "Contractor-Generated Contaminated Soil", of the State Standard Specifications. Within 5 business days of transporting hazardous waste, submit documentation of proper disposal from the receiving landfill.
6. Where there is not a specific bid item for Hazardous Waste Management, full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in handling of the hazardous waste shall be considered included in the price paid for various items of work and no separate compensation will be allowed therefor.
7. All surface openings shall be saw cut using a power-driven saw with a diamond blade to provide a smooth joint for both concrete and bituminous street and sidewalk surfaces. All the trenches shall be "T" cut trenches as per City Standard details.
8. Impact pavement breakers (drop hammers, stampers, jack hammers) are not permissible.
9. The requirements of Section 7-1.02K(6) and 7-1.02L(2) of State Standard Specifications concerning Trench Safety and Antitrust Claims shall be complied with in addition to the requirements of Article 6 and Section 1503 of the State of California Construction Safety Orders.
10. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations. Unless otherwise indicated, excavation shall be by open cut except that short sections of a trench may be tunneled if the pipe, cable, or duct can be safely and properly installed, backfilled with Controlled Low Strength Materials not tamped in such tunnel sections.

B. Related Sections:

1. [Section 01 33 00 - Submittal Procedures](#)
2. [Section 02 41 00 - Demolition](#)
3. [Section 31 05 13 – Clearing & Grubbing, Excavation, and Earthwork](#)
4. [Section 32 11 23 - Aggregate Base Courses](#)
5. [Section 32 12 16 - Asphalt Paving](#)
6. [Section 32 13 13 - Concrete Surface Improvements](#)
7. [Section 33 05 13 - Manholes and Structures](#)
8. [Section 33 11 13 - Water Distribution Piping](#)
9. [Section 33 12 13 – Water Service Connections](#)
10. [Section 33 31 13 - Sanitary Sewer Piping](#)
11. [Section 33 41 13 - Storm Drainage Piping](#)

## C. California Codes:

1. Titles 17 and 22 California Code of Regulations - Chapter 16 – California Waterworks Standards
2. Water Main Separation Criteria: Chapter 16 - California Waterworks Standards Article 6 - §64572

## 1.2 REFERENCES

## A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

## B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
4. ASTM D1633 - Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders.
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10. ASTM D3776 - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
11. ASTM D3786 - Standard Test Method for Bursting Strength of Textile Fabrics -Diaphragm Bursting Strength Tester Method
12. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
13. ASTM D4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
14. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

15. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
16. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
17. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
18. Cal/OSHA - Division of Occupational Safety and Health (DOSH) Administration

- C. State Codes;
  - a. California Labor Code
  - b. Construction Safety Orders of the State of California
- D. State of California (Caltrans) - State Standard Specifications:
  - a. Section 25 - Aggregate Subbases
  - b. Section 26 - Aggregate Bases
- E. Geotechnical Report dated March 17, 2023 by BSK Associates (File No. G00000268)
  - a.

### 1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.
- B. Utility Structure: Maintenance holes, inlets, catch basins or vaults

### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Excavation Protection Plan: Contractor's attention is directed to the provisions in Section 6705 of the California Labor Code. Prior to beginning any trench or structure excavation five (5) feet or more in depth, the Contractor shall submit to the Project Manager for review for compliance with Section 6705 of the Contractor's detailed excavation protection plan showing the design of all shoring, bracing, sloping of the sides of excavation, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches or structure excavations.
- C. Product Data: Contractor shall submit data for various types of backfill, trenching and shoring plans, and geotextile fabric. Contractor shall submit laboratory results indicating all soils and backfill material are not hazardous.

- D. Samples: Contractor shall submit fill samples, in air-tight containers for each type of fill to testing laboratory a minimum of 10 working days before fill is to be imported to the project site.
- E. Materials Source: Contractor shall submit name of imported fill materials suppliers.
- F. Manufacturer's Certificate: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.
- G. Contractor shall submit a Safety Certification

## 1.5 QUALITY ASSURANCE

- A. Capital Improvement Projects (CIP):
  - 1. All soil and backfill testing shall be done by a testing laboratory of the City's choice at the City's expense except as otherwise specified in Paragraph 1.5 B. below. The Contractor shall notify the Project Manager at least 48 hours prior to performing any utility excavation and before beginning of backfill materials.
  - 2. Where soil material is required to be compacted to a percentage of maximum density the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be densified to a percentage of relative density the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 2922, or by such other means acceptable to the Project Manager.
  - 3. In case the first test and one re-test of the fill or backfill show non-compliance with the requirements, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent re-testing after the first re-test to show compliance shall be at the Contractor's expense.
- B. All Other Projects including but not limited to permit projects, utility company projects, development and redevelopment projects:
  - 1. All soil and backfill testing shall be by the Permittee/Developer/Utility Company's Geotechnical Engineer of Record and shall submit all testing information to the City.
  - 2. Maintain one copy of the Construction Documents and City Standard Details and Specifications on site.

## 1.6 QUALIFICATIONS

- A. If the Contractor's excavation protection plan varies from the shoring system standards established in the Construction Safety Orders of the State of California,

such alternative system plan shall be prepared, stamped and signed by a Civil or Structural Engineer licensed in the State of California at the Contractor's expense.

#### 1.7 FIELD MEASUREMENTS

- A. Contractor shall verify field measurements prior to fabrication.

#### 1.8 COORDINATION

- A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

### **PART 2 - PRODUCTS**

#### 2.1 SUITABLE FILL MATERIALS

- A. Suitable backfill shall be a selected or processed clean, fine earth, rock, or sand, free from objectionable materials, vegetation, or other deleterious substances.
- B. All import material from a source outside the project limits for use as backfill shall be clean soil, not hazardous, free from organic material, trash, debris, rubbish, broken Portland cement concrete, bituminous materials or other objectionable materials. Whenever the Contractor elects to use imported material for backfill, it shall be delivered not less than 10 business days prior to the intended use and a sample of the material shall be submitted to the Project Manager for review. The sample shall have a minimum dry weight of 100 pounds and shall be clearly identified as to source, including street address and community of origin. The Project Manager will determine the suitability, the minimum relative compaction to be attained, and the placement method based on the Geotechnical Report or input from a representative of the Geotechnical Engineer. If the backfill material is found not suitable, the Contractor shall remove material from the site and dispose of at no additional cost to the City.
- C. Should the imported material not be substantially the same as the approved sample, it shall not be used for backfill and shall be removed from the job site at the Contractor's expense.
- D. The densification method for imported material authorized by the Project Manager will be dependent upon its composition, the composition of the in-place soil at the point of placement, once the relative compaction to be obtained.
- E. The following are the types of backfill materials:

1. **Sand** shall be a material with 100 percent passing a 3/8" sieve, at least 90 percent passing a No. 4 sieve, and a sand equivalent value not less than 30.
2. **Class 2 Aggregate Base** shall be crushed rock aggregate base material meeting the requirements of Section 26, "Aggregate Bases", for 3/4" maximum aggregate gradation, of the State Standard Specifications. Recycled Aggregate Base is an acceptable backfill material.
3. **Controlled Low Strength Materials (CLSM)** shall be fluid workable mixture of cement, pozzolan, aggregate and water mixed in accordance with ASTM C94. Cement shall be Type II Cement and comply with ASTM C150. Pozzolan shall be added to improve the flowability and shall be Type F in accordance with the requirements of ASTM C618. Water must be free of oil, salts, and other impurities that adversely affect the backfill. Aggregate must consist of well graded mixture of crushed rock, soil, or sand with a maximum aggregate size of 1/2-inch. 100percent of the aggregate shall pass the 3/4" sieve and not more than 30-percent retained on the 3/8" sieve and not more than 12 percent shall pass the No. 200 sieve. Air entraining admixtures shall be added to improve the workability and shall in accordance with the requirements of ASTM C260. Density of CLSM shall be between 120 pounds per cubic feet to 135 pounds per cubic feet. Minimum 28-day compressive strength for CLSM shall be between 50psi minimum to 100psi for depths 20 feet or less in height of cover. For depths greater than 10 feet in height, CLSM mix shall have a minimum 28-day compressive strength of 100 psi.
4. **Native** material shall be material obtained from on-site excavations, provided the materials are not classified as unsuitable. Native materials shall be free of stones, lumps, rubbish, debris, organic material, broken concrete or bituminous surfacing over 4 inches in diameter, objectionable material, vegetation, and deleterious substances.
5. **Class 2 Permeable Material** shall be hard, durable, crushed stone, or gravel, and free from slaking or decomposition under action of alternate wetting or drying, uniformly graded, and shall meet the requirements of Section 68-2.02F for Class 2 "Permeable Material", of the State Standard Specifications.
6. **Topsoil** shall be material which has been obtained at the site or may be imported and shall meet the requirements of [Section 32 90 00 - Landscape Work](#). Removal of topsoil shall be done after the area has been stripped of vegetation and debris as specified.

## 2.2 UNSUITABLE BACKFILL MATERIALS

- A. Any material determined to be hazardous is defined as unsuitable material.



- B. Unsuitable soils for backfill material shall include soft, spongy, unstable or other similar soils which, when classified under ASTM D 2487, fall in the classifications of Pt, OH, or OL. Types CH and MH soils will be permitted in unimproved areas only where required compaction and stability can be demonstrated. In addition, any soil which cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use, shall be classified as unsuitable material.
- C. Washed, smooth rock (pea gravel) is classified as unsuitable material.

2.3 FILTER FABRIC

- A. Filter Fabric shall be permeable, non-woven synthetic fabric meeting the requirements of Section 96-1.02B, "Filter Fabric" of the State Standard Specifications. Filter fabric shall have minimum Grab breaking load in each direction of 157 pounds, a minimum puncture strength of 310 pounds, apparent opening size between 40 and 70.

2.4 TEMPORARY STEEL PLATES

- A. When approved by the Project Manager, the Contractor may use steel plate bridging in-lieu of backfill and temporary asphalt where the roadway surface is to be opened to traffic. All steel plates shall be without deformation. Inspectors shall determine the trueness of steel plates by using a straight edge and shall reject any plate that is permanently deformed.
- B. Trench plates shall be coated with Antiskid type surface meeting State Standard Specifications of a nominal Coefficient of friction of 0.35 in accordance with California Test Method 342 (Appendix H).
- C. The following table shows the advisory minimal thickness of steel plate bridging required for a given trench width (A-36 grade steel, designed for HS20-44 truck loading per Caltrans Bridge Design Specifications Manual).

Trench Width	Minimum Steel Plate Thickness (inches)
10 inches	1/2 inch
1 feet 11 inches	3/4 inch
2 feet 7 inches	7/8 inch
3 feet 5 inches	1 inch
4 feet 3 inches	1-3/4 inch

NOTE: For trench width spans greater than 4 feet 3 inches, a structural design shall be prepared, signed, and stamped by a California Registered Civil Engineer.

- D. A Rough Road signs (W8-8) with black lettering on an orange background shall be used in advance of steel plate bridging.

### PART 3 - EXECUTION

#### 3.1 DEFINITIONS - PIPE ZONE, BEDDING, TRENCH & FINAL ZONE

- A. **Pipe Zone:** Pipe Zone is defined as the vertical trench cross-section between the trench subgrade, which is 0.4 times the outside diameter of the pipe in inches below the bottom surface of the pipe or 4" minimum whichever is greater, and 12 inches above the top surface of the pipe.
- B. **Bedding:** Bedding is defined as that portion of the Pipe Zone between the trench subgrade, which is 0.4 times the outside diameter of the pipe in inches below the bottom surface of the pipe or 4" minimum whichever is greater and a level line from the bottom of the pipe.
- C. **Trench Zone:** The Trench Zone is defined as the vertical trench cross-section between top of Pipe Zone and 36" below finish paved surface. In unpaved areas, the Trench Zone shall be the vertical cross-section between the top of Pipe Zone and 24 inches below finished unpaved or landscape surface.
- D. **Final Zone:** The Final Zone is defined as the upper 36 inches of vertical cross-section below the finished paved surface. In unpaved or landscaped areas, the Final Zone is the upper 24 inches of vertical cross-section below the finished surface.
- E. **Pavement Section:** The Pavement Section is defined as the engineered layers of pavement and base conforming to the hot mix asphalt pavement or concrete pavement and aggregate base thickness as shown on the Plans.
- F. **Backfill:** Backfill is considered to be the material used to fill the portion of a trench between the pipe Bedding and the roadway subgrade or finish surface in non-roadway areas
- G. **Trench Plugs:** Trench plugs are temporary barriers placed within an open trench excavation in order to minimize the volume and velocity of trench water flow at the base of slopes and to reduce erosion in the trench, preventing the trench from becoming a subsurface drainage path. These trench plugs may consist of unexcavated portions of the trench, compacted subsoil, sandbags, or some functional equivalent.

#### 3.2 PIPE ZONE BACKFILL MATERIALS

- A. Bedding as defined in this section shall be Sand or Class 2 Aggregate Base.

- B. Pipe Zone backfill, excluding bedding as defined in this section shall be
  - 1. Sand for plastic pipe
  - 2. Sand or Class 2 Aggregate Base for ductile iron pipe, vitrified clay pipe and reinforced concrete pipe.
- C. For dry utility and/or joint trench, Pipe Zone backfill shall conform to latest Pacific Gas and Electric Company (PG&E) Greenbook’s Engineering Material Specification No. 4123 - Backfill Sand or meeting the utility owner’s specifications.
- D. Trench plugs shall be provided at minimum intervals of 200 feet where pipelines are installed on grades exceeding 4 percent, and where backfill materials have gradation less than 10 percent passing a No. 4 sieve.
- E. Unless otherwise specified Bedding and backfill around sub-drainage systems shall be minimum of 12 inches of Class 2 Permeable Material as specified in Section 68-2.02F(3) of the State Standard Specifications.

3.3 TRENCH ZONE BACKFILL MATERIALS

- A. Trench Zone backfill as defined in this section shall be Class 2 Aggregate Base in paved areas.
- B. Native backfill material shall be used in unpaved or landscape areas.

3.4 FINAL ZONE BACKFILL MATERIALS

- A. Final Zone backfill as defined in this section shall be
  - 1. Native backfill in unpaved areas
  - 2. Native backfill with 6 inches thick minimum Top Soil material in landscape areas.
  - 3. Class 2 Aggregate Base in paved areas below the Pavement Section.

3.5 TRENCH WIDTH & LENGTH

- A. Minimum Trench width shall be as follows:

Utility Pipe Outside Diameter (O.D.) (inches)	Minimum Trench Width (inches)
For Pipe Sizes under 12 inches	Pipe O.D. + 12 inches
For Pipe Sizes between 12 inches to 48 inches	Pipe O.D. + 24 inches
For Pipe Sizes above 48 inches	Pipe O.D. + 48 inches

For Dry Utilities (electrical, telephone, cable, street light and traffic signal conduits), the trench width shall be 18" minimum.

- B. Maximum Length of Open Trench: Except by permission of the Project Manager, the maximum length of open trench where prefabricated pipe is used shall be the distance necessary to accommodate the amount of pipe installed in a single day and shall not exceed 300 feet. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily re-surfaced.
- C. Except by permission of the Project Manager, the maximum length of open trench in any one location where concrete structures are cast in place will be that which is necessary to permit uninterrupted progress.

### 3.6 PREPARATION

- A. Call Local Utility Line Information service at USA North 811 not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Contractor's Licensed Land Surveyor shall provide all construction surveying and staking prior to beginning any trenching and excavation.
- C. Protect bench marks, street monuments, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- D. Contractor shall maintain and protect above and below grade utilities unless otherwise noted.
- E. Establish temporary traffic control per Contractor's approved traffic control plans when trenching is performed in public right-of-way. Relocate controls as required during progress of Work.

### 3.7 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations more than 5 feet deep to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. All sheeting, shoring and bracing shall conform to Cal/OSHA.
- C. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

- D. Design sheeting and shoring to be removed at completion of excavation work.
- E. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- F. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.
- G. **Access to Trenches** - A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for the employees, the Contractor, and any other personnel.
- H. **Bracing Excavations** - The manner of bracing excavations shall be as set forth in the rules, orders and regulations of the Division of Industrial Safety of the State at California.

### 3.8 TEMPORARY ACCESSIBLE PEDESTRIAN BRIDGES

- A. Temporary Accessible Pedestrian bridges of approved construction not less than four feet in width in compliance with ADA, and provided with hand rails and supports of dressed lumber, shall be installed over trenches at all crosswalk intersections, and at such other points where traffic conditions make it advisable. Substantially constructed bridges, adequate for handling all vehicular traffic, shall be installed over any trench or other excavation in a street intersection, whenever such excavation is in excess of half the width of the street crossing. Adequate bridges shall be provided to make possible the safe and full use of all driveways or roadways used to move vehicles from the public street onto private property.
- B. All bridges required to be installed shall be maintained in place as long as the condition of the work requires their use for the safety and convenience of the public. Removal or relocation of these temporary bridges shall be at the Contractor's own discretion and risk.

### 3.9 TRENCHING AND EXCAVATION

- A. All excavations for utilities, pipelines and Minor Structures shall be open cut trenches, unless otherwise shown.
- B. Do not advance open trench more than 200 feet ahead of installed pipe.
- C. Cut trenches to widths per Standard Specifications or as indicated on the Drawings and sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

- D. Excavate trenches to depth per Standard Specifications or as indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utility pipes.
- E. Do not interfere with 45-degree bearing splay of foundations.
- F. When Project conditions permit, slope side walls of excavation per Cal/OSHA. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- G. Excavation and other work under or adjacent to existing pipe lines, cables, conduit runs or structures of any kind, shall be prosecuted in such a manner as not to interfere with the safe operation and use of such installations. Should any damage be incurred to existing facilities during the Contractor's operations, the Contractor shall immediately notify the proper owners or authorities, and shall arrange for the immediate repair of same at the Contractor's own expense.
- H. Excavations for appurtenant structures, such as but not limited to maintenance holes, transition structures, junction structures, vaults, valve boxes, catch basins, thrust blocks, and boring pits shall, for the purpose of shoring and bracing, be deemed to be in the category of trench excavation.
- I. Excavation shall include the removal of all water and materials of any nature which interfere with the construction work. Removal of ground water to a level below the structure sub-grade will be necessary unless specified otherwise. The water removed during excavation shall not be directed to storm drain system. The contractor shall apply to Delta Diablo for a Discharge Permit to dispose the water encountered during excavations into the sanitary sewer system.
- J. Should the Contractor elect to tunnel or jack any portion, he shall first obtain approval from the Project Manager. Payment for such work will be made as though the originally specified method of construction has been used.
- K. Trenching, tunneling, boring and jacking shall comply with the applicable provisions of the State Standard Specifications, these specifications and the plans. All work shall comply with the applicable Federal, State and local laws, regulations, codes and ordinances, and in addition, shall meet the respective utility agencies requirements for joint trench construction for installation of conduits, including, but not limited to, safety, depth, size, type, connection and other regulations and shall be considered as included in the various contract items of work and no additional compensation shall be made therefore.
- L. Pipe will be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Project Manager and shall be at no cost to the City.

- M. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Project Manager shall be given the opportunity to inspect the existing pipe or conduit before connection is made.
- N. Gravity flow pipe shall be laid downstream to upstream with the socket or collar ends of the pipe upgrade unless authorized by the Project Manager.
- O. Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position.
- P. Any adjustments in line or grade of not more than 0.1 feet up or down which may be necessary to accomplish the intent of the plans shall be considered as included in the various contract items of work and no additional compensation will be made therefore.
- Q. Locations of existing underground utilities and structures, insofar as they are known from information furnished by the respective utility companies and agencies, have been shown on the plans. The City assumes no responsibility for the accuracy or completeness of said data, which is offered solely for the convenience of the Contractor it shall be the Contractor's responsibility to verify the location of these obstructions, and to locate any other underground utilities or structures, which might interfere with the Contractor's operations.
- R. If soft spongy, unstable or other similar material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a depth ordered by the Project Manager based on the Geotechnical Report or input from a representative of the Geotechnical Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the plans or specifications, will be paid for as provided in the Proposal or the Technical Specifications. If the necessity for such additional bedding material has been caused by an act or failure to act on the part of the Contractor, or is required for the control of ground water, the Contractor shall bear the expense of the additional excavation and bedding.
- S. Where pipe culverts are to be installed in new embankment, it shall first be constructed to the required height as shown on the plans, and for a distance each side of the culvert location of not less than five (5) times the diameter of the culvert, after which the trench shall be excavated with sides as nearly vertical as soil conditions will permit and culvert installed
- T. For excavations in landscape areas, all damaged irrigation systems, including irrigation piping and electrical wiring shall be repaired and restored to the original condition on the same day they are damaged. All landscape surface areas shall be restored to its original condition unless specified otherwise.

- U. No tree roots over 1.5 inches in diameter shall be cut without the authorization from the Project Manager or City's Arborist. If existing roots over 1 inch in diameter are cut during the course of work, the cut faces shall be thoroughly coated with emulsified asphalt made especially for use on cut or damaged plant tissues. All exposed roots shall be covered with wet burlap to prevent them from drying out.
- V. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- W. Correct over excavated areas with compacted backfill as specified for authorized excavation as directed by Project Manager.
- X. Remove excess subsoil not intended for reuse, from site. The legal disposal of excess materials shall be the responsibility of the Contractor.
- Y. Use of explosives and blasting material will not be permitted.
- Z. Stockpile excavated material in area designated on site as shown on the Contractor's approved Staging Plans.
- AA. In areas of high vehicular or pedestrian volumes, the Project Manager may order the immediate removal of excavated material and that sidewalks and gutters be kept clean at all times.
- BB. The Contractor may transport or backhaul material to be used as backfill material from any portion of a project to any other portion or line of the same project, or from any project being constructed under one contract to any other project being constructed under that same contract. Such transported material shall be clean soil, free from organic material, trash, debris, rubbish, or other objectionable substances except that broken Portland cement concrete or bituminous type paving allowable for the type of backfill specified may be permitted

### 3.10 OVER-EXCAVATION

- A. When ordered by the Project Manager, whether or not indicated in the project plans and specifications, trenches shall be over-excavated beyond the depths shown and such over-excavation shall be to the depths ordered the Project Manager. Backfill for over excavation backfill shall be Class 2 Permeable materials unless otherwise recommended by the Geotechnical Report. For wet trenches, Contractor shall install a filter fabric on top and below the permeable materials.

### 3.11 PIPE LAYING

- A. Lay pipes to lines and grades indicated on Drawings, with uniform bearing under the full length of the barrel of the pipe. Project Manager reserves right to make



changes in lines, grades, and depths of utilities when changes are required for Project conditions.

- B. Pipe sections shall be laid and joined in such a manner that the offset of the inside of the pipe at any joint will be held to a minimum at the invert. The maximum offset at the invert of pipe shall be 1 percent of the inside diameter of the pipe or 3/8 inch, whichever is smaller.
- C. After the joints have been made, the pipe shall not be disturbed in any manner.
- D. At the close of work each day, or whenever the work ceases for any reason, the end of the pipe shall be securely closed unless otherwise permitted by the Project Manager.
- E. All pipe shall be installed in accordance with the manufacturer's recommendations.
- F. The interior of the pipe shall be clean and free from foreign materials before sections of the pipe are connected. The open ends of the pipe shall be sealed with watertight plugs or other approved means at times when pipe laying is not in progress. Under no conditions shall ground water be allowed to enter the pipe.
- G. Dropping or bumping of pipe will not be permitted. Care shall be exercised by the Contractor to prevent damage to the pipe during handling. There shall be no distortion or deflection of the pipe which might induce damage to the pipe, pipe lining, pipe coating or joints.
- H. Pipe will be carefully inspected in the field before and after laying. In no event shall rejected pipe be installed. Any pipe failing to pass inspection after laying shall be subject to rejection. Any corrective work shall be approved by the Project Manager and shall be at no cost to the City.
- I. The Contractor shall provide a minimum of twelve (12) inches vertical clearance between the pipe and proposed or existing facilities and improvements or per the Utility owner's requirements. A minimum of twelve inches (12 inches) vertical clearance between the pipe and sanitary sewers, gas or petroleum lines and telephone cables shall be provided. Clearance for electrical conduits shall be as provided in the applicable General Safety Orders or utility regulations. Sanitary sewer and water lines shall be 10 feet horizontally clear and not in the same trench and in conformance with Water Main Separation Criteria: Chapter 16 - California Waterworks Standards Article 6 - §64572, unless specifically shown or directed by the Project Manager.
- J. Every precaution shall be taken against floating the pipe. In case of such floating, the Contractor shall replace the pipe to its proper location at his own expense, and replace any damaged pipe which may have resulted.

### 3.12 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Regardless of compaction method, backfill shall be evenly spread in horizontal layers so that when compacted each layer shall not exceed eight (8) inches in loose thickness. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material and uniformity of moisture throughout backfill materials. Material placed in excess of eight (8) inches in loose thickness shall be removed and re-compacted with the next lift.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Water shall be added before or during spreading until the proper moisture content is achieved where the backfill material moisture content is below the optimum moisture content.
- D. Where the backfill material moisture content is too high to permit the specified degree of compaction, the material shall be dried or replaced until the moisture content is satisfactory.
- E. Unless otherwise approved by the Project Manager, all trenches within the existing roadway shall be backfilled completely and the roadway made passable to traffic at the end of each day's operation.
- F. Backfill, or fill, as the case may be, for cast-in-place structures such as, but not limited to, manholes, transition structures, junction structures, vaults, valve boxes and reinforced concrete conduits shall start at the sub-grade for the structure.
- G. Except where the pipe must remain exposed for force main leakage tests and subject to the provisions herein, the Contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised so that the conduit will not be damaged or displaced. If the pipe is supported by concrete bedding placed between the trench wall and the pipe, the remainder of any bedding material shall be placed to 1 foot over the top of the conduit. The backfill above the concrete bedding shall not be placed nor sheeting pulled until the concrete has attained sufficient strength as required by the Project Manager.
- H. Trenches shall not be backfilled until all required pressure tests are performed and until the utilities systems as installed conform to the requirements specified in the several sections covering the installation of the various utilities.
- I. Voids left by the removal of sheeting, piles and similar sheeting supports shall be immediately backfilled and compacted into place to assure dense and complete filling of the voids.
- J. After the placing of backfill has been started, the Contractor shall proceed as soon as practicable with compaction.

- K. Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Project Manager. Impact-type pavement breakers (stompers) will not be permitted. Sheepsfoot equipment shall be limited to outside the Pipe Zone.
- L. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will produce required results or will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make its own determination in this regard.
- M. Material for mechanically compacted, backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified above.
- N. Mechanically compacted backfill shall be placed in horizontal layers of thickness compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped, vibrated or rolled until the specified relative compaction has been attained.

3.13 COMPACTION OF BACKFILL MATERIALS

- A. Compaction of backfill materials shall be in accordance with ASTM D1557 for cohesive type soils and in accordance with ASTM D4253 and D4254 for cohesionless, free-draining granular type materials. The following compaction test requirements shall apply unless otherwise indicated by the Geotechnical Report:

Location of backfill	Relative Compaction
Pipe Zone (including Bedding)	90
Trench Zone	90
Final Zone (paved areas, excluding the Pavement Section)	95
Final Zone (unpaved or landscape areas)	90
Over-excavated areas	90
Around minor structures	90
Beneath minor structures	95

The above minimum relative compaction shall be achieved at the moisture content levels specified in the Geotechnical Report.

- B. Compaction of Pipe Zone including Bedding material shall be by hand tamping, hand held mechanical vibrating equipment or other means approved by the Project Manager.

- C. Each layer of backfill material shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content range. Flooding, ponding, or jetting shall not be used.
- D. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.
- E. Backfill within 3 feet of structures or walls shall be compacted with hand operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to the depth of the fill at that time.

### 3.14 TEMPORARY RESURFACING

- A. Unless permanent pavement is placed immediately, temporary bituminous re-surfacing 2 inches thick shall be placed and maintained in streets and parking lot areas and at locations determined by the Project Manager wherever excavation is made through pavement, sidewalk or driveways. Temporary asphalt shall be placed flush with the adjacent pavement grade.
- B. Hot Mix Asphalt shall be used for temporary resurfacing when permanent surfacing is not to be placed within seven (7) days.
- C. In sidewalk areas the temporary bituminous re-surfacing shall be at least 1-inch-thick, in all other areas it shall be at least 2 inches thick. At major intersections and other critical locations, a greater thickness may be ordered. Temporary resurfacing shall be placed as soon as the condition of the backfill is suitable to receive it and shall remain in place until the condition of the backfill is suitable for permanent resurfacing. Surfacing shall be maintained in a smooth and level condition. The temporary paving shall conform to the requirements of Section 39 of the State Standard Specifications and unless specified differently in the Technical Specifications, may use any of the mixes allowed in Section 39 for such temporary surfacing of trenches.
- D. The re-surfacing shall be placed, rolled, maintained, removed and disposed of by the Contractor.

### 3.15 PAVEMENT SECTION REPLACEMENT

- A. Unless otherwise specified on the plans or in the Technical Specifications, all existing pavement surface improvements damaged or removed as a result of the Contractor's operations shall be reconstructed by the Contractor per City of Pittsburg Standard Detail R-5, to same dimensions, except for pavement thickness, and with the same type materials used in the original work. Trench

resurfacing shall match the existing pavement thickness, but no less than 3 inches.

- B. The type and thickness of the replacement pavement, base, cement treated base, and sub-base for trenches in public streets and highways shall be as shown on the plans or designated by the Project Manager.
- C. Unless otherwise specified, the following requirements shall govern:  
  
Sub-base: Existing sub-base shall be replaced with Class 2 Aggregate Base. The thickness of sub-base replacement shall be designated by the Project Manager, and that portion of trench backfill lying within such designated limits shall be compacted in accordance with this Section and shall not be less than ninety-five (95) percent as determined by California Test Method No. 216.
- D. Surfacing of trenches in new street sections shall be as required to match the Pavement Section as shown on the project plans and specifications.

### 3.16 TOLERANCES

- A. [Section 01 45 00 - Quality Control](#): Tolerances.
- B. Top Surface of Backfilling under paved areas: Plus or minus 1/2 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1/2 inch from required elevations.

### 3.17 FIELD QUALITY CONTROL

- A. [Section 01 45 00 - Quality Control](#): Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at the Contractor's expense.

### 3.18 PROTECTION OF FINISHED WORK

- A. [Section 01 77 00 - Closeout Requirements](#): Contractor shall protect all the finished work and any damage to the finished work shall be replaced at the Contractor's expense.

### 3.19 TEMPORARY STEEL PLATE BRIDGING

- A. When backfilling operations of an excavation in the roadway including bike lanes, sidewalks and parking strip, whether transverse or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring shall be required to preserve unobstructed traffic and pedestrian flow. In such cases, the following conditions shall apply:
1. Steel plates used for bridging must extend a minimum of 12-inches beyond the edges of the trench.
  2. Steel plate bridging shall be installed to operate with minimum noise or movement.
  3. The trench shall be adequately shored to support the bridging and traffic loads.
  4. Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates, if plate installation by Method (2) described below, is used.
  5. Bridging shall be secured against displacement by using adjustable cleats, shims, or other devices.
- B. The Contractor is responsible for maintenance of the steel plates, shoring, asphalt concrete ramps, and ensuring that they meet minimum specifications.
- C. All work done by the City crews for lack of maintenance of the temporary steel plates as specified above by the Contractor shall be back charged to the Contractor.
- D. Steel plate bridging shall not exceed four (4) consecutive working days in any given week and should not be left through the weekend, unless approved by the Engineer.
- E. Steel plate bridging and shoring shall be installed using either Method (1) or (2):
1. **Method 1** For speeds of 45 MPH or greater:  
  
The pavement shall be cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate. Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2-inches into the pavement. Subsequent plates are to be butted and tack welded to each other.

2. **Method 2** For speeds less than 45 MPH:

Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2-in into the pavement. Subsequent plates are to be butted and tack welded to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12-inch taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry, epoxy or an equivalent that is satisfactory to the Project Manager.

**END OF SECTION 31 23 16**

**SECTION 32 11 23 - AGGREGATE BASE COURSES****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Class 2 Aggregate Base course.
2. Gravel Parking Stalls

## B. Related Sections:

1. [Section 31 23 16 - Utility Trenching](#): Compacted fill under base course.
2. [Section 32 12 16 - Asphalt Paving](#): Binder and finish asphalt courses.
3. [Section 32 13 13 - Concrete Surface Improvements](#): Finish concrete surface course.

## REFERENCES

## C. American Association of State Highway and Transportation Officials:

1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.

## D. Caltrans Standard Specifications:

1. Section 26 Aggregate Base.

## E. CalRecycle

1. <http://www.calrecycle.ca.gov/ConDemo/Aggregate/>

## F. Geotechnical Report dated March 17, 2023 by BSK Associates (File No. G00000268).

## 1.2 SUBMITTALS

A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.

## B. Product Data:

1. Submit data for geotextile fabric and herbicide.

## C. Samples: Submit, in air-tight containers, 5 lbs sample of each type of aggregate fill to testing laboratory or as required by the City.



- D. Submit aggregate base gradation, R-value requirements, and sand equivalent requirements as specified in this sections.
- E. Aggregate samples must not be treated with lime, cement, or chemicals before testing for durability index.
- F. Aggregate from untreated reclaimed processed asphalt concrete, Portland cement concrete, lean concrete base or cement-treated base is not considered treated.
- G. If the aggregate gradation test results, sand equivalent test results, or both do not comply with the Contract compliance requirements, remove the aggregate base or request a payment deduction. If the payment deduction request is authorized, \$2.00/cubic yard is deducted.
- H. Materials Source: Submit name of aggregate materials suppliers.
- I. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- J. Field survey and certify the top of aggregate base design grades as specified in [Section 01 71 23 - Construction Surveying](#).
- K. Supplier shall submit certification data that aggregate base meets the requirements per Caltrans Testing Methods.

### 1.3 SUSTAINABLE DESIGN SUBMITTALS

- A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for salvaged and reused products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for regional materials and distance from jobsite.

### 1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work according to City Standards.

**PART 2 - PRODUCTS**

**2.1 SUSTAINABILITY CHARACTERISTICS**

**A. Materials and Resources Characteristics:**

1. Recycled Content Materials: Furnish materials with maximum available recycled content.
2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of jobsite.

**2.2 AGGREGATE MATERIALS**

**A. Aggregate must be clean and consist of any combination of the following:**

1. Broken Stone
2. Crushed Gravel
3. Natural rough-surfaced gravel
4. Sand
5. Processed reclaimed asphalt concrete, Portland cement concrete, lean concrete base, or cement-treated base.

**B. Quality:** Aggregate base furnished for the base material shall be free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm stable base.

**C. Maximum aggregate size shall be 3/4-inch maximum aggregate gradation unless specified otherwise.**

**D. Class 2 Aggregate Base:** ASTM D2940; graded type. Conform to Section 26 of the Caltrans Standard Specifications. Aggregate gradation for 3/4-inch maximum aggregate base must be within the percentage passing limits for the sieve sizes shown in the following table:

**Aggregate Gradation**

Sieve Size	Percentage Passing	
	Operating Range	Contract compliance
2"	-	-
1-1/2"	-	-
1"	100	100
3/4"	90-100	87-100
No. 4	35-60	30-65
No. 30	10-30	5-35
No. 200	2-9	0-12

- E. The aggregate quality characteristic must comply with the requirements shown in the following table:

<b>Aggregate Quality Characteristics</b>		
<b>Quality Characteristics</b>	<b>Requirement</b>	
	Operating Range	Contract compliance
Resistance (R-value, min.)	-	78
Sand Equivalent (min.)	25	22
Durability Index (min.)	-	35

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify compacted subgrade is dry and ready to support paving and imposed loads.
  - 1. Proof roll subgrade with minimum two perpendicular passes to identify soft spots unless specified otherwise in the Project Geotechnical Report.
  - 2. Remove soft subgrade and replace with compacted fill unless specified otherwise in the Project Geotechnical Report or as ordered by the Project Manager.
- B. Immediately before spreading aggregate base, the subgrade must comply with the specified compaction and elevation tolerance for the material involved and be free from loose or extraneous materials.
- C. Contractor may use aggregate base to fill areas of the subgrade that are lower than the grade as shown on the Drawings.

**3.2 PREPARATION**

- A. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

**3.3 AGGREGATE PLACEMENT**

- A. Deliver uniform thickness of aggregate base to the roadbed. Deposit aggregate base in layers or windrows.
- B. Spread and shape the aggregate base to such thickness that after watering and compacting, the completed aggregate base is within the tolerances specified below in Section 3.5.

- C. Avoid material segregation. Segregated materials shall be re-mixed until uniform.
- D. Aggregate base must be free from pockets of coarse or fine material.
- E. If the aggregate base thickness shown is 0.50 foot or less, spread and compact the aggregate base in one layer. If the thickness shown is more than 0.50 foot, spread and compact the aggregate base in at least 2 approximately equal layers in thickness. The compacted thickness of any one later must not exceed 0.50 foot.
- F. At locations inaccessible to spreading equipment, spread and compact aggregate base by any means that will attain the specified requirements; by hand compaction if needed.
- G. Apply water to moisture condition the aggregate base as needed for optimum moisture content for compaction.
- H. Compact each aggregate base layer to at least 95 percent relative compaction unless otherwise specified in the Geotechnical Report.
- I. .
- J. Level and contour surfaces to elevations, profiles, and gradients indicated.
- K. Maintain optimum moisture content of fill materials to attain specified compaction density.
- L. Correct areas of aggregate base that do not comply with the described thickness.

### 3.4 TOLERANCES

- A. [Section 01 45 00 - Quality Control](#): Tolerances.
- B. Maximum Variation from Flat Surface: 1/4 inch measured with 10-foot straight edge.
- C. Maximum Variation from Thickness: 1/4-inch.
- D. Maximum Variation from Elevation: 1/4-inch.

### 3.5 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Field inspecting, testing, adjusting, and balancing.
- B. When tests indicate Work does not meet specified requirements, correct areas of aggregate base that do not comply with the specified requirements and retest, or

request a payment deduction. If a payment deduction is authorized, the deduction is calculated by multiplying:

1. Deficient thickness less allowable tolerance
2. Planned width
3. Longitudinal distance of the deficient thickness
4. \$17.00/cubic yard of the item price adjusted for cubic yards, whichever is higher

**END OF SECTION 32 11 23**

## SECTION 32 12 16 - ASPHALT PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Asphalt materials.
2. Aggregate materials.
3. Type A HMA Asphalt paving
4. Tack coat
5. Asphalt Rubber Binder Seal Coat

##### B. Related Requirement:

1. [Section 32 11 23 - Aggregate Base Courses](#): Compacted subbase for paving.
2. [Section 33 05 13 - Manholes and Structures](#)

#### 1.2 REFERENCE STANDARDS

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
7. AASHTO M324 - Standard Specification for Joint and Crack Sealant s, Hot Applied, for Concrete and Asphalt Pavements.
8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.
9. AASHTO T283-14 – Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage.
10. AASHTO T324 (Modified) -Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA).

##### B. Asphalt Institute:

1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.
2. AI MS-19 - Basic Asphalt Emulsion Manual.
3. AI SP-2 - Superpave Mix Design.

C. State Standard Specification:

1. Section 39 Asphalt Concrete.
2. Section 92 Asphalt Binder.
3. Section 94 Asphaltic Emulsions
4. Section 96 Geosynthetics

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Job Mix Formula (JMF): Except for the Hot Mix Asphalt (HMA) to be used in miscellaneous areas (median island areas not including inside shoulders, island areas, sidewalk, gutters, ditches, over side drains and aprons at end of drainage structures) and dikes, submit the proposed JMF for Type A HMA.
- C. The JMF must be submitted on the Contractor Job Mix Formula Proposal form along with:
1. Mix design documentation on Contractor's Hot Mix Asphalt Design data form dated with 12 months of submittal.
  2. Safety Data Sheets (SDS) for the following:
    - a. Asphalt Binder
    - b. Supplemental fine aggregate except fines from dust collectors
    - c. Antistripping additives.
- D. The Contractor's Hot Mix Asphalt Design Data form must show documentation on aggregate quality.
- E. Submit QC test results for Reclaimed Asphalt Pavement (RAP) gradation with the combined aggregate gradation within 2 business days of taking RAP samples during Type A HMA production.
- F. Contractor shall submit a new JMF if there are changes to any of the following:
1. Target asphalt binder percentage greater than  $\pm 0.2$  percent.
  2. Asphalt binder supplier
  3. Combined aggregate gradation
  4. Aggregate sources
  5. Liquid antistripping producer or dosage
  6. Average binder content in a new processed RAP stockpile by more than  $\pm 2.0$  percent from the average RAP binder content reported on Contractor Hot Mix Asphalt Design Data form.

7. Average maximum specific gravity in a new processed RAP stockpile by more than  $\pm 0.060$  percent from the average maximum specific gravity value reported on Contractor's Hot Mix Asphalt Design Data form.
  8. Any material in the JMF.
- G. Submit a current asphalt concrete mix design from two separate sources (primary source and backup source) for asphalt concrete proposed to be used.
- H. Contractor shall provide delivery tickets to the City at the time of delivery of each load of product, including asphalt concrete, tack coat, sealant, and paving reinforcement fabric. Each delivery ticket shall include or be accompanied by appropriate batch information produced by the batching plant or factory of origin and information stating the mix or model number, total yield in tons, gallons, or square feet, and time, date, and location of delivery.
- I. Any asphalt concrete rejected by the Project Manager shall be deducted from the total quantity of asphalt concrete tonnage.
- J. Reference Plan: Contractor shall have a walk through with the Project Manager for all installed underground boxes and/or iron elements, 10 days prior to any pavement repair. Contractor shall submit a reference plan (RP) to the Project Manager's review for utility facilities adjustment 3 working days prior to lowering any utility facilities.
- K. Contractor shall submit a paving plan for longitudinal joints.

#### 1.4 QUALITY CONTROL PLAN

- A. The Contractor shall submit a Quality Control (QC) plan for HMA.
- B. The QC plan shall describe the organization and procedures for:
1. Controlling HMA quality characteristics
  2. Taking samples, including sampling locations.
  3. Establishing, implementing, and maintaining QC
  4. Determining when corrective actions are needed.
  5. Implementing corrective actions.
  6. Using methods and materials for backfilling core locations.
- C. The QC plan must address the elements affecting HMA Quality, including
1. Aggregates
  2. Asphalt binder
  3. Additives
  4. Productions
  5. Paving



- D. For CIP projects, the Contractor shall permit the City’s certified testing laboratory to take samples of the aggregate and asphalt emulsion used in the project at the City’s discretion. Gradation and sand equivalent tests may be run on the aggregate and residual asphalt tests on the emulsion. City will compare the test results with this Section and notify the Contractor if any test fails to meet specifications.
- E. The Contractor shall furnish all tools and equipment and employ sufficient trained personnel to operate all equipment and perform all handwork efficiently and skillfully.

1.5 AGGREGATES TESTING:

- A. Contractor shall test the quality of aggregates under the test methods and frequencies shown in the following table and provide results to the City:

**Aggregate Testing Frequencies**

Quality Characteristic	Test Method	Minimum Testing Frequency
Gradation <sup>a</sup>	AASHTO T 27	1 per 750 tons and any remaining part
Sand Equivalent <sup>b,c</sup>	AASHTO T 176	
Moisture Content <sup>d</sup>	AASHTO T 255	
Crushed particles	AASHTO T335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles Rattler	AASHTO T96	
Flat and Elongated particles	AASHTO D4791	
Fine Aggregate angularity	AASHTO T 304 Method A	

<sup>a</sup>If RAP is used, test the combined aggregate gradation under California Test 384.

<sup>b</sup>Reported Value must be average of 3 tests from a single sample

<sup>c</sup>Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, “Manual Shaker,” 7.1.2, “Alternate Method No.2,” and 8.4.3, “Hand Method”, do not apply. Prepare the stock solution as specified in Section 4.8.1, “Stock solution with formaldehyde”, except omit the addition of formaldehyde.

<sup>d</sup>Test at continuous mixing plants only. If RAP is used, test the RAP moisture content at continuous mixing plant and batch mixing plant.

1.6 AMBIENT CONDITIONS

- A. [Section 01 50 00 - Temporary Facilities and Controls](#): Ambient conditions control facilities for product storage and installation.
- B. Do not place HMA on wet pavement or frozen surface.

- C. Maximum lift thickness for asphalt paving shall be 4-inches unless shown otherwise on the Drawings.
- D. Spread Type A HMA at the ambient air and surface temperatures shown in the following table unless shown otherwise on the Drawings:

Lift Thickness (Feet)	Ambient air (°F)		Surface (°F)	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder
< 0.15	55	50	60	55
≥ 0.15	45	45	50	50

**PART 2 - PRODUCTS**

2.1 ASPHALT PAVING

- A. Asphalt Concrete shall conform to Section 39, “Asphalt Concrete”, of the State Standard Specifications and the City Standard Specifications.
- B. Asphalt Concrete for surfacing shall be Hot Mix Asphalt (HMA) Type A.
- C. Asphalt Materials:
  - 1. Asphalt Binder: Asphalt Binder must comply with Section 92, “Asphalt Binders” of the State Standard Specifications.
    - a. For a leveling course, the grade of the asphalt binder for the Hot mix asphalt (HMA) must be PG 64-10 or PG 64-16.
    - b. For Miscellaneous areas, and asphalt dikes the grade of the asphalt binder for the Hot mix asphalt (HMA) must be PG 70-10. Minimum asphalt binder content must be 6.40 percent for 3/8” maximum size aggregate.
  - 2. Tack Coat: Diluted cationic emulsified asphalt per Section 94, “Asphaltic Emulsions”, of the State Standard Specification. Asphaltic emulsion shall be Grade CSS1h setting type.
  - 3. Reclaimed Asphalt Pavement (RAP): Processed material obtained by milling or full depth removal of existing asphalt paving.
- D. Reclaimed Asphalt Pavement (RAP) aggregate may be substituted for a part of virgin aggregate in a quantity not to exceed fifteen percent (15%) by weight of the aggregate blend.
  - 1. RAP shall conform to Section 39-2.02A(3)(c), “Reclaimed Asphalt Pavement”, of the State Standard Specifications.
  - 2. During Type A HMA production, sample RAP twice daily and perform QC testing for:

- a. Aggregate gradation at least once a day under California Test 384.
- b. Moisture content at least twice a day.
- 3. If RAP is used, RAP quality requirements must be as shown in the following table.

**Reclaimed Asphalt Pavement Quality**

Quality Characteristic	Test method	Requirement
Binder Content (% within the average value reported)	AASHTO T 164	± 2.00
Specific Gravity (within the average value reported)	AASHTO T 209	± 0.06

E. Aggregate Materials:

- 1. Coarse Aggregate: ASTM D692; Aggregate retained on a no. 4 sieve. crushed stone or gravel.
- 2. Fine Aggregate: ASTM D1073, AASHTO M29; Aggregate passing a no. 4 sieve. Natural sand or sand manufactured from stone or gravel.
- 3. Mineral Filler: finely ground mineral particles, free of foreign matter consisting of rock dust, slag dust, hydrated lime, hydraulic cement, or any combination of these and complying with AASHTO M17. Mineral fillers shall only be used if needed to improve the workability of the mix or gradation of the aggregate.
- 4. The aggregate gradation for Type A HMA must comply with the requirements shown in the following table unless specified otherwise on the Drawings:

**Aggregate Gradation Requirements**

Type A HMA pavement thickness shown	Gradation
Greater than 0.10 to less than 0.20 foot	1/2 inch
0.20 to less than 0.25 foot	3/4 inch
0.25 foot or greater	3/4 inch

- 5. The top 0.20-foot layer of asphalt pavement on the roadway shall have an aggregate gradation of 1/2" inch maximum.
- 6. Aggregate gradation must be within the Target Value (TV) limits for the specified sieve size shown in the following tables:

**Aggregate Gradation for Type A HMA (percentage passing)  
1 inch**

Sieve Size	Target value limit	Allowable tolerance
1"	100	-
3/4"	88-93	TV ± 5
1/2"	72-85	TV ± 6
3/8"	55-70	TV ± 6

No. 4	35-52	TV ± 7
No. 8	22-40	TV ± 5
No. 30	8-24	TV ± 4
No. 50	5-18	TV ± 4
No. 200	3-7	TV ± 2.0

**3/4 inch**

Sieve Size	Target value limit	Allowable tolerance
1"	100	-
3/4"	90-98	TV ± 5
1/2"	70-90	TV ± 6
No. 4	42-58	TV ± 5
No. 8	29-43	TV ± 5
No. 30	10-23	TV ± 4
No. 200	2-7	TV ± 2.0

**1/2 inch**

Sieve Size	Target value limit	Allowable tolerance
3/4"	100	-
1/2"	95-98	TV ± 5
3/8"	72-95	TV ± 5
No. 4	52-69	TV ± 5
No. 8	35-55	TV ± 5
No. 30	15-30	TV ± 4
No. 200	2-8	TV ± 2.0

**3/8 inch**

Sieve Size	Target value limit	Allowable tolerance
3/4"	100	-
1/2"	95-98	TV ± 5
3/8"	72-95	TV ± 5
No. 4	52-69	TV ± 5
No. 8	35-55	TV ± 5
No. 30	15-30	TV ± 4
No. 200	2-8	TV ± 2.0

7. Before the additional of asphalt binder, the aggregates must comply with the quality requirements shown in the following table:

Quality characteristics	Test Method	Requirement
Aggregate Gradation <sup>a</sup>	AASHTO T27	JMF ± Tolerance
Percent of crushed particles		
Coarse aggregate (min, %)		
One-fractured face	AASHTO T 335	95
Two-fractured face		90

Fine aggregate (min, %) Passing No. 4 sieve and retained on No. 8 sieve.) One-fractured face		70
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T96	12 40
Sand equivalent (min.) <sup>b, c</sup>	AASHTO T176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10
Fine aggregate angularity (min, %) <sup>d</sup>	AASHTO T304, Method A	45
<p><sup>a</sup>The Project Manager determines combined aggregate gradations containing RAP under California Test 384.</p> <p><sup>b</sup>Reported value must be the average of 3 tests from a single sample.</p> <p><sup>c</sup>Use of a sand reading indicator is required as shown in AASHTO T176, Figure 1. Section 4.7, "Manual Shaker", 7.1.2, "Alternate Method No.2." and 8.4.3, "Hand Method," do not apply. Prepare the stock solution as specified in section 4.8.1, "Stock solution with formaldehyde," except omit the addition of formaldehyde.</p> <p><sup>d</sup>The Project Manager waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.</p>		

2.2 TYPE A HMA PRODUCTION

- A. Contractor shall test the quality characteristics of Type A HMA under the test methods and frequencies shown in the following table and provide results to the City:

**Type A HMA Production Testing Frequencies**

Quality Characteristic	Test method	Minimum testing frequency
Asphalt Binder	AASHT T 308, Method A	1 per 750 tons and any remaining part
HMA Moisture Content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air Void Content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days whichever is greater

Voids in mineral aggregate	SP-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	SP-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg wheel track	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is greater.
Moisture susceptibility	AASHTO T 283	

2.3 TYPE A HMA ACCEPTANCE

- A. In place Type A HMA quality requirements shall be as shown in the following table:

**Type A HMA Acceptance In Place**

Quality Characteristic	Test method	Requirement
Asphalt Binder content (%)	AASHTO T 308 Method A	JMF – 0.3, +0.50
HMA moisture content (max, %)	AASHTO T 329	1.00
Voids in mineral aggregate on laboratory-produced HMA (min, %)d Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS = 1-inch with NMAS = 3/4-inch	SP-2 Asphaltic Mixture Volumetrics	16.5-19.5 15.5-18.5 14.5-17.5 13.5-16.5  13.5-16.5 14.5-17.5
Voids in mineral aggregate on plant-produced HMA (min, %)a Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS = 1-inch with NMAS = 3/4-inch		15.5-18.5 14.5-17.5 13.5-16.5 12.5-15.5  12.5-15.5 13.5-16.5
Dust proportion	SP-2 Asphaltic Mixture Volumetrics	0.6-1.3g

Density of core (% of max theoretical density) <sup>e,f</sup>	California Test 375	91.0-97.0
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 <del>PG 76 or higher</del>	AASHTO T 324 (Modified)	10,000 15,000 20,000 <del>25,000</del>
Hamburg wheel track (min number of passes at inflection point) Binder grade: PG 58 PG 64 PG 70 <del>PG 76 or higher</del>	AASHTO T 324 (Modified)	10,000 10,000 12,500 <del>15,000</del>
Moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	70
<p><sup>a</sup>Prepare 3 briquettes. Report the average of 3 tests,  <sup>b</sup>For CIP projects, the City’s Testing Laboratory determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.  <sup>c</sup>Determine the bulk specific gravity under AASHTO T 275, Method A.  <sup>d</sup>For CIP projects, the City’s Testing Laboratory determines the laboratory-prepared Type A HMA value for only mix design verification.  <sup>e</sup>For CIP projects, the City’s Testing Laboratory determines percent of theoretical maximum density under California Test 375 except for CIP Projects, City’s Testing Laboratory uses:</p> <ol style="list-style-type: none"> <li>1. AASHTO T 275 to determine in-place density of each density core.</li> <li>2. AASHTO T 209, method A to determine theoretical maximum density instead of calculating test maximum density.</li> </ol> <p><sup>f</sup>For CIP projects, the City’s Testing Laboratory determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, part 5, section D.  <sup>g</sup>For lime-treated aggregates, the dust proportion requirement is 0.6-1.5</p>		

2.4 SOURCE QUALITY CONTROL

- A. [Section 01 45 00 - Quality Control](#): Testing, inspection and analysis requirements.
- B. Test samples in accordance with AI MS-2.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation examination.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted aggregate base is dry and ready to support paving and imposed loads as specified in the project Geotechnical Report or as directed by the Project Manager.
  - 1. Proof roll subbase with minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft subbase and replace with compacted fill.
- D. Verify with a licensed land surveyor that the gradients and elevations of base are correct.
- E. Verify drainage grates and frames, and manhole frames are installed in correct position and elevation.

**3.2 CONSTRUCTION**

- A. Contractor may deposit HMA in a windrow and load it in the paver if:
  - 1. Paver is equipped with a hopper that automatically feeds the screed.
  - 2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without contaminating or damaging HMA and subgrade base material.
  - 3. Activities for depositing, pickup loading and paving are continuous.
  - 4. HMA temperature in the windrow does not fall below 260-degree F.
- B. HMA placed in a windrow on the roadway surface must not extend more than 250 feet in front of the loading equipment or material transfer vehicle.
- C. HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.
- D. Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.
- E. HMA must be free of:
  - 1. Segregation
  - 2. Coarse or fine aggregate pockets
  - 3. Hardened lumps



- F. Complete finish rolling activities before the pavement surface temperature is
  1. Below 150 degrees F for HMA with unmodified binder
  2. Below 140 degrees F for HMA with modified binder

### 3.3 SPREADING AND COMPACTING EQUIPMENT

- A. Paving equipment for spreading must be:
  1. Self-propelled
  2. Mechanical
  3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane.
  4. Equipped with a full-width compacting device.
  5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope.
- B. Install and maintain grade and slope reference.
- C. The screed must be heated and produce a uniform HMA surface texture without tearing, shoving, or gouging.
- D. The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.
- E. Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.
- F. In areas inaccessible to spreading and compacting equipment:
  1. Spread the HMA by any means to obtain the specified lines, grades and cross sections.
  2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction.

### 3.4 MATERIAL TRANSFER VEHICLE:

- A. The material transfer vehicle must have sufficient capacity to prevent stopping the paver and must be capable of:
  1. Either receiving HMA directly from trucks or using a windrow pickup head to load it from a windrow deposited on the roadway surface.
  2. Remixing the HMA with augers before transferring into the paver's receiving hopper or feed system.
  3. Transferring HMA directly into the paver's receiving hopper or feed system.

### 3.5 METHOD COMPACTION EQUIPMENT:

- A. For method compaction, each paver spreading HMA must be followed by 3 rollers:
  - 1. One vibratory roller specified designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
  - 2. One oscillating-type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
  - 3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

### 3.6 SURFACE PREPARATION:

- A. Before placing HMA, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.
- B. Prepare subgrade to receive HMA under the sections for the material involved. Subgrade must be free of loose and extraneous material.

### 3.7 TACK COAT:

- A. Apply tack coat in accordance with Section 39-2.01C(3)(f) of the State Standard Specifications.
- B. Apply tack coat:
  - 1. To existing pavement including planed surfaces.
  - 2. Between HMA layers
  - 3. To vertical surfaces of:
    - a. Curbs
    - b. Gutters
    - c. Construction joints.
- C. Coat surfaces of manholes and catch basins.
- D. Equipment for the application of tack coat must comply with Section 37-1.03B, "Equipment" of the State Standard Specifications.
- E. Before placing HMA, apply tack coat in one (1) application at the minimum residual rate shown in the following table for the condition of the underlying surface:

**Tack Coat Application Rates for HMA**

<b>HMA Over:</b>	<b>Minimum residual rates (gal/sq. yd) CSS1/CSS1h asphaltic emulsion</b>
New HMA (between layers)	0.02
Concrete Pavement and existing asphalt concrete surfacing	0.03
Planed pavement	0.05

- F. If a stress absorbing membrane interlayer as specified in Section 37-2.05, “Stress Absorbing Membrane Interlayers”, of the State Standard Specification is applied, the tack application rates for new HMA apply.
- G. Notify the Project Manager if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.
- H. Apply tack coat to vertical surfaces with a residual rate that will thoroughly coat the vertical face without running off.
- I. Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.
- J. Close areas to traffic receiving tack coat. Do not allow the tracking of tack coat onto pavement surfaces beyond the job site.
- K. If an asphalt binder is used for tack coat, the asphalt binder temperature must be from 285 to 350-degree F when applied.

**3.8 LONGITUDINAL JOINTS**

- A. Longitudinal joints in the top layer must match lane lines. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the lane line.
- B. A vertical longitudinal joint of more than 0.15 foot is not allowed at any time between adjacent open lanes to traffic.
- C. For an HMA thickness of 0.15 foot or less, the distance between the ends of the adjacent surfaced lanes at the end of each day’s work must not be greater than can be completed in the following day of normal paving.
- D. For an HMA thickness greater than 0.15 foot, you must place HMA on adjacent travel way lanes or shoulder such that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane’s end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. Place Kraft paper or other

authorized release agent under the conform tapers to facilitate the taper removal when paving activities resume.

- E. If placing HMA against the edge of existing pavement, saw cut or grind the pavement straight and vertical the joint to the full depth and remove extraneous material.

### 3.9 COMPACTION

- A. Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving.
- B. If a vibratory roller is used as a finish roller, turn the vibrator off.
- C. If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.
- D. Relative compaction will be determined by California Test 375.

### 3.10 PAVEMENT CRACK SEALING

- A. See [Section 32 12 17 – Asphalt Paving Rehabilitation](#) for Pavement Crack Sealing Specifications.

### 3.11 ASPHALT PAVING TOLERANCES

- A. [Section 01 45 00 - Quality Control](#): Tolerances.
- B. Flatness: Maximum variation of 1/8 inch measured with 10-foot straight edge.
- C. Scheduled Compacted Thickness: Within 1/4 inch.

### 3.12 FIELD QUALITY CONTROL

- A. [Section 01 45 00 – Quality Control](#): Requirements for testing, adjusting, and balancing.
- B. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

### 3.13 PROTECTION

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for protecting finished Work.

- B. Immediately after placement, protect paving from mechanical injury for until surface temperature is less than 140 degrees F.

**END OF SECTION 32 12 16**

**SECTION 32 13 13 - CONCRETE SURFACE IMPROVEMENTS****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Aggregate base course.
2. Concrete Surface Improvements for:
  - a. Concrete sidewalks
  - b. Concrete driveways
  - c. Concrete curb ramps
  - d. Concrete curbs and gutters
  - e. Concrete retaining curbs
  - f. Concrete median curbs
  - g. Concrete median nose surfacing
  - h. Concrete valley gutters
  - i. Concrete bus turnouts
  - j. Concrete survey monuments
  - k. Concrete ditches
3. Forms for Concrete
4. Concrete reinforcement (reinforcing bars, welded wire fabric and accessories).
5. Portland Cement Concrete placement
6. Concrete Joints - Expansion, Weakened plane and Score joints
7. Curing compounds

## B. Related Requirements:

1. [Section 09 90 00 - Painting and Coating](#): Pavement markings.
2. [Section 31 05 13 - Clearing & Grubbing, Excavation, and Earthwork](#)
3. [Section 32 11 23 - Aggregate Base Courses](#)
4. [Section 32 12 16 - Asphalt Paving](#)
5. [Section 33 05 13 - Manholes and Structures](#)

## 1.2 REFERENCE STANDARDS

## A. State of California (Caltrans) Standards:

- |    |            |                     |
|----|------------|---------------------|
| 1. | Section 19 | Earthwork           |
| 2. | Section 26 | Aggregate Base      |
| 3. | Section 51 | Concrete Structures |
| 4. | Section 52 | Reinforcement       |

5. Section 73 Concrete Curbs and Sidewalks
6. Section 90 Concrete

B. American Association of State Highway and Transportation Officials:

1. AASHTO M295 - Standard Specification for Coal Fly Ash or Calcined Natural Pozzolan for Use in Concrete.
2. AASHTO M302 – Standard Specification for Ground Blast-Furnace Slag for Use in Concrete and Mortars
3. AASHTO T160 - Standard Method of Test for Length Change of Hardened Hydraulic Cement Mortar and Concrete

C. American Concrete Institute:

1. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specification for Structural Concrete
3. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
4. ACI 308.1 - Specification for Curing Concrete.
5. ACI 347 – Guide to Formwork for Concrete

D. American Forest & Paper Association:

1. AF&PA - National Design Specification (NDS) for Wood Construction.

E. APA - The Engineered Wood Association:

1. APA/EWA PS 1 - Voluntary Product Standard - Structural Plywood.

F. ASTM International:

1. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
3. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
5. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
6. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
7. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
8. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
9. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
10. ASTM C150 - Standard Specification for Portland Cement.

11. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
12. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
13. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
15. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
16. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
17. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
18. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
19. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
20. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
21. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
22. ASTM C1017 - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
23. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
24. ASTM D209 - Standard Specification for Lampblack Pigment
25. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

G. Concrete Reinforcing Steel Institute:

1. CRSI 10-MSP – Manual of Standard Practice
2. CRSI 10PLACE – Placing Reinforcing Bars

H. West Coast Lumber Inspection Bureau:

1. WCLIB - Standard No. 17 Grading Rules for West Coast Lumber.

### 1.3 SUBMITTALS

A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.

B. Product Data:

1. Submit data on concrete materials, joint filler, joint sealants, admixtures, curing compounds.



2. Submit certified copies of mill test report of reinforcement materials analysis. Indicate bending and cutting schedules and supporting and spacing devices.
3. Submit manufacturer's information on curing compounds. Submit detailed instructions on installation requirements, including storage and handling procedures.
4. Shop drawings indicate formwork, shoring and reshoring.

C. Design Data:

1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
  - a. Hot and cold weather concrete work.
2. Identify mix ingredients and proportions, including admixtures.
3. Chloride can contribute to corrosion of metals embedded in concrete. Admixture manufacturers shall identify chloride content of admixtures and whether or not chloride was added during manufacture.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

E. Source Quality Control Submittals: Indicate results of factory tests and inspections.

F. Certifications:

1. At the time of delivery provide certificates of compliance signed by both the Contractor and Supplier to verify the following:
  - a. Materials supplied comply with the specification in all respects.
  - b. Proportioning and mixing is in compliance with a design mix which has been field tested in accordance with the herein requirements and produces the required compressive strength under like conditions.
  - c. Statement of type and amount of admixtures.
  - d. All Certificates shall include the Material and Supplier's mix design number.
  - e. Volume of concrete. At the time of delivery provide certified delivery ticket stating volume of concrete delivered and time of mixing, or time of load-out in case of transit mixers.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to ACI 301.
- B. Obtain cementitious materials from same source throughout unless approved by the City.
- C. Concrete finish shall be consistent with adjacent concrete unless specified otherwise on the Drawings.
- D. For wood products furnished for Work of this Section, comply with AF&PA.

#### 1.5 MOCKUP

- A. [Section 01 45 00 - Quality Control](#): Requirements for mockup.
- B. Construct mockup, 5 feet x 5 feet, including paving, expansion joints, weakened plane joints, score joints, surface texture, and base material for decorative colored concrete work.
- C. Locate where directed by the Project Manager.
- D. Remove mockup when directed by Project Manager.

#### 1.6 AMBIENT CONDITIONS

- A. [Section 01 50 00 - Temporary Facilities and Controls](#): Ambient conditions control facilities for product storage and installation.
- B. Do not place concrete when surface is wet or frozen.
- C. Do not place concrete when base surface temperature is less than 45 degrees F, nor when conditions indicate that the temperature may fall less than 45 degrees F. within 24 hours, except with the written permission of the City Engineer. Salt chemicals, or other foreign materials shall not be mixed with the concrete for the purpose of preventing freezing. Concrete shall be effectively protected from freezing or frost for period of 5 days after placing.
- D. Concrete for structures shall not be mixed or placed while the ambient temperature is above 110 degrees F. unless adequate means are employed to cool the aggregate and water and satisfactory provisions have been made for protecting the work.

**PART 2 - PRODUCTS****2.1 AGGREGATE BASE COURSE**

- A. Aggregate Base: 3/4" maximum - Class 2 Aggregate Base as specified in Section 32 11 23 - Aggregate Base Courses.

**2.2 CONCRETE SURFACE IMPROVEMENTS****A. Form Materials:**

1. Form Materials: Conform to ACI 301 and shall be new.
2. Plywood:
  - a. Species: Douglas fir.
  - b. Grade: Solid one side
  - c. Edges: Clean and true.
3. Plywood Forms:
  - a. Application: Exposed finish concrete.
  - b. Description:
    - 1) Comply with APA/EWA PS 1.
    - 2) Panels: Full size, 4 by 8 feet.
    - 3) Label each panel with grade trademark of APA/EWA.
  - c. Plywood for Surfaces to Receive Membrane Waterproofing:
    - 1) Minimum Thickness: 5/8 inch.
    - 2) Grade: APA/EWA "B-B Plyform Structural I Exterior."
4. Formwork shall be designed for the loads and lateral pressure outlined in Section 102 of ACI 347 and other loads indicated and shall be designed to have sufficient strength to carry the dead weight of the concrete as a liquid, without appreciable deflection. If any such deflection occurs, it shall be sufficient cause for rejection of the work.
5. Where necessary to maintain the tolerances indicated, the formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the fresh concrete and due to construction loads.
6. Forms shall be smooth, mortar-tight, true to the required lines and grades and of sufficient strength to resist springing out of shape during the placing of concrete.
7. Surfaces of forms shall be free from irregularities, dents, snags, rust, and other material which would discolor or transfer to the concrete.

**B. Reinforcement:**

1. Deformed Reinforcing: Steel: ASTM A615, 60 ksi yield grade, deformed billet bars, uncoated finish.
2. Welded Deformed Wire Fabric: ASTM A497; in [flat sheets] [coiled rolls]; [unfinished] [epoxy coated finish].

3. Dowels: ASTM A615; 60 ksi yield strength, plain steel bars; cut to length indicated on Drawings, square ends with burrs removed; unfinished. One end of the dowel shall include a sleeve over the dowel.
4. Tie Wire: ASTM A1064, Minimum 16 gage, black annealed type.
5. Chairs, Bolsters, Bar Supports, and Spacers:
  - a. Size and Shape: To strengthen and support reinforcement during concrete placement conditions.
1. Splicing: Splice reinforcing where indicated on Drawings. The length of lapped splices shall be as follows:
  - a. Reinforcing bars No. 8, or smaller, shall be lapped at least 45 bar diameters of the smaller bar joined, except when otherwise shown on the Drawings.
  - b. Reinforcing bars No. 9, 10 and 11 shall be lapped at least 60 bar diameters of the smaller bars joined, except when otherwise shown on the Drawings.
  - c. If not indicated on Drawings, locate reinforcement splices at point of minimum stress. Obtain approval of splice locations from the City.
2. Reinforcing bars shall be free of mortar, oil, dirt, excessive mill scale and scabby rust and other coatings of any character that would destroy or reduce the bond. All bending shall be done cold, to the shapes shown on the Drawings.
3. Place, support, and secure reinforcement against displacement by using precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads. Supports and ties shall be such as to permit walking on reinforcing without undue displacement.
4. Do not deviate from required position beyond specified tolerances.
5. Accommodate placement of formed openings.
6. Spacings:
  - a. Space reinforcement bars with minimum clear spacing as shown on the Drawings.
  - b. If bars are indicated in multiple layers, place upper bars directly above the lower bars, unless specified otherwise on the Drawings.
7. Maintain minimum concrete cover around reinforcement according to ACI 318 code and as follows:
  - a. Footings and Concrete formed against earth: 3 inches
  - b. Concrete Exposed to Earth or Weather: 2 inches
8. Splice reinforcing where indicated on Drawings. The length of lapped splices shall be as follows:
  - a. Reinforcing bars No. 8, or smaller, shall be lapped at least 45 bar diameters of the smaller bar joined, except when otherwise shown on the Drawings.
  - b. Reinforcing bars No. 9, 10 and 11 shall be lapped at least 60 bar diameters of the smaller bars joined, except when otherwise shown on the Drawings.
9. All reinforcing shall be securely tied in place prior to pouring concrete.

10. Placing of dowels or other reinforcing in the wet concrete is not permitted.
- C. Joint Filler: ASTM D1751; Premolded expansion joint filler 1/4-inch thick.
  - D. Joint seal materials must be either silicone joint sealant, asphalt rubber joint sealant, or preformed compression joint seal. Silicone or asphalt rubber joint sealant must not bond or react with the backer rod.
    - a. Silicone Joint Sealant. Silicone joint sealant must be on the Authorized Material List for silicone joint sealant.
    - b. Asphalt Rubber Joint Sealant. Asphalt rubber joint sealant must:
      - 1) Be asphalt binder mixed with not less than 10 percent ground rubber by weight. Ground rubber must be vulcanized or a combination of vulcanized and devulcanized materials that pass a no. 8 sieve.
      - 2) Comply with ASTM D6690 for Type II.
      - 3) Be capable of melting at a temperature below 400 degrees F and applied to cracks and joints.
      - 4) Be delivered in containers complying with ASTM D6690.
  - E. Concrete Materials:
    1. Cement: Cement shall conform to Section 90, "Concrete" of the State Standard Specifications.
    2. Fine and Coarse Aggregates: Conform to the requirements of Section 90-1.02C, "Aggregates" of the State Standard Specifications. Size of aggregate for Portland cement concrete mix to be used for Survey monuments shall be 1/2-inch maximum.
    3. Water: Conform to Section 90-1.02D, "Water" of the State Standard Specifications.
    4. Air Entrainment: Air Entrainment admixtures shall meet the requirements of Section 90-1.02E(3), "Air-Entraining Admixtures" of the State Standard Specifications.
    5. Chemical Admixture: Chemical admixtures shall meet the requirements of Section 90-1.02E(2), "Chemical admixtures" of the State Standard Specifications.
    6. Supplementary Cementitious Materials - Fly Ash: Conform to the requirements of Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications.
    7. Supplementary Cementitious Materials - Slag: Conform to the requirements of Section 90-1.02B(3), "Supplementary Cementitious Materials" of the State Standard Specifications.

8. Color Pigment: ASTM C979; mineral oxides, alkali and fade resistant. The dosage must not exceed 10 percent by weight of cementitious material in the concrete mix design.
  - a. Lampblack: Conform to ASTM D209, and shall be of approved quality mixed at a rate of one pound per cubic yard of concrete.
  - b. Color: No added color unless specified otherwise on the Drawings, except lampblack.

2.3 CONCRETE MIX

A. Concrete Mix:

1. Concrete shall conform to Section 90, "Concrete", of the State Standard Specifications.
2. The concrete shall contain not less than 564 pounds of cementitious material per cubic yard.
3. Maximum slump for concrete is 4".
4. Provide concrete to the following criteria:

Item	Min. 28-day Compressive Strength (psi)
Sidewalks	4,000
Driveways	4,000
Curb Ramps	4,000
Curb and Gutters	4,000
Median Curbs	4,000
Median Nose Surfacing	4,000
Concrete Ditches	4,000
Valley Gutters	5,000
Bus Turnouts	5,000
Survey Monuments	5,000

## 2.4 CONCRETE CURING COMPOUND

- A. Curing Compound: ASTM C309, Type 1D, Class A and shall conform to Section 90-1.03B (3) "Curing Compound Method", of the State Standard Specifications.

## 2.5 SOURCE QUALITY CONTROL

- A. [Section 01 45 00 - Quality Control](#): Testing and Inspection Services.
- B. Submit proposed mix design of each class of concrete to City for review prior to commencement of Work.
- C. Concrete Slump shall conform to Section 90-1.02G (6) "Quantity of Water and Penetration or Slump", of the State Standard Specifications
- D. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. [Section 01 70 00 - Execution](#) and [Section 01 77 00 - Closeout Requirements](#): Requirements for installation examination.
- B. Verify compacted subgrade and base is dry and ready to support paving and imposed loads.
  - 1. Proof roll subgrade with two perpendicular passes to identify soft spots.
  - 2. Remove soft subgrade and replace with compacted fill as specified in [Section 31 05 13 – Clearing & Grubbing, Excavation, and Earthwork](#).
- C. Verify gradients and elevations of base are correct.

### 3.2 PREPARATION

- A. [Section 01 70 00 - Execution](#) and [Section 01 77 00 - Closeout Requirements](#): Requirements for installation preparation.
- B. Moisten subgrade to minimize absorption of water from fresh concrete.
- C. Notify City minimum 24 hours prior to commencement of concrete operations.

### 3.3 INSTALLATION

#### A. Subgrade Preparation:

1. Remove soft or spongy basement material to a depth of six (6) inches below the subgrade elevations for sidewalks, driveways, curb ramps, curbs, gutter depressions, median nose island paving, valley gutters, bus turnouts, and other miscellaneous concrete pads. Backfill the subgrade with earth, sand, gravel or suitable backfill materials to produce a stable foundation.
2. The subgrade, including any base material, shall be thoroughly compacted by an approved mechanical device to not less than ninety-five percent (95%) relative compaction as determined by Test Method No. Calif. 216 or 231 before placing the concrete at bus turnouts, driveways and valley gutters.
3. The subgrade, including any base material, shall be thoroughly compacted by an approved mechanical device to not less than ninety percent (90%) relative compaction as determined by Test Method No. Calif. 216 or 231 before placing the concrete at curb and gutters, sidewalk, median nose surfacing and curb ramps.

#### B. Sawcutting Existing Concrete:

1. Where a portion of existing concrete surface improvements is to be removed and replaced, the section to be removed shall be sawcut with an approved concrete saw to a minimum depth of 2-1/2 inches. For sidewalks, curbs, gutters, concrete pads, curb ramps, and driveways the limit of the saw cut shall be at a minimum the first score line beyond the limits of the area to be replaced or as directed by the City.

#### C. Base Course:

1. Aggregate Base Course: Install as specified in [Section 32 11 23 - Aggregate Base Courses](#).

#### D. Forms:

1. No forms shall be placed prior to approval of the aggregate base and subgrade by the City.
2. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
3. All dirt, chips, soil, dust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein.
4. Form boards having joints opened by shrinkage of the wood shall be swelled by wetting until closed, before concrete is placed.
5. The design and construction of forms and form supports shall be subject to approval, but responsibility for their adequacy shall rest with the Contractor.
6. Forms shall be carefully set to alignment and grade and shall conform to the required dimensions. Forms shall be held rigidly in place by stakes. Clamps, spreaders and braces shall be used where required to insure rigidity in the forms.



7. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
  8. When grades are less than 0.4 percent, the Contractor shall set grade stakes at a minimum of 25 foot intervals.
  9. Where shown on the Drawings, specified in the Technical Specifications or permitted by the City, side forms for footings may be omitted and concrete may be poured against the firm earth.
- E. Coating:
1. Before concrete is placed, the contact surfaces for forms shall be coated with an approved non-staining form coating compound.
  2. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being re-used.
  3. When forms are coated to prevent bond with concrete, coating shall be done prior to placing of the reinforcing steel.
  4. Excess coating material shall not be allowed to stand in puddles in the forms nor allowed to come in contact with concrete against which fresh concrete will be placed
- F. Reinforcement:
1. Place reinforcing as indicated on Drawings.
  2. Interrupt reinforcing at weakened plane and expansion joints as shown on the Drawings.
  3. Place dowels where required to achieve concrete paving and curb alignment as detailed.
- G. Ties:
1. Approved form clamps or bolts shall be used to fasten forms.
  2. The use of ties consisting of twisted wire loops to hold forms in position during the placing of concrete will not be permitted.
  3. Bolts and form clamps shall be positive in action and shall be of sufficient strength and number to prevent spreading of the forms.
  4. They shall be of such type that when the forms are removed all metal shall be at least one (1) inch from any surface.
  5. Spreader cones and ties shall not exceed one (1) inch in diameter. These shall be of the type which do not have to be completely withdrawn as holes through the wall will not be permitted
- H. Joints
1. Place weakened plane joints at D/4 (1" deep and 1/8" wide with rounded edges of 1/8" radius for a 4" thick concrete sidewalk) at maximum of 10 foot intervals, unless shown otherwise on the Drawings. Align curb, gutter, and sidewalk joints.
  2. Place expansion joints (full depth of concrete section and 1/2" wide) at maximum of 40 foot intervals, at begin and end of curve, all changes in horizontal alignment, back of sidewalk at driveways, at corners of tree wells

- and corners of utility vaults, unless shown otherwise on the Drawings. Align curb, gutter, and sidewalk joints.
3. Place joint filler between concrete paving components and building or other appurtenances. Recess top of filler 1/4 inch for sealant installation.
  4. Seal all expansion joints as shown on the Drawings.
  5. The joint opening shall be thoroughly cleaned before the sealing material is placed.
  6. Sealing material shall not be spilled on exposed surfaces of the concrete. Any excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.
  7. Provide scored joints transversely (1/4" deep and 1/8" wide with rounded edges of 1/8" radius for a 4" thick concrete sidewalk) at maximum of 5 foot intervals, unless shown otherwise on the Drawings and between sidewalk and back of curbs at an optimum time after finishing. Provide additional score lines longitudinally at mid-point on sidewalks 8 feet and over in width.
  8. Provide keyed joints as indicated.
  9. For sidewalk replacement projects, match adjacent scoring and joint pattern.
- I. Inspections prior to Placing Concrete:
1. All excavations, false-work, forms, reinforcement, joints made prior to pouring, electrical and mechanical inserts, etc., shall be inspected and approved before concrete is placed, and if found unsatisfactory the work shall not proceed until all defects have been remedied. Approval will in no way relieve the Contractor of his obligations to produce the finished concrete required by the Drawings and the Specifications
- J. Placing Concrete:
1. Place concrete according to Section 73, "Concrete Curbs and Sidewalks" of the State Standard Specifications.
  2. All concrete shall be placed while fresh and before it has taken an initial set.
  3. Re-tempering partially hardened concrete with additional water or vibrating will not be permitted.
  4. Runways or other means must be provided to convey the concrete to the place of deposit in order not to disturb forms or reinforcement. Runways shall not be blocked up on reinforcement and wheel barrows shall not be run directly over reinforcement.
  5. Immediately before placing reinforcement or pouring concrete on the ground, the surface of the ground shall be brought to a true, even plane, and compacted to a solid bearing by rolling or tamping. The subgrade surface shall then be dampened to prevent absorption of water from the concrete. Too much water shall not be used and no pools shall form on the area to receive concrete.
  6. Concrete shall be effectively protected from freezing or frost for period of 5 days after placing.

7. The concrete shall be deposited as nearly as possible in its final position and the use of vibrators for extensive shifting of the mass of fresh concrete will not be permitted.
8. Fresh concrete shall not be permitted to fall from a height greater than 4 feet without the use of adjustable pipes or "elephant trunks."
9. Concrete shall be placed with square ends and level tops. Concrete shall be deposited continuously or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
10. The Contractor shall stamp an appropriate two (2) inch symbol S, W or C in the top of curb at all locations where sanitary sewer, water or conduit crosses under curbs.
11. All exposed edges shall be tooled with a one-half inch (1/2") radius tool.
12. If a section cannot be placed continuously, keyed construction joints shall be located at points as indicated or as approved. Placing shall be carried out at such a rate that the concrete which is being integrated with fresh concrete is still plastic.
13. Concrete placement shall be stopped at construction joints before rainfall starts or is sufficient to cause damage to the work.
14. Poured work shall be covered and protected.
15. Concrete, after being deposited, shall be consolidated until all voids are filled and free mortar appears on the surface.
16. Consolidate the concrete by means of high frequency internal vibrators of type, size, and number as approved by the City. The number of vibrators employed shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in forms. Vibrators shall not be attached to nor held against the forms or the reinforcing steel. The location, manner, and duration of the application of the vibrators shall be such as to secure maximum consolidation of the concrete without causing segregation of mortar and coarse aggregate and without causing water or cement paste to flush to the surface. The thickness of the layers shall be not greater than can be satisfactorily consolidated with the vibrators. The vibrators shall vertically penetrate a few inches into the previous lift (which should not be rigid) at regular intervals. The use of approved external vibrators for consolidating concrete will be permitted when the concrete is inaccessible for adequate consolidation, provided the forms are constructed sufficiently rigid to resist displacements and damage from external vibration.
17. The forms on the face of curbs shall not be removed while the concrete is sufficiently plastic to slump.

K. Finishing:

1. After the concrete has been placed and consolidated, the surface of the concrete shall receive a preliminary finish. The preliminary finish shall consist of carefully striking of the surface of the concrete with a template, strike board, or approved compacting type screed, operated on and between supports or headers, until a uniform surface is obtained.

2. Horizontal surfaces shall receive a broom finish unless otherwise shown on the Drawings. Make the broom finish perpendicular to the path of travel on surfaces used by Pedestrians.
3. Miscellaneous concrete footings shall be sloped to provide drainage away from the post/pipe.
4. Imperfect or Damaged Work: The Contractor shall repair and clean all concrete damaged or discolored during construction.
5. Finishing Unformed Surfaces: Following completion of the preliminary finish, a final finish of the type indicated shall be provided.

L. Curing and Protection

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
2. Curing concrete shall conform to Section 90-1.03B – “Curing Concrete”, of the State Standard Specifications.
3. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
4. Membrane-Curing Compound: Apply curing compound in two coats with second coat applied at right angles to first over the entire exposed faces of the concrete.
5. Do not permit traffic over unprotected surfaces.

### 3.4 TOLERANCES

- A. [Section 01 45 00 – Quality Control](#): Tolerances.
- B. Maximum Variation from True Position: 1/4 inch.
- C. The finished surface must not vary more than 0.02 foot from a 10-foot straightedge except at grade changes.

### 3.5 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Perform field inspection and testing according to State Standard Specifications.
- C. Inspect reinforcing placement for size, spacing, location, support.
- D. For development projects, Developer’s or Contractor’s testing firm will take cylinders and perform slump and air entrainment tests according to ACI 301. For City projects, the City’s testing team will perform testing.

- E. Clean any discolored concrete by abrasive blast cleaning or other authorized method.
- F. Strength Test Samples:
  - 1. Sampling Procedures: ASTM C172.
  - 2. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens, standard cure/field cured.
  - 3. The frequency of sampling will be determined by the City.
  - 4. Sample concrete and make at a minimum of one set of three cylinders (each cylinder must be six (6) inches in diameter by 12 inches depth) for every 100 cubic yards less of each class of concrete placed each day and for every 5,000 square feet of surface area paving.
  - 5. Make one additional cylinder during cold weather concrete and placement, and field cure.
- G. Field Testing:
  - 1. Slump Test Method: ASTM C143.
  - 2. Air Content Test Method: ASTM C173 or ASTM C231.
  - 3. Temperature Test Method: ASTM C1064.
  - 4. Density: ASTM C138
  - 5. Measure slump and temperature for each compressive strength concrete sample.
  - 6. Measure air content in air entrained concrete for each compressive strength concrete sample.
- H. Cylinder Compressive Strength Testing:
  - 1. Test Method: ASTM C39.
  - 2. Test Acceptance: Average compressive strength of three consecutive compressive strength test shall be equal to or greater than minimum specified compressive strength specified in this Section. No single strength test should fall below the specified compressive strength by more than 500 psi.
  - 3. Test one cylinder at 7 days.
  - 4. Test two cylinders at 28 days.
  - 5. Retain one cylinder for testing when requested by City.
  - 6. Dispose remaining cylinders when testing is not required.
- I. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- J. The finished surface shall be true and straight, and shall be of uniform width, free from humps, sags, or other irregularities.
- K. Where curb and gutter, valley gutter and bus turnout gutter grades are less than one percent (1%), the Contractor shall water test the gutters for low spots. Any depressions shall be corrected prior to asphalt concrete paving.

3.6 PROTECTION

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- C. Do not permit pedestrian or vehicular traffic over paving for 7 days minimum after finishing until 75 percent design strength of concrete has been achieved, unless approved by the City.
- D. Vandalism: Contractor shall be responsible for protection of newly poured concrete against vandalism. Any damage to the newly poured concrete shall be the responsibility of the Contractor and shall be replaced at the Contractor's expense.

**END OF SECTION 32 13 13**

**SECTION 32 15 40 - DECOMPOSED GRANITE PAVING****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. The scope of work outlined in this Section includes the following items of work, as detailed in these Contract Specifications, as shown on the Contract Drawings or reasonably implied therefrom and is not limited to the following items:
  - 1. Decomposed Granite (at stairs)

**1.02 RELATED REQUIREMENTS**

- A. These Contract Specifications are part of the Contract Drawings and shall include all labor, materials, equipment, reasonable incidentals, and services necessary for the execution of the Work installed complete in place.
- B. Refer to all other sections, determine the extent and character of related work, and coordinate all work to produce a complete, properly constructed product.

**1.03 RELATED SECTIONS**

- A. Section 12 93 00            Site Furnishing and Accessories
- B. Section 31 00 00            Earthwork
- C. Section 32 11 17            Aggregate Subbase Courses

**1.04 REFERENCES AND STANDARDS**

- A. Standard Specifications: Where referred to in these Specifications, "State Specifications" shall mean the California Caltrans Specifications, latest edition.
- B. Percent Compaction: As referred to in these Specifications, percent compaction or relative compaction is required in-place dry density of material expressed as a percentage of the maximum dry density of the same material determined in accordance with Caltrans 216. Optimum moisture content is the moisture content corresponding to the maximum dry density determined by Caltrans 216.
- C. American Society for Testing and Materials, (ASTM).

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: engage a firm experienced in manufacturing stabilized aggregate pavement aggregate binder similar to that indicated for this project and with a record of successful in-service performance.
- B. Installer Qualifications: engage an experienced installer who has successfully completed paving similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Decomposed granite paving shall comply with these specifications and all applicable sections of the above named references and standards.
- D. Do not change source of decomposed granite and binder during the course of the work.
- E. All manufacturer's specifications and details shall be included as part of the Contract Documents. Contractor shall review all manufacturer requirements, standards, specifications and details prior to bid and include all mix designs, additives, and incidentals required.
- F. Installing contractor shall assign experienced mechanics to this project, of which one will serve as lead mechanic for the complete duration of the project.
- G. Supervision: On site foreman must have experience installing Technisoil stabilization materials. Submit project list of installer qualifications, demonstration of square footage installed, number of projects, and contact information to verify experience. The supervising foreman shall be onsite during all Decomposed Granite placement and finishing work for the complete duration of the project.
- H. Maintain field records of time, date of placing, weather of each portion of Decomposed Granite work.

**1.06 SUBMITTALS**

- A. General: Refer to Section 01 33 00 – Submittal Procedures for submittal requirements and procedures.
- B. Submit manufacturer's product data and specifications for all materials including but not limited to Decomposed Granite and Decomposed Granite Binder
- C. Submit the following material samples for the City's written approval prior to delivery of materials to site, or preparation of sample panel. Provide suppliers sieve analysis with each sample.
  - 1. Base Course: one-half cubic foot.
  - 2. Surface Course: one-half cubic foot.



- D. Submit material certificates for base materials.
- E. Samples:
  - 1. Sample panel: Before ordering material for Decomposed Granite paving, provide sample panels, minimum 2' x 2' of color and finish, using specified materials. Show color, texture, and edging treatments. Contractor to provide additional samples at no additional cost to contract until all colors and finishes have been approved by the Landscape Architect.
  - 2. Approved samples will not be a portion of the work and will remain in place throughout the construction period for comparison. Location as selected by the contractor and approved by the Landscape Architect. Contractor will be required to provide additional panels as necessary, until approved.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Packaged Materials: Deliver packaged materials in clearly marked containers showing net weight, guaranteed analysis and name of manufacturer. Specified requirements for packaged materials apply to bulk shipments. Protect materials from deterioration by moisture and temperature during delivery and during storage at site. Protect liquid components from freezing.
- B. Protect all stored materials and items from weather, careless handling, and vandalism. Repair or replace damaged items, as determined by the Landscape Architect.
- C. Deliver, store, handle and protect aggregate and stabilizer material with provision for drainage and intrusion of dirt, debris, or other foreign matter.
- D. Store Stabilized Aggregate Paving material under cover to prevent accumulation of moisture until placed.

### **1.08 PROJECT CONDITIONS**

- A. Review installation procedures and coordinate paving work with other work affected by decomposed granite paving work. Do not begin the work until installation of trees and boulders is complete.
- B. Protect partially completed paving against weather damage when work is not in progress.
- C. Weather and site requirements
  - 1. Prevent wind or rain disturbance of setting materials, protect from sheet flow from adjacent areas, and generally maintain optimum installation conditions.
  - 2. Do not install Stabilized Aggregate Paving in conditions of standing water.
  - 3. Aggregate base or sub-base is to be dry.

4. Do not install Decomposed Granite mix, or apply seal coat if the possibility of rain is forecast within four days following installation.
5. Resin emulsion is diluted with water: protect newly installed pavement and seal coat from water until curing is complete.
6. Install DG mix and seal coat when ambient temperature is above 60 degrees Fahrenheit and overnight temperature is above 32 degrees F.

#### **1.09 COORDINATION AND SCHEDULING**

- A. Cooperate with other trades and arrange scheduling to avoid damage to other work, including grading, site utilities and piping, exterior concrete, landscaping and irrigation systems.
- B. Before commencing pavement operations, ascertain that utility lines, site lighting and wiring, piping, curb and gutter work, general grading and heavy trucking is complete so that such operations will not damage paving work
- C. Mask off and protect exposed building surfaces and abutting concrete from damage or staining by paving operations

#### **1.10 WARRANTY**

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Warranty Period: Contractor shall provide warranty for performance of product. Contractor shall warranty installation of product for the time of one year from completion.
- C. Contractor shall provide, for a period of ninety days, unconditional maintenance and repairs as required.

### **PART 2 - PRODUCTS**

#### **2.01 DECOMPOSED GRANITE**

- A. Base Course: ¾" Class II aggregate base per CalTrans Specifications;
- B. Surface Course: #4 minus Path Fines by Felton Quarry, Granite Construction Co., (408) 335-3445, decomposed granite; color: Tan or buff.  

<u>Sieve Size</u>	<u>Percent Passing</u>
-------------------	------------------------

3/8"	89-99
#4	95-100
#8	75-90
#30	35-50
#200	10-19

## 2.02 STABILIZING AGENT

- A. Stabilizer, Technisoil G3 Pathway Stabilizer

## 2.03 ACCESSORIES

- A. Wood headers: Pressure treated Doug fir
- B. Geotechnical Fabric: Mirafi 140N or approved equal per Section 12 93 00 – Site Furnishing and Accessories
1. Spun or woven, non-degrading geotextile fabric that blocks 95% of weed growth and is permeable to air, water, gases and fertilizer.
  2. Filter Fabric: Composite fabric geotextile consisting of woven, needle-punched polypropylene geotextile substrate bonded to a non-woven polypropylene fabric, weighing not less than 4.8 oz./sq. yd. (160 g/sq. m).
- C. Soil Sterilizer: Granular weed growth inhibiting type herbicide, labeled for use under pavement surfaces. Material shall not damage trees and plant adjacent to pavement surfaces.
1. Oxycil Ureabor, as manufactured by Best Products Division, Occidental Chemical Company, Lathop, CA
- D. Herbicide
1. Chemical herbicide shall be Surflan or Dacthol pre-emergent. All material shall have an integral dye so that it is evident which areas have been treated. It is the Contractor's responsibility to post warnings to indicate that the above chemicals are being applied.
  2. Chemical herbicide for control of actively growing weeds and grasses shall be Roundup or approved equal.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine the substrate under which paving is to be installed. Notify the Engineer, in writing, of conditions detrimental to the proper and timely completion of the

work. Do not proceed with the work until unsatisfactory conditions have been corrected.

- B. Review subgrade to verify that it has been graded correctly and compacted in accordance with the Geotechnical report as required for installation of the aggregate base.
- C. Review aggregate base to verify that it has been graded correctly and compacted in accordance with the Geotechnical report as required for installation of the Decomposed Granite paving.
- D. Before proceeding with work, Contractor shall notify the Engineer in writing of any unsuitable conditions and conflicts.

### **3.02 LINES AND LEVELS**

- A. Establish lines and levels, locate and lay out by instrumentation and similar appropriate means for aggregate paving finish grades.
- B. Finished grade of decomposed granite shall be ¼" to ½" below top of existing curb and top of paving. Any settlement below this level shall be corrected.
- C. Surfaces shall be true to within 1/8" inch when tested in any direction with a 10 foot straightedge. There shall be no pools of water standing on the pavement after a rain.
- D. Staking: Provide a sufficient quantity of grade stakes as required to provide aggregate paving with smooth finish grades and positive drainage.
- E. Transition between changes in vertical gradient of walks and paving shall be smooth and gradual with no abrupt or sharp changes.

### **3.03 PREPARATION OF SUBGRADE**

- A. Prepare subgrade and aggregate base in accordance with the Geotech Report.
- B. Grade sub-grade surface to within 0.05 foot of finish grade minus aggregate paving thickness.
- C. Compact subgrade under paving systems to a minimum 95% modified Proctor density ASTM D1557.
- D. Fill and compact any depressions and remove loose material to finish true to line and grade, presenting a smooth, compacted and unyielding surface.
- E. Remove debris, loose dirt and other extraneous materials.

- F. Ditches, drains and drain pipes shall be installed if necessary to protect of the pavement and base from cross flows of water. All water flow should be directed off of and away from the pavement and base.

### **3.04 PREPARATION OF SUBGRADE**

- A. Base Course
  - 1. Construct crushed aggregate base course to compacted thickness as shown on the drawings at not less than 95% of maximum dry density as determined by ASTM D1557.
  - 2. Field Quality Control: Owner shall engage and pay for the services of a qualified soils Testing Laboratory/Agency to perform testing and inspections of Base Course material and installations.

### **3.05 WEED CONTROL**

- A. Apply soil sterilizer over subgrade prior to installing paving in accordance with the manufacturer's printed instructions.
- B. Install Geotechnical fabric over compacted subgrade prior to installation of DG mix. Overlap all seams 6" and hold in place with landscape staples as required to prevent shifting during the placement of Decomposed Granite work.

### **3.06 HEADERS**

- A. Layout and stake edging material in true straight lines and smooth continuous curves. Edging shall be placed parallel to adjacent curbs or header board. Stake edging at distances as indicated on plans, the mfr details, and as necessary to prevent distortions of the alignment
- B. Edging materials must be in place prior to placing Decomposed Granite. The Decomposed Granite compacted surface should be no less than 1/8" above the edging material to assure proper drainage.

### **3.07 DECOMPOSED GRANITE**

- A. General: Immediately before placing G5 materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Aggregates:
  - 1. Aggregates used for construction shall be representative of material approved in the Job Mix Formula. Stockpiles shall be uniform in gradation throughout and be kept separate of other types of material.

2. Avoid cross contamination from other materials and sources.
3. The moisture content of the aggregates shall be uniform and not exceed 25% of the optimum moisture content as determined by ASTM D1557. In no case shall aggregates containing visible water be used for construction.

C. Mixing:

1. Stabilized aggregate binder and aggregates shall be mechanically mixed in accordance with the manufacturer's requirements.
2. Aggregates and binder material shall be weighed and batched according to the mix design or manufactures instruction.

D. Hand Placement

1. Place aggregate mixture inside edge restraints on a prepared sub-base. Level material to a height that when compacted to proper density the lift thickness and grade meet the plans and specifications for slope.
2. Level material by either screed boards, asphalt rake, or other approved methods. Care shall be taken to minimize movement of material once initially placed.
3. Do not step in or compact material prior to using compaction equipment.
4. Promptly correct surface irregularities in paving course.. Use suitable hand tools to remove excess material forming high spots.
5. Fill depressions. Use suitable hand tools to smooth surface.
6. Do not broadcast materials across the placed course prior to compaction. Any loose coarse aggregate shall be removed prior to compaction. This does not include seeding aggregate when intended for embedment into surface.

E. Compaction

1. Compact surface per the manufacturers requirements.
2. Compact paving with hand tampers or approved vibratory-plate compactors in areas inaccessible to rollers.
3. DO NOT use water as a bond breaker for rolling drums or vibrator plate compactors. Either use intermittent coatings of a biodegradable oil, and or if required, only use fine materials (- #30 mesh or similar) from the same design or as approved for a bond breaker between compaction equipment and the pavement surface. DO NOT spread fines on un-compacted material. One pass must be made prior to spreading bond breaking fines.
4. Paving course shall be compacted to a density of 95% of the maximum density, determined according to ASTM D6926. Field density determination will be in accordance with ASTM D2950 (with core correlation)

**3.05 CURING**

- A. Allow time for the placed material to cure before allowing traffic to use. At minimum do not allow pedestrian traffic until after final compaction.

- B. During the first 24 hours protect pavement from spills or irrigation overspray.
- C. Do not permit traffic on pavement until sufficient curing has occurred to prevent damage to layer.

### 3.06 **INSTALLATION TOLERANCES**

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus  $\frac{1}{4}$  inch (6 mm).
  - 2. Surface Course: Plus  $\frac{1}{4}$  inch (6 mm), no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course:  $\frac{1}{4}$ -inch (6 mm).
  - 2. Surface Course:  $\frac{3}{16}$  – inch (5 mm)
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown.
- C. Correct areas failing smoothness prior to final acceptance. Prior to correcting smoothness obtain approval from the engineer for planned corrective methods and disposal.

### 3.08 **DEFECTIVE WORK**

- A. Decomposed Granite work which does not meet the Contract Specifications or Contract Drawings shall be considered defective work.
- B. All work shall match. Inconsistent color, and finishing shall be considered defective work.
- C. Decomposed Granite work which ponds, does not conform to ADA requirements, does not match grading, is of poor finish, has poor depth, cracking, sunken or otherwise deemed non acceptable shall be considered defective work.
- D. Defective Decomposed Granite shall be repaired or replaced as directed by the Engineer, at no added expense to the Contract.
  - 1. Contractor to provide repair plan to the Engineer for review and approval prior to corrective action.
  - 2. The Engineer's authorization for the Contractor to repair defective Decomposed Granite work does not provide an acceptance of defective Decomposed Granite work. All final repair work that does not meet the approval of the Engineer shall be rejected, removed and replaced at no additional cost to the contract.

3. If defective work is serious or affects the strength of the structure or the appearance, the Engineer may require the removal and replacement of the portion or all of the work.
4. Repaired or Replaced work shall match existing work. Work which does not match may require full removal and replacement.
5. All labor, materials, equipment, incidentals, and work related to the repairs or replacement of Concrete work shall be done at no additional cost to the Contract.

**3.09 CLEANING**

- A. Perform cleaning during installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from crushed stone paving operations.

**3.10 PROTECTION**

- A. Restrict traffic from paving surfaces during construction and until final project acceptance by the Engineer.

**END OF SECTION 32 15 40**



## SECTION 32 17 00 - PAVEMENT DELINEATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Work under this section shall consist of all traffic striping, markings and all other directional information or pavement delineation on the surfaces of streets, detour roads, parking lots, median strips and curbing in accordance with the plans, Technical Specifications and as specified herein, in conformance with the applicable provisions of the Department of Transportation Standard Specifications, California Manual on Uniform Traffic Control Devices (CA MUTCD), and California Vehicle Code.
- B. Related Sections:
  - 1. [Section 01 33 00 – Submittal Procedures](#)
  - 2. [Section 01 60 00 - Product Requirements](#)
  - 3. [Section 01 77 00 - Closeout Requirements](#)
  - 4. [Section 01 78 00 - Closeout Submittals](#)

#### 1.2 REFERENCES

- A. Department of Transportation (Caltrans Standard Specifications)
- B. California Manual on Uniform Traffic Control Devices (CA MUTCD)
- C. California Vehicle Code (CVC)

#### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Submittal procedures.
- B. Certificates of Compliance: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.
- C. Product Data: Provide manufacturers specification and literature for materials furnished.

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.

### 1.5 QUALITY ASSURANCE

- A. Perform work in accordance with the plans, Technical Specifications and as specified herein, in conformance with the applicable provisions of the Caltrans Standard Specifications, CA MUTCD, and CVC.

### 1.6 QUALIFICATIONS

- A. Pavement markings installer shall have experience in the type of work required and a reputation for producing satisfactory work on time.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Product transportation, storage, handling, and protection requirements.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. [Section 01 60 00 - Product Requirements](#): Environmental conditions affecting products on site.
- B. Install pavement markers only when ambient temperature and humidity conditions acceptable per manufacturer's specifications.
- C. Testing and removal of yellow traffic stripe and pavement markings with hazardous waste residue shall be in conformance with Department of Transportation Standard Specification 14-11.12, "Removal of Yellow Traffic Stripe and Pavement Marking with Hazardous Waste Residue".

### 1.9 MAINTENANCE/EXTRA MATERIALS

- A. [Section 01 77 00 - Closeout Requirements](#): Extra materials and maintenance products.

**PART 2 - PRODUCTS****2.1 GENERAL**

- A. Unless otherwise specified in the Technical Specifications or contract plans, all pavement striping and markings (except temporary) shall be thermoplastic.

**2.2 THERMOPLASTIC**

- A. Thermoplastic for traffic stripes and pavement markings shall conform to Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications.
- B. The thermoplastic material shall conform to Caltrans Specification PTH-02SPRAY, PTH-02HYDRO or PTH-02ALKYD. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of Caltrans Standard Specification.
- C. Concrete surfaces shall be treated before thermoplastic stripes and markings are installed, per Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specification.

**2.3 PAINT**

- A. Paint for traffic stripes and pavements markings shall conform to Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications and the following:
  - 1. Waterborne Traffic Line (White, Yellow, Black): Caltrans Standard Specification PTWB-01
  - 2. Acetone-Based (White, Yellow, Black): Specification PT-150VOC(A)
  - 3. Waterborne Traffic Line for disabled persons' parking, and other curb markings (blue, red, green): Federal Specification No. TT-P-1952D
- B. Glass beads shall conform to Caltrans Standard Specification.

**2.4 PAVEMENT MARKERS**

- A. Pavement markers shall conform to Section 81-3, "Pavement Markers," of the Caltrans Standard Specifications, as specified herein, and in the Technical Specifications.
- B. Fire Hydrant markers shall be two-way, reflective blue markers.

## 2.5 TEMPORARY PAVEMENT DELINEATION

- A. Temporary Pavement Delineation shall conform to Section 12-6, "Temporary Pavement Delineation," and Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications.

## 2.6 ADHESIVE

- A. Adhesive for Pavement Markers shall be the hot melt bituminous type conforming to Section 81-3, "Pavement Markers," of the Caltrans Standard Specifications.

## PART 3 - EXECUTION

### 3.1 LAYOUT, ALIGNMENT, AND SPOTTINGS

- A. All layout, spotting and tracking required shall be performed by and at the expense of the Contractor and approved by the City, prior to placement of pavement striping or markings.
- B. When no previously applied figures, markings, or traffic striping are available to serve as a guide, suitable layouts shall be spotted in advance of the permanent paint application by any means satisfactory to the City.
- C. The Contractor shall mark or otherwise delineate the traffic lanes in the new roadway or portion of roadway, or detour before opening it to traffic.
- D. The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimensions, and application of the delineation or marking.
- E. The Contractor shall furnish all equipment, materials, labor and supervision necessary for installing pavement striping and markings in accordance with the contract plans for temporary detours required for the safe control of traffic through and/or around the project.
- F. Standard word markings, letters, numerals, and symbols shall be as shown, on the plans. In the absence of such information, all stencils and templates shall be identical with those used by the City. The Contractor shall obtain stencils for all required legends.

### 3.2 TEMPORARY PAVEMENT MARKINGS

- A. Should the Contractor elect to alter the existing traffic stripes and markings, or to divert the flow of traffic on construction projects for his own convenience and

there are no special pavement markings or lane delineations shown on the plans or in the Technical Specifications, he shall, at no expense to the City, provide the necessary temporary striping in accordance with the CA MUTCD, unless otherwise directed by the City. Removal of such striping shall be at the Contractor's expense. The Contractor shall remove all existing or temporary detour striping or markings that may confuse the public. When temporary detour striping or markings are no longer required, they shall be removed prior to applying the new traffic stripes or markings.

- B. Temporary Traffic Stripe or Marking Tape shall be removed "clean" prior to installation of permanent pavement delineation.

### 3.3 REMOVAL OF EXISTING MARKINGS

- A. Existing striping and pavement markings that will be in conflict with the finish traffic circulation shall be removed as directed by the City in accordance with Section 84-9 of the Caltrans Standard Specifications.
- B. The Contractor shall conduct his work so as not to damage existing pavement and public improvements to remain. Any resultant damage determined to be excessive by the City shall be repaired in kind by the Contractor at its sole expense.
- C. Damage to the pavement resulting from removal of pavement markers shall be considered as any depression more than 1/4-inch (6.35mm) deep and shall be repaired by the Contractor by filling the depression with hot melt bituminous adhesive to the satisfaction of the City.
- D. Where blast cleaning is used for the removal of traffic stripes and pavement markings or objectionable material, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation.
- E. Where removal of traffic stripes and pavement markings is done by grinding or sandblasting methods, the effected pavement surface shall be completely covered by applying asphaltic emulsion conforming to Section 94 of Caltrans Standard Specifications.
- F. All reference markings made by the Contractor shall be done with spray chalk.
- G. All temporary traffic stripes and pavement markings shall be removed by the Contractor on the same day as placement of the permanent striping and markings.

### 3.4 PAVEMENT MARKER INSTALLATION

- A. Placement of pavement markers shall conform to Section 81-3, "Pavement Markers," of the Caltrans Standard Specifications, as specified herein, and in the Technical Specifications.
- B. Fire hydrant markers shall be two-way blue retroreflective pavement markers and installed at all fire hydrant locations, as directed by the City.

### 3.5 PAVEMENT MARKINGS INSTALLATION

- A. Placement of all traffic stripes and pavement markings shall be in conformance with Section 84, "Markings" of the Caltrans Standard Specifications, referenced Plans of the Caltrans Standard Plans, with color required as shown on the Drawings and as specified herein.
- B. Any overlap, dripping, or tracking of fresh thermoplastic or paint onto unmarked surfacing shall be removed to the satisfaction of the City.
- C. Thermoplastic and paint shall be placed as close as possible to existing utility structure and monument frames and covers without covering them.
- D. The Contractor shall protect all fresh thermoplastic and paint and shall repair or replace all damage to traffic stripes and pavement markings caused by his failure to do so at its own expense.
- E. All traffic stripes and pavement markings, new or existing, within or adjacent to the work limits which become defaced or damaged during the Contractor's operations shall be replaced by the Contractor at its expense concurrently with other traffic marking operations in the immediate area. The City shall be the sole judge as to which stripes or legends are defaced or damaged.
- F. Curb painting shall be applied as shown on the plans and as directed by the City. Curb painting shall include the application of two coats of traffic paint with glass beads incorporated in the second coat. Top and face of curb shall be painted. Color of curb markings shall conform to ASTM D6628.
- G. All traffic stripes and pavement markings shall be placed at application rates in conformance with Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications.

### 3.6 GLASS BEAD APPLICATION

- A. All traffic stripes, except the black separation line, shall be beaded.

- B. Glass beads shall be applied directly and uniformly to the set traffic line with a bead dispenser machine placed the proper distance behind the paint spray nozzle, unless pre-mix is approved.
- C. Glass beads shall be applied to pavement markings and crosswalks by a special paint spray gun developed for this purpose.
- D. Glass beads shall be applied at application rates in conformance with Section 84-2, "Traffic Stripes and Pavement Markings", of the Caltrans Standard Specifications.:

### 3.7 CLEANING

- A. [Section 01 77 00 - Closeout Requirements](#): Final cleaning.
- B. Clean finishes and touch up damage.

### 3.8 PROTECTION OF FINISHED WORK

- A. [Section 01 77 00 - Closeout Requirements](#): Protecting finished work.

**END OF SECTION 32 17 00**

## SECTION 32 17 26 - DETECTABLE WARNING SURFACING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Detectable warning surfacing and accessories at curb ramps, median opening islands, and at other locations as shown on the drawings.
- B. Related Requirements:
  - 1. [Section 01 50 00 - Temporary Facilities and Controls](#): Short-term traffic control as required by this Section.
  - 2. [Section 32 12 16 - Asphalt Paving](#): Coordination with paving systems for equipment specified in this Section.
  - 3. [Section 32 13 13 - Concrete Surface Improvements](#): Coordination with paving systems for equipment specified in this Section.

#### 1.2 REFERENCE STANDARDS

- A. American Association of State and Highway Transportation Officials:
  - 1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
- B. ASTM International:
  - 1. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers.
  - 2. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
  - 3. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
  - 4. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  - 5. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 6. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
  - 7. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
  - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 9. ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
  - 10. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.



11. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
  12. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
  13. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- C. U.S. Architectural and Transportation Barriers Compliance Board (Access Board):
1. Americans with Disabilities Act (ADA) - Accessibility Guidelines for Buildings and Facilities.
- D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Chapter 2, Section 202 definition of "Detectable Warning". Section 11B-247 and 11B-705 "Detectable Warnings And Detectable Directional Texture"
- E. Caltrans Standard Specifications
1. Section 73 – Concrete Curbs and Sidewalks.
- F. California Building Code (CBC).

### 1.3 COORDINATION

- A. Coordinate Work of this Section with Work of other Sections.

### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#) specifies requirements for submittals.
- B. Product Data: Submit manufacturer's information including characteristics, dimensions, domes, and special shapes.
- C. Manufacturer's Certificate: Certify that product meets or exceeds specified requirements.
- D. Manufacturer's Instructions: Submit detailed instructions on installation requirements, including storage, cleaning and handling procedures.
- E. Submit maintenance recommendations.
- F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- G. Manufacturer Reports:

1. Certify that equipment has been installed according to manufacturer's instructions.
2. Indicate activities on Site, adverse findings, and recommendations.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store and protect materials according to manufacturer's instructions. Finished surfaces shall be protected by sturdy wrappings.

#### 1.6 WARRANTY

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for warranties.
- B. Furnish five (5) year manufacturer's warranty for detectable warning surfacing.

### **PART 2 - PRODUCTS**

#### 2.1 DETECTABLE WARNING SURFACING

- A. Manufacturer List:
  1. Armor-Tile Tactile Systems by Engineered Plastics, Inc.
  2. ADA Solutions
  3. Or approved equal
- B. Description:
  1. ADA-compliant detectable warning surfaces for visually impaired pedestrians.
  2. Suitable for installation on both asphalt and concrete.
- C. Design and Performance Criteria:
  1. Loading: Single-wheel HS20-44, according to AASHTO HB-17.
  2. Resistant to impacts, wear, freeze-thaw, UV exposure, and stains.
  3. Fire Spread: Less than 25 when tested according to ASTM E84.
  4. Slip Resistance: 0.80, according to ASTM E303.
  5. Taber Abrasion: 150 mgs, according to ASTM D1044.
  6. Durometer Hardness: 90, according to ASTM D2240, Type A.

7. Water Absorption:
  - a. Comply with ASTM D570.
  - b. Maximum: 0.05 percent.
8. Minimum Strengths:
  - a. Compressive: 28,000 psi according to ASTM D695.
  - b. Flexural: 25,000 psi, according to ASTM D790.
  - c. Tensile: 11,000 psi, according to ASTM D638.
9. Slip Resistance:
  - a. Static coefficient of friction (Dry): 1.03.
  - b. Static coefficient of friction (Wet): 0.83.
  - c. Wheelchair Safety: Furnish minimum 40, 90-degree raised 0.045-inch points per sq. in.
  - d. Spacing: Center to center spacing of 2.30-inches minimum to 2.40-inches maximum, and base-to-base spacing of 0.65-inches minimum, measured between the most adjacent domes on a square grid.

**Exception:** Where installed in a radial pattern, truncated domes shall have a center-to-center spacing of 1.60-inches minimum to 2.40-inches maximum.
  - e. Size: Base bottom diameter of 0.90-inches minimum and 0.92-inches maximum, top diameter of 0.45-inches minimum and 0.47-inches maximum, and a height of 0.2-inches.

D. Cast-in-Place-Type:

1. Epoxy polymer, glass-reinforced, thermoset composite
2. Length and Width: As shown on the Drawings.
3. Depth: 1-3/8 inches.
4. Face Thickness: 3/16 inch
5. Color: Yellow, FS33538 of Federal Standard 595C. Color shall be homogeneous throughout the detectable warning surface.
6. Detectable Warning surfaces shall provide a 70 percent minimum visual contrast with adjacent walking surfaces.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation examination.
- B. Verify that substrate is level or to correct grade, is smooth, is capable of supporting detectable warning surface units and imposed loads, and is otherwise ready to receive Work of this Section.

**3.2 PREPARATION**

- A. Maintenance and Protection of Traffic:
  - 1. Provide short-term traffic control as specified in [Section 01 50 00 - Temporary Facilities and Controls](#).
  - 2. Prevent interference with operations.
  - 3. Maintain access to existing business and other properties requiring access.
- B. Surface Preparation:
  - 1. Clean and dry paved surface prior to installing detectable warning surface modules.
  - 2. Blow or sweep surface free of dirt, debris, oil, grease, or gasoline.
  - 3. Cleaning materials used on site shall have code acceptable low VOC solvent content and low flammability.
- C. Existing Work:
  - 1. Remove existing detectable warning surface modules by methods that will cause least damage to pavement surface.
  - 2. Repair pavement or surface damage caused by removal operations.

**3.3 INSTALLATION**

- A. Install detectable warning surfacing according to manufacturer's instructions. Contractor shall use whole pieces before using any cut pieces of domes.
- B. The concrete shall be poured and finished, true and smooth to the required dimensions and slope prior to Cast-in-Place Detectable Warning Surfacing.
- C. Cast-in-Place Detectable Warning Surfacing shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the Cast-in-Place Detectable Warning Surfacing is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

3.4 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Inspect for correct location, extent of coverage, and final grade.

3.5 CLEANING

- A. Clean detectable warning surfacing according to manufacturer's instructions.

3.6 PROTECTION

- A. During and after the detectable warning surfacing installation and the concrete curing stage, it is imperative that there are no walking, leaning or external forces placed on the detectable warning surfacing to rock the detectable warning surfacing, causing a void between the underside of the detectable warning surfacing and the concrete.
- B. Protect detectable warning surfacing from vehicular and pedestrian traffic on newly installed detectable warning surface modules for period of time as instructed by manufacturer.
- C. Remove Protective Plastic Sheeting from detectable warning surfacing within 24 hours of installation of the detectable warning surfacing. Particularly under hot weather conditions (80 degrees or higher), plastic sheeting will adhere strongly (resulting in difficult removal of same) to detectable warning surfacing when not removed quickly.
- D. While detectable dome installation is susceptible to vandalism, Contractor shall have someone present on-site to ensure that the detectable dome installation isn't damaged.

**END OF SECTION 32 17 26**

**SECTION 32 31 13 - CHAIN LINK FENCES AND GATES****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Fence framework, fabric, and accessories.
2. Excavation for post bases.
3. Concrete foundation for posts and center drop for gates.
4. Manual gates and related hardware.
5. Fencing improvements for:
  - a. Fence A
  - b. Fence B

## B. Related Sections:

1. [Section 03 30 00 – Utility Cast-in-place concrete](#)

## 1.2 REFERENCES

## A. ASTM International:

1. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
5. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
6. ASTM A817 - Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
7. A1011/A1011M-07 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
8. ASTM B42 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
9. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
10. ASTM F552 - Standard Terminology relating to Chain Link Fencing.
11. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.

12. ASTM F626 - Standard Specification for Fence Fittings.
13. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
14. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
15. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
16. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
17. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
18. ASTM F1183 - Standard Specification for Aluminum Alloy Chain Link Fence Fabric.
19. ASTM F1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.
20. ASTM F1345 - Standard Specification for Zinc - 5% Aluminum -Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric.

B. Chain Link Fence Manufacturers Institute:

1. CLFMI - Product Manual.

C. State Standard Specifications

1. Section 75 Miscellaneous Metal
2. Section 80 Fences

### 1.3 SYSTEM DESCRIPTION

- A. Fence Height: per plans and details.
- B. Line Post Spacing: At intervals not exceeding ten (10) feet, unless otherwise indicated otherwise on the Drawings.
- C. Fence Post and Rail Strength: Conform to ASTM F1043 quality, unless otherwise indicated otherwise on the Drawings.

### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.

- D. Manufacturer's Installation Instructions: Submit installation requirements and post foundation anchor bolt templates.
- E. Submit structural calculations and structural details for footings, posts and rail diameter for Chain Link Fences greater than six (6) feet in height and for gates longer than 16 feet with any gate leaf greater than 8 feet in length.
- F. For fence to be located on or near the property line, and prior to the Contractor installing fence, Contractor's licensed land surveyor to obtain the recorded property line map and stake the property line every 50 feet along the fence and at all changes in direction.
- G. Contractor to obtain from the Engineer the dimension from the line post and corner post to the property line.

#### 1.5 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
- C. Operation and Maintenance Data: Procedures for submittals.

#### 1.6 QUALITY ASSURANCE

- A. Supply material according to CLFMI - Product Manual.
- B. Perform installation according to ASTM F567.
- C. Perform Work according to 2018 Caltrans Standard Plans A85, 85A, and A85B.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.



- D. Store fence fabric and accessories in secure and dry place.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers:
  1. Master Halco
  2. Pacific Fence and Wire Company
  3. Allied Tube & Conduit, a part of Atkore International.
  4. Amico Corporation
  5. Merchant Metals
  6. Or approved equal.

2.2 MATERIALS AND COMPONENTS

- A. Materials and Components: Conform to CLFMI Product Manual.
- B. Fabric Size: Chain link fabric must comply with AASHTO M 181 for Type 1 fabric (zinc-coated steel) with a class C coating (1.2 oz/ft<sup>2</sup>) or ASTM F1345, Class 2 (1.0 oz/ft<sup>2</sup> - Zinc-5% Aluminum-Mischmetal Alloy Coated Steel Fabric). The wire for the fabric must be 11 gauge for a fence height 84 inches or less in height and 9 gauge for a fence over 85 inches in height and for a slatted chain link fence. Chain link fabric for fence must have the diamond count corresponding to the fabric height as shown in the following table:

**Diamond Counts**

Fabric Height (inches)	36	42	48	60	72	84	96
Diamond Count	10-1/2	12-1/2	13-1/2	17-1/2	20-1/2	24-1/2	27-1/2

- C. Chain link fabric for slatted fence must have 3-1/4-inch-vertical and 5-1/4-inch horizontal mesh. Knuckle finish fabric on the top and bottom edges.
- D. Posts and Braces: The base metal for posts and braces must be commercial-quality, weldable steel complying with AASHTO M181, Type 1, except for the protective coating requirements.
- E. Posts and braces must comply with the strength requirements in ASTM F1043:
  1. Group IA (Round Steel Pipe-Schedule 40), regular grade, for round pots
  2. Group II-L (Roll formed Steel Shapes – C-Sections), for roll-formed posts and braces.

- F. Galvanize posts and braces as required per State Standard Specification section 75-1.02B, except, instead of galvanizing, tubular posts and braces may have a protective coating system complying with the following:
1. Exterior surfaces of tubular posts and braces must have a combination coating consisting of hot-dip galvanized primer followed by a chromate conversion coating, and then a finish coat of clear, cross-linked organic coating. For this combination coating:
    - a. Thickness of the zinc coating must be at least 0.9 mil as determined from the average results of at least 2 samples and at least 0.8 mil on an individual sample.
    - b. Chromate conversion coating must be at least 15µg/square inch.
    - c. Total thickness of the combination coating must be at least 1.7 mils.
    - d. Clear finish coat must not have any film cracking after 500 hours of exposure in an artificial weathering device under one of the following:
      - 1) ASTM G152, cycles 1, or 3 Carbon Arc artificial weathering device.
      - 2) ASTM G155, cycles 1, or 2 Xenon Arc artificial weathering deviceClear finish coat must not have blistering or cracking after 500 hours of exposure to 100 percent relative humidity under ASTM D2247.
  2. Interior surfaces must have a zinc coating or a cross-linked organic coating containing a corrosion inhibitor. For these coating:
    - a. Coating thickness must be at least 0.3 mil.
- G. Each post must have provisions to securely hold the top tension wire in position and allow for post removal and replacement without damaging the wire. Fit each tubular post with rainproof top.
- H. Post tops, extension arms, stretcher bars, and other fittings and hardware must be:
1. Steel or malleable or wrought iron
  2. Galvanized after fabrication per State Standard Specification Section 75-1.02B.
- I. Galvanize or coat ferrous materials. Do not use materials imperfectly galvanized or imperfectly coated or with serious abrasion.
- J. Concrete: Type specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

## 2.3 PRIVACY SLATS

- A. Slats must be wood or plastic. Wood slats must be clear redwood or as shown on Drawings.
- B. Each wood slat must have a thickness of at least 1/4 inch, width about 2-5/8 inch and length enough to fill the vertical openings of the fabric.

- C. Plastic slats must be HDPE with UV inhibitors and have a flat tubular cross section with a minimum wall thickness of 0.03 inch, minimum depth of 0.325 inch, minimum width of 2.38 inch, and length equal to the fence height.
- D. Plastic slat material must comply with the requirements shown in the following table:

**Plastic Slat Material Requirements**

Quality characteristic	Test Method	Requirement
Melt Index	ASTM D1238	0.24
Density	ASTM D1505	0.951
Low temperature brittleness (°F)	ASTM D746	-76
Tensile strength (psi)	ASTM D638	3,700

**2.4 ACCESSORIES**

- A. Caps: Galvanized pressed steel sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Extension Arms: Galvanized pressed steel to accommodate strands of barbed wire, [sloped to 45 degrees].
- D. Gate Hardware: Fork latch with gravity drop or center gate stop and drop rod for double gates; two 180-degree gate hinges for each leaf and hardware for padlock keyed.
- E. Incidentals: All non specified hardware as required including ties, brackets, terminals, wiring, UV stable zip ties, rope, turnbuckles, thimbles, shackles, anchors, and clips as required to fully fabricate and install the Fencing Systems.

**2.5 FINISHES**

- A. Components and Fabric: Galvanized to ASTM A123 for components; ASTM A153 for hardware; ASTM A392 for fabric.
- B. Components and Fabric: Vinyl coating, dark green color according to ASTM F934 over galvanized coating as selected and as shown on Drawings.
- C. Hardware: Galvanized to ASTM A153

- D. Accessories: Same finish as fabric.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Contractor shall contact Underground Service Alert (USA) and utility locators at least three (3) days prior to installation to identify and mark utilities around the proposed chain link fence to avoid damaging any utilities. Any utilities damaged shall be replaced at the Contractor's expense.
- B. Install framework, fabric, accessories and gates according to ASTM F567.
- C. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying materials.
- D. Prior to drilling posts, mark gate width locations in the field and obtain written approval from City for gate location.
- E. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.
- F. Set intermediate, terminal, and gate posts plumb, in concrete footings with top of footing one (1) inch above finish grade. Slope top of concrete forming crown for water runoff.
- G. Line Post Footing Depth Below Finish Grade: ASTM F567; varies from 2.5 feet to 4 feet depending on height of fence as shown on Caltrans Standard Plans A85.
- H. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567; varies from 2.5 feet to 4 feet depending on height of fence as shown on Caltrans Standard Plans A85.
- I. Allow footings to cure minimum seven (7) days before installing fabric and other materials attached to posts.
- J. Brace each end, latch, and corner post to the nearest line post with either of the following:
  - 1. Diagonal brace used as a compression member.
  - 2. Horizontal brace used as a compression member and truss rods used as tension member
- K. Install brace rail one bay from end and gate posts.
- L. Brace each gate post to the nearest line post with a horizontal brace used as a compression member and truss rods used as tension members.

- M. Equip each steel truss rod with a turnbuckle or truss tightener.
- N. Brace line posts horizontally and truss in both directions at intervals of at most 300 feet.
- O. Fasten chain link fabric on the side of the posts designated by the Engineer. Stretch and securely fasten the fabric to the posts.
- P. Fasten the top and bottom edges of the fabric to the tension wires. Stretch the tension wires tight.
- Q. Install the bottom tension wire on a straight grade between posts by excavating high points of the ground. Do not fill in low points.
- R. Fasten the fabric to end, latch, corner, and gate posts with stretcher bars and stretcher bar bands at 1-foot intervals except the fabric may be fastened to end and corner posts by threading through loops formed on the posts.
- S. Fasten the fabric to line posts with tie wires or post clips and to tension wires with tie wires or hog rings. Space the fasteners at about 14 inches on line posts and about 18 inches on tension wires. Give wire ties at least 1 complete turn. Close each hog ring with the ends overlapping. Wrap tension wires around terminal posts. The top of the fabric to the top tension wire must be at most 2 inches.
- T. If supporting arms for barbed wire are shown, extend each arm upward from the top of the fence at an angle of about 45 degrees. Fit it with clips or other means for attaching 3 lines of barbed wire. Attach the top outside wire to the supporting arm at a point about 12 inches above the top of the chain link fabric and 12 inches out from the fence line. Attach the other wires to the arm spaced evenly between the top of the fence and the top outside wire.
- U. Hang each gate with at least 2 steel or malleable iron hinges at least 3 inches in width such that the gate is securely clamped to the gate post and permits the gate to be swung back against the fence. The bottom hinge must have a socket to take the ball end of the gate frame.
- V. Construct a center rest with a catch and stops to hold gates open.
- W. For a walk gate constructed in an existing fence, remove a line post and install the gate such that the gate is centered on the hole of the removed post. When not working on the walk gate, close the opening made in the existing fence with existing fence fabric or 6-foot chain link fabric.
- X. Install top rail through line post tops and splice with 6-inch-long rail sleeves.
- Y. Place fabric on outside of posts and rails, unless shown otherwise on Drawings or otherwise directed by Project Manager.

**SECTION 32 80 00 - IRRIGATION SYSTEM****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. The CONTRACTOR shall provide all labor, materials, supplies, tools, and transportation and perform all operations in connection with and reasonably incidental to complete the installation of the automatic sprinkler irrigation systems as shown on the drawings. Items hereinafter are included as an aid to take off, and are not necessarily a complete list of work items.
1. Trenching, stockpiling, excavation, materials, and refilling trenches.
  2. Furnishing materials and installation for complete system including piping, valves, fittings, sprinkler heads, automatic controls, and final adjustment of heads to insure complete coverage.
  3. Line voltage connections to the irrigation controllers and low voltage control wiring from controllers to remote control valves.
  4. Replacement of unsatisfactory materials.
  5. Clean-up, inspection and approval.
  6. All work of every description mentioned in the specification and/or addenda thereto, all other labor, and materials reasonably incidental to the satisfactory completion of the work, including clean-up of the site, as directed by the Project Manager.
  7. Tests.
  8. Record drawings.
- B. Related Requirements:
1. [Section 01 29 00 - Payment Procedures](#)
  2. [Section 01 70 00 - Execution](#)
  3. [Section 01 77 00 - Closeout Requirements](#)
  4. [Section 31 23 16 – Utility Trenching](#)
  5. [Section 32 90 00 – Landscape Work](#)
  6. [Section 33 05 26 – Utility Identification](#)
  7. [Section 33 11 13 – Water Distribution Piping](#)
  8. [Section 33 12 00 – Water Distribution Equipment](#)
  9. [Section 33 12 13 – Water Service Connections](#)
  10. [Section 33 12 16 – Water Distribution Valves](#)

## 1.2

## 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit manufacturer catalog information on all material to be used on the project as specified on the legend, notes, details and plans. Redline or highlight exact items on page to be submitted. Complete material list shall be submitted prior to performing any work.
- C. Substitutions: No substitution will be permitted without prior written approval by the Project Manager. If the product is approved and, in the opinion of the Project Manager, the substituted product does not perform as well as the specified product, the Contractor shall replace it with the specified product at no additional cost to the City.
- D. All equipment or materials installed or furnished without prior approval of the City may be rejected and the Contractor may be required to remove the equipment or material at their own expense.

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: The Contractor shall maintain in good order in the field office, one complete set of black line prints of all sprinkler drawings which form a part of the contract, showing all water lines, electrical, sprinklers, valves, stub-outs. In the event any work is not installed as indicated on the drawings, such work shall be corrected and dimensioned accurately from the building walls. All underground stub-outs for future connections and valves shall be located and dimensioned accurately from building walls on all record drawings. In addition to the hard copies a full sized scanned PDF will be required at completion.
- C. Controller Chart:
  - 1. Provide one laminated controller chart showing the area covered by controller for each automatic controller supplied at the maximum size controller door will allow. Chart shall be a reduced drawing of the actual "as-built" system. If controller sequence is not legible when the drawing is reduced to door size, the drawing shall be enlarged to a size that is readable and placed folded, in a sealed plastic container, inside the controller door.
  - 2. Controller chart shall be a blackline print with a different color used to show area of coverage for each station. Charts must be completed and approved by the Project Manager prior to final inspection of the irrigation system.
- D. Maintenance and Operating Instructions and Manuals:
  - 1. Contractor shall prepare an Operation and Maintenance Manual, organized in a 3-ring binder, containing the following information.
    - a. Contractor's name, address, and telephone number. Duration of guarantee, periods as specified herein, list of equipment with names and addresses of local manufacturer's representatives with duration of

written warranties. Complete operating and maintenance instructions on all equipment spare parts lists and related manufacturer's information.

2. Submit the Operation and Maintenance Manual to the Project Manager within 10 Calendar Days of completion of work of this Section and as a condition of project acceptance.

E. SiteOne Green Tech controller certification:

1. Contractor shall coordinate with SiteOne Green Tech to have each controller certified after installation. A certification letter shall be provided to the Project Manager upon completion of project. Irrigation Controller shall be EPA WaterSense® approved.

## 1.5 QUALITY ASSURANCE & GENERAL REQUIREMENTS

- A. Qualifications: The Contractor, personally or through an authorized and competent representative, shall supervise the work constantly, and shall as far as possible keep the same foreman and workmen on the job from commencement to completion. The workmanship of the entire job must in every way be first class, and only experienced and competent workmen will be allowed on the job. A minimum of five years' experience of installing irrigation systems of similar scope, size and complexity as the system being installed under this scope of work is required for all on-site job superintendents.
- B. Manufacturer's installation instructions and best practices: Manufacturer's installation instructions shall be followed in all cases when not shown in the Drawings or Specifications.
- C. O.S.H.A. Compliance: All articles and services covered by this specification shall meet or exceed the safety standards established under the Federal Occupational Safety and Health Act of 1970, together with all amendments in effect as of the date of this specification.
- D. All irrigation systems shall be installed to meet or exceed the requirements set forth in the California Department of Water Resources Model Water Efficient Landscape Ordinance.
- E. All irrigation systems shall be installed to meet or exceed the requirements set forth in Bay Friendly Landscape Guidelines.
- F. Codes and Standards: Comply with all applicable codes and standards.
1. All work and materials shall be in full accordance with the latest rules and regulations of the National Electric Code; published by the Western Plumbing Officials Association; and other State or local laws regulations. Nothing in these drawings or specifications is to be construed as to permit work not conforming to these codes.
  2. When the specifications call for materials or construction of a better quality or larger size than required by the above mentioned rules and regulations,



the provision of the specifications shall take precedence over the requirements of said rules and regulations.

3. Contractor shall furnish, without extra charge, any additional material and labor when required by the compliance with these rules and regulations, though the work be not mentioned in these particular specifications or shown on the drawings.
4. The Contractor shall erect and maintain barricades, guards, warning signs, and lights as necessary or required by O.S.H.A. regulations for the protection of the public or workmen.
5. Any existing buildings, equipment, piping, pipe covering sewers, etc., damaged by the Contractor during the course of his work shall be replaced or repaired by the Contractor in a manner satisfactory to the Project Manager and at Contractor's own expense, before final payment is made. The Contractor shall be responsible for damage caused by leaks in the piping systems being installed or having been installed under this contract. He/she shall repair, at his/her own expense, all damage so caused, in a manner satisfactory to the Project Manager.
6. The Contractor shall pay for all permits, licenses, and fees required.

## 1.6 EXISTING CONDITIONS

### A. Protection Of Existing Structures and Utilities

1. The Drawings show, if applicable, existing above and below grade structures and utilities that are known to the City. Locate known existing installations before proceeding with construction operations that may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be repaired with no adjustment of Contract Sum. Verify with Project Manager if As Built drawings are available.
2. If other structures or utilities are encountered, request Project Manager to provide direction on how to proceed with the Work. If a structure or utility is damaged, take appropriate action to ensure the safety of persons and property.

- B. Trench Interference with Existing Tree Root Systems: Prior to trenching, layout main and lateral line locations within drip Line of trees and review locations with Project Manager. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Project Manager.

## 1.7 LAYOUT OF WORK

- A. The Contractor shall stake out the irrigation system as shown on the drawings. These areas shall be checked by the Contractor and Project Manager before construction is started. Any changes, deletions or additions shall be determined at this check.

- B. Due to the scale of the Drawings, it is not possible to indicate all piping offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affected all of the work and plan accordingly, and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities and architectural features.
- C. Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in Project Manager. Bring such obstruction or differences to the attention of the Project Manager. Notify and coordinate irrigation Work with applicable contractors for location and installation of piping and sleeves through or under walls, pavement and structures. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

## 1.8 SEQUENCING AND SCHEDULING

- A. Acceptance: Do not install main line trenching prior to acceptance by Project Manager of rough grades completed under another Section.
- B. Coordination: Coordinate with the all other trades the sleeving, power requirements of the project, prior to the start of construction.

## 1.9 INSTRUCTION

- A. After the system has been installed and approved, the Contractor shall instruct the Project Manager in complete operation and maintenance of the irrigation system.

## **PART 2 - MATERIALS**

### 2.1 PIPE AND FITTINGS

- A. Main lines (constant pressure); 4" and larger shall be polyvinylchloride (PVC) 1120-Class 200, ASTM D1785, Type 1, Grade 1 with rubber gasketed bell connections with ductile iron fittings with thrust blocks or joint restraints; 3" and smaller shall be PVC 1120-Schedule 40 plastic pipe. Pipe shall be made from NSF approved Type 1, Grade 1 PVC compound conforming to ASTM D1785.
  - 1. Join lengths of pipe by means of integrally formed bell end on pipe using rubber ring seal.
  - 2. Ring-tite main line: At changes in direction or branch mains, use appropriate Ductile Iron rubber ring seal fittings with thrust blocks or joint restraints.
  - 3. Solvent weld main lines: At changes in direction or branch mains, use appropriate Schedule 40 PVC solvent weld fittings as approved by the Uniform Plumbing Code.

- B. All piping for recycled water systems shall be manufactured from purple-colored PVC material and shall be printed on two sides with the wording "CAUTION-RECLAIMED WATER". Refer to Delta Diablo specifications for requirements.
- C. Lateral lines (non-pressure): 3/4" and larger shall be 1120-Schedule 40 PVC plastic pipe. All lateral lines shall be connected with Schedule 40, Type I, Grade I, PVC solvent weld fittings.
- D. Irrigation Sleeves shall be 1120-Schedule 40 PVC plastic pipe. Irrigation pipe and wires crossing beneath hardscape surfaces shall be contained within sleeving and Schedule 40 PVC conduit. Provide a minimum of one sleeve for water lines and a minimum of one Schedule 40 PVC electrical conduit for control wires. Sleeving size shall be a minimum of two times the aggregate diameter of all pipes contained within sleeve. Provide vertical sweeps for all electrical conduit on each side of hardscape and terminate ends a minimum of 12" from hardscape surface.
- E. Connections between main lines and RCV's shall be of Schedule 80 PVC (threaded both ends) nipples and fittings.
- F. Risers shall be as follows:
  - 1. Rotary Sprinklers Schedule 80 PVC threaded nipples and Schedule 80 PVC ells as shown in the construction details.

## 2.2 BACKFLOW PREVENTION DEVICE

- A. Backflow prevention device shall be the reduced pressure type with gate valves, check valves, test cocks, reduced pressure chamber and air vent.
- B. Provide a freeze preventative blanket around backflow assembly. Blanket shall be green.
- C. All metallic pipe and fittings installed below grade shall be may be wrapped with an approved asphaltic tape.
- D. Backflow prevention device model shall be per City of Pittsburg standard equipment list. Size as shown on the drawings. Install backflow prevention device in accordance with City of Pittsburg standard detail.

## 2.3 BACKFLOW PREVENTION DEVICE ENCLOSURE

- A. Enclosure shall be sized to completely enclosure backflow device.
- B. Install enclosure device in accordance with City of Pittsburg standard detail.
- C. Enclosure model shall be per City of Pittsburg standard equipment list. Powder coated dark green. Size as shown on drawings.

## 2.4 PRESSURE REDUCING VALVE

- A. Pressure reducing valve shall be diaphragm type, bronze body, with bolt to adjust the downstream pressure.
- B. Pressure reducing valve shall reduce pressure in both flow and no-flow conditions.
- C. Pressure shall adjustable with a range of 25-75 PSI.
- D. Pressure reducing valve shall be per City of Pittsburg standard equipment list. Size as shown on drawings.

## 2.5 BOOSTER PUMP

- A. When static water pressure in the City water system is less than 55 psi or when the hydraulic analysis of a proposed irrigation system requires more pressure than available a booster pump is required.
- B. Booster pump shall be a prefabricated, self-contained, Variable speed, (VFD), horizontal centrifugal pump station with piping, valves, and enclosure. Controls will be an operator interface with software programming written specifically for the project specific pump requirements. Pump station shall have a formed and reinforced base platform and enclosure with lockable lid contains all manifolding, pumps, motors and control panels to provide an integral unit ready for easy installation.

## 2.6 MASTER CONTROL VALVE

- A. Master control valve shall be a normally closed 24 VAC solenoid actuated globe pattern valve.
- B. Valves shall be made of durable glass-filled nylon with a pressure rating of 200 PSI
- C. Valve shall have external and internal bleed for manual operation.
- D. Valve shall have a scrubber mechanism to clean the stainless steel screen.
- E. Valve shall be model shall be per City of Pittsburg standard equipment list. Size as shown on drawings.

## 2.7 GATE VALVES

- A. Gate valves 3" and smaller shall meet the following requirements:
  - 1. Valves shall be of stainless steel (304 or higher) construction with non-rising stem, cross handle and threaded connections.

2. Valves shall be per City of Pittsburg standard equipment list. Size as shown on the drawings
  3. Install in 10" diameter plastic valve box as detailed.
- B. Gate valves 4" and larger shall meet the following requirements:
1. Valves shall be cast iron with operating nut (2" square) and "O" ring connections for Class 200 PVC plastic pipe.
  2. Valves shall be per City of Pittsburg standard equipment list. Size as shown on the drawings.
  3. Install in 10" diameter plastic valve box as detailed.

## 2.8 QUICK COUPLING VALVES

- A. Quick coupling valves shall per City of Pittsburg standard equipment list. Use Rain Bird 44NP with purple covers for use with recycled water. Install in 10" diameter plastic valve box as detailed. Refer to Delta Diablo specifications for requirements.

## 2.9 CONTROLLERS

- A. Controller's size and model shall be as listed on the drawings.
- B. Final location(s) of controller shall be approved by the Project Manager.
- C. Controller requires 120v power. Maximum power output of controller is 2.0 amps.
- D. Controllers shall be RainMaster Evolution DX2 controller within a Strongbox Stainless Steel Top entry controller. All controllers shall have a high gain antenna installed adjacent to the enclosure for communication with City's central computer. Contact Site One Green Tech when purchasing.
- E. Controller shall have a preinstalled flow sensor terminal board.
- F. Install Controller and accessories per City and Manufacturer's details.
- G. Each controller shall be equipped with a built in radio remote receiver and one remote transmitter.

## 2.10 CONTROLLER COMMUNICATION CABLE

- A. All sites with multiple Rain Master DX2 controllers shall be connected together via communication cable. Cable shall be Rain Master model EV-CAB-COM
- B. Communication cable shall be installed within 1¼" Schedule 40 grey PVC with Schedule 40 fittings and Schedule 40 electrical long sweeps elbows at all changes in direction. Pull boxes shall be located a minimum of 200 feet on center, adjacent to controller, and at each change of direction. Use rectangular

boxes for all pull boxes. Use Carson model 1419-12 with bolt down lid. Color shall be black. Heat brand box "PB". Text height of letters to be 2".

- C. Maximum distance of communication cable shall be 2000'.
- D. Splicing of cable between controllers is not permitted.

## 2.11 CONTROL WIRE

- A. Control wire shall be copper with U.L. approval for direct burial in ground, size #14-Common ground wire shall have white insulating jacket; control wire shall have insulating jacket of color other than white or yellow. Runs over 2,000 lineal feet shall be #12- AWG-UF 600-volt copper wire. Splices shall be made with 3M-DBY seal packs.
- B. Provide a separate ground wire for each controller.
- C. Provide a minimum of two spare control wires into each RCV box for future. Spare wires shall be yellow in color.
- D. Tracer wire shall be used on all pressure piping. Tracer wire shall be blue and suitable for direct burial and wet conditions. Refer to Section 33 05 26 for additional requirements.

## 2.12 ELECTRIC REMOTE CONTROL VALVES

- A. Electric remote control valves sizes shall be shown on drawings.
- B. Electric remote control valve shall be a normally closed 24 VAC solenoid actuated globe pattern valve.
- C. Valves shall be made of durable glass-filled nylon with a pressure rating of 200 PSI
- D. Valve shall have external and internal bleed for manual operation.
- E. Provide and install one Schedule 80 PVC FIPT threaded true union ball valve with EPDM O-rings on the upstream side of valve and one Schedule 80 union on the downstream side of valve. Match valve size when sizing ball valve and union.
- F. All electric remote control valves for dripline or drip systems shall include a wye filter with a 200 mesh stainless steel screen and pressure regulator on the valve or downstream of the valve.

## 2.13 IDENTIFICATION TAGS/TAPE

- A. Identification tags for all electric control valves shall be manufactured by Christy. Tag numbers shall match stationing in controller and as shown on as-built

drawings. Provide one yellow station number tag for each electric control valve and an additional purple one for recycled water system as follows:

1. Potable water systems: Christy ID.STD.Y1
2. Recycled water systems: Christy ID.STD.Y1 and Christy ID.MAX.P2.RC006. Refer to Delta Diablo specifications for requirements.

B. Identification tags for all quick coupling valves are ONLY required for recycled water systems. Tags shall be Christy model ID.MAX.P2.RC006. Refer to Delta Diablo specifications for requirements.

C. Detectable tape shall be installed on all pressurized pipes greater than 2". Tape shall be placed above the centerline of the pipe, spanning the full length of the pipe, and be placed at a depth of 6" above the top of the pipe. Tape shall be 3" wide by 5 mil thick and manufactured for direct burial service. Use blue colored tape for potable irrigation and purple for recycled water systems. Standard imprints shall read "CAUTION WATER LINE BELOW" AND "CAUTION BURIED RECLAIMED WATER LINE BELOW".

## 2.14 VALVES BOXES

### A. ELECTRIC REMOTE CONTROL VALVE BOXES:

1. All electric remote control valve boxes that service non-drip systems shall be installed within a Carson Model 1419-12 or 1324-12 plastic valve box with bolt down plastic lid. Size of box is dependent on the size of valve. Lid shall be marked: "Irrigation Control Valve." Color: Green.
2. All electric remote control valve boxes that service dripline or drip systems shall be installed within a Carson Model 1324-12 plastic valve box with bolt down plastic lid. Lid shall be marked: "Irrigation Control Valve." Color: Green.
3. Use purple colored boxes with bolt down lid marked "RECLAIMED OR RECYCLED WATER" and with bilingual non-potable warning and symbol for all recycled water systems. Refer to Delta Diablo specifications for requirements.
4. Heat brand controller letter and numbers into lid. Minimum text height to be 2".

### B. GATE VALVE AND QUICK COUPLING VALVE BOXES:

1. All gate valve and quick coupling valve shall be installed within a Carson Model 910-10 plastic valve box with plastic lid or approved equal. Use 8" sleeve to encase gate valve. Color: Green.
2. Use purple color boxes with bolt down lid marked "RECLAIMED OR RECYCLED WATER" and with bilingual non-potable warning and symbol. Refer to Delta Diablo specifications for requirements.
3. Heat brand the letters "GV" into lid. Minimum text height to be 2".

### C. DRIP COMPONENT BOXES:

1. All drip components shall be installed within a 6" round black plastic valve box with plastic lid.
2. Use purple color lid with non-hinged bolt down lid marked "RECLAIMED OR RECYCLED WATER" and with bilingual non-potable warning and symbol. Refer to Delta Diablo specifications for requirements.

#### 2.15 SPRINKLER HEADS AND BUBBLERS

- A. All sprinkler heads shall be as listed on the drawings. Refer to City of Pittsburg standard equipment list for make and model of pop-up rotary and spray sprinklers.
- B. Pop-up spray sprinklers shall include a built in check valve in the body to hold up to 14 feet of head.
- C. Pop-up spray sprinklers shall include built in pressure regulation in the body.
- D. Use built in 30 psi regulators for all spray nozzles and 45 psi regulators for all rotating nozzles. Use 12" pop-ups in shrub and ground cover areas and 6" pop-ups in turf areas.
- E. Riser units and nipples shall be the same size as the inlet to the sprinkler body.
- F. Use purple caps on sprinkler head for recycled water systems. Refer to Delta Diablo specifications for requirements.

#### 2.16 DRIPLINE & DRIPLINE COMPONENTS

- A. Dripline shall be as listed on the drawings. Refer to City of Pittsburg standard equipment list for model number.
- B. Tubing shall be low density, UV resistant, polyethylene tubing with 17mm in size with internal pressure-compensating, drip emitters impregnated into the tubing spaced at 12 or 18 inches
- C. The built in emitters shall be capable of delivering 0.6 gallons per hour per emitter.
- D. Use purple colored tubing for recycled water systems.
- E. All dripline systems shall have a manual flush valve at each isolated zone within the systems. Multiple flush valves may be required per drip zone.
- F. All dripline systems shall have air relief valve(s) at the highest elevation point(s) within each isolated zone. Install one air relief valve for every 500 linear feet of dripline.

#### 2.17 FLOW SENSORS



- A. Inline flow sensors shall be installed in accordance with the manufacturer's installation instructions. Contractor is responsible for the installation, all required materials and connections of the flow sensors for complete operation with the irrigation controller.
- B. Flow sensor size and model shall be listed on the drawings. Contact Site One Green Tech for models numbers

#### 2.18 FLOW SENSOR CABLE AND CONDUIT:

- A. Flow sensor wire shall be shielded cable model EV-CAB-SEN manufactured by Rain Master.
- B. Maximum cable distance from controller to flow sensor shall be 2000 ft.
- C. Install flow sensor cable in a 1" grey SCH 40 PVC conduit with long sweep elbows.
- D. Conduit and flow sensor cable shall be routed with mainline wherever possible. Install 18" below grade. Provide a minimum 6" separation between conduit and pressure main line.
- E. Provide 10" round grey electrical pull boxes a minimum of every 200 ft, at each change in direction and adjacent to each controller. Heat brand lid of pull box "FSB".

#### 2.19 CHECK VALVE

- A. Spring check valve shall be Schedule 40 PVC with ½ lb spring and stem rated at 150 PSI.
- B. Model and size as shown on drawings.

#### 2.20 MISCELLANEOUS INSTALLATION MATERIALS

- A. Solvent cement and primer for solvent weld joints shall be of make and type approved by manufacturer(s) of pipe and fittings. Cement shall be maintained at proper consistency throughout use.
- B. Lubricant for assembling rubber ring seal joints shall be of make and type approved by manufacturer of pipe.
- C. Pipe joint compound shall be non-hardening, non-toxic materials designed specifically for use on threaded connections in water carrying pipe. Performance shall be same as RectorSeal #5.

## 2.21 MISCELLANEOUS EQUIPMENT

- A. Provide all equipment called for by the drawings.
- B. Provide to the Project Manager, at completion of the maintenance period, three (3) each of all operating and servicing keys and wrenches required for complete maintenance and operation of all heads and valve. Include all wrenches necessary for complete disassembly of all heads and valves.

## **PART 3 - INSTALLATION**

### 3.1 PREPARATION

- A. Schedule and coordinate placement of materials and equipment in a manner to effect the earliest completion of work in conformance with construction and progress schedule.

### 3.2 HANDLING AND STORAGE

- A. Protect work and materials from damage during construction and storage as directed by the Project Manager.
- B. Handle plastic pipe carefully; especially protect it from prolonged exposure to sunlight. Any section of pipe that has been damaged will be discarded and removed and replaced if installed.

### 3.3 LAYOUT

- A. Lay out work as accurately as possible in accordance with diagrammatic drawings.
- B. Where site conditions do not permit location of piping, valves and heads where shown, notify Project Manager immediately and determine relocation in joint conference.
- C. Prior to installation, the Contractor shall stake out the routing of all pressurized main lines and sprinkler heads for approval by Project Manager.
- D. Run pipelines and automatic control wiring in common trenches wherever practical.

### 3.4 EXCAVATING AND TRENCHING

- A. Excavation shall be in all cases ample in size to permit the pipes to be laid at the elevations intended and to permit ample space for joining.
- B. Make trenches for pipelines deep enough to provide minimum cover from finish grade as follows:

1. 18" minimum cover over main lines to control valves and quick coupling valves.
  2. 18" minimum cover over control wires from controller to valves.
  3. 12" minimum cover over RCV controlled lateral lines to sprinkler heads.
- C. Restore surfaces, existing underground installations, etc., damaged or cut as a result of excavations, to original conditions in a manner approved by the Project Manager.
- D. Where other utilities interfere with irrigation trenching and pipe work, adjust the trench depth as instructed by the Project Manager.

### 3.5 ASSEMBLING PIPELINES

- A. All pipe shall be assembled free from dirt and pipe scale. Field cut ends shall be reamed only to full pipe diameter with rough edges and burrs removed.
- B. Install plastic pipe in accordance with manufacturer's recommendations.
- C. Install 3" wide detectable warning tape above all pressurized main lines as shown in the City standard "Irrigation System Trenching Detail". Refer to Section 33 05 26 – Utility Identification.
- D. Rubber Ring Seal Joint:
1. Use factory made male end or prepare field-cut male end to exact specifications of factory made end.
  2. Carefully clean bell or coupling and insert rubber ring without lubricant. Position ring carefully according to manufacturer's instructions.
  3. Lubricate male end according to manufacturer's instruction and insert male end to specified depth. Use hands only when inserting PVC pipe.
  4. Thrust blocks shall be provided where necessary to resist system pressure on ring-tite pipe and fittings. Blocks shall be concrete and the size shall be based on an average soil safe bearing load of 700# per square foot.
  5. Form thrust blocks in such a manner that concrete comes in contact only with the fittings. Thrust blocks shall be between solid soil and the fittings.
- C. Solvent Weld Joint:
1. Prepare joint by first making sure the pipe end is square. Then, de-burring the pipe end, and clean pipe and fitting of dirt, dust and moisture.
  2. Dry insert pipe into fitting to check for proper sizing. Pipe should enter fitting 1/3 to 2/3 depth of socket.
  3. Coat the inside socket surface of the fitting and the male end of the pipe with P-70 primer (manufactured by Weld-On). Then without delay, apply Weld-On 711 cement liberally to the male end of the pipe and also apply 711 cement lightly to the inside of the socket. At this time, apply a second coat of cement to the pipe end.
  4. Insert pipe immediately into fitting and turn 1/4 turn to distribute cement and remove air bubbles. The pipe must seat to the bottom of the socket and

fitting. Check alignment of the fitting. Pipe and fitting shall be aligned properly without strain to either.

5. Hold joint still for approximately thirty (30) seconds and then wipe the excess cement from the pipe and fitting.
6. Cure joint a minimum of thirty (30) minutes before handling, at least six (6) hours before allowing water in the pipe.

D. Threaded Joint:

1. Field threading of plastic pipe or fittings is not permitted. Only factory formed threads will be permitted.
2. Factory made nipples shall be used wherever possible. Field cut threads in metallic pipe will be permitted only where absolutely necessary. When field threading, cut threads accurately on axis with sharp dies.
3. All threaded joints shall be made up with pipe joint compound. Apply compound to male threads only.
4. Where assembling metallic pipe to metallic fitting or valve, not more than three (3) full threads shall show when joint is made up.
5. Where assembling to threaded plastic fitting, take up joint no more than one full turn beyond hand tight.
6. Where assembling plastic pipe, use strap type friction wrench only; do not use metal-jawed wrench.

E. Cap or plug openings as pipeline is assembled to prevent entrance of dirt or obstructions. Remove caps or plugs only when necessary to continue assembly.

F. Where pipes or control wires pass through sleeves, provide removable non-decaying plug at ends of sleeve to prevent entrance of earth.

### 3.6 REMOTE CONTROL VALVES

A. Install where shown on drawings and group together where practical. Limit one remote control valve per box. No exceptions!

B. Locate valve boxes 12" from and perpendicular to walk edges, buildings and walls. Provide 12" between valve boxes where valves are grouped together.

C. Thoroughly flush main line before installing valves.

D. Install in shrub or groundcover areas where possible.

E. Label control line wire at each valve with an I.D. tag, indicating identification number of valve (controller and station number). Attach label to control wire.

F. Flow control stems shall be adjusted or tuned per manufacturer recommendations.

### 3.7 AUTOMATIC CONTROL WIRE

- A. Run lines along mains wherever practical. Tie wires in bundles with pipe wrapping tape at 10' intervals and allow slack for contraction between strappings.
- B. Loop a minimum of three (3) feet of extra wire in each valve box; both control wire and ground wire.
- C. Connections shall be made by crimping bare wires with brass connectors and sealing with watertight resin sealer packs.
- D. Splicing will be permitted only on runs exceeding 2500'. Locate all splices at valve locations within valve boxes.
- E. Where control lines pass under paving, they shall pass through Schedule 40 electrical PVC conduit. Do not tape wire in bundles inside conduit.

### 3.8 AUTOMATIC CONTROLLER

- A. Provide and install automatic irrigation controller in approximate locations shown on drawings. The exact location will be determined on the site by the Project Manager. Provide conduit and wire and connect to 120 volt switch accessible to controller for ease of maintenance.
- B. Connect control lines to controller in sequential arrangement according to assigned identification number on valve. Each control line wire shall be labeled at controller with a permanent non-fading label indicating station number of valve controlled. Attach label to control wire.
- C. Provide each irrigation controller with its own independent low voltage common ground wire.
- D. Provide each pedestal controller with its own ground rod. Separate the ground rods by a minimum of eight feet. The ground rod shall be an eight foot long by 5/8" diameter U.L. approved copper clad rod or as recommended by controller manufacturer. Install no more than 6" of the ground rod above finish grade. Connect #8 gauge wire with a U.L. approved ground rod clamp to rod and back to ground screw at base of controller with appropriate connector. Make this wire as short as possible, avoiding any kinks or bending. Install a minimum of 8' away from pedestal housing base unless otherwise noted.

### 3.9 BUBBLERS, SPRINKLER HEADS AND QUICK COUPLING VALVES

- A. Thoroughly flush lines before installing heads, bubblers or QCV's.
- B. Locate bubblers, heads and QCV's as shown in the drawings and details.
- C. Adjust sprinkler heads for proper distribution and trim.

- D. Install lawn heads 1" above grade in seeded lawn area at time of installation. Lower to finished grade after turf is well established and as directed by Project Manager.

### 3.10 DRIPLINE AND DRIPLINE COMPONENTS

- A. Thoroughly all flush lines driplines.
- B. Install dripline a minimum of 12" away from all buildings and 6" off hardscapes for shrubs and groundcover. 2" of paving for all no-mow or sod type grasses.
- C. Space driplines equally throughout the planting area as detailed. Refer to legend for emitter and row spacing of dripline. Adjust alternate rows so emitters are spaced in a triangular pattern.
- D. All dripline tubing shall be buried 3" below finish grade and stapled down every 4' and at each change in direction with a 6" tubing stake.
- E. For slopes greater than 10:1, modify dripline row spacing on the bottom 1/3 of the slope to be 25% greater at the bottom of the slope.
- F. Install flush valves at the low end of each drip zone minimum of 2 valves are required for each valve. Refer to manufacturer details for installation instructions.
- G. Install air vacuum relief valve(s) at high point(s) of each planting area. Refer to drawings for approximate locations. Revise locations in field based on actual grades of the site. Locate 1 valve per every 500' of dripline. Refer to manufacturer details for installation instructions.
- H. Thoroughly saturate soil prior to planting. Provide additional surface watering as required to keep plant root systems moist during planting establishment period.

### 3.11 BACKFILLING

- A. Backfill only after piping and wire has been inspected and approved.
- B. Sand bed all pressurized mainlines as shown in the City standard "Irrigation System Trenching Detail"
- C. Backfill material shall be the earth excavated from the trenches, free from rocks, concrete chunks, and other foreign or coarse materials. The pH value of all backfill material shall be tested to be within 6.5 to 7.5 range.
- D. Place backfill materials in 6" layers and compact by tamping to a minimum compaction of 90 percent of original soil density.
- E. Dress off areas to finish grade and remove excess soil, rocks, or debris remaining after backfill is completed.

- F. If settlement occurs along trenches, and adjustments in pipes, valves, and sprinkler heads, soil, sod, or paving are necessary to bring the system, soil, sod, or paving to the proper level or the permanent grade, the Contractor, as part of the work under this contract, shall make all adjustments without extra cost to the City.

### 3.12 FIELD QUALITY CONTROL

#### A. Coverage Tests:

1. Perform coverage tests in the presence of Project Manager, after sprinkler or drip system is completed. Test system to assure that all areas are irrigated completely and uniformly.
2. Do not spray onto pavement or structures. Adjust arc nozzles as needed to provide full coverage without over spray.

#### B. Adjusting and Cleaning:

1. System adjustment:
  - a. Valves: Adjust flow for proper operation.
  - b. Heads: Adjust for alignment and coverage.
  - c. If it is determined that coverage could be improved by adding additional driplines or a nozzle change, make such changes as required to provide adequate coverage to all plant material.
  - d. Perform final cleaning of all risers, dripline, heads, and equipment for proper operation. Demonstrate operation and uniform coverage in the presence of the Project Manager prior before final acceptance.

### 3.13 TESTING

Perform test as specified below. Remake any faulty joints with all new materials. Use of cement or caulking to seal leaks is absolutely prohibited.  
Contractor shall:

- A. Notify the Project Manager at least three (3) days in advance of testing.
- B. Perform testing at his/hers own expense.
- C. Center load piping with small amount of backfill to prevent arching or slipping under pressure. No fitting shall be covered
- D. Apply the following tests after welded plastic pipe joints have cured at least twenty-four (24) hours.
  1. Ring-Tite Mainline: Remove all the air from the piping system then test live (constant pressure) and QCV lines hydrostatically at 125 PSI minimum. Lines will be approved if test pressure is maintained for two (2) hours. Maintain pressure during this time period and measure the amount of water required to maintain that test pressure. Approved tables of allowable loss are below, and the line will be approved or not approved as such results may

indicate. The Contractor shall make tests and repairs as necessary until test conditions are met.

Allowable leakage for PVC plastic pipe with elastomeric joints in U.S. gallons per hour at a test pressure of 150 PSI.

- a. 4" - 0.30 gallons per 1000 ft. or 50 joints
  - b. 6" - 0.45 gallons per 1000 ft. or 50 joints
  - c. 8" - 0.60 gallons per 1000 ft. or 50 joints
2. Solvent Weld Mainline: Remove all the air from the piping system then test live (constant pressure) and QCV lines hydrostatically at 125 PSI minimum. Lines will be approved if test pressure is maintained for six (6) hours. The lines shall be restored to the original test pressure. The Contractor shall make tests and repairs as necessary until test conditions are met.
  3. Test RCV controlled lateral lines with water at line pressure and visually inspect for leaks. Retest after correcting defects.

### 3.14 MAINTENANCE

- A. Continuously maintain irrigation system in areas indicated in the Contract during the progress of work and for a period of **90 days** after substantial completion.
- B. It is Contractor's responsibility to turn over the irrigation in a first-class condition at the end of the maintenance period.
- C. Maintenance Schedule: Contractor shall submit schedule of maintenance tasks to be performed for City review and approval. At a minimum, maintenance staff shall be on-site two times per month. It is not the intention of these Specifications to allow a "quick cleanup" at the end of the maintenance period, but rather that the work be continuous and ongoing.
- D. Proper irrigation system maintenance includes the overall supervision of the system, controller scheduling, routine adjustments and necessary repairs.
- E. Maintain irrigation system for optimum performance, as per manufacturer's specifications, by inspecting the entire system on an on-going basis. This includes cleaning and adjusting all sprinkler, bubbler heads, drip and drip tube emitters and valves for proper coverage

### 3.15 GUARANTEE

- A. It shall be the responsibility of the Contractor to fill and repair all depressions and replace all necessary lawn and planting due to the settlement of irrigation trenches for one year following completion and acceptance of the job.



- B. The Contractor shall also guarantee all materials, equipment and workmanship furnished by him to be free of all defects of workmanship and materials, and shall agree to replace at his expense, at any time within one year after installation is accepted, any and all defective parts that may be found.

3.15 CLEAN-UP

- A. When work of this section has been completed and at such other times as may be directed, remove all trash, debris, surplus materials, and equipment from site.

**END OF SECTION 32 80 00**

**SECTION 32 90 00 - LANDSCAPE WORK****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. The CONTRACTOR shall provide all materials, equipment, and labor necessary to furnish and install the planting as shown on the Drawings and herein specified. The scope of work includes but is not limited to the following items:
1. Bark mulch
  2. Delivery Tag
  3. Plant Establishment Period
  4. Plant Supply List
  4. Pre-emergent
  5. Root Ball Guy System
  6. Root Barrier
  7. Sod
  8. Trees 24" Box
  9. Trees 15 Gallon
  10. Shrubs, and Groundcover
  11. Tree Staking System
  12. Month Plant Warranty
- B. Related Requirements:
1. [Section 01 29 00 - Payment Procedures](#)
  2. [Section 01 70 00 - Execution](#)
  3. [Section 01 77 00 - Closeout Requirements](#)
  4. [Section 32 80 00 - Irrigation](#)

## 1.2 DEFINITIONS

- A. ReScape Landscaping is a holistic approach to design, construction and maintenance of the landscape in order to support the integrity of the San Francisco Bay watershed ecosystem. ReScape practices foster soil health, conserve water and other valuable resources while reducing waste and preventing pollution. BFL practices incorporated in these specifications are designated as **(ReScape Practice)**. Additional ReScape resources are available at [www.rescapeca.org/resources/publications-list](http://www.rescapeca.org/resources/publications-list)
- B. Compost: An organic matter resource that is the product of controlled biological decomposition of organic materials, often including urban plant debris and food waste. Compost contains plant nutrients but is typically not characterized as a fertilizer. It has the unique ability to improve chemical, physical and biological characteristics of soils or growing media. (Excerpted from US Compost Council, Field Guide to Compost Use).

### 1.3 REFERENCE STANDARDS

#### C. Reference Standards:

1. American Standard for Nursery Stock (ANSI) - ANSI A300: Tree, Shrubs and Other Woody Plant Maintenance - Standard Practices, current edition.
2. ANSI Z133.1: Tree Care Safety Standards, current edition.
3. **BASMAA-SBF**: Bay Area Stormwater Management Agencies Association Specification of Soils for Biotreatment or Bioretention Facilities, dated April 18, 2016, or most current edition.
4. International Society of Arboriculture (ISA) Tree Pruning Guidelines, current edition.
5. U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program assures that compost producers have regularly tested compost for chemical, physical and biological properties. [www.compostingcouncil.org](http://www.compostingcouncil.org)

#### D. Related Documents:

1. California Model Water Efficient Landscape Ordinance (MWEL0), updated July 2015, or current edition.
2. Bay-Friendly Landscape Guidelines describing the principles and practices in sustainable landscape construction and maintenance. Bay-Friendly publications and resources are available on-line at [www.rescapeca.org/resources/publications-list](http://www.rescapeca.org/resources/publications-list).
3. Cal-Trans 'Storm Water Quality Handbooks' - Construction Site Best Management Practices (BMP's) Manual, current edition.

### 1.4 SUBMITTALS AND SAMPLES

#### A. References

1. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
2. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.

#### B. Product Data & Schedules: Furnish manufacturer's literature, laboratory analytical data (soil analysis results and amendment recommendations) as required in this specification section, samples as noted, and schedules for the following items:

1. Planting fertilizer(s)
2. Composted Greenwaste Organic Amendment (**ReScape Practice**)
3. Mulch (two one-quart samples) (**ReScape Practice**)
4. Import topsoil (two one-quart samples)
5. Bioretention Soil (two one-gallon samples)
6. Nursery invoices for all plant material for this project
7. Pesticide(s)
8. Maintenance Schedule

#### C. Substitutions: Plant Material Substitutions of plant material shall not be permitted unless authorized in writing by the Landscape Architect / Project Manager. If

proof is submitted that specified plant material is not available, a proposal will be considered for use of the nearest equivalent size or variety with an equitable adjustment of contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

D. Closeout Submittals

1. As-built drawings (hard copy and PDF-format scanned images) shall be provided as part of the closeout submittals.

E. The Landscape Architect / Project Manager reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request of the Project Manager. Rejected materials shall be immediately removed from the site at Contractor's expense. Costs of testing materials not meeting specifications shall be paid by Contractor.

## 1.6 QUALITY ASSURANCE

A. Contractor Qualifications: Provide sufficient experienced workmen and supervisors who shall be present at all times during execution of this portion of work and who are thoroughly familiar with the type of construction, materials and methods involved. In the acceptance or rejection of the work, no allowance will be made by City for lack of workmen's skill.

B. Requirements of Regulatory Agencies:

1. Obtain and pay for all licenses and permits and pay all inspection and other fees connected with the work.
2. Conform to requirements of applicable Federal, State and local agencies. Nothing in the Contract Documents is to be construed to permit work not conforming to these requirements. Furnish without extra charge any additional material and labor required by above.
3. Where conflict exists between requirements of above agencies and/or these Specifications, the more restrictive shall govern.
4. All plants and planting material shall meet or exceed the Specifications of Federal, State, and local laws requiring inspection for plant disease and insect control. All inspection certificates required shall accompany shipments.

C. Source Quality Control: Quality and size shall conform to current edition of "USA Standard for Nursery Stock" for number one grade nursery stock as adopted by American Associations of Nurserymen. In all cases, botanical names shall take precedence over common names.

## 1.7 QUANTITIES

- A. Plant material quantities indicated on the Drawings are for estimating purposes only. Furnish and install all plant materials as indicated - drawn quantities shall supersede numerical quantities.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Deliver all items to the site in their original containers with all labels intact and legible. Protect plants at all times from sun or drying winds as necessary or until planted. Do not handle plants by stems, trunks or tops, but only by container.

#### 1.9 SITE CONDITIONS

- A. Contractor shall familiarize himself with existing site conditions as they may affect his work.
- B. Water will be provided at the site at no cost to Contractor. Make and remove temporary lines and connections as necessary for the proper execution of the work.

#### 1.10 WARRANTY PERIOD

- A. All trees, shrubs, and ground covers shall be guaranteed to take root and thrive for a period of one year after FINAL ACCEPTANCE date.
- B. Plants shall be free of dead or dying branches and branch tips, and shall bear foliage of normal density, size and color. All dead plants, all plants not in a vigorous growing condition and plants exhibiting conditions unacceptable due to actions during planting and maintenance operations, as determined by Landscape Architect / Project Manager, shall be replaced immediately by Contractor at no additional cost to the City. Replacement shall closely match size and habit of adjacent specimens of the same species and shall be subject to all requirements of the Specifications.
- C. Contractor shall not be responsible for failures due to neglect by the City, vandalism, abuse or damage by others, or unusual phenomenon or incidents above and beyond the Contractor's control, during Warranty Period. Report such conditions to the City in writing.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

A. Fertilizers, Soil Amendments and Mulch: First quality, standard brand, agricultural products. Deliver in original containers with brand name marked thereon. Furnish City with all certificates or delivery slips for each material delivery in containers or in bulk. Fertilizers listed below are for bid purpose only. Fertilizers shall be organic type as recommended by the certified soil testing laboratory . Contractor shall submit soil report including organic amendment and fertilization programs. Soil report shall be considered as part of the specifications and shall be dated within six months before delivery, or sample of organic amendment for Testing Laboratory’s analysis.

1. Commercial Fertilizer: A complete control-release fertilizer in pellet form of which part of the elements are derived from organic sources:  
16% Nitrogen, 16% Phosphoric Acid and 16% Potash  
Plant Fertilizer Paks: Best-Paks 20-10-5 planter paks.
2. Soil Sulfur: Agricultural grade Sulfur containing minimum of 99% Sulfur (expressed as elemental).
3. Ammonium Sulfate, 21-0-0
4. Iron Sulfate: 20% iron (expressed as metallic iron) derived from ferric and ferrous sulfate, 10% sulfur (expressed as elemental).
5. Potassium Sulfate, 0-0-50.
6. Calcium Carbonate: 95% lime derived from oyster shells.
7. Gypsum: Agricultural grade with 98% Calcium Sulfate.
8. Sulfur Coated Urea (SCU): SCU 21-7-14 or SCU 21-7-7.
9. Composted Organic Greenwaste Amendment (**BFL Practice**): Yard waste compost free of contaminants with pH of 5.5-8.0, minimum organic content of 250 pounds per cubic yard of compost (minimum 50% of compost’s dry weight, TMECC 05.07-A), 35-60% moisture content, maximum 4.5 dS/m Ece, salinity measured on the saturation extract solution shall not exceed 8.0 dS/m, 8 or below carbon dioxide evolution rate (TMECC 05.08-B), greater than 80% seedling emergence maturity bioassay (TMECC 05.05-A), and a minimum of 90% of the material by weight shall pass a ½" screen. Material passing the ½" screen shall meet the following criteria:

<u>Sieve Designation</u>	<u>Percent Passing</u>
9.51 mm (3/8")	85-100%
2.38 mm (No. 8)	50-80%
500 micron (No. 35)	0-40%

- Composted Organic Amendment shall have ‘STA’ certification from U.S. Composting Council (USCC).
- Provide sample (two one-quart size) certificate of conformance and current analysis for approval.

Approved products include WM EarthCare “Homegrown Compost” (877.963.2784); BFI Organics “Super Humus” compost (408.687.1928); Z-Best Organic Compost (408.263.2384); “Premium Compost” by Recology Blossom Valley Organics (209.872.0734), or equal.  
(verify products)

10. Mulch: 100% recycled, clean, untreated lumber coarsely ground to 2” minus, and dyed with colorfast, natural dye with 1-year color retention; no

ground wood stumps or branches. "Mission Mahogany" by WM EarthCare (877.963.2784), or equal.

- Submit samples (two one-quart size) for approval.

B. Soils

1. "On-Site" topsoil: Topsoil from the site without admixture of subsoil, free from rocks, clay or foreign matter.
  - a. Soil Testing: Obtain soil analysis and recommendations from Waypoint Analytical, San Jose, (408)727-0330, for approval prior to planting. At a minimum, soil analysis shall include soil texture, infiltration rate determined by laboratory test or soil texture infiltration rate table, PH, total soluble salts, sodium, essential nutrients and percent organic matter. Recommendations shall reflect amending soil with compost to bring the soil organic matter to a minimum of 5% by dry weight and incorporating fertilizers to recommended levels for planting area.
  - b. Amendments, fertilizer rates and quantities listed under Item 3.2K-Soil Amendment are to be used for bid basis only. Adjust the quantities of soil amendments and fertilizer per soil report. Contractor shall be reimbursed for additions as approved by Project Manager.
2. "Import" Topsoil: "Import" Topsoil: Fertile, friable local natural sandy loam or loam, free from weeds, seed, stones, subsoil or other debris and complying with the following:

a. Physical Properties:

<u>Class</u>	<u>Particle size range</u>	<u>maximum, % wt.</u>	<u>minimum, % wt.</u>
Coarse sand	0.05-2.0 mm	15	0
Silt plus clay	<.05 mm	50	25
Silt	0.002-0.05 mm	30	10
Clay	0-0.002 mm	20	10
<u>Other Classes</u>			
Gravel	2-13 mm	15	0
Rock	>½ inch	10% by volume	0
	none>1 inch		
Organic matter		15	0

If the native subgrade texture is within specified limits, the import topsoil texture should be as similar as practical to that material to minimize interfacing concerns.

- b. Chemistry: pH shall be between 5.5 and 7.5 without high qualitative lime content and boron shall not exceed 1 part per million as measured on a saturation extract. Salinity E<sub>ce</sub> shall be less than 3.0 dS/m @ 25 degrees C. and sodium adsorption ratio (SAR) shall be less than 6.0.
- c. Fertility Considerations: Soil to contain sufficient available nitrogen, phosphorus, potassium, calcium and magnesium to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials prior to planting.

- d. Sample: Submit samples (two one-quart size) with a soil analysis and recommendations from Waypoint Analytical for approval.
3. Bioretention Soil: A mixture of fine sand and compost, conforming to **BASMAA-SBF**, shall provide a long-term, in-place infiltration rate of at least 5 inches per hour, shall support vigorous plant growth and consist of the following mixture, measured on a volume basis: 60-70% Sand, 30-40% Compost.
    - a. Submit Requirements per **BASMAA-SBF**:
      - Sample of mixed Bioretention Soil (one-gallon size).
      - Certification that the Bioretention Soil meets the guideline specification requirements.
      - Grain size analysis results of the fine sand component.
      - USCC STA quality analysis results for compost.
      - Organic content test results of mixed Bioretention Soil.
      - Grain size analysis results of compost components.
      - Description of equipment and methods used to produce Bioretention Soil.
    - b. Suppliers producing Bioretention Soil found to meet and/or exceed the Guideline Specifications are:
      - LH Voss Materials, 925.560.9920
      - Contra Costa Topsoil, Martinez, 925.228.4007
- C. Plants:
1. Furnish plant materials to complete work as indicated on Drawings and as specified.
  2. Plants shall be typical for variety and species; healthy, vigorous, free from disease and insects, with healthy normal root systems, filling their containers, but shall not be rootbound.
  3. Plants shall be subject to review and approval by the Landscape Architect / Project Manager at place of growth and upon delivery for conformity to Specifications. Such approval shall not impair the right of review and rejection during progress of the work.
    - a. Submit written request for review of plant material at place of growth to the Project Manager. Written request shall state the place of growth and quantity of plants to be inspected. The Landscape Architect / Project Manager reserves the right to refuse review at this time if, in his judgment, a sufficient quantity of plants is not available for review.
    - b. Inspection for approval or rejection is reserved for the project site upon delivery. Plants shall be inspected for size, variety, condition, root system and defects. Any rejected material shall be promptly removed from site. Notify Project Manager 48 hours prior to inspection.
  4. Sod: As noted on the Drawings. Sod shall be machine cut at a uniform thickness. It shall be harvested, delivered and planted within 30 hours. Individual slabs shall be no larger than 9 sq. ft. and shall be weed free.
- D. Supplies:



1. Tree Stakes: Lodgepole Pine tree stakes; untreated chamfered top and bottom.
2. Tree Ties: Cinch-Tie, UV resistant, virgin flexible black vinyl meeting ASTM-D-412 standards for tensile elongation strength. Ties shall have a double back locking configuration and secured with one galvanized screw to prevent slippage. Manufacturer: V.I.T. Products, 800.729.1314.
3. Tree Drains: Flexible corrugated perforated plastic drain pipe, 4" diameter. Tree drain to extend 6" deeper than tree rootball, 18" minimum length. Backfill with ¾" drain rock.
4. Root Barrier: #UB 24-2 polypropylene plastic barrier. Manufacturer: Deep Root Corp. available through Ewing 510-687-3220.
5. Water Barrier: WB24/30 24/40 24/60 24/80 24" depth polyethylene (HDPE), 0.030" (0.76 mm) thickness, by Deep Root Corp.
6. Pesticides: Product and application rates to conform to manufacturer's recommendations and as approved by City IPM Coordinator. Notify Project Manager 24-hours prior to application. City staff shall be present during application unless otherwise directed.
  - a. Pre-emergence Weed Control: Ronstar manufactured by Chipco
  - b. Broad Leaf Control: Trimec.
  - c. Grass Control: Poast (mix with oil concentrate emulsifier - No Foam Herbicide Activator) or Fusilade (mix with non-ionic surfactant).

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Prior to the work of this section, inspect existing grades and installed work of other trades and verify that planting may be completed in accordance with Contract Documents.
- B. Should sub-surface drainage or soil conditions (high water table, excessive compaction, etc.) be encountered which would be detrimental to growth or survival of plant material, notify Project Manager in writing, stating conditions and submitting a proposal covering cost of correction. If the Contractor fails to notify Project Manager of such conditions, he shall be responsible for plant material under the guarantee clause of this Section.

#### **3.2 PREPARATION**

- A. Layout of Work: Drawings are to be considered schematic unless specifically dimensioned. Check all Drawings and make work conform to all conditions shown thereon. Stake out exact plant locations on the job to suit actual conditions. Verify with Project Manager any variations prior to planting. Locations so determined are Contractor's responsibility and changes required because of such actions shall be by Contractor at no extra cost to City.

- B. Debris Removal: Remove all construction debris, base rock, refuse and paving material to full depth where occurs in planting areas.
- C. Plant Material Protection: Existing plant material to remain shall be protected from damage. Do not stockpile material or equipment within 25' of dripline. Trenching adjacent to roots shall be performed in accordance with the irrigation specs.
- D. Existing Plant Material to Be Removed: In order to accommodate proposed planting installation, remove existing plant material including vegetation, stumps, and roots 1" in diameter and larger to a depth of 2 feet below existing ground surface or to subgrade, whichever is deeper. Fill all stump and roots holes with import or on-site (see plan) topsoil in accordance with fill and compaction requirements.
- E. Plant Material Removal: All vegetation, stumps, and roots 1" in diameter and larger shall be removed 2 feet below existing ground surface or to subgrade, whichever is deeper. Fill all stump and roots holes with suitable material in accordance with fill and compaction requirements.
- F. Root Barrier: Provide as noted on Drawings. Install barrier per manufacturer's specifications and as detailed.
- G. Water Barrier: Provide water barrier at perimeter of all median planting areas. Provide as noted on Drawings. Install barrier per manufacturer's specifications and as detailed.
- H. Topsoil: "On-site Topsoil" shall be used where possible. If there is not sufficient soil available to meet finish grades, add "Import Topsoil" to complete grading.
- I. Bioretention Soil Installation: Conform to Civil Engineer's Drawings. Place soil in 8" to 12" lifts. Lifts are not to be compacted but are placed to reduce the possibility of excessive settlement. Allow time for natural compaction and settlement prior to planting. Bioretention Soil may be watered to encourage compaction.
- J. Topsoil Preparation: Do not work soil when moisture content is so great that excessive compaction will occur or when clods will not break readily. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and planting.
  - 1. Grades shall conform to those indicated on the Drawings and herein specified. Do not place topsoil in the drip line of any existing tree.
  - 2. Cultivate all planting areas to 10" depth for continuous area of friable soil. Larger areas may be cultivated by ripping using tractor with downpressure on ripper shanks at 8" to 10" on center, or equivalent.
  - 3. Import topsoil shall be incorporated into top two inches (2") of existing site soil.
  - 4. Compact topsoil to 80% maximum relative compaction.

- K. Soil Amendment (excluding Bioretention Soil): After grading, cultivation, and topsoil placement has been completed and soil water settled, high and low spots regraded and rough grades approved by Project Manager, add soil amendment as indicated below and rototill until thoroughly mixed to six inch (6") depth.

AMOUNT/1,000 SQUARE FEET

6 Cubic Yards Composted Organic Amendment  
20 Pounds 18-12-6 Commercial Fertilizer

- L. Planting Backfill at Tree and Shrub Planting Pits:

1. Shrubs (5 gallon and smaller): Utilize surface amended soil for planting backfill, full depth of plant pit.
  - a. At areas where soil amendment procedure is not required, amend soil at plant pits. Amend plant pit at the following rate: .33 cubic yards organic amendment per cubic yard of soil.
2. Shrubs (15-gallon size): See tree planting backfill as follows.
3. Trees:
  - a. 0-12" depth: Utilize surface amended soil.
  - b. 0-12" depth (areas where soil amendment procedure is not required): Amend soil at each plant pit. Amend upper 12" of plant pit at the following rate: .33 cubic yards organic amendment per cubic yard of soil.
  - c. Backfill below 12" depth:  
Utilize native soil without amendment or additives.  
Incorporate 1 pound 6-20-20 and 2 pounds iron sulfate per cubic yard of soil.

- M. Finish Grading:

1. Slope soil areas adjacent to buildings away from buildings. Surface drainage shall conform to Engineer's drawings.
2. Finish grades shall be uniform levels or slopes between points where elevations are given or established by paving, curbs or catch basins. Grades shall be smooth, uniform planes with no abrupt changes.
3. All grades shall provide for natural runoff of water without pockets. Accurately set flow line grades to a minimum of 2% gradient.
4. Finish grade for all planted areas shall be 1" below top of paving, curbs or walls unless indicated on Drawings.

### 3.3 INSTALLATION

- A. General:

1. Do not install plant material until all construction work has been completed and irrigation system installed and checked. Do not install planting during unfavorable weather.
2. Set all plants so that, when settled, the natural grade in the container is the same as the finished grade of planting area. All roots shall be covered and

no filling will be permitted around trunk. Water all plants at least 1/2 hour before planting and again after planting each plant.

B. Installation of Shrubs and/or Trees:

1. Locate plant material as indicated on the Drawings. Where material is indicated in a "loose" pattern, maintain an unequal, random spacing. Excavate holes for trees and shrubs to depths and widths as shown on details. Scarify bottom and sides of holes. Soils at bottom of plant pit shall be scarified to 8" depth to improve soil porosity. If rocky or shale soil is encountered, increase width and depth of plant hole by 6", and insure drainage.
2. Lift plant out of container carefully by the rootball. Place each plant in the center of plant hole. Spread out any exposed roots, do not fold under or bend up. Prune injured roots.
3. Place Plant Fertilizer Paks in backfill, 6"-8" under soil surface & 1" from rootball at all plants when planted. Apply paks at the following rate: one gallon - 1 Pak; 5 gallon - 3 Paks; 15 gallon - 9 Paks; boxed trees - 12 Paks.
4. Backfill with specified material and firmly tamp around the rootball to force out all air pockets. Water thoroughly.
5. If settlement occurs, lift plant or replant plants to finish flush with existing grade.
6. Form a circular earth watering basin centered on plant. Basin rim shall be 4" above finish grade at the trunk. Install 2" depth mulch at inside of basin. Basins shall be lifted around plants until winter, and then one side shall be broken to allow water passage.
7. Remove all nursery stakes and plant labels.

C. Mulch:

1. Mulch all planted areas (including Bioretention Facilities) with minimum 3" depth of mulch (**ReScape Practice**), except that within plant basins mulch shall be 2" depth.
2. Hold mulch material a minimum four (4") inches away from rootcrown of tree and a minimum two (2") inches away from rootcrown of shrubs, perennials and ornamental grasses one (1) gallon size and larger. Mulch may be installed to the rootcrown of plant material smaller than one (1) gallon in size.
3. Install mulch immediately after plant installation.

D. Ground Cover Installation:

1. Prior to planting ground cover, install mulch in planting areas indicated on the Drawings.
2. Plant ground cover in designated areas at spacing shown on Drawings, in neat staggered rows, insuring complete coverage and including around shrubs and trees. After planting, smooth the soil around plants.

3. Water plants immediately after planting with a light spray until soil is saturated. Do not spray in hot direct sun. Do not allow plants to dry out before planting.
- E. Installing of Tree Stakes and Ties:
1. Double stake all trees as detailed on Drawings. Set stakes at right angles to prevailing wind. Drive stakes 2' into firm ground, set plumb. Do not drive stake through rootball.
  2. Tree Ties: Install per manufacturer's specifications, securing at stakes with galvanized screws.
  3. Set up a sample stake and ties for approval of Project Manager prior to installing tree stakes and ties.
- F. Lawn Installation:
1. Do not install lawns until all construction and irrigation work has been completed. This includes cultivation and incorporation of soil amendment as specified.
  2. Rototill soil to 6" minimum depth. Remove all stones 3/4" or larger. Incorporate soil amendment as specified. Remove all stones 3/4" or larger.
  3. Bring lawn bed to grade by rolling, raking and dragging until surface is smooth and of a uniform fine texture.
  4. Sodding: Sod shall be as noted on the Drawings.
    - a. Sod shall be machine cut at a uniform thickness of 3/4" excluding top growth and thatch. It shall be harvested, delivered and planted within 30 hours. Individual slabs shall be no larger than 9 sq. ft. and shall be weed free.
    - b. Distribute SCU 21-7-14 commercial fertilizer over lawn areas at rate of 10 lbs. per 1000 sq.ft.; water thoroughly.
    - c. While areas are still damp, lay slabs tightly together without overlapping. Stagger rows of slabs.
    - d. Lightly roll sod with 200 lb. roller to obtain uniform grade. Correct any irregularities or settlement by lifting sod, regrading area and relay.
    - e. Water thoroughly to a depth of 8", and keep moist at all times until it has rooted into the soil.
- 3.4 CLEAN-UP Prior to pre-maintenance inspection, remove all debris, dirt, rocks, trash, etc. from paving, sidewalks, and other non-planter areas. Be prepared to wash all paved areas clean with either a water truck or fire hose or other large suitable equipment capable of accomplishing the work quickly.

### 3.5 PRE-MAINTENANCE INSPECTION

- A. Upon receipt of Contractor's written notification that all construction and installation work has been completed, a date for pre-maintenance inspection will be scheduled.
- B. All planting areas shall be free of weeds and neatly cultivated at time of inspection.
- C. Contractor, Project Manager, Landscape Architect and such others as the Project Manager directs shall be present at the inspection. If, after the review, the Landscape Architect / Project Manager is of the opinion that all work has been performed per the Contract Documents and that all plant materials are in satisfactory growing condition, the Contractor will be given a written notice of acceptance of the planting portions of the Work and commencement of the Maintenance Period.
- D. Work requiring corrective action or replacement shall be performed within 10 days after the Inspection. This work will not be accepted for the start of the maintenance period until all items noted as deficient during the inspection are corrected or completed. Corrective work and materials replacement shall be in accordance with the Plans and Specifications and shall be made by the Contractor at no cost to the City. Upon approval of work by Project Manager, maintenance period shall begin.

### 3.6 MAINTENANCE

- A. Continuously maintain all plantings and irrigation system in areas indicated in the Contract during the progress of work and for a period of **90 days** after substantial completion.
- B. It is Contractor's responsibility to turn over the landscaping in a first-class condition at the end of the maintenance period. All plants will be healthy and growing; the beds will be free from weeds and generally clean.
- C. Maintenance Schedule: Contractor shall submit schedule of maintenance tasks to be performed for City review and approval. At a minimum, maintenance staff shall be on-site two times per month. It is not the intention of these Specifications to allow a "quick cleanup" at the end of the maintenance period, but rather that the work be continuous and ongoing.
- D. Plant Material: Reset plants to proper grades or upright position. Replace, without cost to City, all dead, dying or missing plants with plants of a size, condition and variety acceptable to the Landscape Architect / Project Manager. Replacement plants shall be installed as soon as unacceptable condition is noted.

- E. Tree Staking: Check and adjust frequently to ensure that no tree damage is being caused. Remove stakes as soon as tree roots are established and trees are stable (typically after one full growing season).
- F. Weeding: Manually or chemically at Contractor's discretion and as approved by City.
  - 1. Pre-emergence control:
    - a. Four (4) days following the planting of the trees and shrubs, treat all exposed soil with Ronstar G or equal.
    - b. Exposed soil shall be defined as "that soil not planted with ground cover at least 6 inches away from a shrub rootball and 12 inches away from a tree rootball."
    - c. Pre-emergence materials shall always be applied prior to mulching of any kind.
  - 2. Post-emergence control:
    - a. Grass control: Apply in accordance with manufacturer's recommendations.
    - b. General broad spectrum control: Apply in accordance with manufacturer's recommendations. NEVER SPRAY ON WINDY DAYS! APPLICATOR WILL BE RESPONSIBLE FOR REPLACEMENT OF ALL DAMAGED PLANT MATERIALS.
- G. Fertilizing - Ground Cover/Shrub Areas: Apply ammonium sulfate (21-0-0) at the rate of 5 lbs per 1,000 sq. ft. of area in all ground cover areas at least once every 30 calendar days during the maintenance period, until final acceptance of Project Manager. Water thoroughly.
- H. Fertilizing - Lawn Areas: Apply SCU 21-7-14 fertilizer at the rate of 10 lbs per 1,000 sq. ft. 50 days after planting.
- I. Cultivation: All areas that are not covered with ground cover or mulch shall be kept cultivated. Perform this work in such a way as not to disturb feeder roots. Cultivating at least once a month in prominent areas close to entrance ways to keep the "fresh look" apparent. Do not cultivate until all trash and leaves are removed from planting beds.
- J. Insect and Disease Control: Contractor shall be prepared to effect a spraying program to control all infestations of insects, fungus diseases, etc. that could cause damage to the landscape. Inspection for spraying program shall be on the same schedule as fertilization.
- K. Rodent & Pest Control (If problems occur): Contractor shall be prepared to implement a pest management program to control rodents, rabbits, and ground squirrels that could cause damage to the landscape.
  - 1. Coordination with City staff for recommendations and approval.
  - 2. Utilize tamperproof trapping devices to control infestations where feasible. Submit product literature for City's review and approval.

3. Utilize EPA-approved rodenticides applied at manufactured recommended rates. Submit literature for City's review and approval.
- L. Pruning: Pruning shall be kept to the minimum necessary for safety, improving long-term tree structure, and providing the necessary clearance for construction equipment. Remove crossover branching, developing co-dominant leaders and dead wood. Do not over prune or shear plants.
1. All pruning shall be performed by a tree contractor possessing a State of California Contractor's License for Tree Service and supervised by a certified arborist. All operations shall be in accordance with the ISA pruning guidelines and adhere to ANSI Z133.1 and ANSI A300. Heading cuts shall not be used.
  2. Prune all trees once a year in the dormant season for thinning and shaping. In the spring at the start of growing season, remove unwanted sucker growth by "thumb" pruning.
- Pruning: Follow the standard pruning techniques recommended by the University of California at Davis Pruning Manual.
- M. Mowing: Lawns shall be mowed once a week during growing season and as required during dormant season.
- N. Edging
1. The interface between turf areas and hard surfaced areas shall be edged using a power edger or other appropriate tool. Upon completion of the edging operation, the turf edge shall be set back approximately 1/2 inch from the edge of the hard surfacing.
  2. The interface between turf areas and hydroseed areas shall be maintained clear by the use of a power edger, 'shovel cut', or other appropriate tool. Upon completion of the edging operation, the turf edge shall be clearly defined from the hydroseed and free of weeds.
  3. All clippings or displaced soil shall be swept and removed from the site when edging is complete.
  4. Edging shall be performed as part of the routine mowing schedule.
  5. The Contractor shall use care to protect pedestrians and vehicles within or adjacent to the hard surfaced area during the edging operation.
- O. Watering: Automatic: Contractor is responsible for setting irrigation controller to apply enough water each week to keep the plantings moist--not too wet and not too dry. The amount of watering will vary with the season and location. Make sure through weekly examination of irrigation system that all heads are operating properly. See Section 32 80 00 for irrigation system maintenance.

### 3.7 FINAL ACCEPTANCE REVIEW

- A. Contractor shall request review in writing. Arrangements shall be made 48 hours in advance for final review at end of maintenance period.



- B. Contractor, Project Manager, Landscape Architect and such others as the Project Manager directs shall be present at the review.
- C. If, after the review, the Landscape Architect / Project Manager is of the opinion that all work has been performed per the Contract Documents and that all plant materials are in satisfactory growing condition, and the irrigation system is in operating order, the Contractor will be given a written notice of Final Acceptance Review, the end of the Maintenance Period, and commencement of the Warranty Period.
- D. Work requiring corrective action or replacement shall be performed within 10 days after the Final Acceptance Review. Corrective work and materials replacement shall be in accordance with the Plans and Specifications and shall be made by the Contractor at no cost to the City.
- E. No partial approvals will be given.

**END OF SECTION 32 90 00**

**SECTION 32 92 13 - HYDROSEEDING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including Division 01 Specification Sections, apply to this Section.

**1.2 SCOPE**

- A. Furnish and place hydroseeding and related work, including fertilizer, organic materials, seed fiber, stabilizing emulsion and all other materials shown on drawings and as specified herein.
- B. Related Work Described Elsewhere:
  - 1. Section 31 05 13 – Clearing & Grubbing, Excavation and Earthwork
  - 2. Section 32 80 00 – Irrigation System
  - 3. Section 32 90 00 – Landscape Work

**1.3 QUALITY CONTROL**

- A. Reviews: The Contractor shall specifically request a review by Engineer of finish grade to receive hydroseeding, and site inspection of seed, fiber and fertilizer, prior to starting work Certificates shall be submitted to Engineer prior to review; see following.
- B. Nomenclature: Plant botanical names conform to “Standardized Plant Names”, second edition.
- C. Schedule: Hydroseeding schedule shall be submitted to the Owner’s Representative within fourteen (14) days of the signed contract.
- D. Hydroseeding limits: Shall include all areas disturbed by demolition, grading, and construction not limited by the limit of work which do not receive planting, mulch, or pavement. Final limits to be confirmed with the Engineer prior to seeding.

**1.4 SUBMITTALS**

- A. All submittal data shall be forwarded in a single package to the Owner’s Representative within 15 days of award of contract.
- B. Furnish electronic copy of manufacturer’s literature for the following items:
  - 1. Seed Mix

2. Fertilizer
  3. Stabilizing Agent
  4. Cellulose Fiber
  5. Flexible Growth Medium
- C. Samples
1. Submit 1 ounce sample of certified seed mix.
- D. Certificates of Compliance, receipts and/or delivery tickets for the following:
1. Grass Seed Mix
    - a. Seed: Contractor shall furnish the Engineer with seed supplier's certificate guaranteeing statement of composition, mixture and percentage or purity or germination of each variety, weight and origin for all seed within five days after award of contract.
  2. Cellulose Fiber
    - a. Cellulose Fiber for hydroseeding shall be certified for laboratory and field testing of the product and that the product meets and has been tested for all requirements specified herein. Weight of fiber material specified and shipped shall refer only to air dry weight, containing no more than 10 percent (by weight) water.
- E. Hydroseed Work Sheets: Prior to the slurry preparation the operator shall supply the Owner a worksheet and checklist showing the amount of materials to be added to each dump of the seeder and the number of dumps needed to complete this job with the seeder size to be used.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Seed shall be of commercial quality and certified by the California Crop Improvement Association. Grass seed shall be fresh, clean, new crop seed having a minimum purity of 98.5% and a minimum germination rate of 83%.
1. Seed shall be pre-mixed and packaged by a commercial seed supplier, tagged and labeled in accordance with California Agricultural Code.
  2. Inert matter shall not exceed 5.0% nor weed content 0.5%, with no noxious weeds.
  3. Seed shall be certified composed of the mix available from S&S Seeds or approved equal:
    - a. Seed Mix A: Native Erosion Control Mix
    - b. Seed Mix B: Ornamental Low Growing Native Mix
- B. Fertilizer:

1. Deliver fertilizer to site in original unopened containers bearing commercial manufacturer's guaranteed chemical analysis, name, trademark and conformance to California Food and Agricultural Code.
  2. Fertilizer shall be a granular type mixed by a commercial fertilizer house with a guaranteed chemical analysis of 16% Nitrogen, 20% Phosphoric and 10% Potash (16N-20P-0K) plus Sulfur (approximately 15%) or as recommended by seed company. Apply rates per seed manufacturer's recommendations.
- C. Stabilizing Agent (soil binder): Stabilizer shall be a biodegradable tacifier, non-toxic to plant or animal life, such as sentinel or M-binder.
- D. Cellulose Fiber: Fiber shall be colored with a non-toxic, water soluble green dye to provide the proper visual gauge for metering of material over ground surfaces and shall be produced from natural or recycled (pulp) fiber, such as wood chips, similar wood materials, or newsprint, chip board, corrugated cardboard, or a combination of these processed materials.
1. Fiber shall be of such a character that upon addition and agitation in slurry tanks with fertilizer, seed, water and other additives, fibers become uniformly suspended to form homogeneous slurry.
  2. When hydraulically sprayed on the ground, fiber shall form a blotter-like groundcover impregnated uniformly with seed which allows absorption of moisture and rainfall percolation into underlying soil.
  3. Materials that inhibit germination or growth shall not be present in the mixture.
- E. Flexible Growth Medium: Flexterra FGM, Manufacturer – Reed & Graham, or approved equal. Install per manufacture's slope gradient/conditions chart, specifications and details.
- F. Water: Shall be potable and furnished in accordance with Section 01 50 00 – Temporary Facilities and Controls. Contractor to transport as required.

## 2.2 HYDRAULIC EQUIPMENT

- A. Use a commercial-type hydroseeder with a built-in agitation system and an operating capacity sufficient to agitate, suspend and homogeneously mix slurry of fiber mulch, seed, fertilizer, soil binder, flexible growth medium and water. Use distribution lines large enough to provide even distribution of the slurry over the ground surface to be seeded. Pump must be capable of exerting up to 150 psi at the nozzle and the slurry tank have a minimum capacity of 1,000 gallons when operating and be mounted on a traveling unit to place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded in order to provide uniform distribution without waste.

- B. Equipment for irrigation shall be available if deemed necessary for establishment of hydroseed.

**PART 3 - EXECUTION**

**3.1 SURFACE CONDITIONS**

- A. Prior to all work in this section, verify grades and carefully inspect the installed work of all other trades. The Contractor shall verify that hydroseed areas are adequately graded for seed application and free of deleterious material and weeds and complete to the point where the installation may properly commence. In the event of discrepancy, immediately notify the Engineer. Do not proceed with this installation in areas of discrepancies until all such discrepancies have been fully resolved.
- B. The Contractor shall obtain approval of hydroseed area preparation from the Engineer prior to application.
- C. After approval of scarified finished grades, uniformly apply 2 inches of water within a 48-hour period to promote weed growth. Allow weeds to germinate a minimum of 14 days after application of water and then kill with a systemic herbicide that will not affect the subsequent germination of hydroseed mix. Provide temporary irrigation equipment required to apply the water.
- D. Install trees, shrubs and groundcover to be planted in hydroseeded area, prior to hydroseeding.

**3.2 APPLICATION OF HYDROSEED**

- A. The hydroseed erosion control materials shall be mixed uniformly and applied in the following proportions to all areas indicated on the Drawings:

Seed mix per plan			
Cellulose Fiber	1800 lbs./acre		
Fertilizer	1,000 lbs./acre		
R/Binder	60 lbs./acre		
Flexible Growth Medium	Per Manufacture's	Slope	Gradient/ Condition
Chart, 3,500lbs/ acre			
Stabilizing Agent	Water	As needed	

- B. Mixing: Care shall be taken that the slurry preparation takes place on the site of the work. The slurry preparation should begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, good recirculation shall be established and seed shall be added. Fertilizer shall then be added, followed by wood pulp mulch. The wood pulp mulch shall only be added to the mixture after the seed and when the tank is at

least one-third filled with water. The engine throttle shall be opened to full speed when the tank is half filled with water. All the wood pulp mulch shall be added by the time the tank is two-thirds to three-fourths full. Spraying shall commence immediately when the tank is full. The operator shall spray the area with a uniform, visible coat by using the green color of the wood pulp as a guide.

C. Application:

1. Timing:
  - a. Irrigated hydroseed shall be applied between February 15<sup>th</sup> and October 15<sup>th</sup>.
  - b. Non-irrigated hydroseed shall be applied between October 15<sup>th</sup> and December 30<sup>th</sup>.
  - c. Hydroseed materials shall not be applied during windy or rainy weather or when soil temperature is below 40 degrees F.
2. Operators of hydromulching equipment shall be thoroughly experienced in this type of application. Apply specified slurry mix in a sweeping motion to form a uniform mat at specified rate.
3. Keep hydromulch within areas designated and keep from contact with other plant materials.
4. Slurry mixture which has not been applied within 4 hours of mixing shall not be used and shall be removed from the site.
5. After application, the Contractor shall not operate any equipment or allow pedestrians in the covered area.
6. Daily worksheets shall be filled out by the nozzleman, with the following information: Seed type and amount, fertilizer analysis and amount, mulch type and amount, seeding additive type and amount, number of loads and amount of water, area covered and equipment used, capacity and license number.
7. Protect all adjacent hardscape and planting from overspray.

### 3.3 MAINTENANCE

- A. Any area which has not produced a healthy, established stand of grasses after a period of 45 days from the date of seeding shall be reseeded and refertilized at the original rates of application. The Contractor shall be responsible for all seeded areas until an acceptable stand of hydroseed material has been achieved.

### 3.4 CLEAN-UP

- A. Immediately after application thoroughly wash off any plant material, planting areas, paved areas, or architectural features not intended to receive slurry mix. Keep all areas of work clean, neat and orderly at all times. Keep all paved and planting areas clean during planting and maintenance operations. Clean up and

remove all deleterious materials and debris from the entire work area prior to Final Acceptance or the satisfaction of the Engineer.

### 3.5 INSPECTIONS

- A. Make written request for inspection prior to seeding and after areas have been seeded and planting operation completed.
- B. Submit requests for inspections to the Engineer at least 72 hours prior to anticipated inspection date.

**END OF SECTION 32 92 13**

## SECTION 33 01 30 – TESTING FOR SANITARY SEWER, STORM DRAINAGE - PIPING AND MANHOLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The CONTRACTOR shall provide all materials, equipment and labor to perform and complete pipeline flushing and testing, and Closed Circuit Television Inspection (CCTV) complete, for sanitary sewer and storm drain system piping, as specified herein.
- B. The CONTRACTOR shall be responsible for conveying test water from the source to the point of usage and also for proper disposal, as required, of water used in the testing operations. All costs associated with supply and disposal of test water shall be at the Contractor's expense.
- C. Section Includes:
  - 1. Testing of Gravity Sewer Piping and Storm Drainage Piping:
    - a. Low pressure air testing.
  - 2. Deflection testing of plastic sewer piping and storm drainage piping.
  - 3. Testing of Manholes:
    - a. Vacuum testing.
  - 4. Closed Circuit Television Inspection (CCTV)
- D. Related Requirements:
  - 1. [Section 01 33 00 – Submittal Procedures](#)
  - 2. [Section 01 70 00 - Execution](#)
  - 3. [Section 01 77 00 - Closeout Requirements](#)
  - 4. [Section 33 31 13 - Sanitary Sewer Piping](#)
  - 5. [Section 33 41 13 - Storm Drainage Piping](#)

#### 1.2 REFERENCE STANDARDS

- A. ASTM International:
  - 1. ASTM C 828 - Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines.
  - 2. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.



3. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings. (For Determining Dimension of PVC pipes).

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Contractor shall submit following items a minimum of 3 working days prior to start of testing:
  1. Testing procedures.
  2. List of test equipment.
  3. Testing sequence schedule.
  4. Provisions for disposal of flushing and test water.
  5. Certification of test gage calibration certified by laboratory at the Contractor's expense prior to the leakage test.
  6. Deflection mandrel drawings and calculations.
- C. Test and Evaluation Reports: Contractor shall submit results of manhole and piping tests.
- D. The Contractor shall provide all inspection data and files on a portable external hard drive or CD or DVD and shall become the property of the City once submitted. All mpg video files and individual report PDF's contained on the hard drive shall be named as follows: upstream manhole ID-downstream manhole ID-Date Time Stamp; (i.e.MH22-MH23 MM-DD-YYYY-HH:MM:SS.mpg)
- E. The Contractor shall utilize Pipeline Assessment and Certification Program (PACP) certified inspectors for the CCTV work at all times and PACP latest Version. coding methods shall be employed for all CCTV inspections conducted. Evidence of PACP certification of the Operator shall be provided to the City prior to the commencement of any work

## PART 2 - PRODUCTS

### 2.1 MATERIAL REQUIREMENTS

- A. All testing equipment and materials including but not limited to materials and equipment specified below shall be provided by the Contractor. No materials shall be used which would be injurious to pipeline system or structure or future function.
- B. All test gages shall be laboratory-calibrated test gages and shall be recalibrated by a certified laboratory at the Contractor's expense prior to the leakage test. A timeline for the last testing of the calibration gage shall be submitted prior to use.

## 2.2 VACUUM TESTING

- A. Contractor shall furnish all equipment:
1. Vacuum pump.
  2. Vacuum line.
  3. Vacuum Tester Base:
    - a. Compression band seal.
    - b. Outlet port.
  4. Shutoff valve.
  5. Stopwatch.
  6. Plugs.
  7. Vacuum Gage: Calibrated to 0.1 in. Hg.

## 2.3 AIR TESTING

- A. Contractor shall furnish all equipment:
1. Air compressor.
  2. Air supply line.
  3. Shutoff valves.
  4. Pressure regulator.
  5. Pressure relief valve.
  6. Stopwatch.
  7. Plugs.
  8. Pressure Gage: Calibrated to 0.1 psi.

## 2.4 DEFLECTION TESTING

- A. Contractor shall furnish all equipment:
1. "Go, no go" mandrels of various sizes with diameter not less than 95 percent of the average inside diameter of pipe, as determined by ASTM standard to which pipe is manufactured.
  2. Pull/retrieval ropes.

## 2.5 CCTV INSPECTION

- A. For Capital Improvement Projects (CIP) and new development projects, the CCTV inspections shall be completed by the City. The Project Developer shall pay the City for the CCTV inspection services and fees. The developer will only be responsible to conduct the CCTV inspections if the City is unable to perform the work.

- B. Television inspection equipment shall have an accurate footage counter that will display on the monitor and record the camera distance from the centerline of the starting manhole.
- C. The camera shall be of the remotely operated pan and tilt type and shall have full HD resolution (1920x1080 pixels) camera capable of zooming. The rotating camera and light head configuration shall have the capability of panning 360° with pan and tilt capability of providing a full view of the pipe to ensure complete inspection of the mainline pipe and service laterals. A disk to determine the depth of water shall be installed to the CCTV camera.
- D. The camera, television monitor, and other components shall be color. To ensure peak picture quality throughout all conditions encountered, the color camera shall be equipped with the necessary circuitry to allow for the remote adjustment of the optical focus iris from the power control unit at the viewing station. A variable intensity control of the camera lights shall also be located at the viewing station
- E. Lighting and camera quality shall be suitable to allow a clear, in focus picture for the entire inside periphery of the pipe.
- F. Camera quality shall be suitable to provide a full 360° view of the pipe during the inspection pipelines extending at least ten (10) feet in front of the camera.
- G. The travel speed of the camera shall be variable but uniform and shall not exceed 30 feet per minute. Any means of propelling the camera through the sewer line which would produce non-uniform or jerky movement of the camera, will not be acceptable.
- H. The television system shall be capable of performing line segment inspection in increments of 400 feet with one setup.
- I. Service laterals shall be inspected utilizing a CCTV inspection push camera system, capable of inspecting up to one hundred (100) feet of pipe.
- J. Water shall be flowing in pipe continuously during CCTV recording.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that manholes and piping are ready for testing.
- B. Verify that trenches are backfilled.

### 3.2 PREPARATION

- A. [Section 01 70 00 - Execution](#): Requirements for preparation.
- B. Lamping:
  - 1. Lamp gravity piping after flushing and cleaning.
  - 2. Perform lamping operation by shining light at one end of each pipe section between manholes.
  - 3. Observe light at other end.
  - 4. Pipe not installed with uniform line and grade will be rejected.
  - 5. Remove and reinstall rejected pipe sections.
  - 6. Re-clean and lamp until pipe section is installed to uniform line and grade.
- C. Plugs:
  - 1. Plug outlets, wye branches, and laterals.
  - 2. Brace plugs to resist test pressures.

### 3.3 FIELD QUALITY CONTROL

- A. [Section 01 45 00 – Quality Control](#): Requirements for testing, adjusting, and balancing.
- B. All sanitary sewer and storm drain lines shall be cleaned and flushed prior to testing using a high-pressure sewer jet with vacuum equipment or other methods acceptable to the Project Manager.
- C. Contractor will be solely responsible for conveying test water from the source point to the point of usage as part of Contractor's expense and will be solely responsible for the proper disposal of all water used in the flushing and testing process. Disposal of all water shall be in accordance with appropriate regulatory agency requirements. All flushing and testing operations shall be performed in the presence of the Project Manager. During flushing of the sanitary sewer and storm drain lines, the manholes at the low end of the new line shall be plugged and incoming water pumped to a drain point approved by the Project Manager. Before the plug can be removed, all sand, silt, gravel and other foreign material shall be completely removed from the manhole.

### 3.4 LOW-PRESSURE AIR TESTING FOR STORM DRAINAGE AND SANITARY SEWER PIPING

- A. The Contractor shall furnish all materials, equipment and labor for making an air test. Air test equipment shall be approved by the Project Manager. The Contractor may conduct an initial air test of the sewer main line after densification of the backfill but prior to installation of the laterals. Such tests will be considered

to be for the Contractor’s convenience and need not to be performed in the presence of the Project Manager.

1. Test each reach of gravity sewer piping between manholes by plugging and bracing all openings in the main sewer line and the end of all laterals.
2. Prior to any air pressure testing, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated and the test procedure started over again.
3. The final leakage test of the sewer main line and laterals shall be conducted in the presence of the Project Manager.
4. Introduce air pressure within the line slowly to approximately 4 psig using a compressed air supply.
5. Determine ground water elevation above spring line of piping.
6. For every foot of ground water above spring line of piping, increase starting air test pressure by 0.43 psi.
7. Do not increase pressure above 10 psig.
8. Allow pressure to stabilize for at least five minutes before the actual test begins.
9. Adjust pressure to 3.5 psig or to increased test pressure as determined above when ground water is present.
10. Minimum Testing Duration in Minutes:

Pipe Size (inches)	Distance between openings					
	50 ft	100 ft	150 ft	200 ft	250 ft	300 ft
3	0.10	0.20	0.30	0.40	0.50	0.60
4	0.15	0.30	0.45	0.60	0.75	0.90
6	0.35	0.70	1.05	1.40	1.75	2.10
8	0.60	1.20	1.80	2.40	3.00	3.60
10	0.75	1.50	2.25	3.00	3.75	4.50
12	0.90	1.80	2.70	3.60	4.50	5.40
15	1.05	2.10	3.15	4.20	5.25	6.30
18	1.20	2.40	3.60	4.80	6.00	7.20
21	1.50	3.00	4.50	6.00	7.50	9.00
24	1.80	3.60	5.40	7.20	9.00	10.80
27	2.10	4.20	6.30	8.40	10.50	12.60
30	2.40	4.80	7.20	9.60	12.00	14.40
33	2.70	5.40	8.10	10.80	13.50	16.20
36	3.00	6.00	9.00	12.00	15.00	18.00

11. Record drop in pressure during testing period.
12. If air pressure drops more than 1.0 psi during testing period, piping has failed.
13. If 1.0 psi air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.

14. If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.
15. After completion of the test, the air pressure shall be released slowly and the test plugs shall not be removed until the air pressure is no longer measurable.
16. At the Contractor's option, joints may be air tested individually, joint by joint, with the use of specialized equipment. The Contractor shall submit its joint testing procedure for the Project Manager's review prior to testing. Prior to each test, the pipe at the joint shall be wetted with water.

### 3.5 DEFLECTION TESTING OF PLASTIC STORM DRAINAGE AND SANITARY SEWER PIPING

#### A. See below for Deflection Testing requirements.

1. Contractor shall perform vertical ring deflection testing on PVC non-pressure piping after backfilling and initial paving has been in place and prior to last lift of paving.
2. Allowable maximum deflection for installed plastic sewer pipes shall not exceed the limits on the Central San Standard Specifications for Design and Construction.
3. Perform deflection testing using properly sized "go, no go" mandrel.
4. Furnish mandrel with diameter not less than 95 percent of the average inside diameter of pipe, as determined by ASTM standard to which pipe is manufactured; measure pipe diameter in compliance with ASTM D2122.
5. Perform testing without mechanical pulling devices.
6. All PVC non-pressure piping shall be tested by passing the mandrel from the nearest downstream structure to the nearest upstream structure.
7. Contractor shall locate, excavate, replace, and retest piping that exceeds allowable deflection.

### 3.6 MANHOLE TESTING

#### A. All manholes shall be vacuum tested for leakage after installation in the presence of the Project Manager. Prior to vacuum testing all manholes shall be visually inspected for leaks. All leaks, cracks and lift holes shall be repaired by the Contractor, prior to vacuum testing, to the satisfaction of the Project Manager. All repairs shall be made with non-shrink grout. Any alternative repair methods shall be approved by the Project Manager.

1. If air testing, test prior to backfilling in order to easily locate the leaks.
2. Repair both outside and inside of joint to ensure permanent seal.
3. Test manholes with manhole frame set in place.
4. Vacuum Testing:

- a. Comply with ASTM C1244.

- b. Plug pipe openings; securely brace plugs and pipe to sufficiently hold against vacuum pressure during testing, and removed following successful completion of the testing.
- c. Inflate compression band to create seal between vacuum base and structure.
- d. Connect vacuum pump to outlet port with valve open, then draw vacuum to ten (10) inches of Mercury (Hg). Stabilize the vacuum at ten (10) inches of Mercury (Hg).
- e. Close valve and shut off the vacuum pump.
- f. Manhole Test Duration in Seconds:
  - 1) Diameter 4 Feet: 60.
  - 2) Diameter 5 Feet: 75.
  - 3) Diameter 6 Feet: 90.
- g. Record vacuum drop during test period.
- h. If vacuum drop is greater than one (1) inches of Mercury (Hg) during testing period, repair and retest manhole.
- i. If vacuum drop of one (1) inches of Mercury (Hg) does not occur during test period; manhole is acceptable; discontinue testing.
- j. If vacuum test fails to meet one (1) inches of Mercury (Hg) drop in specified time after repair, repair and retest manhole.
- k. Manholes repairs and retesting shall proceed until a passing test is completed.

### 3.7 CCTV INSPECTION

- A. See below for CCTV requirements before final lift of paving:
  1. All sanitary sewer systems shall be CCTV inspected. In addition, all storm drain systems are subject to CCTV inspection. In all paved areas the CCTV inspection must be coordinated by the Contractor to allow sufficient time for the CCTV inspection to be performed after backfill, initial paving and prior to the final lift of asphalt paving being placed. The City's approved CCTV testing company will perform the CCTV inspections. The Contractor shall repair all problems revealed by the CCTV inspection. The Contractor shall coordinate with the Project Manager to arrange for a compatible time to conduct the inspection.
  2. The Contractor shall contact the Project Manager for a list of approved CCTV testing companies. The Contractor shall submit the sanitary sewer video (CD/DVD disk) to the City for review. No unrecorded gaps shall be left in the recording of a segment between the inspections. All recording of a single segment shall not extend over more than one CD/DVD disk.
  3. CD/DVD shall visually display, at a minimum, CCTV Contractor's name, project name, date of inspection, pipe segment number, manhole numbers as shown on the Drawings or lateral lot numbers. The distance between manholes shall be verified by measuring tape. If the counter distance and the

taping distance differ by more than 2 feet per 100 feet, the run shall be re-televised by the CCTV Contractor at the Contractor's expense.

4. Any of, but not limited to the following observations from CCTV inspections will require correction:
  - a. Low spot 0.0625 x diameter of pipe or greater (e.g., 0.5" for an 8" pipe).
  - b. Joint separations (3/4" or greater opening between pipe sections).
  - c. Cocked joints present in straight runs or on the inside of pipe curves.
  - d. Chips in pipe ends.
  - e. Cracked or damaged pipe.
  - f. Offset joints.
  - g. Infiltration.
  - h. Debris or other foreign objects.
  - i. Other obvious deficiencies.
  
5. CD/DVD disk, USB flash drive, or portable external hard drive shall become the property of the City.

**END OF SECTION 33 01 30**



## SECTION 33 05 13 - MANHOLES AND STRUCTURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Cast-in-place concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
3. Bedding and cover materials.

##### B. Related Requirements:

1. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete Forming and Accessories, Erection and bracing of forms.
2. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete Reinforcing: Execution requirements for reinforcing steel as required by this Section.
3. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete type for manhole and structure foundation slab construction.
4. [Section 31 05 13 – Clearing & Grubbing, Excavation, and Earthwork](#): Backfill.
5. [Section 31 23 16 – Utility Trenching](#): Excavating for manholes, structures, and foundation slabs.
6. [Section 33 01 30 – Testing for Sanitary Sewer, Storm Drainage – Piping and Manholes](#): Testing requirements for manholes.
7. [Section 33 05 17 – Precast Concrete Valve Vaults and Meter Boxes](#): Execution requirements for utility structures affected by this Section.
8. [Section 33 31 13 – Sanitary Sewer Piping](#): Piping connections to manholes.
9. [Section 33 41 13 – Storm Drainage Piping](#): Piping connections to manholes and structures.

#### 1.2 REFERENCE STANDARDS

##### A. American Association of State Highway Transportation Officials:

1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
2. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

##### B. American Concrete Institute:

1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
4. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
6. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
7. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data for manhole covers, component construction, features, configuration, and dimensions.
- C. Shop Drawings:
  1. Indicate structure locations and elevations.
  2. Indicate sizes and elevations of piping, conduit, and penetrations.
- D. Manufacturer's Certificate: Certify that products meet or exceed the Specifications.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three (3) years' documented experience.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing, and moving precast manholes and drainage structures.
- D. Storage:
  - 1. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
  - 2. Repair property damaged from materials storage.

## PART 2 - PRODUCTS

### 2.1 MANHOLES AND STRUCTURES

- A. Manufacturers:
  - 1. Oldcastle Precast, Inc.
  - 2. Jensen Precast
  - 3. Cook Concrete Products, Inc.
  - 4. US Concrete Precast Group
  - 5. Forterra
  - 6. Or approved equal
- B. Manhole and Structure Sections:
  - 1. Description: Reinforced precast concrete conforming to ASTM C478 with gaskets conforming to ASTM C923.
  - 2. Joints for Precast Manholes and Structures:
    - a. Conforming to ASTM C913.
    - b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.
- C. Manhole and Structure Sections: Reinforced cast-in-place concrete as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).
- D. Mortar and Grout:
  - 1. Type S with minimum 28-day compressive strength of 2,100 psi.
- E. Reinforcement: Formed steel: Welded wire and reinforcing rebar per ASTM A615 Grade 60.

- F. Shaft Construction and Eccentric Cone Top Section:
  - 1. Pipe Sections: Reinforced precast concrete, unless specified otherwise.
  - 2. Joints:
    - a. Watertight Joints
    - b. Dry.
  - 3. Sleeved to receive pipe.
- G. Shape: Cylindrical for Manholes and Square or Rectangular for inlet structures
- H. Clear Inside Dimensions: Diameter of Minimum 48 inches for manholes unless specified otherwise on the Drawings.
- I. Design Depth: As indicated on Drawings.
- J. Clear Cover Opening: Diameter of Minimum 26 inches unless specified otherwise on the Drawings.
- K. Pipe Entry: Furnish openings as indicated on Drawings.
- L. Structure Joint Gaskets:
  - 1. ASTM C361.
  - 2. Material: Rubber.
- M. Steps: No steps are to be installed in any structures.
- N. All storm drain inlet structures require a fish decal with the wording, "No Dumping, Drains to Delta", or as approved by the Project Manager.
- O. The exterior surfaces of all Precast Concrete Structure sections shall be waterproofed.
  - 1. Tremco, TREMproof 250GC
  - 2. Or approved equal.

## 2.2 FRAMES, GRATES AND COVERS

- A. Manufacturers:
  - 1. D&L Foundry and Supply
  - 2. Neenah Enterprises, inc.
  - 3. EJ
  - 4. Or approved equal.
- B. Description:

1. Construction: ASTM A48, Class 35B, AASHTO M306, cast iron.
2. Lid:
  - a. Machined flat bearing surface.
  - b. Lockable on all unpaved areas and Boltable for all grates.
  - c. One Pick/Lift hole
3. Grate: Grates shall be boltable and covers in unpaved areas shall be lockable.
4. Cover Design: Closed, Open checkerboard grille ASTM grid pattern and waterproof.
5. Frame and covers shall be non-rocking.
6. Wheel Load Rating: H-20.
7. Sealing gasket.
8. Cover: Molded with identifying name and logo: Storm Drain or Sanitary Sewer, City of Pittsburg.
9. Grate: Galvanized and Bicycle safe
10. All castings shall be thoroughly cleaned and subject to a hammer inspection after which they shall be twice dipped with an asphalt or coal tar coating applied at a temperature of not less than 290° F, nor more than 310° F.

## 2.3 RISER RINGS

### A. Riser Rings:

1. 4 Inches to 6 Inches Thick:
  - a. Material: Precast concrete.
  - b. Comply with ASTM C478.
2. Less than 4 Inches Thick:
  - a. Material: Cast iron.
  - b. Comply with AASHTO M306.

### B. Accessories:

1. Joint Sealant: Comply with ASTM C990.

## 2.4 RUBBER SEAL WRAPS:

1. Rubber Seal Wraps shall be
  - a. Wraps and Band Widths: Conform to ASTM C877, Type III.
  - b. Cone/Riser Ring Joint: Minimum 3 inches of overlap.

- c. Frame/Riser Ring Joint: 2 inches of overlap.
- d. Additional Bands: Overlap upper band by 2 inches.

## 2.5 CONCRETE CRADLES

### A. Concrete Cradle:

- 1. As specified in Section 03 30 00 – Utility Cast-in-Place Concrete.
- 2. Description: Minimum compressive strength of 4,000 psi, 28-day reinforced concrete, air entrained, rough troweled finish.

### B. Cast-in-place Concrete Reinforcement: As specified in Section 03 30 00 – Utility Cast-in-place Concrete.

## 2.6 MATERIALS

### A. Bedding and Backfill:

- 1. Install minimum 8-inches thick Class 2 Permeable material as specified in Section 31 23 16 – Utility Trenching below the manholes and structures.
- 2. Bedding and Backfill shall conform to Section 31 23 16 – Utility Trenching.

## 2.7 ACCESSORIES

### A. Foundation Slab:

- 1. Cast-in-place concrete as specified in Section 03 30 00 – Utility Cast-in-Place Concrete.
- 2. Top Surface: Level.

### B. Interior Manhole Coating: Coatings shall be white in color or grey in color.

- 1. Manufacturers:
  - a. Sewper Coat
  - b. Carboline
  - c. Or approved equal.

### C. Concrete: As specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#)

### D. Grout: As specified by the Manufacturer.

## 2.8 FINISHES

### A. Steel Galvanizing:

1. ASTM A123.
2. Hot dip galvanize after fabrication.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that items provided by other Sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location and are ready for roughing into Work.
- C. Verify correct size of manhole and structure excavation.

#### **3.2 PREPARATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- D. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- E. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

#### **3.3 INSTALLATION**

- A. Excavation and Backfill:
  1. Excavate for manholes and structures as specified in [Section 31 23 16 – Utility Trenching](#) and in indicated locations and depths.
  2. Provide twenty-four (24) inches of minimum clearance around sidewalls of manhole or structure for construction operations, granular backfill, and placement of geotextile filter fabric if required.
  3. If groundwater is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench. Where possibility exists of watertight manhole or structure becoming buoyant in flooded

excavation, anchor manhole or structure to avoid flotation, as approved by Project Manager.

- B. Foundation Slab:
  - 1. Cast-in-place foundation slab and trowel top surface level. Precast foundation slabs are acceptable with approval from City.
  - 2. Place manhole sections plumb and level, trim to correct elevations, and anchor to foundation slab.
- C. Install manholes and structures supported at proper grade and alignment on Class 2 permeable material bedding extending twenty-four (24) inches beyond the sidewalls of manholes or structures.
- D. Backfill excavations for manholes and structures as specified in [Section 31 23 16 – Utility Trenching](#)
- E. Form and place manhole or structure cylinder plumb and level, to correct dimensions and elevations.
- F. Cut and fit for pipe, conduit and sleeves.
- G. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour to form continuous drainage channel as indicated on Drawings.
- H. Paint interior with two coats of interior coating at rate of 120 sq. ft. per gal. for each coat.
- I. Set cover frames and covers level to correct elevations without tipping.
- J. Precast Concrete Manholes and Structures:
  - 1. Lift precast components at lifting points designated by manufacturer.
  - 2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
  - 3. Set precast structures, bearing firmly and fully on Class 2 Permeable Material bedding, compacted as specified in [Section 31 23 16 – Utility Trenching](#) or on other support system as indicated on Drawings.
  - 4. Assembly:
    - a. Assemble multi-section manholes and structures by lowering each section into excavation.
    - b. Install rubber gasket joints between precast sections according to manufacturer's recommendations.
    - c. Lower, set level, and firmly position base section before placing additional sections.



5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.
6. Maintain alignment between sections by using guide devices affixed to lower section.
7. Joint sealing materials should be installed on site.
8. Verify that installed manholes and structures meet required alignment and grade.
9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
10. Cut pipe flush with interior of structure.
11. Install synthetic rubber water stop gasket at all pipe entries.
12. Shape inverts through manhole and structures as indicated on Drawings.

K. Cast-in-Place Concrete Manholes and Structures:

1. Unless approved in writing by the City Engineer, Cast-in-Place Concrete Manholes shall only be constructed to retrofit existing sanitary sewer mains at locations without an existing manhole in place.
2. Cast-in-Place Concrete Manholes shall be installed in accordance with Central San Standard Specifications for Design and Construction.
3. Prepare Class 2 Permeable Material bedding or other support system as indicated on Drawings to receive base slab as specified for precast structures.
4. Erect and brace forms against movement, install reinforcing steel, place and cure concrete as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

L. Sanitary Manhole Exterior Drop Connections:

1. CLSM Encasement: Minimum 2 feet outside of manhole.
2. Form channel from pipe drop to sweep into main channel at maximum angle of 30 degrees.

M. Castings:

1. Set frames using mortar and masonry as indicated on Drawings.

### 3.4 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Test cast-in-place concrete as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

- C. Test concrete manhole and structure sections prior to backfill according to ASTM C497 as specified in [Section 33 01 30 - Testing for Sanitary Sewer, Storm Drainage - Piping and Manholes](#).
- D. Vertical Adjustment of Existing Manholes and Structures:
  - 1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
  - 2. Frames, Grates, and Covers:
    - a. Install a false bottom to prevent dirt getting into the structure. Carefully remove frames, grates, and covers cleaned of mortar fragments.
    - b. Reset to required elevation according to requirements specified for installation of castings.
  - 3. Reinforcing Bars:
    - a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
    - b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.
  - 4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

### 3.5 REHABILITATION OF MANHOLES

- A. Contractor shall hire a certified Manhole Rehabilitation Inspector by NASSCO (National Association of Sewer Service Companies).
- B. Remove existing steps within manhole.
- C. Clean and prepare interior surface of manhole using a power wash with up to 5000 psi to remove all loose concrete to get to a good substrate.
- D. Repair any existing leaks considered as weepers using a fast setting blend of special cements and fillers that is used to stop leaks through cracks and holes on underground concrete and brick structures and remove any infiltrating roots. Manufacturer for fast setting blend of cement shall be Mainstay ML-10 or approved equal.
- E. Apply up to 3/4" of a Portland cement-based, microsilica-enhanced, high-strength structural restoration and resurfacing mortar designed to be applied at a minimum of 1/4", and up to 5" on vertical and overhead surfaces and trowel it to get a smooth finish. Manufacturers for Portland cement-based resurfacing mortar is Mainstay ML-72 or approved equal.

- F. Spray 100 mils of a 100% solids epoxy coating. Manufacturer is Mainstay DS-5, or approved equal.
- G. Finalize with at least 4" wide of a 100% solids flexible epoxy joint sealant that is applied by trowel to the joint between the chimney and the manhole frame, at a thickness of 1/4" to prevent premature cracks where the manhole frame and mortar meet. Manufacturer for this flexible epoxy joint sealant is Madewell 806, or approved equal.
- H. Create a smooth transition between the bench and the walls of the manhole to avoid debris accumulation.
- I. Seal, plug, patch and coat the manhole structure as specified in the specifications from bench up to the top of each manhole.
- J. Contractor shall provide a minimum one year guarantee of material from the manufacture company and one year on workmanship.

**END OF SECTION 33 05 13**

**SECTION 33 05 17 - PRECAST CONCRETE VALVE VAULTS****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Precast concrete valve vaults.

## B. Related Requirements:

1. [Section 33 11 13 - Water Distribution Piping](#): Execution requirements for piping Work as required by this Section.

## 1.2 REFERENCE STANDARDS

## A. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
3. ASTM A536 - Standard Specification for Ductile Iron Castings.
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM C33 - Standard Specification for Concrete Aggregates.
7. ASTM C150 - Standard Specification for Portland Cement.
8. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
9. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
10. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
11. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
12. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
13. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

14. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>).
15. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
16. ASTM D4104 - Standard Test Method (Analytical Procedure) for Determining Transmissivity of Nonleaky Confined Aquifers by Overdamped Well Response to Instantaneous Change in Head (Slug Tests).
17. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

### 1.3 COORDINATION

- A. Coordinate Work with other utilities within construction area.

### 1.4 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data on valve vaults.
- C. Shop Drawings: Indicate plan, location, and inverts of connecting piping.
- D. Manufacturer's Certificate: Certify that precast concrete valve vaults meet or exceed ASTM standards and specified requirements.
- E. Manufacturer Instructions: Submit special procedures for precast concrete valve vault installation.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statement:
  1. Submit qualifications for manufacturer.

### 1.5 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for closeout procedures.
- B. Project Record Documents: Record actual locations and inverts of buried pipe, components, and connections.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Transport and handle precast concrete units with equipment designed to protect units from damage.
- D. Storage:
  - 1. Store precast concrete valve vaults according to manufacturer instructions.
  - 2. Do not place concrete units in position to cause overstress, warping, or twisting.

## PART 2 - PRODUCTS

### 2.1 DESIGN REQUIREMENTS

- A. Performance and Design Criteria:
  - 1. Watertight, Precast, Reinforced, Air-Entrained Concrete Structures:
    - a. Design to ASTM C890 A16: equivalent to AASHTO HS20 - 16-kip wheel live loading and installation conditions.
    - b. Manufactured to conform to ASTM C913.
  - 2. Minimum 28-Day Compressive Strength: 5,000 psi
  - 3. Honeycombed or re-tempered concrete is not permitted.

### 2.2 PRECAST CONCRETE VALVES

- A. Manufacturers:
  - 1. Oldcastle Precast, Inc.
  - 2. Jensen Precast
  - 3. Or approved equal
- B. Valve Vault and Covers:
  - 1. Cast Iron Castings:
    - a. ASTM A48, Class 30 or better.
    - b. Free of bubbles, sand, air holes, and other imperfections.
    - c. Slip resistant coating.

- d. ADA rated grating in pedestrian routes and pathways.
2. Christy G5 traffic valve box (or approved equal)

## 2.3 MATERIALS

### A. Portland Cement:

1. ASTM C150, Type II.

### B. Coarse Aggregates:

1. ASTM C33.
2. Graded 1 inch to No. 4 sieve.

### C. Sand:

1. ASTM C33.
2. Fineness Modulus: 2.35.

### D. Water:

1. Potable.
2. Clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.

### E. Air-Entraining Admixtures: ASTM C260.

### F. Reinforcing Steel:

1. Deformed Bars: ASTM A615, Grade 60.
2. Welded Wire Fabric: ASTM A185.

### G. Joint Sealant:

1. ASTM C990.

### H. Bedding and Backfill:

1. Bedding: Bedding Type, as specified in [Section 31 23 16 – Utility Trenching](#).
2. Backfill: Backfill Type, as specified in [Section 31 23 16 – Utility Trenching](#).

## 2.4 FABRICATION

- A. Fabricate precast reinforced concrete structures according to ASTM C913, to dimensions indicated on Drawings, and to specified design criteria.

## 2.5 MIXES

- A. Design concrete mix to produce required concrete strength, air-entrainment, watertight properties, and loading requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping connections, sizes, locations, and inverts are as indicated on Drawings.

### 3.2 PREPARATION

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Ream pipe ends and remove burrs.
- C. Remove scale and dirt from components before assembly.
- D. Establish invert elevations for each component in system.
- E. Hand trim excavation to suit valve vaults; remove stones, roots, and other obstructions.

### 3.3 INSTALLATION

- A. Bedding and Backfill:
  - 1. Excavate as specified in [Section 31 23 16 – Utility Trenching](#) for Work of this Section.
  - 2. Hand trim excavation for accurate placement of vaults to elevations indicated.
  - 3. Place bedding material level in one continuous layer and compacted depth and compact to percent maximum density as specified in [Section 31 23 16 – Utility Trenching](#).
  - 4. Backfill around sides of vaults, tamp in place, and compact to 95 percent maximum density.
  - 5. Maintain optimum moisture content of bedding material to attain required compaction density.
  - 6. Install vaults and related components on bedding.
- B. Connect piping.



3.4 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Request inspection by Project Manager prior to placing aggregate cover over piping.
- C. Compaction Testing: Conform to ASTM D1557.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

**END OF SECTION 33 05 17**

**SECTION 33 05 26 - UTILITY IDENTIFICATION****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. The Contractor shall provide all materials, equipment, and labor necessary to furnish, install all utility identifications systems and appurtenances as required and as specified below:
1. Pipeline marker posts.
  2. Metal utility markers.
  3. Marking flags.
  4. Plastic warning tape for placement above direct-buried utility.
  5. Trace wire for placement above direct-buried utility.
- B. Related Requirements:
1. [Section 31 23 16 – Utility Trenching](#): Backfilling considerations for installation of underground pipe markers.
  2. [Section 33 11 13 - Water Distribution Piping](#): Piping, valves, and appurtenances requiring identification marking.
  3. [Section 33 31 13 - Sanitary Sewer Piping](#): Piping, valves, and appurtenances requiring identification marking.
  4. [Section 33 41 13 - Storm Drainage Piping](#): Piping, valves, and appurtenances requiring identification marking.

## 1.2 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit manufacturer's catalog information for each product required.
- C. Samples: Submit one sample of pipeline marker post, utility marker, marking flag, 10 feet of warning tape, and 10 feet of trace wire.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Qualifications Statement: Submit qualifications for manufacturer.

1.3 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of tagged valves.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for maintenance materials.

**PART 2 - PRODUCTS**

2.1 PIPELINE MARKER POSTS

- A. Manufacturers:
  - 1. Furnish above ground utility marker materials with visibility enhancer according to City standards.
    - a. Pro-Mark Utility Supply Inc,
    - b. Northtown Company
    - c. Bernsten
    - d. or approved equal.
- B. Description:
  - 1. Material: High Impact Fiberglass Reinforced Resins
  - 2. Width: 4 inches +/- 0.25 inches
  - 3. Length: 96 inches
  - 4. Color: Orange (Telecommunications, Fiber Optic cables or conduits), Yellow (Natural Gas, Oil, Steam, Petroleum Pipelines), Blue (Water lines), Red (Electric Power Lines, cables), Green (Sewer and Drain Lines), Purple (Reclaimed Water, Irrigation), White (Proposed excavation limits) and Pink (Temporary Survey Markings, Unknown/Unidentified facilities).
  - 5. Embedment: T-anchor.
  - 6. Technical Data:

Description	Test Spec. or Criteria	Test Result
Tensile Strength	ASTM D638	410 kg/cm <sup>2</sup>
Tensile Elongation	ASTM D638	35%
Tensile Modulus	ASTM D638	17,600 kg/cm <sup>2</sup>
Flexural Strength	ASTM D790	660 kg/cm <sup>2</sup>
Flexural Modulus	ASTM D790	19,500 kg/cm <sup>2</sup>
IZOD Impact Strength	ASTM D256	45 kg cm/cm
Heat Deflection Temp	ASTM D648	204.8°F
Vicat Softening Temp	ASTM D1525	201.2°F

Flammability	UL94	HB Class
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## 2.2 UTILITY MARKERS

### A. Manufacturers:

1. Furnish materials according to City standards.
  - a. Bernsten
  - b. Rhino
  - c. or approved equal.

### B. Metal:

1. Material: Bronze
2. Diameter: 2 inches.
3. Stem: 3/4 by 2 inches
4. Text: "Warning Water Pipeline Caution Call 811 Before you dig" or "Stub for Pipeline".

## 2.3 MARKING FLAGS

### A. Manufacturers:

1. Furnish materials according to City standards.
  - a. Bernsten
  - b. Presco Products
  - c. or approved equal.

### B. Description:

1. Material: Polyethylene
2. Minimum Size: 2-1/2 by 3-1/2 inches.
3. Wire Stem: 21 inches
4. Color: Yellow, Orange, Blue, Green, Red, Pink and White.
5. Text: Blue (Buried Waterline), Red (Buried Electric Line), Pink (Survey Marker), Green (Buried Sewerline), Yellow (Buried Gas line) and Orange (Buried Fiber Optic conduits).

## 2.4 WARNING TAPE

### A. Warning Tape:

1. Warning Tape shall be installed on all pipes greater than 2 inches and the warning tape shall be placed above the centerline of the pipe, spanning the full length of the pipe, and be placed at a depth of 1-foot above top of pipe.
2. Furnish materials according to National Transportation Safety Board NTSB-PSS-73-1, GSA Public Buildings Service Guide, American Gas Association 72-D-56, API RP 1109, OSHA 1926.956 (c)(1), APWA Uniform Color Code,

DOT Office of Pipeline Safety USAS B31.8, and Federal Gas Safety Regulations S 192-321 (e).

**3. Technical Data:**

<b>Properties</b>	<b>Test Method</b>	<b>Value</b>
Thickness	ASTM D2103	0.005" (5 mil)
Elongation	ASTM D882-75B	80%
Colors	APWA Coded	See below
Tensile Strength	ASTM D882	35 lbs/inch (15,000 psi)
Bond Strength	Boiling Water	5 Hours w/o Peel
Adhesives	Mfg. Specs	Morton 548 or Equivalent
Bottom Later	Mfg. Specs	Virgin PE
Top Later	Mfg. Specs	Virgin PET
Foil	Mfg. Specs	0.00035 (0.35 Mil)
Flexibility	ASTM 671-76	Pliable Hand
Message Repeat	Mfg. Specs	AXL II
Inks	Mfg. Specs	Varies per Legend
Printability	ASTM D2578	45 Dynes

**4. Manufacturers:**

- a. Northtown Company
- b. Christy's
- c. Bernsten
- d. or approved equal.

**B. Description:**

- 1. Material: Polyethylene
- 2. Brightly colored, continuously printed.
- 3. Minimum Size: 6 inches wide by 5 mils thick.
- 4. Manufactured for direct burial service.
- 5. Lettering Size: 1 inch
- 6. Color: All tape is APWA color coded and permanently printed
  - a. Red – Electric, Fire
  - b. Yellow – Gas, Oil
  - c. Blue – Water, Potable Water
  - d. Green – Sewer, Storm Drain
  - e. Orange – Fiber Optic, Telephone
  - f. Purple – Recycled Water, Non-Potable Water.
- 7. Standard Imprints: "CAUTION WATER LINE BURIED BELOW", "CAUTION SEWER LINE BURIED BELOW", "CAUTION SANITARY SEWER BURIED BELOW", "CAUTION GAS LINE BURIED BELOW", "CAUTION HIGH VOLTAGE ELECTRIC BURIED BELOW" or other custom utility legends in large letters.

## 2.5 TRACE WIRE

### A. Tracer Wire:

1. Tracer wire shall be used on all pressure piping (water, recycled water, irrigation water, sewer force main etc). Tracer wire shall be blue and suitable for direct burial and wet conditions.
2. Tracer wire shall be continuous and splices shall be made with two copper or brass split bolt fasteners without encapsulation in epoxy.
3. Contractor shall submit proof of continuity testing to the City in a written format.
4. Tracing wire through valve boxes shall be placed outside of riser but inside the valve box.
5. Tracer wire shall be UL listed, Standard 83, conforming to Federal Specification JC-30-B, ANSI-C 33.80 and the requirements of National Electric Code.
6. For all pressure piping systems (potable, recycled water, sewer force mains, irrigation system, and water valves), a No. 12 A.W.G. UF Insulated solid copper wire shall be attached to the pipeline.
7. The wire shall be taped to hold in place and the tape shall be 2 inches wide, 10 mil. thick. On mains the wire shall be held in place with tape spaced not more than 10 feet apart. On service laterals the wires shall be wrapped around the pipe.
8. Furnish materials according to City standards.
  - a. Northtown Company
  - b. Priority Wire and Cable, Inc.
  - c. or approved equal.
9. Description:
  - a. Wire: Unshielded 12-AWG THWN insulated copper.

## 2.6 RECYCLED WATER SIGNING

- A. Contractor shall provide all identification signs and stickers for irrigation controllers for recycled water systems in compliance with Delta Diablo Water District's requirements.
- B. Signs shall be measured no less than 8"x8" with white type against a purple background.

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. Pipeline Marker Posts, Utility Markers, and Marking Flags: As recommended by manufacturer.
- B. Warning Tape and Tracer Wire:

1. Warning tape shall be continuous over top of pipe buried 12 inches above piping.
2. Tracer wire shall be taped to the pipe.
3. If multiple pipes occur in common trench, locate tape and wire above centerline of trench.
4. Coordinate with trench Work as specified in [Section 31 23 16 – Utility Trenching](#).

**END OF SECTION 33 05 26**

**SECTION 33 11 13 - WATER DISTRIBUTION PIPING****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Pipe and fittings for public line, including potable water line, fire water line and fire hydrant lateral.
2. Tapping sleeves and valves.
3. Valves and fire hydrants.
4. Underground pipe markers.
5. Precast concrete vault and boxes
6. Pipe support systems.
7. Bedding and cover materials.

## B. Related Requirements:

1. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete for thrust restraints and Reinforcing steel and required supports for cast-in-place concrete.
2. [Section 31 05 13 – Clearing & Grubbing, Excavation, and Earthwork](#): Soils for backfill in trenches.
3. [Section 31 23 16 – Utility Trenching](#): Execution requirements for trenching required by this Section.
4. [Section 33 05 13 - Manholes and Structures](#): Cast-in-place, precast concrete, fiber reinforced plastic (FRP), masonry manholes and covers, and other structure construction for access to subsurface drainage piping or utilities.
5. [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#): Precast concrete valve vaults and meter boxes for valve and meter installation.
6. [Section 33 12 13 - Water Service Connections](#): Backflow prevention at water main.
7. [Section 33 12 16 - Water Distribution Valves](#): Valves and valve boxes for fire hydrant and water main installation.
8. [Section 33 12 19 - Water Distribution Fire Hydrants](#): Fire hydrants used in water main installations.
9. [Section 33 13 00 - Disinfecting of Water Distribution](#): Disinfection of water piping.

## 1.2 REFERENCE STANDARDS

## A. American Association of State Highway and Transportation Officials:



1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society of Mechanical Engineers:
1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- C. ASTM International:
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
  2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  3. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Application.
  4. ASTM A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
  5. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  6. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  8. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
  9. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  10. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
  11. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
  12. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
  13. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
  14. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- D. American Water Works Association:
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
  2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.

3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
  4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
  6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
  7. AWWA C153 - Ductile-Iron Compact Fittings.
  8. AWWA C223 - Fabricated Steel and Stainless Steel Tapping Sleeves.
  9. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
  10. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
  11. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
  12. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
  13. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm) for Water Transmission and Distribution.
- E. California Codes:
1. Titles 17 and 22 California Code of Regulations - Chapter 16 – California Waterworks Standards
  2. Water Main Separation Criteria: Chapter 16 - California Waterworks Standards: Article 6 - §64572
- F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.
- G. National Fire Protection Association:
1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
- 1.3 SUBMITTALS
- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
  - B. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories.
  - C. Shop Drawings: Indicate piping layout, including piping specialties.
  - D. Manufacturer's Certificate: Certify that product meet or exceeds the manufacturer's requirements.

- E. For all federal-aid construction projects, manufacturer certifies that all melting, casting, cutting, welding, machining and finishing process for manufacturing and fabricating the products and/or materials shipped or provided are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs and with all United States Federal Highway Administration "Buy America" requirements identified in Title 23 CFR Section 635.410
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Preconstruction Photographs:
  - 1. Submit digital files of colored photographs of Work areas and material storage areas.

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### 1.5 QUALITY ASSURANCE

- A. Pipes: Each length of Ductile iron pipe supplied shall be hydrostatically tested at the point of manufacture to 500 psi for a duration of 10 seconds per AWWA C151. Testing may be performed prior to machining bell and spigot. Failure of ductile iron pipe shall be defined as any rupture of the pipe wall. Certified test results shall be furnished in duplicate to the City prior to the time of shipment.
- B. All pipe and fittings shall be permanently marked with the manufacturer's name, date, nominal size, dimension ratio number, type, pressure rating or class, or wall thickness, material cell classification, seal of the National Sanitation Foundation (NSF) testing agency that verified the suitability of the pipe and the material for potable water, and standard produced (AWWA, ASTM etc.)
- C. Valves: Mark valve body with manufacturer's name, date, size, type, pressure rating and standard produced (AWWA, ASTM etc.).
- D. Pipes, valves hydrants, fittings and appurtenances shall be new and unused.
- E. Perform Work according to City standards and manufacturer's specifications.

- F. Contractor shall submit 5-year warranty for all pipe materials.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Deliver and store valves in shipping containers with manufacturer's labeling in place and inspect for damage.
- C. Block individual and stockpiled pipe lengths to prevent moving.
- D. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
- E. Store polyethylene and PVC materials out of sunlight.

## 1.7 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 WATER PIPING

- A. Fittings: Fittings shall have the same pressure rating, as a minimum of the connecting pipe unless specified otherwise.
  - 1. Fittings:
    - a. Material: Ductile iron, AWWA C153.
    - b. Fittings: Comply with AWWA C153.
    - c. Fittings shall conform to a minimum pressure rating of 350 psi.
    - d. Coating and Lining:
      - i. Bituminous Coating: Comply with AWWA C115.
      - ii. Cement Mortar Lining: Comply with AWWA C104.
  - 2. Joints:
    - a. Mechanical and Push-on Joints: Comply with AWWA C111.
    - b. Flanged Joints: Comply with AWWA C115.

- c. Tighten bolts alternately (across from one another) to the recommended manufacturer rating or if not provided, to the following normal torques and as stated in ANSI/AWWA C600 are:

Joint Size	Bolt Size	Range of Torque (ft.-lb.)
3"	5/8"	45 - 60
4"-24"	3/4"	75 - 90
30"-36"	1"	100-120
42"-48"	1-1/4"	120 -150

- d. Flange gasket: Full face type per AWWA C111 to provide positive sealing for the flange ductile iron joints.
  - e. Flange Bolts: Comply with ASTM A193, Type 304 Stainless Steel, Grade B8 hex-head bolts, washers, and hexagon nuts. Bolts shall have "B8 Class 2" stamped on the head. Threads shall conform to ANSI B1.1. Bolt lengths shall be such that after joints are assembled, the bolts shall protrude through the nuts, but not more than 1/2 inch.
  - f. Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal.
  - g. Jointing of pipe dissimilar in size or material shall be accomplished either by use of special adapters or couplings as specified on the plans or approved by the Project Manager for such use.
3. Jackets: Comply with AWWA C105, polyethylene jacket, Double layer, half lapped, 10-mil polyethylene tape.
  4. Manufacturers for ductile iron pipe fittings:
    - a. Tyler
    - b. Sigma
    - c. Star
    - d. Or approved equal.
  5. Manufacturers for pipe restraints:
    - a. EBAA Iron Sales, Inc. (1100 Megalug for DIP and 2000PV for PVC pipes)
    - b. Star Pipe Products (Stargrip Series 3000 for DIP pipes and Stargrip Series 4000 for PVC pipes)
    - c. Or approved equal.

**B. PVC:**

1. Comply with AWWA C900 and AWWA C905 – Pressure Class 305 (DR14) or as specified on the project plans.
2. Fittings: Comply with AWWA C900, AWWA C905, AWWA C111, cast iron.
3. Joints:
  - a. Comply with ASTM D3139, ASTM F477.

- b. Seals: PVC flexible elastomeric.
  - c. Solvent-cement couplings are not permitted.
4. Manufacturers:
- a. Vinyltech
  - b. Diamond Plastics Corporation
  - c. North American Pipe
  - d. JM Eagle
  - e. Or approved equal

## 2.2 TAPPING SLEEVES AND VALVES

### A. Tapping Sleeves:

1. Manufacturers:
- a. Mueller Co. (H-304SS Stainless steel tapping sleeve with stainless steel outlet flange)
  - b. Romac Industries, Inc. (STS420 Stainless Steel Tapping Sleeve)
  - c. JCM Industries, Inc. (JCM 432 All Stainless steel tapping sleeve)
  - d. Or approved equal
2. Description:
- a. Comply with ASTM A240 and AWWA C223
  - b. Material: Stainless Steel Type 304 (18-8)
  - c. Maximum Working Pressure:
    - i. Pipe Sizes 3"-12": 250 psig
    - ii. Pipe Sizes 14"-24": 200 psig
  - d. Gasket: Full circumferential Virgin Styrene-Butadiene Rubber (SBR) per ASTM D2000. For 3"-12" size-on-size flanges, the gaskets are reinforced with a metal ring. Larger than 12" size-on-size sleeves use a square profile o-ring NBR per ASTM D2000 set in a full body thickness cavity.
  - e. Certified to ANSI/NSF 61.
  - f. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125 and MSS SP-60. Flanges on Stainless Steel Tees shall be Stainless Steel. A 3/4-inch NPT stainless steel test plug shall be provided.
  - g. Bolts and Nuts: All hardware for tapping sleeves shall be Polytetrafluoroethylene (PTFE) Teflon coated Type 304 Stainless Steel.

### B. Tapping Valves:

1. Manufacturers:
- a. Mueller Co. (T-2361)
  - b. American (2500 Series)

- c. Or approved equal

2. Description:

- a. Comply with AWWA C515, certified to ANSI/NSF 61 Standard, listed by Underwriters Laboratories, Inc. and approved by Factory Mutual Corporation.
- b. Type: Double disc with non-rising stem.
- c. Sizes: 4"-48"
- d. Maximum Working Pressure: 250 psig
- e. Inlet Flanges: Comply with ANSI B16.42, Class 125 and MSS SP-60.
- f. Mechanical Joint Outlets: Comply with AWWA C111.
- g. Coating: Comply with AWWA C550 and Epoxy Fusion Coating interior and Exterior surfaces.
- h. Fasteners: Stainless Steel Type 316.
- i. Non-rising stem (NRS) valve with 2" square wrench nut (optional hand wheel).
- j. All wedges shall be fully encapsulated with EPDM rubber.
- k. All tapping valves shall include a minimum 3/8 in. NPT pipe plug on the bonnet of the valve body to aid in the field testing of the valve.

3. Mark manufacturer's name and pressure rating on valve body.

2.3 HOT TAP

- A. Water Department personnel shall be present during hot tap and inspection of materials and installation. If Water Department personnel is not available, Contractor shall not perform the hot tap installation.
- B. The location of hot tap to be verified by the Contractor to insure a minimum of 2 feet is kept from tap location and a bell end or end of pipe on a dead end.
- C. For direct tap only Contractor shall apply two layers of adhesive tape completely around the pipe at tapping location prior to tapping.
- D. Contractor shall encase tapping saddle, all fasteners, all pipe fittings, and service lines within, with polywrap.
- E. Where the connection is to be a hot tap larger than 2 inches, the Contractor shall provide and install a flanged by mechanical joint tapping valve and sleeve, and any other hardware required, and Contractor will make the tap with 3 working days advance notice.
- F. In cases, where the tapping sleeve cannot be moved, the joint shall be removed and the proposed hot tap shall be replaced with a "cut-in" tee. When a "cut-in" tee and valve(s) assembly is required on the plans, the Contractor shall provide

and install the entire assembly (including valves) and any other hardware necessary under inspection, and shall provide all other work and materials necessary to complete the installation to City Standards.

## 2.4 VALVES AND FIRE HYDRANTS

- A. Valves: As specified in [Section 33 12 16 - Water Distribution Valves](#).
- B. Fire Hydrants: As specified in [Section 33 12 19 - Water Distribution Fire Hydrants](#).

## 2.5 COUPLINGS:

- A. Couplings shall be fusion bonded epoxy ductile iron per ASTM A536. Rods and nuts shall be Type 304 stainless steel.
- B. Pipe couplings shall be installed in strict accordance with the manufacturer's printed recommendations, using the correct style coupling and gasket as appropriate.
- C. Couplings and sleeves for 4-inch through 12-inch PVC pipe shall be fusion epoxy coated ductile iron, with a minimum working pressure equal to the connecting pipe.
- D. Where flexible connections in piping are specified or indicated on the plans, they shall be obtained by the use of sleeve-type coupling. All sleeve-type couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
- E. Sleeve type couplings shall be
  1. Romac Industries, Inc. (501)
  2. Dresser Mfg Div., (Style 38)
  3. Ford Couplings
  4. Smith-Blair
  5. or approved equal

## 2.6 AIR RELEASE VALVES

- A. Manufacturers:
  1. A.R.I - D-040-NS Combination Air Valve with a non-slam, discharge-throttling attachment, allows full air intake, throttles air discharge.
  2. Or approved equal
- B. Description:
  1. Body and Cover: Ductile Iron ASTM A536 Gr 65-45-12
  2. Float: Stainless Steel, ASTM A240



3. Needle and Seat: Buna-N.
  4. Plug: Stainless Steel ASTM A276
- C. Maximum Working pressure: 250 psi
- D. Test Pressure: 360 psi.
- E. All valves are combination air release valves unless requested otherwise by the Project Manager.
- 2.7 UNDERGROUND PIPE MARKERS
- A. Warning Tape: As specified in [Section 33 05 26 – Utility Identification](#).
  - B. Trace Wire: As specified in [Section 33 05 26 – Utility Identification](#).
- 2.8 PRECAST CONCRETE VALVE VAULTS AND METER BOXES
- A. Precast Concrete Valve Vaults and Meter Boxes: As specified in [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#).
- 2.9 VALVE BOXES
- A. Valve Boxes: As specified in [Section 33 12 16 – Water Distribution Valves](#).
- 2.10 PIPE SUPPORTS AND ANCHORING
- A. Metal for Pipe Support Brackets: Structural steel, galvanized, thoroughly coated with bituminous paint.
  - B. Metal Tie Rods and Clamps or Lugs: Stainless Steel Type 304.
- 2.11 CONCRETE ENCASEMENT AND CRADLES
- A. Concrete:
    1. As specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).
    2. Type: reinforced, air entrained.
    3. Compressive Strength: 4,000 psi at 28 days.
    4. Finish: Rough troweled.
  - B. Concrete Reinforcement: As specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

## 2.12 MATERIALS

### A. Bedding and Backfill:

1. Bedding: Bedding Type, as specified in [Section 31 23 16 – Utility Trenching](#).
2. Backfill: Backfill Type, as specified in [Section 31 23 16 – Utility Trenching](#).

## 2.13 ACCESSORIES

### A. Concrete for Thrust Restraints: As specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

### B. Rods, Bolts and Nuts:

1. Comply with ASTM A193 and ASTM A194.
2. Material: Type 304 Stainless Steel
3. Bolts and Nuts for flanges and couplings shall be Heavy Hex Head ASTM A193 (Grade B8 - Class 2) for bolts and Heavy Hex Head ASTM A194 (Grade 8) for nuts.
4. When approved by the Project Manager, Bolts and Nuts for flanges and couplings which are Heavy Hex Head ASTM A193 (Grade B7) bolts and Heavy Hex Head ASTM A194 (Grade 2H) nuts, they shall be coated as described below.
  - a. Rods, Bolts, Lugs and Nuts (including threads) shall be coated using a three-layer system consisting of a metallic base coat, an adhesion coat, and a heat cured fluoropolymer compound containing PTFE or TEFLON® as topcoat. Coating shall be FluoroKote#1 by Metal Coatings Corp., Tripac 2000 Blue Coating System by Tripac Fasteners, or approved equal.
  - b. Washers shall be provided for each nut, and shall be the same material and coating as the nut.
  - c. Apply a liberal coat of white food grade anti-seizing compound containing PTFE or TEFLON® to the threads of all nuts and bolts, and to the face of all washers. The compound shall have operating range covering -20°F to 440° F, be NSF approved (or meet USDA-H1 and FDA requirements for incidental food contact), suitable for use on stainless steel, with a coefficient of friction no greater than  $K=0.13$ . Compound shall be White-Knight as manufactured by Jet-Lube, or approved equal.

## 2.14 TEST EQUIPMENT

### A. Hydrostatic Testing of Pressure Pipes.

1. Water – From the City's existing water system.
2. Pump – Install water meter in-line with pump to measure water use to maintain pressure.

3. Strainer – On inlet side of the pump to prevent foreign matter from entering the system.
4. Valves – Shall be provided on the suction and discharge side of the pump.
5. Relief Valve – Set a pressure to relieve at 20 to 25 percent above the required test pressure.
6. Pressure Gage(s) – Capable of reaching 50 percent over the test pressure. These should be located at the pump discharge and any other place deemed convenient by the Contractor.
7. Pressure Gages and relief valves shall be checked for accuracy before use in test procedures.
8. Backflow Prevention assembly - A state approved reduce pressure backflow assembly installed to prevent flow into the existing system.
9. Tank or other materials as needed for hydrostatic testing.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

#### **3.2 PREPARATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Preconstruction Site Photos:
  1. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench. The picture should be clear with minimum resolution of 1024 x 768 pixels.
  2. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.
  3. Include Project description, date taken, and sequential number on back of each photograph.
- C. Pipe Cutting:
  1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
  2. Use only equipment specifically designed for pipe cutting and recommended by the pipe manufacturer; use of chisels, hammer or hand saws is not permitted.
  3. Grind edges smooth with beveled end for push-on connections.
- D. Remove scale and dirt on inside and outside before assembly.

- E. Prepare pipe connections to equipment with flanges or unions.

### 3.3 CONNECTION TO EXISTING MAINS

- A. The Project Manager shall be given not less than three (3) working days' notice before any connection shall be made to any existing main. In general, shutdowns in residential areas shall be made at times when there will be the least interference. Connections shall be made only after correlate and satisfactory preparation for such work has been made including passing bacteria test results, in order that the shutdown may be as short as possible. Prior written approval from the Project Manager is required.

The Contractor shall be responsible for contacting the citizens and the City will be responsible to provide the notes.

- B. Under no circumstances shall anyone other than a representative of the Water Division of the Department of Public Works open or close any valve in the city-operated water system.

### 3.4 INSTALLATION

- A. Bedding:

- 1. Excavation:

- a. Excavate pipe trench as specified in [Section 31 23 16 – Utility Trenching](#) for Work of this Section.
- b. Hand trim excavation for accurate placement of pipe to elevations as indicated on Drawings.

- 2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation as specified in [Section 31 23 16 – Utility Trenching](#).
- 3. Provide sheeting and shoring as specified in [Section 31 23 16 – Utility Trenching](#).
- 4. Place bedding material at trench bottom, level fill materials in one continuous layer, and compacted as specified in [Section 31 23 16 – Utility Trenching](#).

- B. Piping:

- 1. Install pipe according to AWWA C600 and AWWA C605.
- 2. Handle and assemble pipe according to manufacturer instructions and as indicated on Drawings.
- 3. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.

4. Water Main Separation Criteria: Chapter 16 - California Waterworks Standards: Article 6 - §64572
  - a. New water mains and new supply lines shall not be installed in the same trench as, and shall be at least 10 feet horizontally from and one foot vertically above, any parallel pipeline conveying sanitary sewer, recycled water or fuel lines.
  - b. New water mains and new supply lines shall be installed at least 4 feet horizontally from, and one foot vertically above, any parallel pipeline conveying storm drainage and disinfected tertiary recycled water.
  - c. If crossing a pipeline conveying a fluid listed in subsections a and b above, a new water main shall be constructed no less than 45-degrees to and at least one foot above that pipeline. No connection joints shall be made in the water main within eight horizontal feet of the fluid pipeline.
  - d. The vertical separation specified in subsections above is required only when the horizontal distance between a water main and pipeline is less than ten feet.
5. Install ductile-iron piping and fittings according to AWWA C600.
6. Route pipe in straight line; re-lay pipe that is out of alignment or grade.
7. High Points:
  - a. Install pipe with no high points.
  - b. If unforeseen field conditions arise that necessitate high points, install air release valves as directed by Project Manager.
8. Bearing:
  - a. Install pipe to have bearing along entire length of pipe.
  - b. Excavate bell holes to permit proper joint installation.
  - c. Do not lay pipe in wet or frozen trench.
9. Prevent foreign material from entering pipe during placement.
10. Install pipe to allow for expansion and contraction without stressing pipe or joints.
11. Close pipe openings with watertight plugs during Work stoppages.
12. Install access fittings to permit disinfection of water system performed under [Section 33 13 00 - Disinfecting of Water Distribution](#).
13. Cover:
  - a. Establish elevations of buried piping with not less than forty-two (42) inches of cover or as shown on the plans.
  - b. Measure depth of cover from final surface grade to top of pipe barrel.
14. Pipe Markers:
  - a. Install warning tape and tracer wire continuous over top of pipe as specified in [Section 33 05 26 – Utility Identification](#).

- b. Coordinate with trench Work as specified in [Section 31 23 16 – Utility Trenching](#).
- C. Valves and Hydrants:
  - 1. Install valves as specified in [Section 33 12 16 - Water Distribution Valves](#).
  - 2. Install hydrants as specified in [Section 33 12 19 - Water Distribution Fire Hydrants](#).
- D. Tapping Sleeves and Valves: As indicated on Drawings and according to manufacturer instructions.
- E. Polyethylene Encasement:
  - 1. Encase piping in polyethylene for all ductile iron pipe and fittings to prevent contact with surrounding backfill material.
  - 2. Comply with AWWA C105.
  - 3. Terminate encasement 3 to 6 inches above ground where pipe is exposed.
  - 4. Care shall be exercised to prevent entrapment of soil materials between the polyethylene wrap and metal surfaces.
- F. Thrust Restraints:
  - 1. Provide valves, tees, bends, caps, and plugs with concrete thrust blocks.
  - 2. Pour concrete thrust blocks against undisturbed earth.
  - 3. Locate thrust blocks at each elbow or change of pipe direction to resist resultant force and to ensure that pipe and fitting joints will be accessible for repair.
  - 4. Provide minimum square feet of thrust restraint bearing on subsoil as specified in the City Standard Details.
  - 5. Install tie rods, clamps, setscrew retainer glands, or restrained joints.
  - 6. Protect metal-restrained joint components against corrosion by applying a bituminous coating or encasing metal area using concrete mortar.
  - 7. Do not encase pipe and fitting joints to flanges.
  - 8. Install thrust blocks, tie rods, and joint restraint at dead ends of water main.
- G. Service Connections: As specified in [Section 33 12 13 - Water Service Connections](#).
- H. Backfilling: Backfill around sides and to top of pipe as specified in [Section 31 23 16 - Utility Trenching](#).
- I. Disinfection of Potable Water Piping System: As specified in [Section 33 13 00 - Disinfecting of Water Distribution](#).

### 3.5 TOLERANCES

- A. [Section 01 45 00 - Quality Control](#): Requirements for tolerances.
- B. Install pipe to indicated elevation within tolerance of 5/8 inch.

### 3.6 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Pressure test system according to AWWA C600 and following:
  - 1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater. The tests shall be performed at ambient temperature unless otherwise specified.
  - 2. Preparation of Test:
    - a. Vents shall be at the high points of the system and drains provided where means of venting or draining do not exist.
    - b. Remove or block off, all relief valves, rupture discs, alarms, control instruments, etc. that shall not be subjected to the test pressure. All gages used in the system shall be calibrated gages.
    - c. All discs, balls, or pistons from check valves shall be removed if they interfere with filling the system. Open all valves between inlet and outlet of the section to be tested.
    - d. Connect pump and provide temporary closures for all the external openings in the system. Use caution to insure that the closures are properly designed and strong enough to withstand the test pressure.
    - e. A joint previously tested in accordance with this specification may be covered or insulated.
    - f. Expansion joints shall be provided with temporary restraint for additional pressure under test or shall be isolated from the test.
    - g. Flanged joints, where blanks are inserted to isolate equipment during the test, need not be tested.
    - h. All concrete block shall be allowed to cure a sufficient time to develop the minimum compressive strength before testing.
    - i. Pressure tests on exposed and above ground piping shall be conducted only after the entire piping systems has been installed and attached to the pipe supports, hangers or anchors or as shown on the plans.
    - j. Any connection between the new pipeline being installed and the existing water system shall include a state approved reduced pressure backflow assembly installed to prevent flow into the existing system. The backflow device assembly shall be required until bacteriological sampling proves the new pipeline is properly disinfected.
    - k. Contractor shall disconnect system from the pump prior to verifying the drop in pressure.

3. The Contractor shall pay costs of all water used for construction purposes, including flushing and testing. The City, at his expense, shall provide a meter approved by the Project Manager to complete the work.
  4. The Contractor shall furnish all required equipment, pumps, calibrated gages and materials, make all connections and perform the required tests.
  5. Conduct hydrostatic test for at least two hours. Apply the hydrostatic test pressure in increments of 25 psig, or as directed by the Project Manager until the maximum test pressure is reached. Hold pressure for 5 minutes at each 25 psig increment and inspect for leaks before adding more pressure.
  6. Slowly fill section to be tested with water; expel air from piping at high points using the vents. Prior to beginning hydrostatic testing, the pipeline shall have been filled with water and allowed to stand a minimum of four (4) hours under a slight pressure. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure slowly with the pump to specified test pressure.
  7. Maintain pressure for four (4) hours keeping personnel at a safe distance.
  8. Observe joints, fittings, and valves under test. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage. Retest.
  9. Correct visible deficiencies by releasing the pressure, draining the system and continue testing at same test pressure for additional two hours to determine any leakage. Maintain pressure within plus or minus 5 psi of test pressure.
  10. During hydrostatic testing, the contractor shall provide for temporary blocking of the pipeline at the tie-in points or as directed by the Project Manager. No hydrostatic test will be allowed against a closed valve connected to the existing system except under specific supervised conditions approved by the Project Manager.
  11. No leakage is allowed.
  12. If test of pipe indicates leakage, locate source of leakage, make corrections, and retest until there is no leakage in the system
  13. After hydrostatic test is complete, remove the pressure with caution to avoid escaping fluid and debris.
- C. Compaction Testing for Bedding: As specified in [Section 31 23 16 - Utility Trenching](#).
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

**END OF SECTION 33 11 13**



**SECTION 33 12 00 - WATER DISTRIBUTION EQUIPMENT****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Reduced-pressure backflow preventer assemblies.
2. Double-check-valve backflow preventer assemblies.
3. Valve vaults.
4. Buried piping within 5 feet of backflow preventer valve vault.
5. Interior piping.
6. Valves.
7. Pipe supports.
8. Bedding and cover materials.

## B. Related Requirements:

1. [Section 09 90 00 - Painting and Coating](#): For pipe supports.
2. [Section 31 05 13 - Clearing & Grubbing, Excavation and Earthwork](#): Excavation and Earthwork
3. [Section 31 23 16 - Utility Trenching](#): Trenching for buried pipe installation.
4. [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#): Backflow preventer precast concrete valve vault.
5. [Section 33 05 26 - Utility Identification](#): Warning tape and tracer wire.
6. [Section 33 11 13 - Water Distribution Piping](#): Potable water piping beyond backflow preventer valve vault.
7. [Section 33 13 00 - Disinfecting of Water Distribution](#): Disinfection of domestic water piping beyond backflow preventer valve vault.

## 1.2 DEFINITIONS

- A. NRS: Non-rising stem.
- B. OS&Y: Outside screw and yoke.

## 1.3 REFERENCE STANDARDS

## A. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.

4. AWWA C506-78 (R83) - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types
  5. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
  6. AWWA C510 - Double Check Valve Backflow Prevention Assembly.
  7. AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly.
  8. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
- B. American Welding Society:
1. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding.
- C. ASME International:
1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
  2. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
  3. ASME B31.9 - Building Services Piping.
- D. ASSE International:
1. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.
  2. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies.
  3. ASSE 1047 - Performance Requirements for Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies.
  4. ASSE 1048 - Performance Requirements for Double Check Detector Fire Protection Backflow Prevention Assemblies.
- E. ASTM International:
1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  3. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  4. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  5. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
  6. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

7. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
  - F. California Code of Regulations (CCR) – Title 17. Public Health – Division 1 State Department of Health Services – Chapter 5 Sanitation (Environmental), subchapter 1 Engineering (Sanitary) – Group 4 Drinking Water Supplies, Article 2 Protection of Water System.
  - G. California Regulations Related to Drinking Water dated July 16, 2015 - §64572. Water Main Separation
  - H. Manufacturers Standardization Society of the Valve and Fittings Industry:
    1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.
  - I. Municipal Code
    1. Chapter 13.14 – Regulations for the Control of Backflow and Cross-Connections to the City’s Water System.
  - J. Foundation of Cross-Connection Control and Hydraulic Research (FCCCHR) of the University of Southern California – Specifications of Backflow Prevention Assemblies.
- 1.4 SUBMITTALS
- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
  - B. Product Data:
    1. Submit data on backflow preventer assemblies.
    2. Piping: Submit data on pipe materials, fittings, and accessories.
    3. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
    4. Supports: Submit manufacturer's catalog information including load capacity.
  - C. Manufacturer's Certificate: Certify that products meet or exceed the Standard Specification requirements
  - D. Manufacturer Instructions: Submit installation instructions for backflow preventer assemblies, valves, and accessories.
  - E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
  - F. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer's approval of installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of backflow preventer assemblies.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views, and recommended maintenance intervals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for maintenance materials.
- B. Extra Stock Materials:
  1. Furnish two (2) sets of seals for each backflow preventer assembly.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three (3) years' documented experience.
- B. Backflow preventers shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the State Water Resources Control Board.
- C. Installer: Company specializing in performing Work of this Section with minimum three (3) years' documented experience and approved by manufacturer.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Furnish temporary protective coating for cast-iron and steel valves.

- D. Furnish temporary end caps and closures for pipe and fittings; maintain caps and closures in place until installation.
- E. Protection:
  - 1. Provide temporary covers for backflow preventer assemblies to prevent entry of foreign materials.
  - 2. Protect openings in sections of completed piping systems.
  - 3. Protect openings in piping systems when Work is not in progress.

## 1.9 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

## 1.10 WARRANTY

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for warranties.
- B. Furnish five-year manufacturer's warranty for backflow preventer assemblies.

## PART 2 - PRODUCTS

### 2.1 BACKFLOW PREVENTERS

- A. All backflow assemblies are reduced pressure backflow prevention assemblies, except for fire services.
- B. Backflow Prevention Assemblies for Fire Prevention Systems
  - 1. Fire Protection Systems
    - a. Class I & II: Direct connections from public water mains only, no physical connection from other water supplies (tanks, reservoirs) and all sprinkler drains discharge to the atmosphere or other safe outlets. Class II same as class I except that booster pumps may be installed.
    - b. Class III (low hazard): Direct connection from public water supply main plus one or more of the following: elevated storage tanks, fire pumps taking suction from above ground, covered reservoirs or tanks.
    - c. Class IV (low hazard): Similar to class I & II but which uses or has available for an unapproved auxiliary water supply.
    - d. Class V (high hazard): Supplied from public mains and interconnected with an unapproved auxiliary water exposed to contamination (harbors, rivers, ponds, wells or industrial fluids). The appropriate backflow prevention assembly shall be determined after the fire

marshal and the engineering department have made a complete survey of the fire protection requirements of the premises.

2. All fire protection systems have detector meters only and do not require service meters.
3. Reduced pressure backflow prevention assembly per University of Southern California's foundation for cross connection control and hydraulic research's list of approved backflow prevention assemblies.

C. Manufacturers:

1. Reduced-Pressure Backflow Preventers:
  - a. Febco LF825YA RP with ball valves (1/2" to 2")
  - b. Febco LF880V (2-1/2" to 8").
  - c. Zurn Wilkins 975XL2 (3/4" to 2")
  - d. Zurn Wilkins 375 (2-1/2" to 10")
  - e. Or approved equal
2. Double Check Detector Assemblies:
  - a. Febco LF876V (2-1/2" to 8")
  - b. Zurn Wilkins 350 (2-1/2" to 10")
  - c. Or approved equal

D. Points of Service

1. Point of service is at the back of the curb for all city streets with planter strips.
2. Point of service is at the back of the sidewalk for streets with combined curb and sidewalk.
3. Point of service is at the right-of-way line on all unimproved streets and alleys.

E. Lists of approved (by state & city) backflow prevention assemblies and certified backflow prevention assembly testers are available at City of Pittsburg, Public Works Dept. at 357 E. 12<sup>th</sup> St. and/or at the Engineering Department at 65 Civic Ave.

F. Reduced Pressure Backflow Preventers are required on all irrigation systems and domestic water main systems mains greater than 3 inches. Install BPD1 Guardshack two-piece protective enclosure around unit, hinged, stainless steel with forest green powder coating or approved equal.

G. A Reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device

- H. A backflow assembly shall be installed above ground, in a horizontal and level position unless otherwise approved by the engineering department or public works department.
- I. No additional connections (outlet, tap or tee) are permitted between the water main and backflow prevention assembly.
- J. Backflow assemblies shall not be installed in basements or vaults.
- K. Provide 20 mil tape between copper supply line and concrete pad 4" above and below concrete.
- L. Provide a 2" minimum bypass on all BFDS. Provide a reduced pressure backflow prevention detector on the bypass 3" and up.
- M. Reduced pressure backflow prevention assembly per University of Southern California's foundation for cross connection control and hydraulic research's list of approved backflow prevention assemblies.
- N. Reduced-Pressure Backflow Preventers:
  - 1. Size: 3 inches to 10 inches.
  - 2. Comply with ASSE 1013 and AWWA C511.
  - 3. Materials:
    - a. Body: Ductile Iron Grade 65-45-12
    - b. Finish: Fusion epoxy coating inside and outside.
    - c. Springs: Stainless steel.
    - d. Maximum Working Pressure of 175psi.
    - e. Maximum Hydrostatic Pressure of 350psi.
  - 4. Check Valves:
    - a. Quantity: Two, operating independently.
    - b. Spring loaded.
    - c. Third Check Valve: Open under back pressure in case of diaphragm failure.
  - 5. Differential-Pressure Relief Valve:
    - a. Type: Diaphragm.
    - b. Located between check valves.
  - 6. Gate Valves:
    - a. Type: Resilient seated according to AWWA C509 and AWWAC515.
    - b. Quantity: Two.
    - c. End Connections: Flanged

d. Operation: OS&Y.

7. Accessories:

a. Strainer.

b. Four resilient-seated ball valve test cocks.

## 2.2 VALVE VAULTS

A. Description: Precast concrete vaults shall be as specified in [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#).

## 2.3 PIPING

A. Description: As specified in [Section 33 11 13 - Water Distribution Piping](#).

## 2.4 PIPE SUPPORTS

A. Manufacturers:

1. Copper B-line#3093
2. Or approved equal

B. Floor Support for Pipe: Cast-iron adjustable pipe saddle, lock nut, nipple, floor flange, and steel support.

C. Copper Pipe Support: Adjustable carbon-steel ring and copper plate.

## 2.5 MATERIALS

A. Bedding and Backfill:

1. Bedding: Bedding Type, as specified in [Section 31 23 16 – Utility Trenching](#).
2. Backfill: Backfill Type, as specified in [Section 31 23 16 – Utility Trenching](#).

## 2.6 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 3 Inches and Smaller:

1. Ferrous Pipe:

- a. Class 150, malleable iron.
- b. Unions: Threaded.

2. Copper Tube and Pipe:



- a. Class 150.
    - b. Unions: Bronze.
    - c. Joints: Soldered.
  - B. Grooved and Shouldered Pipe End Couplings:
    1. Housing:
      - a. Description:
        - 1) Malleable iron clamps to engage and lock.
        - 2) Designed to permit some angular deflection, contraction, and expansion.
      - b. Bolts, Nuts, and Washers: Type 304 Stainless Steel ASTM A193 (Grade B8-Class 2) and ASTM A194 (Grade 8).
    2. Sealing Gasket:
      - a. "C" shape.
      - b. Material: Composite.
  - C. PVC Pipe:
    1. Description: For connections to equipment and valves with threaded connections.
    2. Schedule 80 threaded PVC pipe.
  - D. Dielectric Connections:
    1. Description: Union with one end connection of galvanized or plated threaded steel, and other end connection of copper solder.
    2. Isolation Barrier: Impervious to water.
    3. Manufacturer:
      - a. Epco, Inc.
      - b. Or approved equal
- 2.7 UNDERGROUND PIPE MARKERS
- A. Warning Tape: As specified in [Section 33 05 26 – Utility Identification](#).
  - B. Trace Wire: As specified in [Section 33 05 26 – Utility Identification](#).

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.
- B. Verify that piping connections to existing piping system, sizes, locations, and inverts are as indicated on Drawings.

**3.2 PREPARATION**

- A. Section 01 70 00 - Execution: Requirements for installation preparation.
- B. Remove scale and dirt on inside and outside before assembly.

**3.3 INSTALLATION**

- A. Valve Vault: As specified in [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#).
- B. Pipe Supports:
  - 1. Install pipe supports according to MSS SP-58.
  - 2. Exposed Supports: Prime coated as specified in [Section 09 90 00 - Painting and Coating](#).
- C. Buried Piping Systems:
  - 1. Establish elevations of buried piping with not less than 2.5 feet of cover.
  - 2. Establish minimum five (5) feet of separation from sanitary sewer lateral piping according to §64572. Water Main Separation of the California Regulations Related to Drinking Water.
  - 3. Remove scale and dirt from inside of piping before assembly.
  - 4. Excavate pipe trench as specified in [Section 31 23 16- Utility Trenching](#).
  - 5. Install pipe to elevation as indicated on Drawings.
  - 6. Place bedding material at trench bottom to provide uniform bedding for piping.
  - 7. Level bedding material in one continuous layer as specified in [Section 31 23 16- Utility Trenching](#)
  - 8. Compact bedding material to percent maximum density as specified in [Section 31 23 16- Utility Trenching](#).
  - 9. Install pipe on prepared bedding.
  - 10. Route pipe in straight line.
  - 11. Install pipe to allow for expansion and contraction without stressing pipe or joints.

12. Install shutoff and drain valves at locations as indicated on Drawings and as specified in this Section.
13. Install plastic warning tape and tracer wire continuous over the top of pipe as specified in Section 33 05 26 – Utility Identification
14. Backfill: Install backfill Type, as specified in [Section 31 23 16 – Utility Trenching](#).

D. Vault Interior Piping Systems:

1. Install non-conducting dielectric connections wherever joining dissimilar metals.
2. Establish elevations of buried piping outside valve vault to obtain not less than 2.5 feet of cover.
3. Prepare exposed and unfinished pipe, fittings, supports, and accessories ready for finish painting as specified in [Section 09 90 00 - Painting and Coating](#).
4. Install water piping according to ASME B31.9.
5. Install unions downstream of valves and at equipment or apparatus connections.
6. Install brass male adapters on each side of valves in copper piped system; solder adapters to pipe.

E. Backflow Preventer Assemblies:

1. Install backflow preventers of type, size, and capacity indicated.
2. Comply with California Regulations Related to Drinking Water and authority having jurisdiction.
3. Install air-gap fitting on units with atmospheric vent connection.
4. Pipe relief outlet drain to nearest floor drain.
5. Do not install bypasses around backflow preventers.

### 3.4 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Perform pressure test on installed backflow pressure assemblies as specified in [Section 33 11 13 - Water Distribution Piping](#).
- C. Disinfect installed backflow preventer assemblies as specified in [Section 33 13 00 - Disinfecting of Water Distribution](#).

**END OF SECTION 33 12 00**

**SECTION 33 12 13 - WATER SERVICE CONNECTIONS****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Pipe and fittings for water service connections.
2. Corporation stop assemblies.
3. Curb stop assemblies.
4. Meter setting equipment.
5. Water meters.
6. Backflow preventers.
7. Underground pipe markers.
8. Precast concrete vaults.
9. Bedding and cover materials.

## B. Related Requirements:

1. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete for thrust restraints.
2. [Section 31 05 13 – Clearing & Grubbing, Excavation and Earthwork](#): Excavation for water services.
3. [Section 31 23 16 – Utility Trenching](#): Excavation of pipe trench.
4. [Section 33 05 13 - Manholes and Structures](#): Soil backfill type, manholes, and covers.
5. [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#): Valve vaults.
6. [Section 33 13 00 - Disinfecting of Water Distribution](#): Flushing and disinfecting of water system.

## 1.2 REFERENCE STANDARDS

## A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

## B. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

## C. American Society of Sanitary Engineering:

1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

## D. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
4. ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications.
5. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
6. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
8. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
10. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
11. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

## E. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

## F. American Water Works Association:

1. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
2. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
3. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
4. AWWA C702 - Cold-Water Meters - Compound Type.
5. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.

6. AWWA C800 - Underground Service Line Valves and Fittings.
7. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
8. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data on pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.
- C. Shop Drawings: Indicate details showing vault and accessories.
- D. Manufacturer's Certificate: Certify that products meet or exceed the AWWA and ASTM Standards.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statement:
  1. Submit qualifications for manufacturer.

### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### 1.5 QUALITY ASSURANCE

- A. All pipe, fittings used for potable water systems shall be "lead free". All bronze goods shall be "lead free" and marked by stamping, etching, or casting "NL" in the main body or by other methods acceptable to City.

- B. All bronze parts in contact with potable water shall be certified by an ANSI accredited test lab for “Lead Free” requirements. Contractor shall submit proof of certification.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three (3) years' documented experience.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store products and materials off ground and under protective coverings and away from walls.
- D. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

## PART 2 - PRODUCTS

### 2.1 WATER PIPING AND FITTINGS

- A. Copper Tubing:
  - 1. Comply with ASTM B88.
  - 2. Type K, soft temper, joint free for buried piping and uniform wall thickness.
  - 3. Fittings: Soldered Fittings shall conform to ASME B16.18, cast copper or ASME B16.22, wrought copper.
  - 4. Joints: Compression connections.

### 2.2 CORPORATION STOP ASSEMBLIES

- A. Manufacturers:
  - 1. Mueller Co. (H-15008 with CC thread only and H-15013N for 1-1/2” and 2”).
  - 2. Ford Meter Box, Inc.
  - 3. Or approved equal.
- B. Corporation Stops:

1. Comply with ASTM B62 with the exception that any bronze part of the fitting in contact with potable water (wetted parts) shall be made of a “No-Lead Bronze”, in accordance with the chemical and mechanical requirements of ASTM B584 and “Lead Free” requirements of California Assembly Bill 1953.
2. Maximum working pressure: 300 psig.
3. Type: Ground Key Corporation valve
4. Body: Low Lead Bronze alloy.
5. Inlet End: Threaded for tapping according to AWWA C800.
6. Outlet End: Compression connection for CTS O.D tubing.
7. O-ring: EPDM ASTM D2000

C. Service Saddles:

1. Type: Double strap.
2. Material: Bronze when used with PVC pipe, and full circle stainless steel with full circle insulating pad, when used with ductile iron pipe.
3. Outlet thread shall be AWWA Standard CC thread only.
4. Designed to hold pressures in excess of pipe working pressure.
5. The bronze saddles shall comply with lead leaching threshold per local regulations.
6. Manufacturers:
  - a. Mueller Co. (BR2B Series)
  - b. Or approved equal.

## 2.3 ANGLE METER STOP

- A. Type: Bronze
- B. Compression connection for CTS OD Tubing x meter flange
- C. Manufacturer:
  1. Mueller Co. (H-14258 for 1” service and H-14277 for 1-1/2” and 2” service)
  2. Or approved equal.

## 2.4 METER SETTING EQUIPMENT

- A. As specified in [Section 33 05 17 – Precast Concrete Valve Vaults and Meter Boxes](#).

## 2.5 WATER METERS

- A. For Capital Improvement Projects (CIP) the Contractor shall connect to existing meters.



- B. For Development Projects, the Contractor shall install water meters for two (2) inches and smaller diameter lines furnished by the City. For larger diameter lines, the Contractor is responsible to furnish the water meters.

## 2.6 BACKFLOW PREVENTERS

- A. As specified in [Section 33 12 00 - Water Distribution Equipment](#).

## 2.7 UNDERGROUND PIPE MARKERS

- A. As specified in [Section 33 05 26 – Utility Identification](#)

## 2.8 PRECAST CONCRETE VAULTS

- A. As specified in [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#).

## 2.9 MATERIALS

- A. Bedding and Backfill:
  1. Bedding: Bedding Type, as specified in [Section 31 23 16 – Utility Trenching](#).
  2. Backfill: Backfill Type, as specified in [Section 31 23 16 – Utility Trenching](#).

## 2.10 ACCESSORIES

- A. Concrete for Thrust Restraints: As specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify that building service connections and municipal utility water main sizes, locations, and inverts are as indicated on Drawings.

## 3.2 PREPARATION

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

- C. Remove scale and dirt from inside and outside of piping before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

### 3.3 INSTALLATION

#### A. Bedding:

1. Excavate pipe trench and backfill as specified in [Section 31 23 16 – Utility Trenching](#)

#### B. Pipe and Fittings:

1. Maintain a minimum of five (5) feet of separation between water and sewer services.
2. Group piping with other Site piping Work whenever practical.
3. Route pipe in straight line.
4. Install pipe to allow for expansion and contraction without stressing pipe or joints.
5. Install access fittings to permit disinfection of water system performed under [Section 33 13 00 - Disinfecting of Water Distribution](#).
6. Form and place concrete for thrust restraints at each elbow or change of direction of pipe.
7. Establish elevations of buried piping with not less than two and half (2.5) feet of cover.
8. Install warning tape continuous over top of pipe as specified in [Section 33 05 26 – Utility Identification](#).
9. Backfill trench as specified in [Section 31 23 16 – Utility Trenching](#).

#### C. Curb Stop Assemblies:

1. Set curb stops on solid bearing and compacted soil.
2. Boxes:
  - a. Center and plumb curb boxes over curb stops.
  - b. Set box cover flush with finished grade.

#### D. Hot Tap Process:

1. Tapping for water service connections shall be performed using Corporation Stops threaded on double strap bronze Service Saddles. No direct threaded connection of Corporation Stops on pipe shall be permitted; regardless of the type of mainline pipe material.
2. Minimum distances required when tapping are: 18 inch between taps (staggered at 45 degrees); 24 inch from back of bell; and 24 inch from spigot insertion line; or per manufacturer recommendations, whichever is greater.

Contractor shall consult the City's Inspector on these critical distance situations, and shall not backfill without inspection. Contractor shall submit the tapping bit to the City's Inspector/Engineer for approval, before starting the tapping work.

E. Service Saddles and Service connections:

1. Service saddles shall have a bearing area of sufficient width along the axis of the pipe, so that the pipe will not be distorted when the saddle is made tight.
2. An internal shell cutter shall be used to drill through the corporation stop to minimize PVC shavings, retain the coupon, and reduce stress. Single fluted shell cutters or twist drills will not be allowed.
3. Lubricate the cutting and tapping edges of the tool with cutting lubricant. Make the cuts slowly and use the follower very lightly. Do not force cutter through pipe wall. Shell cutter shall have sufficient throat depth to handle the heavy wall PVC pipe.
4. Maximum outlet size permitted with service saddle is 2 inches.

F. Water Meters: The Contractor shall follow the procedures below in conjunction with the City Standard Detail W-5.

1. The new procedure for installing permanent domestic water service is as follows:
  - a. Contractor to excavate and set meter box per City standard Detail W-5.
  - b. Contractor is responsible for connecting the house line to the new meter, and flushing service line at resident's hose bib to remove any dirt and / or sediment prior to sign off.
  - c. Contractor is responsible for disinfecting new and repaired water mains in accordance with AWWA Ansi/AWWA C651-1.
  - d. Contractor to pay Contra Costa Water District Facility Reserve Fee to the Contra Costa Water District and provide copy of receipt to the Building Department.
  - e. Contractor to pay the Building Department for the meter. Contractor to provide the box.
  - f. Contractor to pay the Engineering Department for the City Water Facility Reserve charge.
  - g. Once Building Department has confirmation of all fees paid, Building Division will notify the Public Works Department that the meter can be released. Public Works staff will install the water meter.
2. The procedure for obtaining temporary water service for construction is as follows: (Picking up a Hydrant Meter)
  - a. Obtain a Construction Water Permit – Hydrant Meter Form from the City of Pittsburg Water Payment Center Desk (first floor, Civic Center, 65 Civic Avenue).

- b. Submit this completed form and pay fees according to the table below at the Water Payment Center Desk.
  - c. Take the completed form and payment receipt to the office of Public Works Corporation Yard, 357 E. 12th Street to pick up hydrant meter between the hours of 7:00 a.m. and 3:00 p.m.
3. Contractor's Responsibilities:
- a. All water to be used for construction purposes and drawn from a fire hydrant MUST be metered.
  - b. Contractor/Applicant is responsible to pay monthly fixed charges and a water usage charge which will be billed once a month, and after the meter is returned to the City of Pittsburg Public Works Department. If account becomes delinquent, Public Works may request hydrant meter to be returned until account has been paid current.
  - c. Contractor/Applicant is responsible for reporting meter reading to the Finance Department during the third week of every month: by faxing the monthly hydrant read request form and picture of read and meter number to (925) 252-6927 or by email [ehelden@pittsburgca.gov](mailto:ehelden@pittsburgca.gov). If a meter reading is not provided by the 20 th of each month, a \$34 verification meter reading fee will be charged to reimburse the city for the cost. If no read has been reported by the 25th Public Works will attempt to contact jobsite and other fees may apply.
  - d. If the meter readings are not verified in the field by city staff at least every three months, the contractor is responsible to bring the hydrant meter to the Public Works Corporation Yard to have it officially read. The reads will be verified to the monthly reads reported to the Finance Department. Also at this time, the condition of the meter will be checked to determine if repairs are needed.
  - e. Contractor/Applicant is responsible for any and all damage to the meter and is required to keep the meter and register clean and free of obstructions which may affect the operation of the meter while issued to them.
  - f. Meters shall not be moved to another job site or taken outside city limits. Meters must be accessible to Public Works at all times.
  - g. Lost, stolen or severely damaged hydrant meters may result in the loss of deposit and/or additional charges to the applicant. At any point Public Works could require the meter to be tested for accuracy.
  - h. Meters shall be kept inside vehicles when not in use. If register rolls backwards extra fees may apply.
- G. Backflow Preventers: Install backflow preventers as specified in [Section 33 12 00 - Water Distribution Equipment](#).
- H. Service Connections:

1. Install water service according to City Standard details. All new water services shall be minimum of 1 inch in size.
2. Services shall be reconnected with an insulating and reducing coupling to the existing customer meters at all locations.
3. Install water meter and backflow preventer in concrete vault located outside of City right of way as specified in [Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes](#).
4. Install water service to the water meter and connect to building water service beyond the water meter.
5. Install water meter and backflow preventer.

I. Precast Concrete Vault:

1. Construct valve vaults of precast concrete.
2. Seal vault joints watertight with preformed plastic joint sealant compound.
3. Apply asphalt waterproofing to exterior walls.
4. Seal annular space between pipe and wall sleeves as indicated on Drawings.
5. Install vault covers and frames and adjust to finished grade elevation.

J. Disinfection of Water Piping System: Flush and disinfect system as specified in [Section 33 13 00 - Disinfecting of Water Distribution](#).

3.4 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Pressure test water distribution system according to AWWA C600 and as specified in [Section 33 11 13 – Water Distribution Piping](#).
- C. Compaction Testing for Bedding: Comply with ASTM D1557.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- E. Frequency of Compaction Tests: Every 25 feet and minimum one test for each water services, whichever is greater.

**END OF SECTION 33 12 13**

**SECTION 33 12 16 - WATER DISTRIBUTION VALVES****PART 1 - GENERAL**

## 1.1 SUMMARY

## A. Section Includes:

1. Gates Valves and Butterfly Valves
2. Valve boxes.

## B. Related Requirements:

1. [Section 03 30 00 – Utility Cast-in-Place Concrete](#): Concrete for thrust restraints.
2. [Section 33 11 13 - Water Distribution Piping](#): Piping trenching, backfilling, and compaction requirements.
3. [Section 33 12 19 - Water Distribution Fire Hydrants](#): Execution requirements for fire hydrants.
4. [Section 33 13 00 - Disinfecting of Water Distribution](#): Flushing and disinfection requirements.

## 1.2 REFERENCE STANDARDS

## A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
3. AWWA C550 - Protecting Interior Coatings for Valves and Hydrants.
4. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

## B. ASTM International:

1. ASTM B 62 - Specification for Composition Bronze or Ounce Metal Castings.

## C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

## 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.

- B. Product Data: Submit manufacturer's latest published literature. Include illustrations, installation and maintenance instructions, and parts lists.
- C. Shop Drawings: Submit description of proposed installation.
- D. Manufacturer's Certificate: Certify that products meet or exceed the City's requirements.
- E. Submit 10-year warranty for valves.
- F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statements:
  - 1. Submit qualifications for manufacturer and installer.
  - 2. Submit manufacturer's approval of installer.

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit information for valves.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for maintenance materials.

#### 1.6 QUALITY ASSURANCE

- A. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.
- B. Contractor shall submit the Hydrostatic and Leakage test report for the valves.
- C. Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Prepare valves and accessories for shipment according to applicable AWWA standards.
- C. Seal valve and ends to prevent entry of foreign matter.
- D. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage. Care shall be taken in loading, transporting and unloading to prevent injury to the valves, appurtenances, or coatings. Equipment shall not be dropped. All valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage to the coatings shall be repaired as acceptable to the Project Manager.
- E. Insofar as is practical, the equipment specified herein, shall be factory assembled. The parts and assemblies that are shipped unassembled, shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final assembly in the field.
- F. Storage:
  - 1. Store materials in areas protected from weather, moisture, or other potential damage.
  - 2. Do not store materials directly on ground.
- G. Handle products carefully to prevent damage to interior or exterior surfaces.
- H. Weight handling instruction shall be included with each shipment.
- I. Special tools and the manufacturer's standard spare parts, if required for normal operation and maintenance, shall be supplied with the equipment.



**PART 2 - PRODUCTS****2.1 VALVES**

- A. The CONTRACTOR shall furnish all valves, valve-operating units, stem extensions and other accessories. All valves shall be new and of current manufacturer.
- B. Valve size shall be the same diameter as the largest adjacent pipe size.
- C. Where buried, all valves shall be provided with valve boxes and covers.
- D. All elastomers used in valves shall be made of EPDM synthetic polymers that are specifically developed for their chemical resistance. EPDM elastomers are to be used in both the gate valves and butterfly valves.
- E. Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the water passages of all valves, as well as the exterior surfaces of all valves shall be coated in accordance with AWWA.
- F. All unburied manual operators shall have handwheels.
- G. All valve operation shall be left-hand (counterclockwise) opening.
- H. All buried valves shall have operating nuts, valve boxes and other features.
- I. All nuts and bolts on valve flanges and supports shall be in accordance with [Section 33 11 13 – Water Distribution Piping](#).
- J. 5lb minimum anode required on all copper service lines 2" and less unless geotechnical report stipulates it is not necessary. Additional weight may be required between copper water lateral and water main if main is metallic.

**2.2 RESILIENT WEDGE GATE VALVES**

- A. Manufacturers:
  - 1. Mueller Co. (A-2360 & A-2361)
  - 2. Or approved equal.
- B. Description:
  - 1. Comply with AWWA C509/WWA C515, Underwriters Laboratory Inc., Certified to NSF 61 and approved by Factory Mutual Corporation.
  - 2. Materials: Body is Ductile iron
  - 3. Seats: Resilient seated with fully encapsulated disk and inside screw type. All elastomers used in valves shall be made of EPDM synthetic polymers that are specifically developed for their chemical resistance.
  - 4. Stem:

- a. Type: Non-rising stem with O-ring stuffing boxes.
- b. Material: Bronze.
5. Operation:
  - a. 2-inch Square operating nut.
  - b. Open counterclockwise unless otherwise indicated.
6. End Connections: Flanged or Mechanical joint.
7. Coatings:
  - a. Comply with AWWA C550.
  - b. Interior and exterior.
  - c. Bolt holes and body-to-bonnet flanges surfaces are fully epoxy coated.
8. Maximum Working Pressure Rating: 250 psig for 10" pipe diameter and smaller.

## 2.3 BUTTERFLY VALVES

### A. Manufacturers:

1. Mueller Co. (Mueller Linesal XPII Class 250B)
2. Or approved equal.

### B. Description:

1. Comply with AWWA C504, Underwriters Laboratory Inc., Certified to NSF 61 and approved by Factory Mutual Corporation.
2. All butterfly valves shall be of the rubber-seated, tight closing type.
3. Materials: All valve bodies and vanes shall be of high strength ductile iron to ASTM A536, Grade 65-45-12.
4. Shafts: Valve shafts shall be ASTM A564 Type 630 stainless steel. Each valve shaft shall be of a one-piece design for valves 10" and smaller and a two-piece design for valves 12" and larger. Valve shafts shall have a minimum diameter extending through the valve bearings and into the valve disc as specified in AWWA C504. All valve shafts must meet or exceed the minimum connection torque requirement set forth in AWWA C504.
5. Rubber valve seats shall be a full-circle 360 degree, seat not penetrated by the valve shaft. Valve seat shall be EPDM.
6. Stem:
  - a. Type: Non-rising stem with O-ring stuffing boxes.
  - b. Material: Bronze.
7. Operation:
  - a. 2-inch Square operating nut. Unless otherwise shown, all unburied manually-operated butterfly valves shall be equipped with a hand wheel and position indicator. All operators shall be side mounted.
  - b. Open counterclockwise unless otherwise indicated.
8. End Connections: Flanged or Mechanical joint.

9. Coatings:
  - a. Comply with AWWA C550.
  - b. Interior and exterior.
  - c. Bolt holes and body-to-bonnet flanges surfaces are fully epoxy coated.
10. Maximum Working Pressure Rating: 250 psig for 12-inch Diameter and larger.

## 2.4 VALVE BOXES

- A. Manufacturers:
  1. Oldcastle Precast
    - a. Christy G5T Box and G05CT Lid for all diameter valves
  2. Or approved equal.
- B. Description:
  1. Valves:
    - a. Style: Flush
    - b. Material: Cast iron.
    - c. Type: Two-piece, screw.
    - d. Lid: Cast Iron Bolt down and Surface Skid Resistant
    - e. Grade Ring Material: Cast Iron
    - f. Body Material: Reinforced concrete with frame and Type 304 Stainless steel bolts – 10-3/8" diameter and 12" high
    - g. Extension: 12" Reinforced Concrete
    - h. Performance: H20 rated.

## 2.5 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).
- B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Determine exact location and size of valves from Drawings.
- B. Verify that invert elevations of existing work prior to excavation and installation of valves are as indicated on Drawings.

### 3.2 PREPARATION

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Conduct operations to not interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures, utilities, and landscape in immediate or adjacent areas.
- C. Identify required lines, levels, contours, and datum locations.
- D. Locate, identify, and protect from damage utilities to remain.
- E. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
  - 1. Notify Project Manager not less than two (2) working days in advance of proposed utility interruption.
  - 2. Do not proceed without written permission from Project Manager.

### 3.3 INSTALLATION

- A. Perform trench excavation, backfilling, and compaction as specified in [Section 33 11 13 - Water Distribution Piping](#).
- B. Install valves in conjunction with pipe laying. All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation
- C. Set valves plumb. Support valves firmly to avoid undue stresses on the pipe during installation.
- D. Provide buried valves with valve boxes installed flush with finished grade.
- E. All exposed valves shall be installed to provide easy access for operation, removal and maintenance and to avoid conflicts between valve operators, structural members, or piping
- F. All gate and butterfly valves, operating nuts, valve boxes and accessories shall be installed in accordance with AWWA Standards and the manufacturer's printed recommendations.
- G. All buried butterfly valves shall be oriented so that the operating nuts are on the side of the water main closest to the curb.
- H. Where flanged butterfly valves are connected to a "Tee" or "Cross" fitting, a minimum 12-inch long ductile iron pipe flange spool shall be installed between the fitting and the valve. An adaptor (FLGxMJ) is required between the valve and the pipe when PVC C-900 DR14 and PVC C905 DR14 pipe are used.

- I. Where flanged butterfly valves are installed with PVC C-900 DR14 and PVC C905 DR14 pipe, an adaptor (FLGxMJ) is required on both sides of the valve.
- J. All exposed butterfly valves shall be installed with a coupling that can be used in removing the complete valve assembly without dismantling the valve or operator.
- K. Disinfection of Water Piping System:
  - 1. Flush and disinfect system as specified in [Section 33 13 00 - Disinfecting of Water Distribution](#).

### 3.4 FIELD QUALITY CONTROL

- A. Pressure test system according to AWWA C600 and following:
  - 1. Perform pressure testing on water distribution system according to [Section 33 11 13 - Water Distribution Piping](#).

**END OF SECTION 33 12 16**

**SECTION 33 13 00 - DISINFECTING OF WATER DISTRIBUTION****PART 1 - GENERAL****1.1 SUMMARY****A. Section Includes:**

1. Disinfection of potable water distribution and transmission systems.
2. Testing and reporting of results.

**B. Related Requirements:**

1. [Section 33 11 13 - Water Distribution Piping](#): Product and execution requirements for installation and testing of site domestic water distribution piping.

**1.2 REFERENCE STANDARDS****A. American Water Works Association:**

1. AWWA B300 - Hypochlorites.
2. AWWA C651 - Disinfecting Water Mains (Please see section 1.6 QUALITY ASSURANCE A.1)

**B. California Codes:**

1. Titles 17 and 22 California Code of Regulations - Chapter 16 – California Waterworks Standards – Article 5. Disinfection Requirements - §64580 – Disinfection of New or Repaired Mains.
2. Titles 17 and 22 California Code of Regulations - Chapter 16 – California Waterworks Standards – Article 5. Disinfection Requirements - §64590 – Direct Additives.

**1.3 SUBMITTALS****A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.****B. A testing schedule, include proposed plans for water conveyance, fill location, bleed location(s), control, disposal, and disinfection shall be submitted to the Project Manager for review a minimum of 72 hours before testing is to start.****C. Submit plan for disinfection of pipelines, appurtenances, and any portion of the existing connecting system that might become contaminated during construction**

activities. The plan must outline how disinfection will be applied and implemented, the method used shall be the continuous feed method using sodium hypochlorite of no less than 12.0% strength, preventative and corrective measures to prevent contamination during construction, method of capping pipes, flushing plan, and bacteriological sampling plan. The plan must be in strict accordance with AWWA Standard C651-05. Other disinfection methods may be approved at the City's discretion.

- D. Product Data: Submit procedures, proposed chemicals, and treatment levels.
- E. Manufacturer's Certificate: Certify that products meet or exceed project requirements.
- F. Certify that cleanliness of water distribution system meets or exceeds the project requirements.
- G. Certify that water conforms or fails to conform to bacterial standards of the jurisdiction.
- H. Certify that water conforms to quality standards of the jurisdiction.
- I. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.
- J. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- K. Qualifications Statements:
  - 1. Submit qualifications for water treatment firm and testing firm.

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for submittals.
- B. Disinfection Report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Name of person collecting samples.
  - 5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
  - 6. Date and time of flushing start and completion.
  - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Submit bacteriologist's signature and authority associated with testing.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work according to AWWA C651 with exception of the following:
  1. The rest period for taking 1st and 2nd samples shall be 24 hours apart. (16-hour rest period is not an option!)

#### 1.6 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three (3) years' documented experience.

### **PART 2 - PRODUCTS**

#### 2.1 DISINFECTION CHEMICALS

- A. Chemicals:
  1. Hypochlorite: Comply with AWWA B300.
  2. Chlorine for disinfection shall be in the form of sodium hypochlorite solution, or calcium hypochlorite granules or tablets.
  3. The Contractor shall only use NSF approved chemicals in accordance with California Code of Regulations Title 22, Article 7. Section §64590.
  4. The concentration dosage of chlorine for disinfecting water mains shall be as defined in AWWA Standard C651-05.

#### 2.2 TEST EQUIPMENT

- A. All test equipment, temporary valves or assemblies, strainers, calibrated pressure gages, pumps, bulkheads, or other water control equipment and materials shall be furnished by the Contractor subject to the Project Manager's review. No materials shall be used which would be injurious to the piping system or its proposed function.



**PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. [Section 01 70 00 - Execution](#): Requirements for installation examination.
- B. Verify that piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

## 3.2 INSTALLATION

- A. Provide and attach required equipment to perform Work of this Section.
- B. After completion of the hydrostatic test as specified in [Section 33 11 13 - Water Distribution Piping](#), the mains shall be thoroughly flushed with a minimum pipe velocity of 2.5 fps until the receiving water is free of visible dirt and impurities.
- C. Filling the system: Fill entire test system with the chlorine solution at a rate not to exceed 1 foot per second. Open all taps and valves and leave open until a strong odor of chlorine is noticeable in the water coming from the outlets, after which close the taps and valves. The chlorine residual must be verified by field sampling and be above 100 PPM at all points of the disinfected pipeline and at designated services.
- D. Testing Period: Allow chlorinated water to remain in the system a minimum of 24-hours, and then thoroughly flush the system. During retention period, operate all valves, stops, and other appurtenances to assist the disinfection process. After 24 hours, the minimum chlorine residual shall be verified by field sampling and not be less than 10 PPM at all points of the disinfected pipeline and at designated services.
- E. Post Disinfection Flushing: Flush, circulate, and clean until required cleanliness is achieved using municipal domestic water. Clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Debris cleaned from the lines shall be removed from the low end of the pipeline. If after this cleaning, obstructions remain, they shall be removed. Flush the potable water system to remove all super chlorinated water. Continue flushing until the receiving water is field verified and the chlorine residual is no higher than 3 PPM and is consistent with the City source water.
- F. Bacteriological Examination: After the system has been thoroughly flushed, the City requires that the new main and services test negative for total coliform and

**Escherichia coli.** Two consecutive sets of samples and one sample from each dead end taken at least 24-hours apart every 600 feet shall be collected by the Contractor at locations approved by the City. At any time that a sample test positive, the disinfection process will restart from the beginning. The Contractor shall sample and perform bacteriological testing for the first two consecutive rounds of sampling, if the samples are all negative for total coliform and Escherichia coli. Contractor shall in writing notify the City 24-hours in advance of any sampling plan changes or results.

- G. Samples shall be taken no sooner than 24 hours after final flushing. Jumpers and/or plates shall be pulled within 14 days of the notification of a successful test, or new bacteria samples will have to be taken. Follow-up bacteriological testing shall take place after tie-ins have been made, and shall meet the same passing requirements as the initial tests.
- H. Should the initial disinfectant fail to produce satisfactory bacteriological test results, the disinfection procedure shall be repeated until acceptable results are obtained at the Contractor's cost if the first time fails (The first round of taking samples are free of charge). All lab costs for the bacteriological testing including staff hours (City of Pittsburg Master Fee Schedule) shall be borne by the Contractor. All costs for water used for flushing, and re-filling of the pipelines shall also be borne by the Contractor. The Contractor shall notify the City in writing a minimum of 7-days prior to commencing the disinfection of any pipe segment.
- I. Testing Documentation: In order to pass the disinfection process, the Contractor shall submit a written report verifying the initial chlorine dose of above 100 PPM, the chlorine residual after the 24-hour test period of above 10 PPM, and the chlorine residual for post disinfection flushing. The Contractor will be responsible for the bacteriological results for the two sets of consecutive samples. The Contractor shall be responsible for providing all required reports conducted in order to pass the disinfection process.
- J. Failure in following any portion of this section and American Water Works Standards C651-05, is in direct violation of the State of California Code of Regulations Article 5. Disinfection Requirements §64580. Disinfection of New or Repaired Mains.
- K. Disposal of Chlorinated Water: Dispose of chlorinated water in accordance with local agency, Delta Diablo Sanitation District (DDSD), state and federal regulations so that no water having chlorine residual reaches a surface stream. Contractor shall receive a permit from all above agencies including the City prior to any flushing operation.
- L. Final Flushing: After completion of successful disinfection process and connection to existing system, flush entire system to achieve velocities on the

order of 3 feet per second. Continue flushing until water is free of dirt and impurities.

- M. After the pipelines are cleaned and if the groundwater level is above the pipe or following a heavy rain, the Project Manager will examine the pipes for leaks. If any further defective pipes or joints are discovered, the Contractor shall repair them. Finished paving shall not be installed prior to completion of all cleaning and testing.
- N. Replace permanent system devices that were removed for disinfection.
- O. After the samples have passed the bacteriological testing, the Contractor will be notified and arrangements can be made to make tie-ins and connections to house services

### 3.3 FIELD QUALITY CONTROL

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for testing, adjusting, and balancing.
- B. Disinfection, Flushing, and Sampling:
  - 1. Disinfect pipeline installation according to AWWA C651.
  - 2. Use of liquid chlorine is not permitted.
  - 3. Taps for chlorination and sampling shall be installed by the Contractor.
  - 4. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
  - 5. Disposal:
    - a. Legally dispose of chlorinated water.
    - b. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
    - c. No discharge of chlorinated water to any storm sewer or natural water course will be allowed.
    - d. All costs for water disposal shall be borne by the Contractor.
  - 6. After final flushing and before pipeline is connected to existing system or placed in service, employ an approved independent testing laboratory to sample, test, and certify that water quality meets quality standards of the jurisdiction.
  - 7. Disinfection of tie-ins shall be performed by the Contractor by swabbing with chlorine or by other approved methods in the presence of Project Manager. Following a tie-in, the area affected by the tie-in shall be thoroughly flushed and bacteriological samples will be taken by the City as deemed necessary.

**END OF SECTION 33 13 00**

**SECTION 33 31 13 - SANITARY SEWER PIPING****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. The CONTRACTOR shall provide all materials, equipment, and labor necessary to furnish and install sanitary sewerage pipe, joints and fittings, pipe markers, connection to existing sewer manholes, wye branches and tees, sanitary sewer laterals.
- B. Jointing of pipe dissimilar in size and/or material shall be accomplished either by use of special adapters or couplings as specified on the plans or approved by the Project Manager for such use.
- C. All field cut pipe shall be accomplished with equipment recommended by the pipe manufacturer. No hammer or chisel cuts will be permitted.
- D. Related Requirements:
  - 1. [Section 01 29 00 - Payment Procedures](#)
  - 2. [Section 01 77 00 - Closeout Requirements](#)
  - 3. [Section 03 30 00 - Utility Cast-In-Place Concrete](#)
  - 4. [Section 03 60 00 - Grouting](#)
  - 5. [Section 31 23 16 - Utility Trenching](#)
  - 6. [Section 33 05 13 - Manholes and Structures](#)
  - 7. [Section 33 05 26 - Utility Identification](#)
  - 8. [Section 33 11 13 - Water Distribution Piping](#).

## 1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
  - 1. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
  - 2. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
  - 3. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).

4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
5. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
7. ASTM D 638 Test Method for Tensile Properties of Plastics
8. ASTM D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics
9. ASTM D 746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
10. ASTM D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
11. ASTM D 1248 Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
12. ASTM D 1505 Test Method for Density of Plastics by the Density- Gradient Technique
13. ASTM D 1525 Test Method for Vicat Softening Temperature of Plastics
14. ASTM D 1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics
15. ASTM D 2240 Test Method for Rubber Property – Durometer Hardness
16. ASTM D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
17. ASTM D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials
18. ASTM F 585 Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers
19. ASTM F 714 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
20. PLASTICS PIPE Renewing Sewers with Polyolefin Pipe Industry (PPI)

C. American Water Works Association:

1. AWWA C906-07 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution and Transmission

### 1.3 COORDINATION

- A. Notify affected property owners at least 72 hours prior to construction. All notifications shall be in English and Spanish and shall require prior approval from City. A detail letter regarding the construction work shall be prepared and mailed to any affected property owners a week ahead of starting the construction by the Contractor. No parking sign barricades shall be installed 72 hours prior to the work by the Contractor.

#### 1.4 PREINSTALLATION MEETINGS

- A. Attendance Roster: Include affected utility companies and appropriate City officials.

#### 1.5 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. **Certificates of Compliance**: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.
- C. Product Data: Submit manufacturer catalog cuts, other information indicating proposed materials, accessories, details, and construction information. Test and Evaluation Reports: Submit reports indicating field tests made and results obtained.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions:
  - 1. Indicate special procedures required to install specified products.
  - 2. Submit detailed description of procedures for connecting new sewer or existing sewer line and directional drilling installation.

#### 1.6 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record invert elevations and actual locations of pipe runs, connections, manholes and cleanouts.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- E. As-built drawings shall be provided as part of the closeout submittals.

#### 1.7 QUALITY ASSURANCE

- A. Testing at Manufacturer's Plant: All pipe shall be subject to a hydrostatic pressure test and a 3-edge bearing test at the manufacturer's plant. The Project Manager may select at random and test as specified one length of pipe for each

1000 feet or fraction thereof to be installed for the test as specified in ASTM C 301. The cost of pipe and the test shall be borne by the Contractor. Pipe will be acceptable under the test requirements specified herein when all test specimens conform to the test requirements. Should any of the test specimens fail to meet the test requirements, the manufacturer will be allowed to retest 2 additional specimens for each specimen that failed, and the pipe shall be acceptable only when all the retest specimens meet the strength requirements.

- B. Inspection of Materials: All pipe and fittings shall be true, circular, and concentric with the barrel of the pipe, cut off on a plane at right angles to the longitudinal axis of the pipe. At no point shall the thickness of the shell of the extreme outer end of the spigot be less in thickness than the shell of the main body of the pipe. Socket ends shall be square with the longitudinal axis and shall be true, circular, and concentric with the barrel of the pipe. All pipe shall be subject to inspection at the place of manufacture. The Contractor shall notify the Project Manager, in writing, of the manufacturing starting date not less than 14 days prior to the start of any phase of the pipe manufacture.
- C. All pipe and fittings shall have smooth interiors and shall be free from injurious cracks, checks, blisters, broken extremities, or other imperfections.
- D. The following imperfections in the barrel or socket of a pipe or fitting will be considered injurious and cause for rejection:
  - 1. A single crack in the barrel of the pipe or fitting regardless of the length and depth of such crack.
  - 2. Lumps, blisters, pits, or flakes on the interior surface of a pipe or fitting.
  - 3. When spigot or bell of the pipe varies from a true circle more than 3 percent (3%) of its nominal diameter.
  - 4. Any piece broken from the spigot end which extends through the barrel.
  - 5. Tramp clays, grog, or other foreign matter which is fused permanently to the exterior or interior surface of the pipe or fittings.

## 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section that are included in the contract shall have minimum three years of documented experience.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.



- C. Storage: Store materials according to manufacturer instructions.
- D. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Block individual and stockpiled pipe lengths to prevent moving.
  - 3. Provide any additional protection according to manufacturer instructions.

## 1.10 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 SANITARY SEWERAGE PIPE AND FITTINGS

- A. Plastic Pipe:
  - 1. Material: Polyvinyl chloride (PVC).
  - 2. Comply with ASTM D3034, SDR-26
  - 3. Inside Nominal Diameter: 4 inches through 15 inches.
  - 4. End Connections: Bell and spigot style, with rubber-ring-sealed gasket joint.
  - 5. Fittings: PVC.
    - i. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends.
    - ii. The strength class of fittings shall be no less than the strength class of any adjoining pipe, unless the adjoining pipe is an existing pipe.
    - iii. PVC fittings shall, at a minimum, conform to the requirements of ASTM D3034 as they apply to type SDR-26 PVC Sewer Pipe using an elastomeric gasket joint in a bell and spigot assembly system. Rubber sealing gaskets shall meet the requirements of ASTM F477.
    - iv. All PVC pipe entering or leaving a concrete structure shall have a rubber sealing gasket, as supplied by the pipe manufacturer, firmly seated perpendicular to the pipe axis, around the pipe banded and cast into the structure base or near the structure wall center as a water stop. Said water stop may also consist of a manhole coupling with rubber sealing rings cast into the structure base.
  - 6. Joints: Joints shall be Elastomeric gaskets complying with ASTM F477.

## 2.2 FLEXIBLE COUPLINGS

- A. Description: Flexible couplings used for repairs, alterations and connections of dissimilar materials shall be rubber, full-circle, clamp-on type conforming with ASTM C 425, resilient chemical-resistant elastomeric polyvinyl chloride (PVC) coupling and provided with four (4) stainless steel band screw-clamps to secure the coupling tightly to entering and exiting pipes. All screw-clamp hardware shall be Type 304 or Type 316 stainless steel. Rubber material shall be suitable for use on sewage systems. All flexible couplings shall be approved by the City Engineer prior to its installation.
- B. Manufacturers: Fernco®, Mission®, Husky® or approved equal
- C. Furnish materials according to ASTM C 425.

## 2.3 TWO WAY SEWER CLEANOUTS

- A. Cleanouts shall be provided in the side sewer system at the following locations:
  - 1. At the property line
  - 2. At any single bend greater than forty-five degrees (45°).
  - 3. At intervals along the side sewer system where the cumulative total of deflection from the point of connection to the main sewer or from another cleanout equals or exceeds ninety degrees (90°).
  - 4. At intervals not to exceed one hundred (100) feet.
  - 5. Cast iron two-way cleanout fittings are not preferred.

## 2.4 RODDING INLETS

- A. Rodding inlets are considered temporary terminal structures and may only be used when: 1) future main sewer extensions are possible beyond the proposed upstream end of the Job; and 2) a future sewer main sewer extension would not require a manhole at the proposed upstream end of the current Job.

## 2.5 OVERFLOW PROTECTION DEVICES:

- A. Overflow protection devices are required when the lowest building finish floor elevation is one foot lower than the rim elevation of the nearest upstream sanitary sewer manhole. This overflow protection device is to prevent backflow of sewage into the building.

- B. No side sewer shall be constructed, altered or repaired without confirming that an approved overflow protection device has been properly installed on the side sewer.
- C. Where reasonably possible, overflow protection devices shall be located in areas away from vehicular and foot traffic. If an overflow protection device must be located in an area which will have concrete or asphalt paving, such as a driveway or sidewalk, the device shall be installed in an approved reinforced concrete utility box fitted with a metal grate.
- D. Where the sewage cannot overflow on the area surrounding of an overflow protection device without damage to property, a City-approved overflow protection device shall be installed.
- E. Manufacturers:
  - 1. Unlimited Home Solutions, LLC or approved equal (Sewer Relief Cap)
  - 2. Genplex – Kelly Backwater Device (No-Hub & IPS) or approved equal (Mushroom type OPD)
  - 3. Sewer Popper™ by Stephens Corp. or approved equal (Sewer Pop up)
  - 4. Mainline Backflow Products; Rector Seal; or approved equal (Extendable Backwater Valve)

## 2.6 MANHOLES

- A. Description: As specified in [Section 33 05 13 - Manholes and Structures](#).

## 2.7 MIXES

- A. Grout: As specified in [Section 03 60 00 - Grouting](#).

## 2.8 FINISHES

- A. Galvanizing:
  - 1. Hot-dip galvanize after fabrication.
  - 2. Comply with ASTM A123.

## 2.9 ACCESSORIES

- A. Pipe Supports:
  - 1. Metal for pipe support brackets: Galvanized structural steel, thoroughly coated with bituminous paint.
- B. Pipe Markers: As specified in [Section 33 05 26 - Utility Identification](#).

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that trench cut is ready to receive Work.
- B. Verify that excavations, dimensions, and elevations are as indicated on the drawings.

**3.2 PREPARATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Utilities:
  - 1. Maintain profiles of utilities.
  - 2. Coordinate with other utilities to eliminate interference.
  - 3. Notify Project Manager if crossing conflicts occur.

**3.3 INSTALLATION**

- A. Bedding:
  - 1. Excavate pipe trench as specified in [Section 31 23 16 - Utility Trenching](#).
  - 2. Excavate to lines and grades as indicated on Drawings, or as required to accommodate installation of encasement.
  - 3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
  - 4. Provide sheeting and shoring as specified in [Section 31 23 16 - Utility Trenching](#).
  - 5. Placement:
    - a. Place bedding material at trench bottom as specified in [Section 31 23 16 - Utility Trenching](#).
    - b. Level materials in continuous layer not exceeding lifts as specified in [Section 31 23 16 - Utility Trenching](#).
    - c. Compact to percentage of maximum density as specified in [Section 31 23 16 - Utility Trenching](#).
- B. Piping:
  - 1. Sewer pipe shall be laid to the line and grade as indicated on the Drawings. A string line shall be set and maintained by the Contractor by measuring

from three (3) consecutive points shown on the same rate of grade or slope, in order to detect any variation from a straight grade, and in any case such discrepancy is not reported to the Project Manager, the Contractor shall be responsible for any error in the finished work.

2. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.
3. Begin at downstream end and progress upstream.
4. Assemble and handle pipe according to manufacturer's instructions, except as may be modified on Drawings.
5. Keep pipe and fittings clean until Work has been completed and accepted by Project Manager.
6. Cap open ends during periods of Work stoppage.
7. Lay bell and spigot pipe with bells upstream.
8. Each length of pipe shall be laid on a firm bed and shall have a true bearing for the entire length between bell holes. No wedging or blocking up of the pipe will be permitted. Pipe found to be damaged must be replaced by new sections, repair clamps will not be allowed.
9. When, for any reason, pipe laying is interrupted, the open end of all lines shall be closed with a close-fitting stopper.
10. All necessary precautions shall be taken to prevent uplift or floating of the pipe prior to the completion of the backfilling operation. The Contractor shall assume full responsibility for any damage due to this cause and shall restore and replace the pipe to its specified condition and grade if it is displaced due to floating including caused by groundwater, weather, or construction activity.
11. Joints shall not be deflected.
12. Install Plastic PVC SDR-26 pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
13. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
14. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used.
15. Backfill and compact as specified in [Section 31 23 16 - Utility Trenching](#)
16. Do not displace or damage pipe when compacting.
17. Pipes entering and leaving manholes or other structures shall have two (2) standard joints within three (3) feet of the manhole base. One (1) joint shall be incorporated in the manhole base or installed immediately adjacent to the manhole base and there shall not be less than twelve (12) inches between the two (2) joints.
18. Pipe Markers: As specified in [Section 33 05 26 - Utility Identification](#).
19. HDPE Pipe:
  - a. The Contractor shall inspect each pipe and fitting prior to butt-fusion welding and again prior to installation. Any damaged pipe or fittings shall be replaced by the Contractor.

- b. Prior to butt-fusion welding or installation, each pipe or fitting shall be thoroughly cleaned and shall be kept clean. The material used to clean the pipe and fittings shall be as recommended by the pipe manufacturer.
- c. Butt-fusion welds shall be performed in accordance with manufacturer's instructions. The butt-fusion welding procedures are summarized below:
  - i. Clean each pipe end with a clean cotton cloth to remove dirt, oil, grease and other foreign materials.
  - ii. Square (face) the mating surfaces of each of the pipes to be fused.
  - iii. Bring the two (2) pipe ends together and adjust the pipe locations to ensure proper alignment.
  - iv. Verify that the surface temperature of the heater plate is between three hundred seventy-five degrees Fahrenheit (375°F) to four hundred degrees Fahrenheit (400°F) and then clean the heater surface with a clean cotton cloth.
  - v. Insert the heater plate between the pipe ends, bring the end into firm contact with the heater plate without applying pressure and achieve a proper melt pattern.
  - vi. After achieving the proper melt bead, remove the heater plate and quickly examine the pipe ends for complete melt.
  - vii. Once complete melt has been accomplished, rapidly bring the pipe ends together and apply pressure as recommended by the pipe manufacturer.
  - viii. Hold the pressure constant and at the proper level throughout the cooling period, for the minimum time period recommended by the pipe manufacturer or as necessary to achieve proper cooling
- d. For main sewer installations, the Contractor shall mark each joint with the individual joint number, corresponding to the joint identification number appearing on the printout of the data logger attached to the butt-fusion welding machine. The printout shall be attached to the pipe near the joint for collection by City.
- e. For main sewer installations, the Contractor shall remove the internal melt bead from the welded joint. Bead removal shall be accomplished in a manner that does not score or gouge the pipe.
- f. The Contractor shall insert and retrieve the pipe through properly prepared insertion and receiving pits, in accordance with the requirements of ASTM F 585.
- g. All pipe bursting and directional drilling procedures that require the use of HDPE pipe, shall be executed as specified on the Drawings and Technical Specifications.
- h. For side sewer installations, a maximum of ten (10) joints per one hundred foot (100) length of laid pipe shall be achieved, unless all joints are debeaded.
- i. Fittings/joints that are to be assembled after pipe bursting or directional drilling has been completed shall be butt fused where accessible. Electrofusion couplings like Friatec® Frialen or approved equal shall be used on inaccessible locations.

j. Saddles used for taps shall be per thermal fused saddles for HDPE pipe.

C. Connection to Existing Manholes:

1. Connections to existing manholes shall be made by core drilling a clean opening into the existing manhole wall. Insert end of the pipe through the opening to flush with the inside wall, installing a watertight neoprene gasket around the pipe and seal with non-shrink concrete grout to form a watertight connection. The grout shall be trowelled smooth and flush with the interior surface of the manhole. Channelizing of the flow through the manhole shall conform to the details shown on the drawings for new manholes. Use of pneumatic hammers, chipping guns, sledge hammers are not permitted to make the opening in the manhole walls.
2. The Contractor shall notify the Project Manager twenty-four hours in advance before any connection is made to existing structures. He shall schedule his work so that there is no interruption of flow.
3. Encasement:
  - a. Concrete encase new sewer pipe minimum of 24 inches to the nearest pipe joint.
  - b. Use epoxy binder between new and existing concrete.
4. Prevent construction debris from entering existing sewer line when making connection.
5. Where required, an exterior drop connection shall be constructed whenever any sewer enters a manhole more than four (4) feet above the flow line of the manhole, in accordance with the drawings, and may include a connection to either an existing manhole or a new manhole.
6. All drop manholes shall be outside drop manholes.
7. Care shall be taken that the riser portion is vertical, and that the elbow is firmly supported by the concrete.

D. Connections to existing sewers:

1. Existing sewers are shown on the plans at the locations where new sewers are to be connected. It is the responsibility of the Contractor to determine the exact location and depth of the existing sewers prior to the installation of any sewer pipe. New pipe shall be plugged with mechanical plugs until further connection is necessary.
2. Connection of new main and/or trunk sewers to existing lines up to and including forty-eight (48) inches in diameter shall be made at existing manholes or by constructing a new manhole over the point of connection or by removing an existing rodding inlet or plug and extending new pipe of the same diameter, material and class from the point of connection.
  - a. Where the connection is to be made into an existing manhole, it shall be done as specified above.
  - b. Where the connection is to be made by constructing a new manhole on an existing sewer, the manhole and new connection shall conform to the details shown on the Drawings. The existing sewer shall be kept intact until immediately before the cleaning and flushing operation for the new sewer is to begin.

- c. Where the connection is to be made at a removed rodding inlet or plug, the existing piping shall be cut square and ends properly prepared for the connection shown and an air tight fitting shall be installed at the connection of new and existing pipelines.
  - d. All new pipe shall be plugged with an approved mechanical plug or brick/mortar until the line is completed and ready for testing.
3. Side Sewer Connections to Main Sewers:
- a. Side sewer connections shall be made with fittings or adapters recommended by the manufacturer for use with the particular pipe as shown on the Drawings
  - b. Side sewers equal in size to the main sewer shall be connected by installing a wye branch or tee fitting.
  - c. Connection and side sewer details shall conform to the drawings.
  - d. Side sewer connections where wyes, laterals were not installed during main sewer construction, shall be made by installing a mainline tap as listed below, installing a main sewer repair spool (replacement pipe section) below including a new wye branch fitting. Installation of taps shall comply with the following requirements
    - 1) Before commencing excavation for tap installation, the Contractor shall have sufficient bedding and backfill material at the site to properly re-bed the main and lateral sewers, and backfill the excavation.
    - 1) The excavation for the tapping work shall be a minimum of two (2) feet in width, give enough length for work space, without under-cut sides and shall be properly shored. A minimum clearance of three (3) inches below, six (6) inches on each side and twelve (12) inches each way along the main from the point of connection shall be provided for tap installation.
  - e. If the main sewer is damaged during excavation for or during installation of the tap, the Contractor shall install a main sewer repair spool (replacement pipe section) including a new wye branch fitting.
  - f. The outer surface of the main in this exposed area shall be thoroughly cleaned prior to tapping.

E. Manholes:

1. Install sanitary sewer manholes as specified in [Section 33 05 13 - Manholes and Structures](#).

F. Wye Branches:

1. Concurrent with pipe-laying operations, install wye branches at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main.
3. Maintain minimum five (5) feet separation distance between wye connection and manhole.



4. Sewer lateral bends shall be made with sewer Combination Wye and (1/8) Bends and not with sanitary tees
5. Use saddle wye with stainless-steel clamps for taps into existing piping.
6. Mount saddles with gasket and secure with stainless steel bands.
7. Lay out holes with template, and cut holes with mechanical cutter.
8. Saddles shall be Sealtite Type "S" Saddle or approved equal with four (4) band coupling for PVC and VCP pipes.
9. All fittings and coupling to be part of the low-pressure air test.

G. Sanitary Laterals:

1. Construct laterals from wye branch to terminal point at the right-of-way of a two-way sanitary sewer cleanout and as shown on the drawings.
2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
3. Minimum Depth of Cover over Piping: Three (3) feet minimum.
4. Minimum Separation Distance between Laterals: Five (5) feet minimum.
5. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral.

H. Backfilling:

1. Backfill around sides and to top of pipe as specified in [Section 31 23 16 – Utility Trenching](#).
2. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

### 3.4 FIELD QUALITY CONTROL

- A. [Section 01 45 00 – Quality Control](#): Requirements for testing, adjusting, and balancing.
- B. Request inspection by Project Manager prior to and immediately after placing bedding.
- C. Testing:
  1. Pipe Testing: Low pressure air test, infiltration test, manhole leakage testing, tv inspections and mandrel deflection test shall be per [Section 33 01 30 - Testing for Sanitary Sewer, Storm Drainage - Piping and Manholes](#)
  2. Compaction Testing: Comply with [Section 31 23 16 - Utility Trenching](#)

### 3.5 PROTECTION

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for protecting finished Work.

- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

**END OF SECTION 33 31 13**

**SECTION 33 41 13 - STORM DRAINAGE PIPING****PART 1 - GENERAL**

## 1.1 SUMMARY

- A. This Section includes all materials, equipment, and labor necessary to furnish and install all storm drainage piping, piping accessories, drainage structures, bedding and cover materials, concrete encasement and cradles, and all appurtenant work, complete and operable, including all connections as shown on the Drawings and as specified herein.
- B. Related Requirements:
1. [Section 03 30 00 - Utility Cast-in-Place Concrete](#)
  2. [Section 03 60 00 - Grouting](#)
  3. [Section 31 05 13 - Clearing & Grubbing, Excavation, and Earthwork](#)
  4. [Section 31 23 16 - Utility Trenching](#)
  5. [Section 33 01 30 - Testing for Sanitary Sewer, Storm Drainage – Piping and Manholes](#)
  6. [Section 33 05 13 - Manholes and Structures](#)
  7. [Section 33 05 26 - Utility Identification](#)
  8. [Subsurface Drain System](#)

## 1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
1. AASHTO M170 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  2. AASHTO M206 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
  3. AASHTO M207 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
  4. AASHTO M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe 3"-10".
  5. AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, 12"-60".
- B. ASTM International:
1. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
4. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
5. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
6. ASTM C1103 - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
7. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>).
8. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
9. ASTM D1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
10. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
11. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
12. ASTM D2564 - Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems.
13. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
14. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
16. ASTM D 3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
17. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
18. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
19. ASTM F679 – Standard Specification for Poly Vinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
20. ASTM F2306 - Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
21. ASTM F2648 - Standard Specification for 2 to 60 in. Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Requirements for submittals.
- B. Product Data: Submit data indicating pipe, pipe accessories and gaskets
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Project Record Documents: Record actual locations of pipe installed and top of pipe elevations and invert of pipe at all structures.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- D. As-built drawings shall be provided as part of the closeout submittals.

### 1.5 QUALITY ASSURANCE

- A. Perform Work according to City Standard Specification.
- B. Maintain one (1) copy of each standard affecting Work of this Section on Site.

### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three (3) years of documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three (3) years of documented experience and approved by the Manufacturer.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Requirements for transporting, handling, storing, and protecting products.

- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage. It is the responsibility of the Contractor to check quantities and note any missing or damaged items.
- C. Storage:
  - 1. Store materials according to manufacturer instructions.
  - 2. Block individual and stockpiled pipe lengths to prevent moving.
  - 3. Stack it on reasonably level ground.
  - 4. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
  - 5. Do not place pipe flat on ground; cradle to prevent point stress.
  - 6. Don't stack the pipes next to heat sources such as boilers, steam lines, electrical equipment or engine exhausts.
  - 7. Gaskets should also be protected from heat, oil and grease.
- D. Protection:
  - 1. Keep UV-sensitive materials out of direct sunlight.
  - 2. Provide additional protection according to manufacturer instructions.

## PART 2 - PRODUCTS

### 2.1 STORM DRAINAGE PIPING

- A. Reinforced Concrete Piping:
  - 1. Pipe:
    - a. Comply with ASTM C76, AASHTO M170, ASTM C506, AASHTO M206, AASHTO M207, Class III or Class V, with Wall Type "B" or Wall "C" as specified in ASTM C76, however Wall "A" will not be allowed.
    - b. The minimum allowable class of RCP shall be class III for pipe cover from three (3) feet to fifteen (15) feet defined as the distance from the inside top of pipe to the top of finished grade. RCP pipe cover less than three (3) feet from finished grade shall be Class V. Pipe covers more than fifteen (15) feet deep shall require structural loading calculations.
    - c. Reinforcement: Circular reinforcing bars.
    - d. Inside Nominal Diameter: 12 inches through 144 inches
    - e. Ends: Bell and spigot.
  - 2. Fittings: Reinforced concrete.
  - 3. Joints:

- a. Comply with ASTM C443.
    - b. Gaskets: O-Ring Rubber compression gaskets retained in a groove on the spigot end.
  4. Manufacturers:
    - a. Oldcastle Precast
    - b. Jensen Precast
    - c. Cook Concrete Products, Inc.
    - d. Or approved equal.
- B. Plastic Piping:
  1. Pipe:
    - a. Material: PVC.
    - b. Comply with ASTM D3034, ASTM F79 - SDR 35 (Pipe Stiffness of 46psi) and SDR 26 (Pipe Stiffness of 115 psi)
    - c. PVC SDR-35 pipe shall be used for perforated pipes only.
    - d. The perforations shall be two rows of 1/2" diameter holes or openings at the bottom of the pipe 120° apart and five (5) inches on center.
    - e. Color: Green
    - f. Inside Nominal Diameter: Four (4) inches through Fifteen (15) inches per ASTM D3034 and Eighteen (18) inches through Forty-eight (48) inches per ASTM F679.
    - g. Style: Bell and spigot with rubber-ring sealed gasket joint.
  2. Fittings: PVC.
  3. Joints:
    - a. Comply with ASTM F477.
    - b. Gaskets: Elastomeric.
  4. Manufacturers:
    - a. JM Eagle
    - b. North American Pipe Corporation
    - c. Or approved equal
- C. Subsurface Drain System
  1. Description
    - 1.1 This work shall consist of providing and placing a drainage system comprised of a geo-composite, prefabricated, water collection system (collection system) and the associated water transport system (transport pipe) as described in the plans. The drainage system shall be installed in accordance with these specifications and in close conformity with the locations and dimensions as shown on the plans or specified by the engineer. The quantities of drainage system materials as shown on the plans may be increased or decreased at the discretion of the engineer based on actual site conditions that occur during construction of the project. Such variations in quantity will not be

considered as alterations in the details of construction or a change in the character of the work.

2. Materials

2.1 The collection system shall be of a flexible, prefabricated, rounded rectangular shaped, composite product, consisting of an inner core described in and an outer geotextile wrap described in 2.1.2. The outer wrap shall function only as a filter and shall not be a structural component of the core.

2.1.1 The collection system core shall be made of a high-density polyethylene. The core shall be constructed using interconnected corrugated pipes that define and provide the flow channels and structural integrity of the collection system. Perforations shall be evenly distributed on both faces of the core. The core of the collection system shall conform to the following physical property requirements.

Thickness, inches	ASTM D-1777	1.0
Flow Rate, gpm/ft*	ASTM D-4716	29
Compressive Strength, psf	ASTM D-1621 (modified sand method)	6000
Perforations / sq. ft.	---	≥ 300

\* At gradient = 0.1, pressure = 10 psi for 100 hours.

2.1.2 The collection system shall be wrapped with a non-woven geotextile. The non-woven wrap shall be of a needle-punched construction consisting of long-chain polymeric fibers composed of polypropylene, polyethylene or polyamide. The fibers shall be oriented into a multi-directional stable network whereby they retain their positions relative with each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating, which reduces permeability and it shall be inert to chemicals commonly found in soil. The geotextile shall conform to the following minimum average roll values.



Weight	ASTM D-3776	4.0
Tensile Strength	ASTM D-4632	100
Elongation %	ASTM D-4632	50
Puncture, lb	ASTM D-751	50
Mullen Burst, psi	ASTM D-3786	200
Trapezoidal Tear, lb	ASTM D-4533	42
Coefficient of Permeability	ASTM D-4491	.1 cm/sec
Flow Rate, gpm/ft <sup>2</sup>	ASTM D-4491	100
Permittivity, 1/sec	ASTM D-4491	1.8
Apparent Opening Size	ASTM D-4751	70 Max US Std Sieve Opening
Seam Strength, lb/ft	ASTM D-4595	100
Fungus	ASTM G-21	No Growth

2.1.3 Multi-Flow meets or exceeds these specifications.

2.2 The connectors used with the collection system shall be of a snap together design. In no case shall any product be joined without the use of the manufacturer’s connector designed specifically for the purpose.

2.3 Transport pipe shall be either PVC pipe meeting the requirements of ASTM D-2729 or ASTM F-949, or high-density polyethylene pipe meeting the requirements of AASHTO M252.2.4

### 3.0 Construction Requirements

3.1 The amount of trench excavated at any time shall not exceed the amount of drain that can be set and backfilled completely in one working day. The trench shall be 4 inches wide and at the depth specified in the plans. The collection system shall be centered in the trench, and backfilled with clean coarse sand or an alternate selected by the engineer. Coarse sand is typically comprised of particles ranging from a # 8 to a # 30 U. S. Standard Sieve.

3.2 The trench excavations for the collection system and transport pipe shall be to the lines and grades shown on the plans. Over excavation in the bottom of the excavation shall be backfilled to the proper grade with excavated material or sand prior to the placement of the collection system.

3.3 The collection system shall be securely connected to the transport pipe using connectors approved by the manufacturer.

3.4 Backfill shall be consolidated in accordance with the plans or as directed by the engineer.

3.5 Any damaged collection system or transport pipe shall be replaced or repaired by splicing in an undamaged section of like material.

## 2.2 DRAINAGE STRUCTURES

- A. Description: As specified in [Section 33 05 13 - Manholes and Structures](#).

## 2.3 CONCRETE ENCASEMENT AND CRADLES

- A. Concrete:

1. Description: Reinforced concrete, as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).
2. Compressive Strength: 4,000 psi at 28 days, reinforced concrete, air-entrained rough-troweled finish.

- B. Reinforcement: As specified in [Section 03 30 00 - Utility Cast-in-Place Concrete](#).

## 2.4 MATERIALS

- A. Bedding and Backfill:

1. Bedding & Backfill: Bedding and Backfill shall be as specified in [Section 31 23 16 - Utility Trenching](#)

## 2.5 MIXES

- A. Grout: As specified in [Section 03 60 00 – Grouting](#)

- B. Concrete Encasements and Cradles:

1. Class A concrete, as specified in [Section 03 30 00 – Utility Cast-in-Place Concrete](#).

## 2.6 ACCESSORIES

- A. Pipe Support Brackets: Galvanized structural steel coated with bituminous paint.

- B. Pipe Markers: As specified in [Section 33 05 26 - Utility Identification](#).

- C. Drainage Structures:

1. Catch Basins, Inlets, Manholes and other Drainage Structures: As specified in [Section 33 05 13 - Manholes and Structures](#).

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that trench cut is ready to receive Work.
- B. Verify that excavations, dimensions, and elevations are as indicated on drawings.

**3.2 PREPARATION**

- A. [Section 01 70 00 - Execution](#): Requirements for installation preparation.
- B. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Utilities:
  - 1. Maintain profiles of utilities.
  - 2. Coordinate with other utilities to eliminate interference.
  - 3. Notify Project Manager if crossing conflicts occur.

**3.3 INSTALLATION**

- A. Excavation and Bedding:
  - 1. Excavate pipe trench and providing sheeting and shoring as specified in [Section 31 23 16 – Utility Trenching](#).
  - 2. Hand trim excavation for accurate placement of piping to indicated elevations.
  - 3. Dewater excavations to maintain dry conditions to preserve final grades at bottom of excavation.
  - 4. Level materials, maintaining optimum moisture content of bedding material, compacting subgrade shall conform to [Section 31 23 16 – Utility Trenching](#).
  - 5. Cradle bottom 20 percent of diameter to avoid point load.
  - 6. The contractor shall notify the project manager if bedrock is encountered during trench excavation activities and perform storm drainage work as described in the project deductive alternate plans. Piping and drainage structure quantities not installed shall be reconciled as credits.
- B. Piping:
  - 1. Install pipe, fittings, and accessories according to ASTM D2321.
  - 2. Install pipes in prepared trenches starting at the lowest point, with the spigot ends pointing in the direction of flow.
  - 3. Seal joints watertight.

4. Place pipe on bedding meeting bedding requirements as specified in [Section 31 23 16 – Utility Trenching](#).
5. Unless otherwise required, all pipe shall be laid straight between the changes in alignment and at uniform grade between changes in grade.
6. The rubber gasket joint shall be made by properly lubricating the rubber gasket with a suitable vegetable compound soap before it is placed in the groove at the spigot end. The gasket shall be stretched over the spigot end of the pipe and carefully seated in the groove, with care taken to equalize the stress in the gasket around the circumference of the joint. The gasket shall not be twisted, rolled, cut, crimped, or otherwise injured or forced out of position during the closure of the joint. A feeler gauge shall be used to check the position of the rubber gasket after the joint has been assembled. Where a joint placement is found to be improper, the tested pipe section shall be removed, the gasket checked for damage, a new gasket installed, if necessary, the pipe re-laid and the gasket placement rechecked.
7. Pointing and bonding mortar at pipe connections to structures shall be plastic and of such consistency that it will readily adhere to the pipe and structure.
8. Install backfill at sides and over top of pipe
9. Compact to percent maximum density as specified in [Section 31 23 16 – Utility Trenching](#).
10. Install water stop at all pipe entry into structures.
11. Backfilling and Compaction:
  - a. As specified in [Section 31 23 16 – Utility Trenching](#).
  - b. Do not displace or damage pipe while compacting.
12. Pipe Markers: As specified in [Section 33 05 26 - Utility Identification](#).

C. Drainage Structures:

1. Catch Basins, Inlets, Manholes, and Other Drainage Structures: As specified in [Section 33 05 13 - Manholes and Structures](#).

### 3.4 TOLERANCES

- A. [Section 01 45 00 - Quality Control](#): Requirements for tolerances.
- B. Maximum Variation from indicated Pipe Slope: 1/8 inch in 10 feet.

### 3.5 FIELD QUALITY CONTROL

- A. [Section 01 45 00 - Quality Control](#): Requirements for testing, adjusting, and balancing.

- B. Request inspection by Project Manager prior to backfill in pipe zone and immediately after placing aggregate base over pipe in the pipe zone.
- C. Testing:
  - 1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
  - 2. Compaction Tests:
    - a. Comply with ASTM D1557, ASTM D698, AASHTO T180, and ASTM D6938.
  - 3. Low-Pressure Air Test:
    - a. As specified in [Section 33 01 30 – Testing for Sanitary Sewer, Storm Drainage - Piping and Manholes](#).
  - 4. Deflection Tests and CCTV Inspections:
    - a. As specified in [Section 33 01 30 – Testing for Sanitary Sewer, Storm Drainage - Piping and Manholes](#)

### 3.6 PROTECTION

- A. [Section 01 77 00 - Closeout Requirements](#): Requirements for protecting finished Work.
- B. Protect pipe and aggregate base from damage or displacement until backfilling operation is in progress.

**END OF SECTION 33 41 13**

**SECTION 34 41 00 - TRAFFIC SIGNALS AND LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Work under this section shall consist of furnishing and installing, modifying or removing one or more electrical systems, all as shown on the plans and as specified in these specifications and the Department of Transportation Standard Provisions. Any deviation from the contract documents shall be approved by the Project Manager.
- B. All signals and lighting materials shall conform to the applicable provisions of the standards specified in Division X "Electrical Work" of the Department of Transportation Standard Specifications and these specifications.
- C. All materials furnished and used shall be new, except materials specified to be reused.
- D. All incidental parts which are not shown on the plans, or specified herein or in the Technical Specifications, and which are necessary to complete or modify the systems, shall be furnished and installed as though such parts were shown on the Plans or specified herein. All systems shall be in satisfactory operation at the time of completion of the work. All work end materials shall conform with the appropriate utility agency standards at Contractor's cost.

**1.2 REFERENCES**

- A. Caltrans Standard Specifications (Department of Transportation)
- B. California Manual on Uniform Traffic Control Devices (CA MUTCD)
- C. California Vehicle Code (CVC)
- D. National Electrical Manufacturers Association (NEMA)
- E. Underwriters' Laboratories Inc. (UL)
- F. Electronic Industries Association (EIA)
- G. National Electrical Code (Code)
- H. California Administrative Code, Title 8, Subchapter 5, Electrical Safety Orders

- I. Rules for Overhead Electrical Line Construction, General Order No. 95 and Rules' For Construction of Underground Electric Supply & Communication Systems, General Order No. 128 of the Public Utilities Commission
- J. Standards of the American Society for Testing and Materials (ASTM)
- K. National Standards Institute (ANSI)

### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Submittal procedures.
- B. Contractor shall submit a schedule of values for all lump sum contract items in accordance with the [Section 01 33 00 - Submittal Procedures](#)
- C. Unless otherwise authorized in writing by the Project Manager, the Contractor shall, in accordance with the [Section 01 33 00 - Submittal Procedures](#), submit to the Project Manager for approval of list of equipment and materials which the Contractor proposes to install. The list shall be complete as to name of manufacturer, size and identifying number of each item.
- D. In addition, the Contractor shall submit detailed drawings and wiring diagrams for all electrical equipment to be used. The City will not be liable for any material purchased, labor performed, or delay to the work prior to review of documents required above.
- E. A certificate of compliance with these specifications shall be submitted to the City by the manufacturer with all 5,000-volt series lighting conductors.
- F. Product Data: Provide manufacturers specification, literature, and shop drawings for all products in this Section including but not limited to the following items:
  - a. Traffic signal controller, cabinets, and network equipment. The cabinet diagram shall include all details and dimensions of the cabinet enclosure, door, shelves, and internal features.
  - b. Conduit (GRS, PVC, and HDPE), pull boxes, conductors, vehicle signal heads, pedestrian signal heads, signal mounting assemblies (framework and mounting hardware), poles, mast arms, push buttons, loop sealants, conduit, pull tape, pull boxes, conduit/duct plugs and caps, LED signal modules, battery backup system, and paint.
  - c. Concrete mix design for foundation concrete.
- G. If ordered by the Project Manager, the Contractor shall submit for review sample articles of the material proposed for use. After review, said sample articles will be returned to the Contractor. Inspection or sampling of certain materials may be

made at the factory or warehouse prior to delivery to the jobsite, when required by the Project Manager.

- H. The Contractor shall submit a Sign Inventory Form to be used as the official sign inventory record. The form is to be submitted by the Contractor as part of the Traffic Control Plan prior to the start of any contract field work. The Sign Inventory Form is included in this Project Manual as Appendix A to this Section. Sign Inventory Forms are required for each intersection corner that included any pole or traffic signal work. Sign Inventory Forms shall accurately reflect all existing traffic control, street name, and other City signs at the required corners including approximately 25' along each sidewalk approaching the corner.
- I. If directed by the Project Manager, submit a scaled shop drawing or full scale mock-up for any sign that does not comply with the CA MUTCD.
- J. If directed by the Project Manager, or as one or more of the following conditions exist, a Short Circuit Coordination study/Arc Flash study shall be required.
  - 1. Voltage ratings above 208 VAC to 15,000 VAC
  - 2. Bolted Fault between 700 Amps – 106,000 Amps Short Circuit Current
  - 3. Arcing Fault based on circuit breaker clearing time
  - 4. XFMR Impedance characteristics above 125 KVA
  - 5. Systems of 50 & 60 Hz
  - 6. Both Grounded and Ungrounded systems

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.
- B. Upon completion of the work, the Contractor shall submit one complete set of "as-built" or corrected plans showing in detail all construction changes, within 30 days of project completion
- C. Prior to acceptance of the work, the Contractor shall furnish 5 sets of traffic signal controller cabinet schematic wiring diagrams which shall have the same phase designations required or as shown on the plans for the intersection. The diagrams shall show the location of the installation and shall list all equipment installed in each cabinet.
- D. For each signal installation, the Contractor shall furnish an intersection sketch showing standards, detectors and phasing. One copy of the controller cabinet diagram and the intersection and phase diagram, as reviewed by the City, shall be placed in a heavy-duty plastic envelope and attached to the inside of the door of each controller cabinet.



## 1.5 QUALITY ASSURANCE

- A. All equipment and work shall be performed in accordance with the regulations and codes as follows: NEMA, the UL, or the EIA, wherever applicable. In addition to the requirements of the plans, these specifications, and the Technical Specifications, all materials shall conform where applicable to the requirements of the Code; California Administrative Code, Title 8, Subchapter 5, Electrical Safety Orders; Rules for Overhead Electrical Line Construction, General Order No. 95 and Rules' For Construction of Underground Electric Supply & Communication Systems, General Order No. 128 of the Public Utilities Commission; ASTM; ANSI; any local ordinances which may apply; and the applicable provisions of the Caltrans Standard Specifications, CA MUTCD, and CVC.
- B. Manufacturers' warranties and guarantees furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the City prior to acceptance of the project. The duration of the warranty or guarantee shall be the standard of the industry with minimum of one year from the date of acceptance of the work.
- C. The controller/cabinet vendor shall provide phone technical support with a response time of 2 hours or less during vendor's normal business hours. This technical support shall be at no additional cost during the life of the contract or warranty period. The technical support shall be provided by qualified personnel with extensive knowledge of the firmware and hardware characteristics of the controllers and cabinets provided in this contract. The vendor shall provide technical assistance with the programming of all controllers provided in this contract.
- D. If necessary, the controller/cabinet vendor shall provide field activation assistance by qualified personnel for all controllers supplied in this contract during the warranty period.
- E. The controller and cabinet, including cabinet wiring and related hardware, shall be guaranteed against defective materials or workmanship for a 24-month period (from date of delivery). The vendor shall be responsible for reimbursing City forces for any time and material utilized to make necessary field trouble calls due to defective controllers and/or related hardware peripherals during the warranty period. Units that are identified as being defective before the warranty has expired shall be replaced within 14 calendar days. The vendor shall be responsible for all costs, including shipping, incurred by the City for all units that are installed at an intersection and fail as a result of warranty covered failure within the warranty period.
- F. Prior to delivery, the controller and/or cabinet assembly shall be tested by the controller and/or cabinet manufacturer or authorized local distributor to ensure proper component integration and operation. All inputs and outputs shall be

tested. The controller manufacturer shall provide certification that the controller has met all CALTRANS quality assurance tests. The cabinet manufacturer shall provide certification that the cabinet assembly has met all NEMA quality assurance tests.

- G. The Battery Backup System (BBS) Manufacturer shall provide a two (2) year factory-repair warranty for parts and labor on the BBS from date of acceptance but more than six (6) months from ship date. Batteries shall be warranted for full replacement for five (5) years from date of purchase with an additional 1- year added when a battery balancer is installed at time of initial installation. A battery shall be considered bad should it not deliver 80% of its original capability within the stated warranty period.

The warranty shall be included in the total bid price of the BBS.

- H. Each BBS shall be manufactured in accordance with a manufacturer Quality Assurance (QA) program. The QA program shall include two Quality Assurance procedures: (1) Design QA and (2) Production QA. The Production QA shall include statistically controlled routine tests to ensure minimum performance levels of BBS units built to meet this specification and a documented process of how problems are to be resolved. The manufacturer, or an independent testing lab hired by the manufacturer, shall perform Design Qualification Testing on new BBS system(s) offered, and when any major design change has been implemented on an existing design. A major design change is defined as any modification, either material, electrical, physical or theoretical, that changes any performance characteristics of the system, or results in a different circuit configuration.

Production Quality Control tests shall be performed on each new system prior to shipment. Failure to meet this requirements shall be cause for rejection. Each system shall be visually inspected for any exterior physical damage or assembly anomalies. Any defects shall be cause for rejection.

## 1.6 QUALIFICATIONS

- A. The Contractor or its listed subcontractor or its key team members performing electrical work for this contract shall have a current and active class A General Engineering Contractor or C-10 Electrical Specialty license, and have satisfactorily completed projects with work that is similar in size and complexity to that of the Contract with the following minimum requirements:
1. The City considers the proper classification for employees who perform all electrical work associated with the installation of underground fed traffic signals to be that of Electrician: Inside Wireman.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Product transportation, storage, handling, and protection requirements.
- B. Protect, transport, and store all electrical items specified herein in accordance with manufacturer's instructions.
- C. Contractor shall deliver controller to the City of Pittsburg's Corporation Yard, 357 E. 12th Street, Pittsburg, CA 94565, for testing at least two weeks prior to installation at the Project Site

## 1.8 MAINTENANCE/EXTRA MATERIALS

- A. [Section 01 78 00 - Closeout Submittals](#): Extra materials and maintenance products.

## **PART 2 - PRODUCTS**

### 2.1 VEHICLE SIGNAL HEADS

- A. Vehicle signal faces shall conform to Section 86-1.02R, "Signal Heads," of the Caltrans Standard Specifications.
- B. All traffic signal heads shall have 12-inch indications and be LED.
- C. All new vehicle signal heads installed at any one intersection shall be of the same style and from the same manufacturer, except for programmed visibility heads.

### 2.2 LOUVERS AND VISORS

- A. All louvers and visors shall conform to Section 86-1.02R(4)(c) "Visors and Directional Louvers," of the Caltrans Standard Specifications. Visors for signal faces shall be aluminum.
- B. Where shown on the plans or standard drawings, louvers shall be furnished and installed in the visors of the signal head sections designated. Louvers shall be Directional Louvers as per Caltrans Standard Plan ES-4C.
- C. Visors shall be attached to signal heads with "universal" clips. The contractor shall apply an anti-seize compound (brand name "Never-Seeze" or equal) to the threads of the screws used to secure visors to signal heads.
- D. Unless indicated otherwise on the plans, angle visors shall be dimensioned as follows:

1. 12-inch heads 12"x12"x27"

## 2.3 PEDESTRIAN SIGNALS

- A. Pedestrian signals shall conform to Section 86-1.02S, "Pedestrian Signal Heads," of the Caltrans Standard Specifications.
- B. All pedestrian signal heads shall have solid "man" and solid "hand" indications and be LED.
- C. All pedestrian heads shall have a device approved by the City to reduce sun glare.

## 2.4 PEDESTRIAN PUSH BUTTON POST

- A. Pedestrian push button posts shall be in accordance with Caltrans Standard Plan ES-7A.

## 2.5 ACCESSIBLE PEDESTRIAN SIGNALS

- A. Accessible pedestrian signals shall conform to Section 86-1.02T "Accessible Pedestrian Signals," of the Caltrans Standard Specifications.
- B. Accessible pedestrian signals shall be Polara Navigator, or approved equal.
- C. Accessible pedestrian signals shall be in accordance with Caltrans Standard Plan ES-5C.
- D. Accessible pedestrian signals shall be installed on the crosswalk side of the standard unless otherwise specified.
- E. Accessible pedestrian signals shall be installed near transit stations, or as directed by the City, with Braille signage.

## 2.6 SIGNAL MOUNTING ASSEMBLIES

- A. Signal mounting shall be as per applicable details shown on Caltrans Standard Plan ES-4A, ES-4B, ES-4C, ES-4D, and ES-4E. Heads shall be supported by assemblies of 1-1/2-inch Standard steel pipes with malleable iron or bronze fittings. All assemblies shall be installed plumb or level, as applicable, shall be symmetrically arranged, and securely tightened.
- B. Top horizontal members shall be approximately 12 inches in length.

- C. Construction shall be such that all conductors are concealed within standards or pipe assemblies.
- D. Each U-bolt type pole clamp shall consist of a cast bronze pole plate drilled and tapped for 1-1/2-inch pipe thread, a hot-dip galvanized 1/2-inch U-bolt to fit the perimeter of the pole and oversized galvanized nuts and SAE washers. Portions of the pole plate shall be hinged for adapting the plate to various pole contours and shall be equipped with bolt openings through which the ends of the U-bolt shall be installed. U-bolt threads shall extend beyond the face of the nut at least 1/4 inch and no more than 1-1/2 inches.
- E. All set screws and back plate attachment screws shall be stainless steel. Plumbizer thru bolts, nuts, and washers shall be galvanized. Setscrews in slip fitters shall have square heads.
- F. Unless otherwise specified herein or on the plans, heads shall be installed with terminal compartment mountings. For top mounting of a one-way head and mast arm mountings, a slip-fitter without a terminal compartment shall be used. Clamp-type mounting may be used for installation of heads on existing concrete standards if inserts for terminal compartment mounting have not been provided. The terminal compartment shall be mounted and the standard on the side away from traffic and parallel with the prolongation of the nearest curb face. Terminal compartment door screws shall be stainless steel and be 3/4 inch in length.

## 2.7 TRAFFIC SIGNAL STANDARDS, PEDESTALS, AND POSTS

- A. Standards for traffic signals and flashing beacons, pedestals for cabinets, and posts for pedestrian push buttons shall conform to Section 56-3 of the Caltrans Standard Specifications, and with Caltrans Standard Plans ES-7A through ES-7O.
- B. Anchor bolts shall be of the type and size as shown on the plans. Anchor bolts shall conform to the specifications of ASTM A307, and shall be provided with 2 nuts and 2 washers each. Anchor bolts shall extend no less than 1/4 inch and no greater than 1-1/4 inch beyond the face on the nut. Anchor bolts shall not be cut.
- C. Anchor bolts, nuts, and washers shall be galvanized by the hot-dipped process conforming to ASTM A153, or cadmium plated with Type NS coating conforming to ASTM A165.
- D. All nuts shall be symmetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that nut can be run the entire length of the thread by the fingers without undue forcing, and without noticeable play or rocking.

## 2.8 FOUNDATIONS

- A. All concrete work related to traffic signal work shall be cast in place.
- B. Concrete for foundations shall conform to Section 90-2 of the Caltrans Standard Specifications, "Minor Concrete," and the Technical Specifications. Concrete shall contain not less than 564 pounds of cement per cubic yard, unless noted otherwise on contract drawings.
- C. The Contractor is advised that existing pole foundations vary in size and shape. They may be as deep as 9 ft and as wide as 5 ft. There may be existing conduits embedded in the foundation. If the pole removal is specified, the Contractor shall remove pole foundation to 5 ft or deeper as required to accommodate the new pole foundation and fill the cavity with slurry.
- D. In unpaved areas, a 4-inch-thick Portland cement concrete slab shall be constructed in front of each controller cabinet. The slab shall extend the full width of the cabinet foundation and extend out 3 feet from the face of said foundation.

## 2.9 TRAFFIC CONTROLLER UNIT

- A. The traffic controller unit shall be Naztec Type TS-2, or approved equal.
- B. Each controller furnished in this contract shall be in compliance with the March 12, 2009 TEES. Units provided in this contract shall meet Caltrans standards.

## 2.10 TRAFFIC SIGNAL CABINET

- A. Controller to be Cubic Trafficware TS2 TYPE 2 980 or 980ATC (approval by City Engineer).
- B. Conflict monitor to be Cubic Trafficware NM512-E123.
- C. Cabinet to be Cubic Trafficware Standard NEMA TS1 cabinet.
  - 1. Controller cabinet shall be City Standard Type P 44 or Stretch P depending on location and/or design conforming to the requirements of Section 86-1.02Q, "Cabinets" of the State Standard Specifications and shall have two exhaust fans with two thermostats wired parallel to non-UPS breaker. A baffle bracket shall be provided to interrupt and prevent reverse air flow between the fans.
  - 2. Controller cabinet shall as per applicable details shown on Caltrans Standard Plan ES-3A, except the following:

- a. Cabinet and doors shall be fabricated of 0.125-inch minimum thickness aluminum with continuously welded exterior seams. The door shall be latched using a three (3) point latching mechanism, using rods with a roller-style design and bearings. The cabinet door shall be fitted with a Number 2 Corbin lock (#2 key) and a stainless-steel handle with a flat profile.
  - b. Cabinet shelves shall provide spaces with minimum dimensions of 12 in. x 19 in. x 12 in.
  - c. Cabinet shall be Anodized Aluminum.
  - d. All equipment and modules shall be secured when properly installed. Vibration and minor shaking of the cabinet shall not cause any equipment or module to become dislodged from its proper position nor its operation to fail.
  - e. All cabinet shelves shall be perforated.
  - f. Cabinet riser 18", Anodized Aluminum to be provided with the signal cabinet. Installation per city engineer based on location.
- D. Cabinet Wiring - Wiring shall conform to the requirements of Sections 87-1.03Q "Cabinets", of the State Standard Specifications and the following:
1. All wires terminating on a terminal strip shall be neatly dressed with adequate service loop.
  2. All solid conductors installed in the cabinet (such as component pigtailed), when a crimp connector is applied, shall be soldered.
  3. No more than three wires shall be attached to the rear of each terminal of a feed-through type terminal block, and it shall be possible to alter or interrupt any and all equipment and terminal interconnections at the front of aforementioned terminal block(s). Jumpers shall be allowed on the rear of terminals in order to bus logic power, logic grounds, and other signals for multiple distributions to front mounted terminations.
  4. Cabinet to be wired for 40 detects.
- E. Cabinet Accessories - The following accessories or features shall be provided and included as part of the controller cabinet assembly
1. A two position "Stop Time Auto-Manual" switch shall be provided stop time of the controller unit when the police panel "Flash-Auto" switch is placed into the "Flash" position. When placed in the "Manual" position, the

controller unit will be stop timed. The "Stop Time Auto-Manual" switch shall not have an off position.

2. An "Equipment Power On-Off" switch shall be provided on the control panel to disconnect power to all equipment in the cabinet except the vehicle flasher circuit, which shall remain operable.
  3. The cabinet lighting fixture shall be an LED type, composed of two modules with each module having an output of 300 lumens. The light fixture shall be mounted on the fan/light control panel. A third LED module shall be mounted under the document drawer. A door switch shall be provided to shut off the cabinet light when the door is closed.
  4. The maintenance panel shall be silkscreened and not use engraved labels.
  5. Signal interconnect terminal strip to be installed.
- F. Auxiliary Equipment - The following equipment shall be provided:
1. The load bay shall be fastened with hinges near the bottom rear of its point of attachment to the cabinet. It shall be possible, by removing no more than two (2) fasteners at the top of the rack, to swing the rack downward and gain access to the rear of the rack and its wiring.
  2. 16 MOV modules shall be supplied with every cabinet, having 12x modules with MOV protection only and 4x modules with MOV protection and a loading capacitor on the YELLOW channel only for pedestrian channels. Load switches shall be PDC #SSS-86I/O.
  3. The back panel shall be constructed from one solid piece of 5052H32 black anodized brushed aluminum of 0.090 inches minimum thickness and formed so as to minimize any flexing when plugin components are installed. Back panels that are riveted together from multiple pieces of aluminum will not be acceptable.
  4. All load switch outputs shall be wired to the field terminal blocks. All load switch field terminals shall be labeled with colored labels (RED, YELLOW, GREEN) that correspond to the appropriate signal indication color.
  5. The load bay shall provide sixteen (16) load switch channels, one (1) flasher, and eight (6) flash transfer relays. Load switches and flasher shall be securely supported by a well braced metal bar or shelf located underneath the load.
  6. Switch convection cooling or with full utilization of the load switch handle to facilitate the insertion and removal. The front portion of the support shall contain the phase/function label(s) for the load switches. The labels shall



be visible while either standing or kneeling in front of the cabinet. All load switches shall be of solid state design and shall be provided with LED indicators of the input and output status

7. Conflict monitors shall conform to Section 3 of NEMA Publication TS 2-2003 v02.06, Type 2 Controller Unit; and the following
  - a. TS1 monitor with twelve (12) fully programmable input channels shall be used
  - b. The monitor shall have the capability to detect the absence of phase color, switch failure, no lamp load conditions and more than one color (R, Y, or G) being on at the same time for each channel. It shall also be capable to detect short clearance intervals for each phase. The minimum interval shall be fixed at 2.5 seconds or shall be adjustable between 2.5 seconds and 2.8 seconds
  - c. Conflict monitors are required to monitor voltage levels per NEMA standards regardless of sensed voltage phase shift with respect to cabinet voltage. This shall include 180 degree out of phase shift with respect to cabinet voltage
  - d. Conflict monitors shall not latch upon the failure of the Controller Voltage Monitor (NEMA CVM) output; however, conflict monitors shall latch upon failure of either 24 volt monitor circuit
  - e. The conflict monitor shall monitor both the controller 24 VDC power supply and the auxiliary power supply. The 24 volt monitor shall operate as follows:
    - 1) If the monitoring device places the signals into flashing operation because of activation of either +24 VDC monitoring circuit, the flashing operation shall lock-in and shall release only upon operation of a reset switch and restoration of the proper +24 VDC levels. If a complete power failure to the controller assembly occurs after the monitoring device has placed the signals into flashing operation because of activation of either +24 VDC monitoring circuit, the flashing operation may release if proper +24 VDC levels exist when power is restored.
    - 2) Circuitry to provide this feature shall be fully contained within the conflict monitor unit.
    - 3) In no case shall a complete power failure to the controller assembly, which was functioning properly and in normal or "automatic" mode prior to the power failure, cause the signals to

be in flashing operation, due to false or erratic operations of the aforementioned circuitry, after restoration of power.

- 4) All conflict monitor wiring for channel assignments to field indications shall be connected only to the field terminal block(s), not to the rear of load switch sockets.
- 5) The conflict monitor logic power shall be furnished by the controller power switch. The power to the conflict monitor relay shall be furnished from the unswitched main power.
- f. One duplex convenience outlet with USB charging ports shall be provided in each cabinet. One six outlet power strip to be provided in each cabinet.
- g. A convenience outlet shall be provided in each cabinet, conforming to the following:
  - 1) Devices plugged into the convenience outlet shall not be damaged or interfered by the cabinet door movement.
  - 2) It shall be equipped with ground fault circuit interrupter (GFCI) protection.
- h. All isolators, interfaces, cables, and related equipment for pedestrian circuitry, telemetry, and preemption systems shall be provided regardless of whether those systems will be provided. The optical discrimination module shall only be provided when specified.

#### G. Detector Card Rack

1. Each controller cabinet shall be provided with two TS1 rack-mount card racks, capable of providing 32 channels of loop detection. EVP rack to provide 2 dual channel detector cards. First slot for channel A & B, Second slot for channel C & D.
2. Detector card racks shall have a rigid aluminum frame and shall have slots set in a modular fashion such that the PCB edge connectors shall plug into the rear while sliding between top and bottom card guides for each module. Mounting flanges shall be provided and be turned outward for ease of access. Detector card racks shall be bolted to and unbolted from the cabinet shelf using simple tools.
3. Card rack slots shall be numbered 1 to 16 from left to right when viewed from the front of the rack. A flange shall be provided on the top and the bottom of the rack to label each individual channel.

4. Detector card racks shall be powered by an external DC power supply.
  5. Rack chassis ground shall be bussed to a common point and wired to the detector panel.
  6. Rack logic ground shall be bussed to both the controller logic ground and the external logic ground at a common point and wired to the detector panel.
  7. Provide 16 (sixteen) LCD "EDI" Oracle 2E 2-channel detector cards with beep tone for maintenance purposes.
- H. Detector Termination Panel - The controller cabinet shall be provided with a loop detector termination panel mounted in the interior left side of the cabinet. The detector panel shall meet the following:
1. Detector termination panel shall provide for all connections between detector loops installed in the street and detector amplifiers.
  2. Detector termination panel shall be constructed of 3.2 mm / (1/8 in.) thick aluminum.
  3. Detector termination panel shall contain a 76 mm (3 inches) horizontal slot in each corner to accommodate 6 mm (1/4 inch) mounting bolts.
  4. All inputs from the loops shall be brought through posted 10/32 inch X 5/16 inch binder screw terminals or 8/32 inch X 5/16 inch binder screw terminals.
  5. Each loop pair shall be protected by lightning surge suppressor. The suppressors shall be mounted to the back of the panel using feed-through screw terminals.
  6. Detector terminals shall each have a test switch such that when the switch is closed, a call is placed upon that detector input. The test switch shall be on momentarily.
  7. A chassis ground bus bar shall be provided on the panel and connected to the cabinet by an insulated braided copper ground strap. The strap shall be bonded to the cabinet.
  8. The detector termination panel shall provide connection points for external 24 V power supply, loop inputs, logic ground, and chassis ground bus.
- I. Power Panel
1. Cabinet power panel shall have a plugin type (HE1750) AC Surge Protector, Modular, and a HESCO/RLS model LF60, 60-amp 125 VAC radio interference line filter.

2. Separate breakers for convenience outlet, fan and light to a terminal block to service power.
3. Separate breaker for signal power to a terminal block for UPS.
4. A Crydom A-2475 solid state contactor shall be used instead of a mercury contactor.

## 2.11 VEHICLE DETECTION SYSTEMS

- A. Vehicle detectors shall be of the type or types shown on the plans. The location of each detector shall be as shown on the plan or as directed by the City.
- B. A minimum of at least one sensor unit shall be provided for each approach for each separately controlled phase of operation unless otherwise specified. Sensor units shall be housed in the controller cabinet unless otherwise specified.
- C. Inductive loops - Detector loops shall conform to the following:
  1. Detector loops, and their leads to the nearest pull box, shall be formed from continuous conductor of No. 12 AWG solid or seven-strand minimum tinned copper wire, having 600-volt type USF cross-linked polyethylene insulation with a minimum thickness of 3/6" inch.

## 2.12 BATTERY BACKUP SYSTEM (BBS)

- A. Battery Backup Systems shall be mounted shown on the plans. The location of each shall be as shown on the plan or as directed by the City.
- B. Battery Backup Systems to provide backup to the Controller and Traffic Signal Control shall be installed by one of the following methods:
  1. Pole Mounted: The BBS Enclosure shall be capable of being Pole Mounted. The enclosure will house the batteries, UPS and bypass switches. The cabinet must meet the requirements for NEMA 3R enclosures. The housing must have the structure and bracket options to be easily attached to wooden, steel or concrete pole. Dimensions of the enclosure shall not exceed 27"H x 22" W x 18" D.  
  
The complete enclosure and door must be made from .125" thick, 5052 aluminum. All external seams must be continuously welded. The door opening must have a double flange for weather sealing purposes.
  2. Pad Mounted: The BBS Enclosure shall be capable of being Pad Mounted. The enclosure will house the batteries, UPS and bypass switches. The

cabinet must meet the requirements for NEMA 3R enclosures. Dimensions of the enclosure shall not exceed 50"H x 17" W x 17" D. An eight (8) inch Riser shall be available for Stand-Alone Pad Mount installations.

The complete enclosure and door must be made from .125" thick, 5052 aluminum. All external seams must be continuously welded. The door opening must have a double flange for weather sealing purposes.

3. Side Mounted: The BBS configuration shall have the UPS Power Module installed into the existing traffic control cabinet along with the bypass manual/automatic transfer switch. The batteries shall be installed into its own side mounted battery compartment. The side mounted battery compartment will house the batteries, battery balancer and compartment fan. The cabinet must meet the requirements for NEMA 3R enclosures. The housing must have the dimensions so that it may easily be attached the side of a M, P or 332 Type cabinet. Dimensions of the enclosure shall not exceed 48"H x 20" W x 10" D. The side mounted battery compartment must not interfere with the opening of the traffic cabinet door.

The complete enclosure and door must be made from .125" thick, 5052 aluminum. All external seams must be continuously welded. The door opening must have a double flange for weather sealing purposes.

The battery side mount compartment will be mounted to the traffic control cabinet with six 8 hex head bolts, 1/4" x 20". All holes will be field drilled by the Contractor to accommodate the specific situation. A grommet must be supplied to protect the cable in a field drilled 1.5" to 2" hole for cable connection to the existing traffic controller. The Contractor will supply all the mounting hardware, bolts, washers, nuts, gaskets, bushings, grommets, caulking, etc., necessary to install the cabinet in a safe and weatherproof manner.

- C. Battery Backup System shall consist of a complete Alpha Technologies BBS, or approved equal, and shall conform to the following.

1. Description.

Furnish an Outdoor Hardened Battery Backup System with a battery enclosure mounted as noted.

2. Materials.

Furnish, assemble, fabricate, or install new corrosion resistant materials in accordance with these specifications. Supply a "rack mounted" UPS unit, including a front panel with indicators and control switches, as shown on the plans.

3. Functional Requirements.

The following are the minimum requirements for a complete emergency battery backup system for use with Light Emitting Diode Traffic Signal Modules at intersections with NEMA, 170 or 2070 cabinets. The Battery Backup System (BBS) shall include, but not be limited to the following: Inverter/Charger, Batteries, a separate automatic and manually operated Bypass Switch and all necessary hardware and interconnect wiring. The BBS shall be capable of providing power for full run-time operation for an "LED –only" intersection (all colors: red, yellow, green and pedestrian heads) or flashing mode operation and intersection Red LED's. The BBS shall be designed for outdoor applications.

4. Enclosure Construction.

- a. Door. The cabinet must have a door to provide access to the complete cabinet interior. The door must include a continuous piano hinge made of 14-gauge stainless steel and a .120" diameter stainless steel hinge pin. The hinge must be attached to the enclosure and the door with close end pop rivets. The door must have a three (3) point locking mechanism with rollers at the ends for the latch rods. The key lock must be a Corbin cylinder lock with a #2 key. When the door is opened it must have stops at 90, and 130 degrees. A continuous neoprene gasket must be used to weatherproof the enclosure when the door is closed.
- b. Ventilation Fan. A fan must be mounted in the air baffle at the top of the cabinet with an air outlet built into the overhang. The fan must be thermostatically controlled. The bottom of the door must be louvered to allow airflow. A removable dust filter must be located behind the vent.
- c. Finish. The enclosure shall be a natural aluminum or painted ASA 61 Gray.
- d. Features. An "On Battery" factory installed high impact red light option shall be available for the enclosure. The "On Battery" LED shall operate off of the DC voltage of the UPS to notify that the UPS is on batteries without opening of the door. The lamp will be wired to and controlled by the UPS power module. The enclosure shall be designed to rack mount the UPS and Fail Safe ATS transfer switch. When the UPS is mounted into the enclosure it must be mounted to accommodate straight-on horizontal viewing of the LCD screen on the UPS.
- e. Generator Connection. An optional factory installed flush mount generator compartment with neoprene gaskets for weatherproofing shall be available for the enclosure. The generator compartment shall include a locking 30 amp plug, L5-30FI, for connecting of a portable

AC generator. A manual transfer switch shall be mounted within the generator compartment to allow for transferring from utility power to generator power. The generator door will provide a cable slot to allow for closing of the door when the generator is plugged in and to lock the cable inside of the compartment. The door will include a Corbin Type 2 lock.

5. Battery System.

a. Individual batteries shall be:

- Voltage rating: 12V type
- Amp-hour rating: 100 amp-hour minimum
- Group size: 31
- Batteries shall be easily replaced and commercially available off the shelf.

b. Batteries used for BBS shall consist of 4 batteries. All batteries must meet their specifications out of the box immediately after the initial 24-hour top off charge. Batteries that require cycling to meet the AH rating specifications are not acceptable.

c. Batteries shall be deep discharge, sealed prismatic lead-calcium based GEL/VRLA Gelled Electrolyte/ Valve Regulated Lead Acid). Batteries designed for Cycle applications, such as Solar, are not acceptable. The battery must be designed for Standby Applications.

d. Batteries shall have a discharge operating temperature range of – 40 °C to +71 °C.

e. Batteries shall have a Manufactures Warranty of 4 Years Full Replacement plus 1 additional year when a battery balancer is used. The warranty shall cover any battery that does not meet 80% of its original reserve capability during the warranty period.

f. The batteries shall be provided with appropriate interconnect wiring for the cabinet into which they will be installed.

g. Batteries shall indicate maximum recharge data and recharging cycles.

h. Battery Harness

1. Battery interconnect wiring shall be via two-part modular harness.

2. Part I shall be equipped with red (+) and black (-) 30.48 cm (12") cabling that can be permanently connected to the positive and negative posts of each battery. Each red and black pair shall be terminated into an Anderson style Power Pole connector or equivalent.
  3. Part II shall be equipped with the mating Power Pole style connector for the batteries and a single, insulated Power Pole style connection to the inverter/charger unit. Harness shall be fully insulated and constructed to allow batteries to be quickly and easily connected in any order to ensure proper polarity and circuit configuration.
  4. Power Pole connectors may be either one-piece or two-piece. If a two-piece connector is used, a locking pin shall be used to prevent the connectors from separating.
  5. All battery interconnect harness wiring shall be UL Style 1015 CSA TEW or Welding Style Cable or equivalent, all of proper gauge with respect to design current and with sufficient strand count for flexibility and ease of handling.
  6. Battery terminals shall be covered and insulated with molded boots so as to prevent accidental shorting.
- i. Battery Balancer: The battery balancer shall be provided that automatically balances the battery charge voltage on all batteries in the string to within  $\pm 100\text{mV}$  between any two batteries. The Balancer shall allow for any single 12V battery within the battery string to be replaced at any time throughout the warranty period and not require the purchase of new batteries, to install the battery covered under the warranty.
6. BBS Operation.
    - a. The BBS shall provide a minimum four (4) hours of full run-time operation at 500 watts with an additional nine (9) hours of Red Flash operation at 125 watts. Typical values for a "LED-only" intersection. The inverter, when on batteries, shall operate with a minimum efficiency of 84% with a load ranging from 25% to 90% of the BBS total output rating. The BBS shall operate at 98% or higher when operating under normal condition (utility power is available).
    - b. The BBS, for safety and efficiency shall operate with a nominal 48 VDC buss. A DC level higher than 56 VDC shall be considered unsafe and not acceptable.



- c. The maximum transfer time allowed, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries, shall be 5 milliseconds. 5 milliseconds maximum allowable transfer time shall also apply when switching from inverter line voltage to utility line voltage.
- d. The BBS shall include a rack mounted Fail Safe Automatic/Manual Bypass Switch for bypassing the UPS for maintenance. The FS-ATS bypass switch will be a 3-stage configuration, UPS Normal mode, bypass UPS on and bypass UPS off. The FS-ATS Bypass Switch shall mount in a 19" rack inside of the BBS side mount enclosure.
- e. The BBS shall provide the user with 6-sets of normally open (NO) and normally closed (NC) single-pole double-throw (SPDT) individually programmable dry relay contact closures, available on a front panel-mounted terminal block, rated at a minimum 120V/1A, and labeled so as to identify each contact.
  - 1. One set of NO and NC contact closures shall be energized whenever the unit switches to battery power. Contact shall be labeled or marked "On Batt."
  - 2. A second and third set of NO and NC contact closures shall be energized whenever the battery approaches approximately 40% of remaining useful capacity. Contact shall be labeled or marked "Low Batt." This setting must be adjustable from 10% to 90% via the RS232 connection.
  - 3. A fourth set of NO and NC contact closures shall be energized two hours after the unit switches to battery power. Contact shall be labeled or marked "Timer." This setting must be adjustable from 1 Min. to 8 Hours via the RS232 connection.
  - 4. A fifth set of NO and NC contact closures shall be energized in the event that an Alarm condition occurs. Contact shall be labeled "Alarm".
  - 5. A 48 VDC output shall be provided for operating an external fan. This output can also be factory configured as a dry contact
  - 6. Relay contact activation shall be annunciated on the front panel via a visual indication. This can be either discreet LED, or part of LCD screen, etc.
- f. The BBS shall have two (2) independently programmable timers 0 to 8 hours with two (2) times-of-day restrictions on each timer, providing dry contacts to provide Red Flash operation at user definable times of day.

- g. The BBS shall provide 3 user inputs to support Intrusion Alarm, Emergency Power Off (EPO) and external Self Test (Battery Test).
- h. Operating temperature for both the inverter/charger, and manual bypass switch shall be  $-40^{\circ}\text{C}$  to  $+74^{\circ}\text{C}$  with a load of 850 watts.
- i. The Fail Safe ATS Bypass Switch shall be rated at 240VAC/30 amps, minimum
- j. The BBS shall use a temperature-compensated battery charging system. The charging system shall compensate over a range of  $2.5 - 6.0\text{ mV}/^{\circ}\text{C}$  per cell. The temperature sensor shall be external to the inverter/charger unit. The temperature sensor shall come with 3 meters (9'10") of wire. .
- k. Batteries shall not be recharged when battery temperature exceeds  $50^{\circ}\text{C} \pm 3^{\circ}\text{C}$ .
- l. BBS shall bypass the utility line power whenever the utility line voltage is outside of the following voltage range: 85VAC to 175VAC ( $\pm 2\text{VAC}$ ). During a utility input from 85 VAC to 175 VAC the UPS shall utilize its internal double buck, double boost regulation to maintain a 108 to 131 VAC output to the controller cabinet, without the use of the batteries. The BBS shall go into Boost Mode 1 when the AC Line voltage reaches below 110 VAC,  $\pm 2$ volts. When the AC line drops below 96 VAC,  $\pm 2$  volts the BBS shall go into Boost Mode 2. When the AC line voltage reaches 131volts,  $\pm 2$ volts the BBS shall go into Buck Mode 1. When the AC Line voltage reaches 150 volts the BBS shall go into Boost Mode 2.
- m. When utilizing battery power, the BBS output voltage shall be between 110 VAC and 128 VAC, pure sine wave output,  $\leq 3\%$  THD, 60Hz  $\pm 3\text{Hz}$ .
- n. BBS shall be compatible with NEMA, 170 or 2170 Controllers, and cabinet components for full time operation. All loads to the maximum rating of the BBS shall be powered through the BBS system to utilize the UPS internal Buck/Boost regulation.
- o. In cases of low (below 85VAC) or absent utility line power, when the utility line power has been restored to normal for more than 3 seconds, the BBS shall transfer from the Boost Regulation Mode or the battery backed inverter mode back to utility line mode.
- p. In cases of high utility line power (above 175VAC), when the utility line power has been restored to normal for more than 3 seconds, the BBS shall transfer from the Buck Regulation Mode or battery backed inverter mode back to utility line mode.

- q. BBS shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service. For conformation the UPS module must be UL/CSA approved and labeled. "Tested to" or "Built to" UL/CSA is not acceptable.
  - r. In the event of inverter/charger failure, battery failure or complete battery discharge, the Fail Safe Transfer Switch shall revert to the NC (and de-energized) state, where utility line power or generator power, if available, is connected to the cabinet.
  - s. Recharge time for the battery, from "protective low-cutoff" to 90% or more of full battery charge capacity, shall not exceed eight (8) hours, unless limited by the Temperature Regulated charger due to excessive battery heat that could damage the integrity of the battery string.
  - t. Batteries shall be Deep Discharge Gel Type Valve Regulated Lead Acid Battery and compatible with the Battery charger.
7. Maintenance, Displays, Controls and Diagnostics.
- a. The BBS shall include a display and /or meter to indicate current battery charge status and conditions.
    - 1. The BBS shall provide voltmeter standard probe input-jacks (+) and (-) to read the exact battery voltage drop at the inverter input.
  - b. The BBS shall have lightning surge protection compliant with IEEE/ANSI C.62.41.
  - c. The BBS shall be equipped with an integral system to prevent battery from destructive discharge and overcharge.
  - d. The BBS and batteries shall be easily replaced with all needed hardware and shall not require any special tools for installation.
  - e. The BBS shall display via an LCD panel to indicate the number of times the BBS was activated and the total number of hours the unit has operated on battery power. The LCD display shall show the UPS mode, Alarm status, Input and output voltages, Output current, Battery voltage, battery charger current and last event. It shall allow for programming of the battery charger from 3, 6 and 10 amp charger setting.
  - f. The BBS shall include two separate communication ports on the front panel of the UPS, a factory installed internal Ethernet port for SNMP/WEB communications along with an RS 232 port for local communications.

- g. The BBS shall include a Microsoft Windows® Graphical User Interface for programming and monitoring the BBS. This must be provided in addition to the use of Hyper Terminal and provided at no cost.
- h. Manufacturer shall include a set of operator's manuals with each BBS.
- i. The BBS shall provide the ability to manage daylight savings time automatically.
- j. The BBS temperature reporting shall be selectable, Celsius or Fahrenheit.
- k. The BBS shall have the ability to update the firmware via the Web Pages.
- l. The BBS shall be capable of reporting the date in either number or text format in any order of day, month and year.
- m. The BBS shall have battery runtime reporting integration based on the current rate of consumption via a selectable collection of common batteries and via generic configuration with editable Peukert's number.
- n. The BBS shall display the MAC address locally and remotely.
- o. The BBS shall display the unit serial number locally and remotely.
- p. The BBS shall display the record the power consumed by the load. (KW)
- q. The BBS shall have a user input selectable alarm. An alarm shall be sent via SNMP when activated.
- r. The BBS shall have a remote shutdown / reboot via SNMP feature.
- s. The BBS shall have up to 255 COM ports available on the RS-232.

## 2.13 STANDARD STREET LIGHTING

- A. Standards for lighting shall be in accordance with Section 56-3 of the Caltrans Standard Specifications, and with Caltrans Standard Plans ES-6A through ES-6G.
- B. All pole hardware nuts, bolts, and screws shall be stainless steel. Mounting bolts, nuts, and screws shall be galvanized.
- C. A No 5 pullbox shall be installed at each light pole, Pullbox lid shall have "LIGHTING" stamped in lid.

- D. A photo cell shall be installed on each fixture.
- E. Each light fixture shall have a fuse
- F. Street lighting conduit shall have a minimum coverage of 24 inches.
- G. Use 8-foot luminaire arm for roadways less than 40 feet in width, and 15-foot luminaire arm for roadways 40 feet or more in width.
- H. A photocell shall be installed in each fixture for un-metered electrical service installations.
- I. A photocell shall be installed in service assembly for metered electrical service installations.
- J. City of Pittsburg Approved "Cobra Head" Fixtures
  - 1. "CREE" (RSW SERIES, MEDIUM) RSWL – A – HT – 3ME – 14L – 40K7 – UL – GY – N - Q
- K. In general, the approved above fixtures shall be used on the following roadway classifications (IESNA RP-8 Report). The specific fixture selected shall be used in a photometric analysis and approved by the City.
  - 1. Local residential streets.
  - 2. Local commercial and collector residential streets (up to 40 feet wide).
  - 3. Collector commercial streets (up to 40 feet wide).
  - 4. All major streets (over 40 feet wide).
  - 5. All expressway streets (over 40 feet wide).
- L. Single Fixture Street Light Pole shall be "HAPCO" Drawing Number B101150, or approved equal (see table for arm length)

## 2.14 DECORATIVE STREET LIGHTING

- A. Standards for lighting shall be in accordance with Section 56-3 of the Caltrans Standard Specifications, and with Caltrans Standard Plans ES-6A through ES-6G.
- B. All pole hardware nuts, bolts, and screws shall be stainless steel. Foundation mounting bolts, nuts, and screws shall be galvanized.
- C. A No 5 pullbox shall be installed at each light pole, Pullbox lid shall have "LIGHTING" stamped in lid.
- D. A twist lock photo cell shall be installed on each fixture for un-metered electrical service installations

- E. A twist lock photo cell shall be installed in service assembly for metered electrical service installations.
  - F. Each light fixture shall be fused.
  - G. Steel tenon base anchorage shall be used in twin-fixture decorative lighting pole with pole height greater than 10' and/or with banner attached.
  - H. "Old Town" boundary includes all streets (both sides) within the perimeter of and including Black Diamond Street, East Third Street, Cumberland Street, and East Tenth Street.
  - I. City of Pittsburg Approved "LED" Decorative ("Acorn") Post Top Light Fixture (Single or Double)
    - 1. "Cyclone Lighting" Catalog # CYT13T4 – VS3ARP – 5 – 50W – 4K – 120 – EV1 – DCP – F2AP – PTDR – SQ – CP1 – BK - TX (For installations outside of "Old Town" boundary)
    - 2. "Cyclone Lighting" Catalog # CYT13T4 – VS3ARP – 5 – 50W – 3K – 120 – EV1 – DCP – F2AP – PTDR – SQ – CP1 – BK - TX (For installations within "Old Town" boundary)
  - J. City of Pittsburg Approved Decorative Luminaire Pole
    - 1. "Cyclone Lighting" Catalog # PD12-\*-GFIC2-BK-TX (single head)
    - 2. "Cyclone Lighting" Catalog # PD12-\*-T12-GFIC2-B-TX (double head)
    - 3. "\*" - Pole height to be determined by the Engineer
  - K. City of Pittsburg Approved Decorative Bracket
    - 1. "Cyclone Lighting" Catalog # CP2408-C2-T12-BK-TX (double head)
    - 2. "Cyclone Lighting" Catalog # BA2-4-24-A-P-D2-BK-TX (pole banner)
  - L. City of Pittsburg Approved Park/Pathway Luminaire Pole, Fixture, and Base Cover
    - 1. "Cyclone Lighting" Catalog "CREE" (EDGE SERIES) ARE-EDR-5M-R6-06-E-UL-BK-40K-525-P ("LED" Light Fixture)
    - 2. "Cyclone Lighting" Catalog # PA40-12-TN32-BK-TX-R30 (Luminaire Pole)
    - 3. "Cyclone Lighting" BD11-BK-TX (Base Cover)
- 2.15 PULL BOXES
- A. Pull boxes shall be in accordance with Section 86-1.02C "Pull Boxes," of the Caltrans Standard Specifications and Caltrans Standard Plan ES-8A and ES-8B.
  - B. Pull boxes shall be installed at the locations shown on the plans or, in long runs, they shall be spaced at not over 200 feet. It shall be the option of the Contractor, at its expense and subject to the approval of the City, to install additional pull boxes that he may desire to facilitate the work.

- C. Where practical, pull boxes shown in the vicinity of curbs shall be placed adjacent and level with the back of curb. Pull boxes shall be installed with the long side parallel to the curb. Pull boxes shall not be installed in any part of a driveway or other traveled way unless otherwise specified.
- D. The bottom of the pull box shall rest firmly on a 12-inch-thick bed of 1-inch max crushed rock extending 6 inches beyond the outside edges of the pull box.
- E. Concrete pull box covers to be installed in street lighting systems shall be inscribed "STREET LIGHTING" "HIGH VOLTAGE" for circuits over 600 volts. For 120 volt or 80 volt circuits, cover shall be inscribed with the applicable voltage.
- F. Concrete pull box covers to be installed in signal systems, or combined signal and low voltage lighting systems, shall be inscribed "TRAFFIC SIGNALS." Concrete pull box covers for underground service points, where both traffic signals and street lighting jointly occupy the same box, shall be inscribed "TS-SL."

## 2.16 CONDUIT

- A. All conductors shall be run in conduit except where they are inside standards, or for overhead and temporary installations or otherwise specified.
- B. Conduits shall be of the size indicated on the plans. It shall be the option of the Contractor to use larger conduit than that specified, provided that where such substitution is made, it shall be for the entire length of the conduit run. No reducing fittings will be permitted.
- C. Detector or street lighting conduit shall be 1-inch nominal size. Direct interconnect or utility service conduit shall be 1-1/2 inches nominal size. Traffic signal conduit shall be 2 inches nominal size minimum, except conduit from the standard to an adjacent pull box may be 1-1/2 inches unless otherwise specified.
- D. All conduit shall be the rigid galvanized steel type unless otherwise specified. Where non-metallic conduit is specified, it shall be Schedule 40 PVC when concrete-encased or Schedule 80 PVC when direct buried.
- E. Conduit and conduit fittings shall be galvanized by the hot-dip, electrodepositing, or metallizing process. Galvanized conduit shall conform to standards for rigid steel conduit as specified by Underwriters' Laboratories, Inc., and shall bear the Underwriters' label on each length.
- F. The ends of the conduit shall be free of burrs and rough edges. Ends of conduit shall be properly coupled. Running threads, threadless connectors or threadless couplings will not be permitted.

- G. The maximum bend of a conduit shall be 90° and the minimum radius of a factory bend shall be 12 inches (305mm).

## 2.17 CONDUCTOR AND WIRE

- A. Copper wire shall conform to the applicable portions of ASTM B3 and B8. Wire sizes shall be based on American Wire Gauge (AWG).
- B. Conductors for series street lighting systems shall be No. 8 AWG solid copper wire insulated with 0.110-inch thickness Polyethylene insulation. Standard S-61-402 of Insulated Power Cable City Association, and designated for operation at 5,000 volts.
- C. Where isolating transformers or ballasts are used, the secondary conductors from transformer to luminaire shall be insulated NO. 10 AWG solid copper wire. Multiple circuit conductors shall be of a size indicated on the plans. Insulation for such conductors shall be rated and UL approved for 600-volt operation, and shall be standard THHN Type. Grounding conductors shall be stranded soft drawn bare copper of the size indicated on the drawings. Insulated ground wires shall be permitted in raceways and shall be THHN Type with green insulating jacket.

## 2.18 SERVICE

- A. The Contractor shall furnish and install all material and equipment necessary to complete the electrical connection between the terminating point of the serving utility and the electrical system as shown on the plans or otherwise required.
- B. Service equipment and enclosures shall be in accordance with Caltrans Standard Plans ES-2A through ES-2G.
- C. For series street lighting systems served from overhead circuits, a switch of 5,000-volt rating shall be connected to control each circuit. The switch shall be enclosed in a NEMA Type 3R, 18-inch by 24-inch by 6-inch terminal box. The terminal box shall be fitted with a cover permanently inscribed "DANGER - HIGH VOLTAGE." The cover shall be attached to the box to form a rain-tight plate and shall require tools for removal. The terminal box shall be installed not less than 10 feet above the ground.

## **PART 3 - EXECUTION**

### 3.1 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

- A. Existing electrical systems, or temporary replacements thereof, shall be maintained in effective operation by the Contractor during the progress of the



work. The Contractor shall notify the Project Manager at least two working days prior to performing work on existing systems.

- B. Before commencing the work, the Contractor shall submit in writing to the Project Manager a description and detailed schedule of the intended operations relative to keeping the traffic signals, traffic signal interconnect, and street lights in operation.
- C. The Contractor shall furnish and install whatever temporary or permanent conduit, overhead and other wiring and equipment as necessary, shall make all connections and do other work necessary to maintain normal signal and street lighting operation and at the conclusion of the need therefore, shall remove all temporary facilities from the site.
- D. Temporary wiring as described herein shall not apply to circuits exceeding 150 volts to ground.
- E. Temporary wiring may be either overhead or underground conductors. All temporary overhead conductors shall be slack-spanned with 20-foot minimum overhead clearance across thoroughfares and 12-foot minimum clearance above sidewalk areas. No temporary conductor may run on top of the ground or across any sidewalk area unless adequately protected in an electrical raceway. Overhead conductors shall be multi-conductor cable or single conductors, securely tied or taped at intervals not to exceed 5 feet. No spare conductors are required. All splices within 10 feet above ground level shall be enclosed in metal junction boxes. Splices made at ground level shall be enclosed in pull boxes.
- F. Temporary traffic signal heads shall provide a minimum of 2 clearly visible signal faces for traffic from each direction, one being adjacent to the left side of the traveled way and one being adjacent at the right side of the traveled way. The exact location and any additional signal faces shall be determined by the City. All temporary signals shall be securely mounted at approximately a 10-foot height and wood poles, platform standards, or semi-permanent structures. Mast arms, where required, shall provide a minimum clearance of 17 feet from the traveled way to the bottom of the signal. All primary and mast arm signals shall have back-plates. All mast arm signals and arrow indications shall be 12-inch size.
- G. When traffic signal shutdown is permitted by the City, it will be for a two-hour period between 9 a.m. and 2 p.m. Work necessitating longer periods of time may be authorized by the Project Manager. Preliminary work associated with the shutdown shall be done prior to the actual shutdown in order to minimize the amount of time necessary for the completion of the work. Sufficient manpower and equipment shall be employed by the Contractor to minimize the shutdown period. Once a shutdown is in effect, all work shall be diligently pursued without interruption until the signals are back in normal operation. Delays in effecting the shutdown by the City shall not constitute shutdown time for the Contractor.

- H. In all cases, shutdown flashing operation, and turn-on must be requested at least 24 hours in advance and must be approved by the City.
- I. Contractor shall provide flagmen where necessary to handle traffic safely.
- J. The Contractor shall temporarily relocate existing City-owned equipment if the present location of equipment conflicts with an installation of this contract.
- K. The Contractor shall be completely responsible for the maintenance and continuity of operation of any temporary electrical facility installed by the Contractor.
- L. Disconnection of any existing or temporary streetlights shall not be permitted until the new equipment has been tested and properly adjusted.
- M. Lamps (LEDS) in traffic signal heads installed or relocated by the Contractor that burn out during the life of the contract shall be replaced by the Contractor with new approved traffic signal rated lamps.
- N. Lamps in street light luminaires installed, relocated or worked on by the Contractor that burn out during the life of the contract shall be replaced by the Contractor with new, equal lamps.
- O. The cost of electrical energy for any temporary facility will be borne by the City but the Contractor shall bear all costs of any temporary service connections.
- P. All work and expenses for maintenance of existing traffic signal and streetlights in operation shall be done as incidental work to traffic signal work of this contract.

### 3.2 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

- A. Removing, reinstalling or salvaging electrical equipment shall be in accordance with Section 87-21 "Existing Electrical Systems," of the Caltrans Standard Specifications and the Technical Specifications.
- B. Unless otherwise specified, conductors, standards, electrical equipment, and foundations not to be reused shall become the property of the Contractor and shall be removed from the jobsite. Any salvage value shall be reflected in the Schedule of Values. All conduit abandoned in place shall be terminated at least 12 inches below the finished grade.
- C. Care shall be exercised in removing equipment to be reused or salvaged so that it will remain in the condition existing prior to its removal. The Contractor will be required to replace, at its expense, any equipment which has been damaged or destroyed by its operations.

- D. All salvaged equipment shall be coordinated and delivered to the City of Pittsburg's Corporation Yard, 357 E. 12th Street, Pittsburg, CA 94565. Contractor responsible for equipment to load, haul and offload materials as directed by the City at the Corporation Yard.

### 3.3 EXCAVATION AND BACKFILL

- A. The excavations required for the installation of conduit, foundations and other equipment shall be performed in such a manner as to cause the least possible damage to the streets, sidewalks and other improvements. The trenches shall not be excavated wider than necessary for the proper installation of the electrical equipment or foundations. Excavating shall not be performed until just prior to installation of equipment. The material from the excavation, shall be shall be placed in a location to cause the least obstruction to surface drainage and vehicular and pedestrian traffic. Refer to [Section 31 23 16 – Utility Trenching](#).
- B. Where excavations are required in parkways and lawns, existing sod shall be removed and preserved by the Contractor. After backfilling, the sod shall be replaced and the entire area restored to original grade and condition or better.
- C. Where excavations are required in concrete sidewalk, cuts and joints shall conform with the applicable provisions regarding concrete.
- D. After backfilling, excavations shall be kept well filled and maintained in a smooth and well-drained condition until permanent repairs are completed.
- E. At the end of each day, and at all other times when construction operations are suspended, all equipment, material and debris shall be removed from that portion of the right of way open for vehicular and pedestrian traffic. Barricades shall be erected at all excavations not backfilled or finished to final grade. Such shall conform with OSHA requirements.
- F. All excavations, including those resulting from removal of existing equipment as specified or on the plans, shall be backfilled and the surface restored to match existing improvements in conformance with the applicable requirements concerning such work. The work in the street or highway shall be performed in such a manner that not more than one lane of traffic is restricted in either direction at any time, unless approved by the City.

### 3.4 FOUNDATION CONSTRUCTION

- A. All work shall conform to line elevation and grade as shown on the plans required by the utility or as established by the City.
- B. The foundations shall be constructed in a single placement of concrete of the class specified. The bottom of the foundations shall rest securely on firm,

undisturbed ground. When a firm footing cannot be obtained at the depth shown on the plans, or where the foundation cannot be constructed to standard dimensions because of an obstruction, the foundation shall be installed as directed by the City.

- C. Where forms are required because of soil conditions or grade, they shall be true to line and grade, firmly braced and secured in place, and shall not be removed until the concrete has set.
- D. Foundations shall cure for 7 days before installing any equipment.
- E. Wherever the edge of a concrete foundation extends within 18 inches of any existing concrete improvement, a concrete slab with a minimum thickness of 4 inches shall be extended to meet such improvement.
- F. The foundation cap shall be of similar color, finish and material as the adjacent sidewalk. It shall be a minimum of 4 inches thick and shall be placed after the standard is set in final position.
- G. All anchor bolts, nuts and washers, including those required for existing standards to be relocated, shall be furnished by the Contractor.

### 3.5 TRAFFIC SIGNAL POLE INSTALLATION

- A. Standards, poles, pedestals, and posts shall be installed in accordance with Caltrans Standard Specification 87-1.03J.
- B. Plumbing of standards shall be accomplished by adjusting the nuts and the anchor bolts before the foundation cap is placed. Shims or other similar devices for plumbing or raking will not be permitted. After plumbing the standard, anchor bolts shall be cut off 1/4 inch above the nuts and the exposed surfaces shall be repaired with cold galvanizing paint.
- C. Holes left in the shafts of existing standards due to removal of equipment, shall be repaired by either welding a suitable disc, grinding smooth, and painting as provided for repairing damaged galvanized surfaces elsewhere specified or grouting to match existing texture and color.

### 3.6 SIGNAL HEAD INSTALLATION

- A. Install as per manufacturer's instructions.
- B. Signal heads shall not be installed at any intersection until all other signal equipment, including the controller, is in place and ready for operation at that intersection, except that signal heads may be mounted if the faces are turned away from traffic or are covered.

- C. Signal heads shall be located and aimed as shown on the plans or as directed by the City. Mounting location and standards shall be as shown or as directed by the City.
- D. After installation, prior to signal operation, all signal heads shall be "bagged". Plastic sheeting and duct tape are not allowed.

### 3.7 CONDUIT INSTALLATION

- A. All threads shall be treated with approved joint compound before fittings are placed thereon. Where the galvanized coating of conduit or fittings has been injured in handling or installing, such damaged areas shall be thoroughly painted with a rust preventive paint.
- B. Conduit shall be installed in accordance with Caltrans Standard Specification 87-1.03B "Conduit Installation".
- C. In any case where a different depth is required to meet the controlling utility agency
- D. requirements, Contractor shall comply with said utility specifications at no additional cost to the City.
- E. Conduit laid in open trench shall not be covered nor shall any trench or inspection hole be backfilled until the installation has been approved by the City.
- F. Conduit shall be placed under existing pavement by jacking or drilling methods. Pavement shall not be disturbed without permission from the City. Jacking or drilling pits shall be kept 2 feet clear of the edge of any type of pavement wherever possible.
  - 1. Excessive use of water, such that pavement might be undermined, or softened, will not be permitted.
  - 2. Jacking pits adjacent to railroad tracks shall be constructed not less than 12 feet from the center line of track or as otherwise required by the railroad agency concerned.
  - 3. When the jacking pit is left overnight, it shall be covered with substantial planking.

### 3.8 WIRING

- A. Wiring shall be done in conformance with all applicable Regulations and Codes and the requirements herein.

- B. Wiring shall be installed in accordance with Caltrans Standard Specification 87-1.03F 'Conductors and Cable Installation'.
- C. The Contractor shall investigate and conform the installation connections to any utility services, shall meet the specifications of the utility agency involved. In case of conflict, the utility specifications shall control and the Contractor shall comply in all respects at no additional cost to the City.
- D. Connectors and terminals for use with aluminum utility power service conductors shall be aluminum and shall be greased with an approved inhibitor.
- E. Where low-voltage conductors are run in standards containing high-voltage conductors, either the low-voltage or the high-voltage conductors shall be encased in flexible or rigid metallic conduit, to a point where the two types of conductors are no longer in the same raceway.
- F. Conductors shall be pulled by hand. Winches or other power-actuated pulling equipment shall not be used. Only approved lubricants may be used in placing conductors in conduit.
- G. Splices, where allowed, shall be made only in pull boxes and standard bases. Conductors shall be joined by the use of a connector approved by the City. The splice shall be capable of satisfactory operation under continuous submersion in water.
- H. Conductor insulation shall be well penciled, trimmed to conical shape, and roughened before applying splice insulation. Splice insulation shall consist of layers of vinyl chloride electrical insulating type, conforming to ASTM D2301, Type I, applied to a thickness equal to and well lapped over the original insulation.
- I. Small permanent identification bands shall be marked as specified. The bands shall be securely attached to conductors in pull boxes and near the termination of each conductor. Where circuit and phase are clearly indicated by conductor insulation, bands need not be used. Permanent identification bands shall be embossed, 6 mil oil resistant polyvinyl chloride tape with pressure-sensitive backing. Tape shall be of a type such that symbols contrast with the background color.

### 3.9 BONDING AND GROUNDING

- A. Metallic cable sheaths, metallic conduit, non-metallic conduit grounding wire, ballast and transformer cases, service equipment, sign switches, anchor bolts, end metal standards that form a continuous system shall be effectively grounded. Bonding and grounding jumpers shall be copper wire or copper strap of the same cross-sectional area as No. 8 AWG for all systems, except where noted herein.

- B. Grounding of metallic conduit, service equipment and neutral conductor at service points shall be accomplished as required by the applicable Code and the serving utility, except that grounding conductors shall be No. 6 AWG copper wire.
- C. For bonding purposes in all non-metallic type conduit, a bare No. 8 AWG copper wire shall be run continuously in all circuits.
- D. Bonding of standards shall be accomplished by means of a No. 8 AWG bonding wire attached from a grounding bushing to a foundation bolt or to a 3/16 inch, or larger, brass or bronze bolt installed in the lower portion of the standard.
- E. Bonding of metallic conduit in non-metallic pull boxes shall be by means of copper strap or galvanized grounding bushings and bonding jumpers.
- F. The metallic conduit or bonding conductor system shall be securely grounded, at intervals not to exceed 500 feet, to one of the following:
  - 1. A 1-inch galvanized pipe driven to a depth of 8 feet and having its upper end not more than 3 inches above the conduit, or
  - 2. A minimum 1/2-inch by 8-foot copper weld rod driven to a depth of 7 feet 9 inches. On wood poles, all equipment mounted less than 10 feet above ground surface shall be grounded.

### 3.10 INDUCTIVE LOOP INSTALLATION

- A. The 2 leads for each loop shall be installed as a pair in a common saw slot. The detector loop leads may share a common saw slot with leads from other detector loops. However, the detector loop leads shall not cross any loops and shall not be installed within 20 inches of any other lead. The lead in cable shall consist of No. 21 AWG-UF twisted pair and be continuous from the pull box where connections are made to the inductive detector loops to the cabinet containing the sensor units for the loops.
- B. The Contractor shall make continuity and insulation resistance tests after installation on both inductive detector loops and lead-in cables. The measurement shall be made using the conduit system as ground and with the shield (if any) of the lead-in grounded.
- C. Slots 1/4-inch minimum width shall be cut in the pavement, blown clean and dried before installing inductive loop detectors. 18-inch corner cutoffs shall be provided on all loops.
- D. After conductors are installed in the slots cut in the pavement, the slots shall be filled with epoxy sealant, "Epoxy Sealant for Inductive Loops (Caltrans Standard Specification 80/40-01E-06,)" to within 1/8 inch of the pavement surface. The sealant shall be at least 1/2 inch (13mm) thick above the top conductor in the saw

cut. Before setting, surplus sealant shall be removed from the adjacent road surfaces without the use of solvents.

- E. The loops shall be joined in the pull box in combination of series and parallel so that optimum sensitivity is obtained at the sensor unit. Final splices between loops and lead-in cable shall not be made until the operation of the loops under actual traffic conditions is approved by the City.

### 3.11 TRAFFIC SIGNAL CONTROLLERS AND CABINET ASSEMBLIES

- A. Prior to delivery, each controller and cabinet assembly shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation. The vendor shall provide certification that the cabinet and controller assembly has met all applicable Caltrans quality assurance tests. Approval certificates for each controller and cabinet assembly shall be delivered at the time the controller units and related components are delivered.
- B. The City reserves the right to reject an entire shipment of controller/cabinet assemblies if ten percent or more of the total number (sample included) prove to be defective within a thirty (30) day period after installation, or fail any performance test.
- C. The Contractor shall install each cabinet directly to a controller foundation in the field. The Contractor shall perform the final signal wire terminations by connecting the field wires to the appropriate terminal locations in the controller cabinet as required preparatory work prior to activation. All field wires shall be labeled per this Section as part of the preparatory work.
- D. Installing New Anchor Bolts into Existing Foundations: The Contractor shall drill new holes for anchor bolts and install anchor bolts with approved materials (see Part 2 for approved bolt and anchor material). The bolts should extend above the concrete by 1.5" (2" max). The depth below the surface of the concrete should be 10-10.5" for epoxy or 6.5 to 7" for the mechanical anchor.

### 3.12 CABINET EQUIPMENT INSTALLATION

- A. The Contractor shall install interior cabinet equipment per the Plans, and as further directed by the Project Manager. The equipment shall be securely fastened to a shelf, wall or rail, i.e. it shall not be left free-standing unless otherwise noted or directed by the Project Manager. The Contractor shall provide training on the setup, configuration, and operation of all equipment.



### 3.13 PAINTING OF WORK FURNISHED AND INSTALLED OR WORKED ON UNDER THIS CONTRACT

- A. All electrical equipment furnished and installed by the Contractor shall not be painted unless otherwise noted on the plans or in these specifications. If electrical equipment is specified to be painted in the plans or in these specifications, the equipment shall be factory painted.
- B. All painted equipment which has been relocated shall be repainted as directed by the City. All paint used on the job site shall be provided in the original container identifying the grade, trade name, number and manufacturer, and shall conform to the requirements of specifications on painting, or as directed by the City.
- C. All paint shall be applied evenly and smoothly by skilled craftsmen by either hand brushing or approved spraying equipment, allowing no surplus to accumulate, except that no spraying shall be done at the job site. The work shall be done in a neat and workmanlike manner, and the use of brushes for the application of paint shall be required when paint spraying proves to be unsatisfactory or otherwise objectionable.
- D. The thickness of each paint coat (two required) shall be limited to that which will result in uniform drying throughout the paint film. Skips, holes, thin areas, or other deficiencies in any one coat of paint shall be corrected before the succeeding coat is applied.
- E. The final coat of paint shall present a sags or excessive brush marks, smooth surface, uniform in color, free of runs.

### 3.14 MAINTENANCE, RELOCATION, AND REMOVAL OF EXISTING TRAFFIC CONTROL, STREET NAME, AND OTHER CITY SIGNS

- A. Before commencing any work, the contractor shall submit completed Sign Inventory Forms as part of the Traffic Control Plan submittal.
- B. The Contractor shall temporarily relocate all traffic control, street name, and other City signs, as required for the prosecution of the work and to prevent interference with traffic signal installations, and shall satisfactorily maintain such signs in place at all times. The contractor shall similarly relocate, or remove and salvage as City property, the standards for such signs. The contractor shall salvage standards in their entirety, and remove any concrete therefrom.
- C. The temporary relocation of each STOP or other traffic regulatory sign shall be done immediately upon its removal, and to a locations as close as possible to the original position of such sign, or where directed by the City. The contractor shall remove, and salvage as City property, existing "STOP" or other signs superseded by traffic signals installed by the contractor, immediately upon being notified by the City that such signals will remain in operation.

### 3.15 SERVICE CONNECTION

- A. The Contractor shall coordinate with PG&E through the City to provide all new service connections. The Contractor shall complete the foundation work and secure service connection dates in a timely manner. Service connection shall be completed no later than 72 hours in advance of the scheduled signal switchover or turn-on; otherwise, the switchover or turn-on will be canceled.
- B. The Contractor shall provide temporary service protection at the controller foundation prior to switchover or turn-on.

### 3.16 INSPECTION/TESTING

- A. Prior to acceptance to the completed work, the Contractor shall cause the following tests to be made on all electrical circuits, in the presence of the City.
  - 1. Each circuit shall be tested for continuity.
  - 2. Each circuit shall be tested for unintentional ground.
  - 3. A megger test at 500 volts DC shall be made on each circuit between the circuit and a ground. The insulation resistance shall be not less than 10-megohms on all circuits, except for inductive loop detector circuits which shall have an insulation resistance value of not less than 100 megohms.
  - 4. A functional test shall be made in which it is demonstrated that each and every part of the system functions as specified or intended. The test may commence only with the approval and in the presence of the City. If unsatisfactory performance of the systems develops the condition shall be corrected and the test shall be repeated until satisfactory operation are obtained. Functional tests shall not start nor turn-ons be made on a Friday, or on the day preceding a legal holiday.

Any material revealed by these tests to be faulty in any part of the installation shall be replaced or corrected by the Contractor at his expense in a manner permitted by the City, and the same test shall be repeated until no fault is evident.

- B. [Section 01 77 00 - Closeout Requirements](#): Final cleaning.
- C. Clean finishes and touch up damage.

### 3.17 PROTECTION OF FINISHED WORK

- A. [Section 01 77 00 - Closeout Requirements](#): Protecting finished work.

**END OF SECTION 34 41 00**

## SECTION 34 41 05 - TRAFFIC SIGNAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Work under this section shall consist of any permanent traffic control sign as required on the plans or in the specifications in accordance with the provisions of Section 82 "Signs and Markers" of the Department of Transportation Standard Specifications and the California Manual on Uniform Traffic Control Devices (CA MUTCD), and the following provisions.

#### 1.2 REFERENCES

- A. Caltrans Standard Specifications (Department of Transportation)
- B. California Manual on Uniform Traffic Control Devices (CA MUTCD)
- C. California Vehicle Code (CVC)

#### 1.3 SUBMITTALS

- A. [Section 01 33 00 - Submittal Procedures](#): Submittal procedures.
- B. Certificates of Compliance: Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.
  1. Sign Panels. Submit a certificate of compliance for:
    - a. Aluminum sheeting
    - b. Retroreflective sheeting - Vendors shall present proof that the type of reflective sheeting they intend to use in the manufacture of the signs has been used on highway signs located on California highways for a period of at least two (2) years and has proven entirely satisfactory.
    - c. Screened-process colors
    - d. Nonreflective, opaque, black film
    - e. Protective-overlay film

- C. Product Data: Provide manufacturers specification and literature for materials furnished.
- D. If directed by Project Manager, submit a scaled shop drawing or full-scale mock-up for any sign that does not comply with the MUTCD.
- E. Upon request, submit test samples of sign panels and materials at various stages of production. Sign panel samples must be at least 12 by 12 inches in size and include background material and legend.
- F. Upon request, within 15 days before starting sign fabrication, submit at least 3 copies of your quality control plan for sign panels. Allow 10 days for the Department's review. Do not start fabricating sign panels until the City accepts the quality control plan. The quality control plan must include:
  - 1. Identification of the person responsible for sign quality control
  - 2. Basis of acceptance for incoming raw materials at the fabrication plant
  - 3. Type, method, and frequency of quality control testing at the fabrication plant
  - 4. Types and brand names of retroreflective sheeting
  - 5. List of the retroreflective sheeting manufacturer's approved process colors, protective overlay film, and black nonreflective film, including the manufacturer's name and product name for each item
  - 6. Retroreflective sheeting manufacturer's installation and splicing instructions
  - 7. Recommended cleaning procedure for each product
  - 8. Method of packaging, transporting, and storing signs
- G. Do not submit a quality control plan for construction area signs

#### 1.4 CLOSEOUT SUBMITTALS

- A. [Section 01 78 00 - Closeout Submittals](#): Requirements for submittals.

#### 1.5 QUALITY ASSURANCE

- A. Perform work in accordance with the plans, Technical Specifications and as specified herein, in conformance with the applicable provisions of the Caltrans Standard Specifications, CA MUTCD, and CVC.

## 1.6 QUALIFICATIONS

- A. Sign manufacturer shall have experience in the type of work required and a reputation for producing satisfactory work on time.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. [Section 01 60 00 - Product Requirements](#): Product transportation, storage, handling, and protection requirements.
- B. Protect, transport, and store sign panels fabricated with screened-process colors under the retroreflective sheeting manufacturer's instructions.
- C. Transport sign panels so that the face of the panels are protected from damage and weather. Ship the panels on pallets, in crates, or in tier racks. Ship the panels vertically on edge. Do not stack the panels horizontally. Place padding and protective materials between the panels as necessary. Keep the panels dry during transit.
- D. Store sign panels in a dry environment at all times. Store the panels vertically on edge whether indoors or outdoors. Do not store the panels directly on the ground. Do not let the panels get wet during storage. In areas of high heat and humidity, store the panels in enclosed, climate-controlled trailers or containers. Store the panels indoors whenever the storage duration will exceed 30 days.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. [Section 01 60 00 - Product Requirements](#): Environmental conditions affecting products on site.

## 1.9 MAINTENANCE/EXTRA MATERIALS

- A. [Section 01 77 00 - Closeout Requirements](#): Extra materials and maintenance products.

## **PART 2 - PRODUCTS**

### 2.1 ALUMINUM SHEETING

- A. The base metal of permanent traffic control signs shall be new sheet aluminum of alloys conforming to Caltrans Standard Specifications Section 82 "Signs and Markers". material shall be subject to inspection prior to month of installation.

- B. Aluminum sheeting for road signs shall be stamped or "etched" on the back of sign with date, month/year numerically (XX/XXXX), of installation. Except on back to back sheeted signs.
- C. The alloy and temper of aluminum sheeting must comply with ASTM B209 for the designation specified.
- D. Aluminum sheeting must be pretreated for corrosion resistance under ASTM B449. The surface of the aluminum sheeting must be cleaned, deoxidized, and coated with a light, tightly adherent chromate conversion coating free of powdery residue. The conversion coating must be Class 2 with a weight from 10 milligrams per square foot to 35 milligrams per square foot and an average weight of 25 milligrams per square foot. After the cleaning and coating process, protect the aluminum sheeting from exposure to grease, oils, dust, and contaminants.
- E. Metal panels shall be cut to size and shape and shall be free of buckles, warp, dents, cockles, burrs, sharp edges and any other defects resulting from fabrication.
- F. The base plate for standard route markers must be die cut.

## 2.2 RETROREFLECTIVE SHEETING

- A. Retroreflective sheeting shall be 3M Diamond Grade or equal unless otherwise indicated on the plans. Sheeting shall meet Table 2A-3, "Minimum Maintained Retroreflectivity Levels", of the CA MUTCD
- B. The surface of the reflective sheeting shall be of a flexible, transparent plastic material and shall be smooth. The backing medium shall be of synthetic sheet resin or other suitable non-cellulosic material. The bonding adhesive shall have no staining effect and shall be mildew resistant. The sheeting shall permit cutting and color processing at temperatures of 60 to 100° F. and relative humidities of twenty (20) to eighty (80) percent. The sheeting shall be heat resistant, and permit force curing of unapplied sheeting at temperatures up to 150°F., and up to 200°F. on applied sheeting. The sheeting surface shall be solvent resistant to gasoline, naphtha, mineral spirits, turpentine and methanol.
- C. Retroreflective sheeting used for background and legend must comply with ASTM D4956 and must be on the Authorized Material List for signing and delineation materials.
- D. Type II, III, IV, VIII, IX, and XI retroreflective sheeting must have Class 1, 3, or 4 adhesive backing except Type II retroreflective sheeting may have Class 2 adhesive backing. The adhesive backing must be pressure sensitive and fungus resistant.

## 2.3 PROCESS COLORS AND FILM

- A. The type of material used for screened-process colors, nonreflective, opaque, black film, and protective-overlay film must be the type recommended by the retroreflective sheeting manufacturer.
- B. The fabricator must perform all patterns, layouts, and set-ups necessary for the screening process.
- C. The completed surface of the applied screened-process color must be flat and smooth.
- D. Colored retroreflective sheeting must be used for the background. Reverse-screened-process color on white retroreflective sheeting for signs with green, red, blue, and brown backgrounds may be substituted for the background color.
- E. The coefficient of retroreflection for reverse-screened-process colors used on white retroreflective sheeting must be not less than 70 percent of the coefficient of retroreflection specified in ASTM D4956 for the corresponding colored retroreflective sheeting.
- F. The legend must be black, screened-process color or nonreflective, opaque, black film.
- G. Screened-process colors and nonreflective, opaque, black film must have equivalent outdoor weatherability characteristics as the retroreflective sheeting specified in ASTM D4956. Nonreflective, opaque, black film must be vinyl or acrylic material.
- H. Cured, screened-process colors must be able to withstand removal when tested by applying the 3M Company's Scotch brand cellophane tape no. 600 or equivalent tape over the color and removing it with a single, quick motion at a 90 degree angle normal to the surface of the sign's face.

## 2.4 ROADSIDE SIGN POSTS

- A. Except as shown on the plans, all traffic signs shall be mounted on two (2) inches inside diameter, galvanized steel pipe at a mounting height meeting Caltrans Standard Specification and traffic code standards and as shown on the plans.
- B. Road signs placed within landscaped medians may be installed on wood posts.
- C. Mountings for roadside signs to be installed on barriers or railings must be fabricated from (1) welded or seamless steel pipe under ASTM A53/A53M, Grade B, and (2) structural steel complying with ASTM A36/A36M.



- D. Bolted connections and concrete anchorage devices must comply with Section 82-3, "Roadside Signs", of the Caltrans Standard Specifications.
- E. All metal parts for mounting roadside signs must be galvanized after fabrication.
- F. Temporary road signs may be placed on wooden posts.

## 2.5 ROADSIDE SIGN FASTENING HARDWARE

- A. Frame assemblies for multiple sign installations must be fabricated from structural steel complying with ASTM A36/A36M or aluminum alloy as shown. Frames fabricated from structural steel must be hot-dip galvanized after fabrication.
- B. Back braces for signs must be commercial quality, mild steel, and hot-dip galvanized after fabrication.
- C. Straps and saddle brackets for mounting sign panels on electroliers, sign structure posts, and traffic signal standards must be stainless steel under ASTM A167, Type 302 or 304. Where shown, theft-proof bolts must be stainless steel with a chromium content of at least 16 percent and a nickel content of at least 8 percent.
- D. Except for theft-proof bolts, the lag screws, bolts, metal washers, and nuts must be commercial quality steel and hot-dip galvanized after fabrication. Fiber washers must be commercial quality.
- E. The exposed portion of the mounting hardware on the sign face, including rivets used to attach sheeting to framing members, must have a factory, or field-applied finish that matches closely the color of the background and legend where it is placed.

## PART 3 - EXECUTION

### 3.1 REMOVAL AND RELOCATION OF EXISTING SIGNS

- A. Traffic control signs are to be removed or relocated as shown on the plans.
- B. Remove foundations to a minimum of six (6) inches below the ground line, and backfill.
- C. Existing mountings may be used; however, the Contractor shall furnish, at his expense, additional mountings necessary to complete the reinstallation, and meet current standards.

- D. Any damage to the existing traffic control sign during removal and reinstallation shall be repaired by the Contractor at his expense.

### 3.2 ALUMINUM SHEETING FABRICATION/PREPARATION

- A. The fabrication of all signs shall be accomplished in a uniform and workmanlike manner. The sign panels are to be cut as shown and the sign specification sheets. The dimensional tolerance of the panels shall be plus or minus one-sixteenth (1/16") inch.
- B. All possible fabrication, including shearing, cutting and punching of holes, shall be completed prior to cleaning and anodization of aluminum.
- C. The aluminum base metal shall be thoroughly cleaned and anodized as per Caltrans Standard Specifications.

### 3.3 RETROREFLECTIVE SHEETING APPLICATION

- A. The reflective sheeting shall be applied to the face of the sign by an approved vacuum applicator using a combination of vacuum and heat, as recommended by the reflective sheeting manufacturer. After aging for forty-eight (48) hours, the adhesive shall produce a durable bond equal to or greater than the strength of the reflective sheeting. No air pocket or bubbles shall exist between the sheeting and the base material.
- B. Repairs to damaged reflective sheeting due to poor workmanship or defective material will not be allowed, items must be replaced.
- C. Reflective sheeting screening coats shall be oven cured as recommended by the reflective sheeting manufacturer.
- D. The legend shall be of high intensity cutout reflective sheeting applied in the same manner as the reflective sheeting specified herein. The orientation of the legend must comply with the retroreflective sheeting manufacturer's instructions.
- E. For signs composed of multiple panels, the legend must be placed across joints in a way that does not affect the size, shape, spacing, and appearance of the legend on the assembled sign.
- F. There shall be no splices in the reflective sheeting on panels with a minor dimension of forty-eight (48) inches or less. On all rectangular signs with a minor dimension of more than forty-eight (48) inches, the splice shall be horizontal. No finished sign shall have more than one splice and no splice shall fall within two (2) inches of the sign edge.

- G. Unless the retroreflective sheeting manufacturer's instructions require a different method, splices in the retroreflective sheeting must overlap by a minimum of 1 inch. The retroreflective sheeting on either side of a splice must not exhibit a color difference under incident and reflected light.
- H. For formed panel signs, the retroreflective sheeting for the background and legend must be wrapped around the interior vertical edges of each panel as shown to prevent delamination.
- I. The edges of each completed reflective sheeting sign face and of all cutout letters, numbers, arrows, symbols and borders shall be sealed in a manner and with a sealing solution as recommended by the manufacturer of the reflective sheeting.
- J. All letters and designs shall be clearly cut and sharply defined, meeting Caltrans Standard Specifications.
- K. The manufacturer's identification shall be according to the Caltrans Standard Specifications unless otherwise directed by the City.
- L. Where shown, a sign with protective-overlay film must be marked at the fabrication plant with a 3/8-inch diameter dot. The dot must be placed on the lower border of the sign before applying the protective-overlay film. The fabricator must determine the application method and exact location of the dot except the dot must not be placed on the legend or near bolt holes. The dot must be black if placed on a white border and white if placed on a black border.
- M. The finished sign shall be flat within a ratio of 0.04 inches per linear foot when measured across the plane of each panel from the opposite corners, or at any location on the panel. All finished signs shall have smooth flat surfaces without defects or objectionable marks of any kind on either the front or back faces.

### 3.4 ROADSIDE SIGN INSTALLATION

- A. Do not reverse screen sign larger than 7 square feet/color.
- B. Do not remove a sign that is being replaced until the new sign is placed and uncovered.
- C. Establish proper elevation and orientation of all signs and structures and determine proper sign post lengths as dictated by construction slopes. Refer to Caltrans S Series Standard Drawings.
- D. Cover signs that require temporary covering with an opaque material. Secure at the rear of the sign so that the sign is not damaged. Maintain covering until covering or sign is removed.

- E. All posts shall be set in concrete a minimum of two (2) feet below existing grade level. Minimum diameter of concrete footing for posts installed outside of sidewalk shall be ten (10) inches.
- F. Signs to be located in existing sidewalk area may be placed by drilling a hole in the sidewalk one (1) inch larger than the diameter of the pole, a minimum of two (2) feet deep, fill the hole with mortar and place the pole in the hole in a plumb position. Top of pipe post should be fitted a screw cap unless a sign or other device will cap said post.

### 3.5 INSPECTION

- A. All materials and finished signs are subject to inspection by the City.
- B. The finished signs shall be clean and free from all router chatter marks, burrs, sharp edges, loose rivets, delaminated reflective sheeting and aluminum marks. Signs with any defects or damage that would affect their appearance or serviceability will not be acceptable.
- C. No repairs shall be made to the face sheet without the approval of the City.
- D. All signs not conforming in all respects to the requirements of these specifications will be rejected and replaced at Contractor's cost.

### 3.6 CLEANING

- A. [Section 01 77 00 - Closeout Requirements](#): Final cleaning.
- B. Clean finishes and touch up damage.

### 3.7 PROTECTION OF FINISHED WORK

- A. [Section 01 77 00 - Closeout Requirements](#): Protecting finished work.

**END OF SECTION 34 41 05**

# Appendix A

## Resolution 93-8022

BEFORE THE CITY COUNCIL OF THE CITY OF PITTSBURG

In the Matter of:

Establishing Voluntary Guidelines to )  
 Encourage Bidders on Public Works )  
 Projects to Increase the Utilization and )  
 Hiring of Local Contractors, Local ) Res. No. 93-8022  
 Businesses and Members of the City's )  
 Minority Community )  
 \_\_\_\_\_ )

The City Council of the City of Pittsburgh DOES RESOLVE as follows:

A. The Council desires to take steps to encourage contractors on public works projects in the City to increase the utilization and hiring of local contractors, local businesses and members of the City's minority community.

B. Both historically and presently, the City has been home to a large and diverse population, including many members of minority communities. The City wishes to increase employment and business opportunities for members of the City's minority communities.

C. Many of the City's public works contracts are awarded to businesses which are not located in the City. The increased employment of City residents on projects located within the City would help to reduce traffic congestion and noise and air quality impacts.

D. Other Bay Area cities have adopted various programs or policies which are designed to heighten awareness and employment of minorities, local residents and local businesses. The adoption of a mandatory program which requires the employment of a fixed percentage of minorities, local residents and local businesses would require further study and must be supported by appropriate evidence. Additionally, findings would be required that either non-residents are a substantial cause of social and economic problems (e.g., unemployment, crime, homelessness, poverty) facing City residents or that the City itself has created disadvantages (e.g., higher business taxes, more stringent land use requirements) which have caused local businesses to suffer.

E. Rather than wait for studies to be completed and for statistical information from various governmental agencies to be compiled, the Council desires to take immediate action that will increase awareness and utilization of, and encourage employment opportunities for minorities, local residents, local businesses and suppliers within the City.

NOW, THEREFORE, the Council resolves:

Section 1. Minority Employment Guidelines

A. The Council declares that it is the policy of the City to increase awareness of the City's minority population and to encourage the employment of members of the City's minority communities.

B. Each bidder who is awarded a public works contract by the City is encouraged to use its best efforts to recruit minority candidates for employment positions. Each bidder is encouraged to employ and endeavor to maintain a minority work force of at least 20% on a craft-by-craft basis.

Section 2. Local Resident Employment Guidelines

A. The Council declares that it is the policy of the City to encourage employment of local residents.

B. Each bidder who is awarded a public works contract by the Council is encouraged to use its best efforts to recruit City residents for employment positions. Each bidder is encouraged to employ and endeavor to maintain a local City resident work force of at least 50% on a craft-by-craft basis.

Section 3. Local Business Guidelines

A. The Council declares that it is the policy of the City to promote growth and economic development for the City's local businesses and suppliers.

B. Each bidder who is awarded a public works contract by the Council is encouraged to use its best efforts to utilize local businesses and suppliers in connection with the contract. Each bidder is encouraged to allocate at least 20% of the dollar amount of the contract to the utilization of local businesses, such as in the purchase of services and supplies.

Section 4. Voluntary Program; Prohibition

A. This program is voluntary in nature and is not intended to supersede or conflict with any applicable State or Federal regulations nor any State or Federal laws pertaining to the funding of a public works project.

B. A copy of this resolution shall be provided as part of the contract documents to each bidder on a public works project conducted by the City. No City official or employee shall take

compliance with this resolution into account when making any decision concerning the letting or administration of a public works contract in the City.

Section 5. Monitoring and Reporting

Each bidder who is awarded a public works contract by the City is required to submit to the City a summary by percentages and/or dollar amount of minority, local resident, local business and local supplier participation in the contract. In its summary, each bidder is required to describe what actions, activities and efforts it used in meeting or attempting to meet the guidelines of this program and also any significant problems or difficulties it encountered in achieving the guidelines set forth above. Staff shall report findings concerning voluntary compliance with this resolution each six months. A copy of this resolution shall be integrated into or included with bid packets published by the City.

Section 6. Effective Date

This resolution shall take effect immediately upon its adoption.

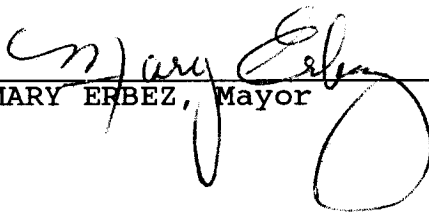
Passed and adopted on the 6th day of December, 1993, by the following vote:

AYES: Councilmembers Canciamilla, Davis, Lewis, Quesada and Mayor Erbez

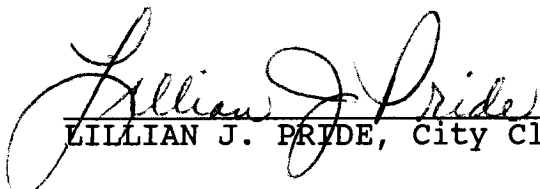
NAYS: None

ABSTAINED: None

ABSENT: None

  
\_\_\_\_\_  
MARY ERBEZ, Mayor

Attest:

  
\_\_\_\_\_  
LILLIAN J. PRIDE, City Clerk

p\gen\local.res\c.nl.100



MICHAEL R. WOODS  
SAMUEL T. CRUMP  
LAURA J. ANDERSON


LAW OFFICES  
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November 24, 1993

MEMORANDUM

TO: Mayor and Councilmembers  
Chair and Board of Directors, Redevelopment Agency

FROM: Michael R. Woods, City Attorney  
Laura J. Anderson 

RE: Local Employment Program

This memorandum is in response to the Council's request for information on a local contractor and minority preference program on public works contracts. Additionally, Councilman Canciamilla recently requested a resolution for Council consideration establishing a voluntary program which encourages the hiring of minorities, local residents and local small businesses in public works contracts.

**A. Requirements for a Mandatory Preference Program**

Before the City (or Agency) could adopt a mandatory program giving preference to local residents or local businesses in public works contracts, the Council would have to make at least one of the following findings:

- (1) non-residents are a "substantial cause" of social and economic problems (e.g. unemployment, crime, homelessness, poverty) facing city residents; or
- (2) the City has itself created disadvantages (e.g. higher business taxes, more stringent land use requirements) which cause local businesses to suffer.

The Council's findings would have to be based on substantial evidence such as statistical information, departmental studies, and testimony of city residents. The program adopted would have to be consistent with the findings, and the findings would have to be supported by appropriate evidence in the record of the Council's action. The program would have to be reasonable in light of the findings and evidence and could not favor local residents at the expense of non-residents in a way that would be disproportionate when considered against the findings and evidence.

Mayor and Councilmembers  
Chair and Board of Directors  
November 24, 1993  
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If a mandatory program were adopted without the required findings or adequate supporting evidence, a non-resident could challenge the local preference program in court as a violation of his or her constitutional rights.

If the Council wishes to entertain a mandatory program, we suggest you direct staff to conduct a study and gather evidence concerning the findings that would have to be made, and return to the Council with a proposed program.

#### **B. Proposed Resolution on Voluntary Program**

The Council may adopt a voluntary contractor preference program without making the findings described above. The program must be truly voluntary, however; the City would not make any decision to grant a contract to a particular contractor based upon compliance with the program.

Enclosed for your consideration is a proposed resolution which recognizes increased employment of City residents and increased opportunities for local businesses are desirable for the City. The resolution encourages bidders on public works contracts to hire members of the minority community, local residents and local businesses. The guidelines set forth below are a suggestion only. The Council may wish to adjust the percentages to encourage maximum participation in the program.

The resolution will state the Council's policy that bidders promote employment opportunities for minorities, local residents and small local businesses, as follows:

(1) Minority Employment Guidelines. A bidder who is awarded a public works contract is encouraged to employ and maintain a minority work force of 20% on a craft-by-craft basis.

(2) Local Resident Employment Guidelines. A bidder who is awarded a public works contract is encouraged to employ and maintain a local resident work force of 50% on a craft-by-craft basis.

(3) Local Business Guidelines. A bidder who is awarded a public works contract is encouraged to award 20% of the total dollar amount of the contract to local small businesses through subcontracts.

If the Council wishes to adopt this voluntary program, it may do so by adopting the enclosed resolution, which would take effect immediately unless otherwise specified.

Mayor and Councilmembers  
Chair and Board of Directors  
November 24, 1993  
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Please feel free to call if you have any questions or comments.

MRW:LJA:lr

Enclosure

cc: S. Anthony Donato, City Manager  
Lillian J. Pride, Assistant City Manager/City Clerk  
Nasser Shirazi, Community Development Director

pitts/general/mconpref/c.nl.100

**BEFORE THE REDEVELOPMENT AGENCY OF THE CITY OF PITTSBURG**

In the Matter of:

Establishing Voluntary Guidelines to )  
Encourage Bidders on Public Works )  
Projects to Increase the Utilization and )  
Hiring of Local Contractors, Local ) Res. No. 93-442  
Businesses and Members of the City's )  
Minority Community )  
\_\_\_\_\_ )

The Redevelopment Agency of the City of Pittsburg DOES RESOLVE as follows:

A. The Agency desires to take steps to encourage contractors on public works projects in the City to increase the utilization and hiring of local contractors, local businesses and members of the City's minority community.

B. Both historically and presently, the City has been home to a large and diverse population, including many members of minority communities. The City wishes to increase employment and business opportunities for members of the City's minority communities.

C. Many of the Agency's public works contracts are awarded to businesses which are not located in the City. The increased employment of City residents on projects located within the City would help to reduce traffic congestion and noise and air quality impacts.

D. Other Bay Area cities have adopted various programs or policies which are designed to heighten awareness and employment of minorities, local residents and local businesses. The adoption of a mandatory program which requires the employment of a fixed percentage of minorities, local residents and local businesses would require further study and must be supported by appropriate evidence. Additionally, findings would be required that either non-residents are a substantial cause of social and economic problems (e.g., unemployment, crime, homelessness, poverty) facing City residents or that the City itself has created disadvantages (e.g., higher business taxes, more stringent land use requirements) which have caused local businesses to suffer.

E. Rather than wait for studies to be completed and for statistical information from various governmental agencies to be compiled, the Agency desires to take immediate action that will increase awareness and utilization of, and encourage employment opportunities for minorities, local residents, local businesses and suppliers within the City.

NOW, THEREFORE, the Agency resolves:

Section 1. Minority Employment Guidelines

A. The Agency declares that it is the policy of the Agency to increase awareness of the City's minority population and to encourage the employment of members of the City's minority communities.

B. Each bidder who is awarded a public works contract by the Agency is encouraged to use its best efforts to recruit minority candidates for employment positions. Each bidder is encouraged to employ and endeavor to maintain a minority work force of at least 20% on a craft-by-craft basis.

Section 2. Local Resident Employment Guidelines

A. The Agency declares that it is the policy of the Agency to encourage employment of local residents.

B. Each bidder who is awarded a public works contract by the Agency is encouraged to use its best efforts to recruit City residents for employment positions. Each bidder is encouraged to employ and endeavor to maintain a local City resident work force of at least 50% on a craft-by-craft basis.

Section 3. Local Business Guidelines

A. The Agency declares that it is the policy of the Agency to promote growth and economic development for the City's local businesses and suppliers.

B. Each bidder who is awarded a public works contract by the Agency is encouraged to use its best efforts to utilize local businesses and suppliers in connection with the contract. Each bidder is encouraged to allocate at least 20% of the dollar amount of the contract to the utilization of local businesses, such as in the purchase of services and supplies.

Section 4. Voluntary Program; Prohibition

A. This program is voluntary in nature and is not intended to supersede or conflict with any applicable State or Federal regulations nor any State or Federal laws pertaining to the funding of a public works project.

B. A copy of this resolution shall be provided as part of the contract documents to each bidder on a public works project conducted by the Agency. No City official or employee shall take

compliance with this resolution into account when making any decision concerning the letting or administration of a public works contract by the Agency.

Section 5. Monitoring and Reporting

Each bidder who is awarded a public works contract by the Agency is required to submit to the Agency a summary by percentages and/or dollar amount of minority, local resident, local businesses and local supplier participation in the contract. In its summary, each bidder is required to describe what actions, activities and efforts it used in meeting or attempting to meet the guidelines of this program and also any significant problems or difficulties it encountered in achieving the guidelines set forth above. Staff shall report findings concerning voluntary compliance with this resolution each six months. A copy of this resolution shall be integrated into or included with bid packets published by the Agency.

Section 6. Effective Date

This resolution shall take effect immediately upon its adoption.

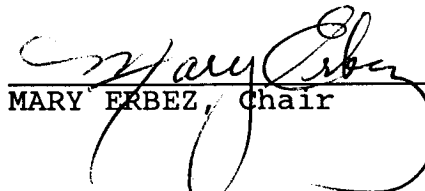
Passed and adopted on the 6th day of December, 1993, by the following vote:

AYES: Members Canciamilla, Davis, Lewis, Quesada & Chair Erbez.

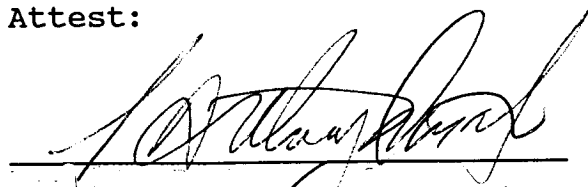
NAYS: None.

ABSTAINED: None.

ABSENT: None.

  
\_\_\_\_\_  
MARY ERBEZ, Chair

Attest:

  
\_\_\_\_\_  
S. Anthony Donato, Executive Director

p:\gen\rloc\res.ra\ra\nl.100

# Appendix B

## Temporary Traffic Control Checklist

# **TEMPORARY TRAFFIC CONTROL PLAN (TTCP) CHECKLIST**

**No traffic control may be implemented on City streets without City approval.**

This checklist is provided to assist developers, contractors, and special event applicants in developing acceptable Temporary Traffic Control Plans (TTCP's) for encroachments onto the City right-of-way. Please refer to the California Manual of Uniform Traffic Control Devices (MUTCD), Part 6: Temporary Traffic Control, for basic information on preparing TTCP's and typical TTCP examples ([www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca\\_mutcd.htm](http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd.htm)).

Contractor/Applicant is responsible for inspecting any approved traffic detour routes to insure adequate horizontal and vertical clearances are maintained from obstructions (e.g., poles and overhanging tree limbs).

## **Lane Closures**

- Except for emergencies or unless otherwise specified:
  - No lane closures will be allowed on weekdays from **6:00 AM to 8:30 AM**, or from **3:30 PM to 6:00 PM**.
  - Two or more lane closures and lane closures with reversible control will not be allowed on weekdays before **9:00 AM**, or after **3:00 PM**.
- The lane closure(s) must be limited in duration and area as practicable. Times and dates of closure must be stated on the approved TTCP.

## **Road Closures**

- Full road closures must be approved by the City Engineer and may only be used when no other types of temporary traffic control are feasible for the work involved.
- Detour routes and notification plans must be submitted to City at least two weeks in advance.
- The road closure(s) must be limited in duration and area as practicable. Times and dates of closure must be stated on the approved TTCP.

## **Construction Activity (may not apply to Special Event Permits)**

- Show the exact location of the work zone and how it is to be protected (e.g., cones, barricades, k-rail) during construction.
- Show construction schedule, work hours, and all times TTCP will be in effect.
- Include details on construction activity and equipment being used within street right-of-way. Specify how the work area will be protected at night (e.g., trench plates).
- If work is to be done in phases, submit separate TTCP's for each phase of work.
- All detour signs must be removed or covered when detour is not in effect.

## **Traffic Control Devices**

- All traffic control signs and devices shown on the TTCP must include any applicable MUTCD sign number, dimension and description.



- A Flashing Arrow Sign/Board (FAS) ***must*** be used for ***all*** lane closures on the following streets. (Include size, panel display and exact location on the TTCP).
  - Railroad Avenue/Kirker Pass Road
  - Bailey Road
  - Somersville Road
  - Loveridge Road
  - West/East Leland Road
  - Buchanan Road
  - Power Avenue
  - Harbor Street
  - North Parkside Drive
  - Willow Pass Road
  - Pittsburg-Antioch Highway
  - California Avenue
  - Century Boulevard
  - West/East Tenth Street
- Show locations of all flaggers, channelizing devices, warning lights, flag trees, and portable barriers on the TTCP. All devices must comply with California MUTCD.
- Flaggers must have formal training in proper flagging operations.

### **Traffic Signal Operation and Equipment**

- Include location of all traffic signals and traffic signal detection devices within the traffic control area.
- If special signal timing is required in the TTCP, specify **all** changes and their effects. This includes changing signal operations to flashing red, recall or fixed time.

### **Pedestrian/Bicycle Safety**

- Pedestrians and bicyclists must have a safe route to walk/ride through and/or around the work area.
- Show all pedestrian/bicycle entries, detours, paths and exits on the TTCP.
- Clearly show description and location of all traffic control devices, including fences and barricades, within the pedestrian's/bicyclists safe route to walk/ride on the TTCP.

### **Parking Restrictions**

- City approved parking restrictions must be clearly posted a minimum of 48 hours before work begins. Their implementation will be at the expense of the contractor/developer.
- All legal parking areas must be maintained. Access to legally parked vehicles' doors and storage areas must also be maintained.
- Parking restrictions must be limited in time as practicable. Restrictions may only be used when there are no other types of traffic control feasible for the work involved, or when parking demand can be reasonably accommodated.

**Please contact the Traffic Engineering Division at (925) 252-4930 for any questions related to TTCP's, including closures, detours, traffic signal operations, and temporary parking restrictions.**

**Please allow five (5) working days for the City to review the TTCP. Once the TTCP is approved it must be available for inspection on-site at all times. City may require field changes to the TTCP to maintain public safety.**

# Appendix C

## Water Meter Application



## Construction Water Permit Fire Hydrant Water Meter

Fire Hydrant Meter #: \_\_\_\_\_ Date Issued: \_\_\_\_\_

Applicant/Company: \_\_\_\_\_ Tax ID: \_\_\_\_\_

Billing Address: \_\_\_\_\_ City/State/Zip: \_\_\_\_\_

Job Site: \_\_\_\_\_ Business License #: \_\_\_\_\_

Cell/Job Site Phone: \_\_\_\_\_ Office Phone: \_\_\_\_\_

Email Address: \_\_\_\_\_ Fax #: \_\_\_\_\_

Applicant Signature: \_\_\_\_\_ Print Name: \_\_\_\_\_

Meter Initial Reading: \_\_\_\_\_ Ccf Read by: \_\_\_\_\_  
(Print Name)

Condition Upon Issuance: \_\_\_\_\_

Inspected By: \_\_\_\_\_

Date Returned: \_\_\_\_\_ Returned Reading: \_\_\_\_\_ Ccf

Condition Upon Return: \_\_\_\_\_

Inspected By: \_\_\_\_\_

### Fire Hydrant Fees

(Resolution 17-13400)

	08/01/2022	01/01/2024	1/1/2025	1/1/2025	01/01/2027
<b>Monthly Fixed Charge</b>	\$330.00	\$340.00	\$360.00	\$380.00	\$485.00
<b>Usage Charge</b>	\$ 5.62 per CCF (748 gallons)	\$ 5.90 per CCF (748 gallons)	\$6.19 per CCF (748 gallons)	\$6.50 per CCF (748 gallons)	\$6.83 per CCF (748 gallons)
<b>Deposit for Meter</b>	\$ 1,200.00	(Refundable)			
<b>Application Fee</b>	\$ 35.00	(Non-refundable)			
<b>Total Deposit</b>	<b>\$ 1,235.00</b>				

# Construction Water Permit Fire Hydrant Water Meter

All water to be used for construction purposes and drawn from a fire hydrant **MUST** be metered.

## **Picking Up a Hydrant Meter**

1. Obtain a Construction Water Permit – Hydrant Meter Form from Pittsburg Water on the first floor of City Hall, 65 Civic Avenue.
2. Submit this completed form and pay fees according to the table .

## **Contractor Responsibilities:**

1. All water to be used for construction purposes and drawn from a fire hydrant **MUST** be metered.
2. Contractor/Applicant **is responsible** to pay monthly fixed charges and a water usage charge which will be billed once a month, and after the meter is returned to Pittsburg Water. If account becomes delinquent, Public Works may request hydrant meter to be returned until account has been paid current.
3. The contractor/Applicant **is responsible** for reporting meter readings to Pittsburg Water during the **third week of every month**. **This form** and a **picture of the register** will need to be emailed to [hydrants@pittsburgca.gov](mailto:hydrants@pittsburgca.gov). If a meter reading is not provided by the **25th of each month**, a **\$37.00** verification meter reading fee will be charged to reimburse the city for the cost
4. The contractor **is responsible** to bring the hydrant meter to the Public Works Corporation Yard to have it officially read and tested every six months At this time, the condition of the meter will be checked, to determine if repairs are needed.
5. Contractor/Applicant **is responsible** for any and all damage to the meter and is required to keep the meter and register clean and free of obstructions which may affect the operation of the meter while issued to them.
6. Meters shall not be moved to another job site or taken outside city limits. Meters must be accessible to Public Works at all times.
7. Lost, stolen or severely damaged hydrant meters may result in the loss of deposit and/or additional charges to the applicant.
8. At any point Public Works could require the meter to be tested for accuracy.

**PLEASE KEEP METERS INSIDE VEHICLES WHEN NOT IN USE. IF REGISTER ROLLS BACKWARDS EXTRA FEES MAY APPLY.**

By signing below, I have read and understand all the rules and regulations regarding my hydrant meter.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# Appendix D

## Project Stabilization Agreement

AGREEMENT TO BE BOUND

[Addressee]

[Address]

[City and State]

RE: City of Pittsburg Project Labor Agreement

Dear Mr./Ms. \_\_\_\_\_:

The undersigned party confirms that it agrees to be a party to and bound by the City of Pittsburg Project Stabilization Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms.

By executing this Agreement to Be Bound, the undersigned party subscribes to, adopts, and agrees to be bound by the written terms of the legally established trust agreements as set forth in Section 9.1, as they may from time to time be amended, specifying the detailed basis upon which contributions are to be made into, and benefits made out of, such trust funds and ratifies and accepts the trustees appointed by the parties to such trust funds.

Such obligation to be a party to and bound by this Agreement shall extend to all work covered by the City of Pittsburg Project Stabilization Agreement undertaken by the undersigned party. The undersigned party shall require all of its subcontractors, of whatever tier, to become similarly bound for all their work within the scope of this Agreement by signing an identical Agreement to Be Bound.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter. However, the undersigned agrees to execute a separate Subscription Agreement(s) for Trust Funds when such Trust Fund(s) so requires.

Contractor/Subcontractor: \_\_\_\_\_

Project Contract Number: \_\_\_\_\_

California State License Number

or Motor Carrier (CA) Permit Number: \_\_\_\_\_

Name and Signature of Authorized Person: \_\_\_\_\_

(Print Name)

\_\_\_\_\_  
(Print Title)

\_\_\_\_\_  
(Signature)

Address and Telephone Number: \_\_\_\_\_

State Public Works Registration Number: \_\_\_\_\_