



NOTICE TO CONTRACTORS, PROPOSAL, AGREEMENT, & SPECIAL PROVISIONS

FOR CONSTRUCTION ON
Project No: 15-57
Parking Lot Reconstruction

IN STANISLAUS COUNTY,
TURLOCK, CALIFORNIA.

Development Services Department/ Engineering Division

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Development Services Director / City Engineer

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Thomas W Holloway, LLA, Landscape Architect, KLA Landscape Architecture

Proposals shall be delivered to Turlock, California
at or before 10:00 AM on August 30, 2016
at the office of the City Engineer,
Development Services: Engineering Division
156 S. Broadway, Suite 150
Turlock, CA 95380

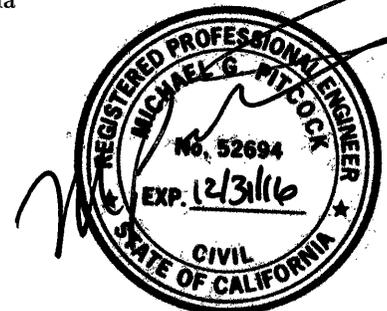


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CITY OF TURLOCK, CALIFORNIA

NOTICE TO CONTRACTORS

Sealed proposals will be received by the City Engineer of the City of Turlock, Development Services/Engineering Division, 156 S. Broadway, Suite 150, Turlock, California 95380, until 10:00 AM on Tuesday, August 30, 2016, for:

City Project No. 15-57 Parking Lot Reconstruction

In accordance with and as described and provided in the plans, specifications and the proposed form of contract therefore, all of which are on file in the office of the City Engineer, and to which special reference is hereby made.

No verbal, telegraphic, electronic mail, facsimile, or telephone Proposals shall be considered.

Proposals are required to be complete and for the entire work, materials and improvements unless the contrary is indicated in the specifications.

In accordance with the provisions of California Business and professions Code, Section 7028, Contractor shall possess one of the following Contractor license(s) at the time of bid and for the duration of the contract:

1. A-General Engineering Contractor

Failure to possess the specified license(s) shall render the Bid as non-responsive, shall act as a bar to award of the contract to any Bidder not possessing said license(s) at the time of Bid opening and shall result in the forfeiture of the security of said Bidder. Furthermore, any Bidder or Contractor not so licensed shall be subject to all legal penalties imposed by law, including, but not limited to, any appropriate disciplinary action by the Contractor's License Board.

Each proposal must be accompanied by cash, cashier's check, or check certified by a responsible bank, or by a bid bond, the proposed form of which is on file in the office of the City Engineer of said City and to which special reference is hereby made in a sum not less than ten percent (10%) of the total amount bid, payable to the City of Turlock as liquidated damages in the case the bidder is awarded the contract and fails within ten (10) days after the date of mailing to him by the City Engineer of a notice of award of the contract and that the contract is ready for signature to execute the above-mentioned written contract and file with the City Engineer satisfactory insurance certificates as required by the terms of said contract and satisfactory bonds as required by law for the faithful performance of said contract and for the protection of material, men and laborers. Special reference is hereby made to Sections 5100, et. seq., of the Public Contracts Code of the State of California and

to the proposed forms for said bonds now on file in the office of the said City Engineer for further particulars regarding bonds.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county Stanislaus in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at 156 S. Broadway St, Turlock, CA 95380 and available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>.

Bidders' attention is directed to the insurance requirements in the contract. It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of insurance certificates and endorsements prescribed and provided herein. If an apparent low bidder fails to comply strictly with the insurance requirements, that bidder may be disqualified from award of the contract.

No proposal will be considered unless made on forms furnished by the City Engineer of said City at his office of said City. Each proposal must be sealed, and the envelope containing the same must be addressed to the City Engineer of the City of Turlock and must be plainly marked. Each proposal shall clearly identify the bidders name and address on the sealed envelope.

Each bid shall separately state in figures the price offered for the approximate quantity of each item set forth and shall also state in words and figures the total contract price. Quantities set forth in the proposal form and in the specifications are approximate only, being given as a basis for comparison of bids, and the City of Turlock does not expressly or implied agree that the actual amount of work or materials will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or materials as may be deemed necessary by the City Engineer.

Proposals may not be withdrawn for a period of sixty (60) days after the time fixed for opening of proposals. The City Council of the City of Turlock reserves the right to reject any and all proposals or any part thereof and to waive any errors or informalities in any proposals and to set and act as sole judge of the merit and qualifications of the equipment, supplies or services offered.

At the request and expense of Contractor, pursuant to Division 2, Part 5, Section 22300, et. seq., of the Public Contracts Code, securities equivalent to any funds withheld as retention from progress payments made under this contract may be deposited with the City of Turlock or with a State or Federally chartered bank as escrow agent, who shall pay such moneys to Contractor upon completion of the contract.

Copies of the Contract Documents, including Instructions to Bidders, Bid Proposal forms, Plans and Specifications, may be downloaded from the engineering division's web site or purchased for a non-refundable fee of **Ninety dollars (\$90)** at the Office of the City Engineer, 156 S. Broadway, Ste. 150, Turlock, CA 95380, Phone (209) 668-5520. For additional information, go to <http://www.cityofturlock.org/capitalprojects>

The U.S. Department of Transportation (DOT) provides a toll-free "hotline" service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., Eastern Time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

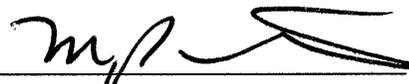
No contractor or subcontractor may be listed on a bid proposal for a public works unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. No contractor or subcontractor may be awarded a contract for public work on a public works unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. The contractors and subcontractors must furnish electronic certified payroll records to the Labor Commissioner.

The contractor shall post job site notices prescribed by regulation. (See 8 Calif. Code Reg. §16451(d) for the notice that previously was required for projects monitored by the CMU.)

DATED: 8/4/16

CITY OF TURLOCK

By: 
Michael G. Pitcock, PE

Director of Development Services / City Engineer

PROPOSAL

Project No. 1557 Parking Lot Reconstruction

City of Turlock, California

DATED: _____

To: The Honorable City Council of the City of Turlock, California:

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

PLACE OF RESIDENCE: _____

Bids are to be submitted for the entire work. The amount of the bid for comparison purposes will be the total of all items. The bidder shall set forth for each unit basis item of work a unit price and a total for the item, and for each lump sum item a total for the item, all in clearly legible figures in the respective spaces provided for that purpose.

In the case of unit basis items, the amount set forth under the "Item Total" column shall be the product of the unit price bid and the estimated quantity for the item. In case of discrepancy between the unit price and the total set forth for a unit basis item, the unit price shall prevail except as provided in (a) or (b), as follows:

(a) If the amount set forth as unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount as the entry in the item total column, then the amount set forth in the item total column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price;

(b) (Decimal Errors) If the product of the entered unit price and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentage wise the unit price or item total in the Department's Final Estimate of cost.

The Contractor shall submit the following at the time of Bid in order for the Bid to be considered responsive:

- Completed Proposal, pages 4 -14

In accordance with the annexed Notice to Contractors, the undersigned, as bidder, declares that he has carefully examined the location of the proposed work, the plans, specifications and technical requirements therefore, and the proposed forms of contract and bonds mentioned or referred to in said Notice and on file in the office of the City Engineer of the City of Turlock, together with the prevailing rate of per diem wages for each craft or type of workmen needed to execute said contract; and he proposes and agrees that if this proposal is accepted, he will furnish all labor, materials, equipment, plant transportation, service, sales taxes, permit fees and other costs necessary to complete the construction in strict conformity to the plans and specifications and he will enter into a written contract with the City of Turlock in the form of contract on file in the Office of the City Engineer for such purposes, and that he will execute and/or provide all bonds and insurance certificates required by law and/or by said contract and/or mentioned in said Notice to Contractors all in accordance with and subject to all applicable laws, and that he will take in full payment therefore the following unit prices, to wit:

BIDDING FORM

FOR PROJECT 1557

PARKING LOT RECONSTRUCTION

Item No.	Item	Estimated Quantity	Unit of Measure	Unit Price (in Figures)	Item Total (in Figures)
GENERAL					
1	MOBILIZATION	1	LS		
2	CONSTRUCTION PROJECT SIGN	1	LS		
3	WATER POLLUTION CONTROL	1	LS		
4	TRAFFIC CONTROL SYSTEM	1	LS		
5	CLEARING AND GRUBBING	1	LS		
DEMOLITION					
6	SAWCUT ASPHALT OR CONCRETE	343	LF		
7	REMOVE EXISTING ASPHALT	11,438	SF		
8	REMOVE EXISTING CONCRETE	2,039	SF		
PARKING LOT / ASPHALT / CONCRETE / STORM DRAIN SYSTEM					
9	EARTHWORK	1	LS		
10	SHORING	1	LS		
11	ASPHALT CONCRETE PAVEMENT (0.20' AC/0.35' AB)	10,744	SF		
12	ASPHALT CONCRETE PAVEMENT (TRENCH SURFACE REPAIR SECTION IN EXISTING PAVEMENT)	400	SF		
13	CONCRETE WHEEL STOP	16	EA		
14	MINOR CONCRETE - VALLEY GUTTER	78	SF		
15	MINOR CONCRETE - 6" VERTICAL CURB AND GUTTER	111	LF		
16	MINOR CONCRETE - 6" VERTICAL PLANTER CURB	539	LF		
17	MINOR CONCRETE - 6" THICK REINFORCED CONCRETE BIO-FILTRATION PLANTER WALL (VARIES 3.1' - 3.7' HIGH WHERE APPLICABLE)	140	LF		
18	MINOR CONCRETE- 6" THICK REINFORCED CONCRETE BIO-FILTRATION PLANTER FLOOR/FOOTING	570	SF		
19	MINOR CONCRETE - CONCRETE FLATWORK	144	SF		
20	PARKING STALL STRIPING AND MARKING	1	LS		
21	ADA PARKING STALL STRIPING, SIGNAGE AND MARKING; INCLUDES TRUNCATED DOMES RETROFIT WHERE APPLICABLE	1	LS		
22	STORM DRAIN PIPE, 12"; INCLUDES EXCAVATION, INSTALLATION, BACKFILL, COMPACTION AND RESTORATION OF HARDSCAPE SURFACE(S) AS APPLICABLE	141	LF		
23	STORM DRAIN PIPE, 12" PERFORATED; INSTALLED IN 4' X 4' ROCK TRENCH; INCLUDES EXCAVATION, INSTALLATION, ROCK BACKFILL, PERMEABLE FILTER FABRIC, BACKFILL AND COMPACTION	97	LF		
24	STORM DRAIN PIPE, 6" PERFORATED BIO-FILTRATION UNDERDRAIN SYSTEM; INCLUDES OVERFLOW PIPING WITH NDS ATRIUM GRATE, 6" AND 12" PVC PIPE FITTINGS, INSTALLATION, ROCK BACKFILL AND BIO-TREATMENT TOPSOIL	52	LF		
25	STORM DRAIN MANHOLE, 48"	2	EA		
26	CONNECT TO EXISTING STORM DRAIN MANHOLE	1	EA		
SITE LIGHTING AND ELECTRICAL SYSTEM / LANDSCAPING AND IRRIGATION					
27	1" WATER SERVICE AND METER	1	EA		
28	SITE LIGHTING, CHARGING STATION, ELECTRICAL SYSTEM	1	LS		
29	IRRIGATION AND LANDSCAPING	1	LS		
30	SURFACE MOUNTED BICYCLE RACKS	3	EA		
GRAND TOTAL:					
SIGNED:				DATE:	
NOTE: All line items must have an entry placed in its appropriate box, and this form must be signed for the bid to be accepted as complete.					

Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents and the following Addenda, receipt of which is hereby acknowledged:

No. _____ Date _____ Signed _____

TOTAL BID WRITTEN IN FIGURES: \$ _____

TOTAL BID WRITTEN IN WORDS: \$ _____

COMPANY'S NAME: _____

BY: _____

ADDRESS: _____

(Number)

(Street)

(City)

(State)

(ZIP)

CONTRACTOR'S PHONE #: _____

NOTE: CONTRACTOR WILL BE REQUIRED TO LIST THEIR LICENSE NUMBER, EXPIRATION DATE, AND APPROPRIATE STATEMENT REGARDING PERJURY AND SIGNED BY INDIVIDUAL AUTHORIZED TO DO SO. FAILURE TO INCLUDE THE ABOVE ITEMS MAY CAUSE SAID CONTRACTOR'S BID TO BE REJECTED.

_____, Contractor's License # _____, Class _____
(Company's Name)

Expires _____. This information is true, is provided as per Section 7028.15 of the Business and Professions Code, and is made herein under penalty of perjury.

X _____
(Bidder's Signature) (Date)

If the proposal is accepted and the undersigned shall fail to contract as aforesaid and fail to file with the City insurance certificates as required by said contract, within fourteen (14) days after the bidder has received notice from the City Engineer or his representative of the City of Turlock that the contract has been awarded to bidder and is ready for signature, the City of Turlock may, at its option, determine that the bidder has abandoned his contract, and thereupon this proposal and the acceptance thereof shall be null and void.

Also accompanying this proposal is an affidavit of non-collusion and questionnaire to general contractors, a statement of proposed sub-contractors, if any, the address of mill, shop or office of any sub-contractor, and a statement of work to be performed by sub-contractors.

The names and addresses of persons interested in the foregoing proposal as principals are as follows:

(IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a partnership, state true name of firm, also names of all individual co-partners composing firm; if bidder or other interested person is an individual, state first and last name in full.)

Licensed in accordance with an act providing for the registration of Contractors,
License No. _____ Expiration Date _____.

DATED: _____, 20_____

Address: _____

Phone: _____

X _____
Signature of Bidder

NOTE: If bidder is a corporation, the legal name of the corporation shall be set forth above together with the signature of the officers authorized to sign contracts on behalf of the corporation; if bidder is a co partnership, the true name of the firm shall be set forth above together with the signature of the partner or partners authorized to sign contracts in behalf of the co partnership; and, if bidder is an individual, his signature shall be placed above. If a signature is by an agent other than an officer of a corporation or a member of the partnership, a Power of Attorney must be on file with the City Clerk prior to opening or submitted with the bid; otherwise, the bid will be disregarded as irregular and unauthorized.

AFFIDAVIT

The undersigned bidder, being first duly sworn, deposes and says that he/she are the party making the foregoing proposal or bid, that this bid is genuine and not collusive or sham, that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any other person or bidder, to put in a sham bid, or that said other person shall refrain from bidding, and has not in any manner sought by collusion to secure any advantage against the said City or any person interested in said improvement, for him/herself or any other person.

X _____
Signature of Bidder

Jurat (Government Code Section 8202)

State of California

County of _____

Subscribed and sworn to (or affirmed) before me on this _____ day of _____, 20____

by _____ proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

(AFFIX SEAL)

NOTARY PUBLIC SIGNATURE

NOTARY PUBLIC PRINTED NAME

INFORMATION REQUIRED OF BIDDER

The bidder is required to provide the following information. Additional sheets may be attached if necessary.

Contractor's mailing address: _____

Contractor's telephone number: _____

Number of years experience as a contractor in construction work or installation work similar to that required in these specifications:

Name of person who inspected the site of the proposed work for your firm:

Date of Inspection: _____

List at least four projects completed as of recent date:

Project No. and Title:	_____
Class and Type of Work:	_____
Name, Address, and Phone No. of Owner	_____
Registered Engineer in Charge of Project:	_____
Total Contract amount:	_____
Contract amount you performed:	_____
Name of Prime Contractor if you were Sub:	_____
Date Completed:	_____
Liquidated Damages Assessed:	_____

Project No. and Title:	_____
Class and Type of Work:	_____
Name, Address, and Phone No. of Owner	_____
Registered Engineer in Charge of Project:	_____
Total Contract amount:	_____
Contract amount you performed:	_____
Name of Prime Contractor if you were Sub:	_____
Date Completed:	_____
Liquidated Damages Assessed:	_____

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract amount: _____
Contract amount you performed: _____
Name of Prime Contractor if you were Sub : _____
Date Completed: _____
Liquidated Damages Assessed: _____

Project No. and Title: _____
Class and Type of Work: _____
Name, Address, and Phone No. of Owner _____
Registered Engineer in Charge of Project: _____
Total Contract amount: _____
Contract amount you performed: _____
Name of Prime Contractor if you were Sub : _____
Date Completed: _____
Liquidated Damages Assessed: _____

IN WITNESS WHEREOF, we have hereunto set our hands and seals on
this _____ day of _____, 201_.

BIDDER

_____(SEAL)
(Bidder's Name and Corporate Seal)

(Signature)

(Print Name and Title)

(ATTACH ACKNOWLEDGMENT OF BIDDER)

SURETY

_____(SEAL)
(Surety's Name and Corporate Seal)

(Signature)

(Print Name and Title)

**(ATTACH ACKNOWLEDGMENT OF SURETY'S
ATTORNEY-IN-FACT)**

NOTE: ATTACH CERTIFIED COPY OF POWER OF ATTORNEY

AGREEMENT

FOR PUBLIC IMPROVEMENT

Project No. 1557 Parking Lot Reconstruction

THIS AGREEMENT is entered into by and between the CITY OF TURLOCK, a Municipal Corporation, hereinafter called "City," and _____ hereinafter called "Contractor" on this ____ day of _____, 20__ (hereinafter called the "Agreement").

RECITALS

A City has taken appropriate proceedings to authorize construction of the public work and improvements herein provided and execution of this contract.

B A notice was duly published for bids for the contract for the improvement hereinafter described.

C On _____, 20__, after notice duly given, the City Council of the City of Turlock awarded the contract for the construction of the improvements hereinafter described to Contractor, which Contractor said Council found to be the lowest responsible bidder for said improvements.

D City and Contractor desire to enter into this Agreement for the construction of said improvements.

IT IS AGREED AS FOLLOWS:

1. **Scope Of Work:**

Contractor shall perform the work described briefly as follows:

The work consists, in general of: Sawcut and removal of existing asphalt parking lot and concrete flatwork; construct new parking layout including preparation of subgrade for new asphalt structural section and concrete planters; install new lighting system including charging station; install new landscaping and irrigation system; incorporate Bio-Filtration stormwater planter, retention system and overflow system per City of Turlock MS4 requirements; provide parking lot striping including ADA marking and signage; surface repair (in kind) of existing street, curb and gutter, and sidewalk; and other associated work and furnishing all necessary labor, materials, tools, equipment and incidentals needed to perform the improvements as shown on the contract plans complete and in place. This work shall be completed in accordance with the Standard Specifications, standard Drawings and these Special Provisions.

The aforesaid improvements are further described in the plans, specifications and technical requirements for such project, copies of which are on file in the office of the City Engineer, and which are incorporated herein by reference as if set forth fully herein.

2. The Contract:

The complete contract consists of the following documents: This agreement, the notice to contractors, the contractor's accepted proposal, general conditions, special provisions, plans and detailed drawings, addendums, faithful performance bond, labor and materials bond, and any and all supplemental agreements amending, decreasing, or extending the work contemplated or which may be required to complete the work in a substantial and acceptable manner. The current edition of the "City of Turlock Standard Specifications and Drawings" is hereby incorporated as a part of the contract.

All rights and obligations of City and Contractor are set forth and described in the contract.

All of the above named documents are intended to incorporate the terms of the others so that any work called for in one and not mentioned in the other, or vice versa, is to be executed the same as if mentioned in all said documents. The documents comprising the complete contract will hereinafter be referred to as the "contract". In case of any dispute, the decision of the City Engineer shall be final.

3. Schedule:

All work shall be performed in accordance with the schedule approved by the City Engineer and under his direction.

4. Equipment & Performance Of Work:

Contractor shall furnish all tools, equipment, facilities, labor and materials necessary to perform and complete in good workmanlike manner the work of general construction as called for and in the manner designated in and in strict conformity with the plans and specifications for said work, which said specifications are entitled, "General Conditions and Special Provisions for **Project No. 1557, "Parking Lot Reconstruction."**

The equipment, apparatus, facilities, labor and material shall be furnished, and said work performed and completed as required in said plans and specifications under the direction and supervision, and subject to the approval of the City Engineer of said City, or City Engineer's designated agent.

5. Contract Price:

City shall pay, and Contractor shall accept in full payment for the work above agreed to be done, an amount not to exceed _____ **and** ___/100ths Dollars (\$_____.__). Said amount shall be paid in installments as hereinafter provided.

6. Time For Performance:

The time fixed for the commencement of such work is within ten (10) working days after the "Notice to Proceed" has been issued. The work on this project, including all punch list items,

shall be completed on or before the expiration of **Sixty (60)** working days beginning on the first day of work or no later than the tenth day after the "Notice to Proceed" has been issued.

7. Rights Of City To Increase Working Days:

If such work is not completed within such time, the City Engineer shall have the right to increase the number of working days in the amount the City Engineer may determine will best serve the interests of the City, and if the City Engineer desires to increase said number of working days, the City Engineer shall have the further right to charge the Contractor and deduct from the final payment for the work the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to Contractor, and which accrue during the period of such extension, except that the cost of the final service and preparation of the final estimates shall not be included in such charges; provided, however, that no extension of time for completion of such work shall ever be allowed unless requested by Contractor at least twenty (20) calendar days prior to the time herein fixed for the completion thereof, in writing, with the City Engineer. In this connection, it is understood that the City Engineer shall not consider any such requests if not filed within the time herein prescribed.

8. Option Of City To Terminate Agreement In Event Of Failure To Complete Work:

If Contractor shall have refused or failed to prosecute the work, or any severable part thereof, with such diligence as will ensure its completion within the time specified or any extensions thereof, or shall have failed to complete said work within such time if Contractor should be adjudged a bankrupt, or if Contractor should make a general assignment for the benefit of Contractor's creditors, or if a receiver should be appointed in the event of Contractor's insolvency, or if Contractor or any subcontractor should violate any of the provisions of this agreement, the City Engineer or the City Council may give written notice to Contractor and Contractor's sureties of its intention to terminate this agreement, and unless within five (5) days after the serving of such notice such violation shall cease and satisfactory arrangements for the correction thereof made, this agreement may, at the option of City, upon the expiration of said time, cease and terminate.

9. Delay Damages:

In the event the Contractor, for any reason, shall have failed to perform the work herein specified to the satisfaction of the City Engineer within the time herein required, the City may, in accordance with Section 7203 of the Public Contract Code, in lieu of any other of its rights authorized by paragraph 8 of this agreement, deduct from payments or credits due Contractor after such breach, a sum equal to **Seven Hundred** and no/100ths Dollars (**\$700.00**) for each calendar day beyond the date herein provided for the completion of such work. This deduction shall not be considered a penalty but shall be considered as delay damages. The aforementioned rate of deduction is an amount agreed to by the Contractor and the City as reasonably representing additional construction engineering costs incurred by the City if the Contractor fails to complete the work within the contract time. However, any deduction assessed as delay damages shall not relieve the Contractor from liability for any damages or costs resulting from delays to other contractors on the project or other projects caused by a failure of the assessed Contractor to complete the work within the contract time. Due account shall be taken of any time extensions granted to the Contractor by the City.

Permitting the Contractor to continue work beyond the contract completion date shall not operate as a waiver on the part of the City of any of its rights under the contract nor shall it relieve the Contractor from liability for any damages or costs resulting from delays to other contractors on the project or other projects caused by a failure of the assessed Contractor to complete the work within the contract time.

10. Performance By Sureties:

In the event of any termination as hereinbefore provided, City shall immediately give written notice thereof to Contractor and Contractor's sureties, and the sureties shall have the right to take over and perform the agreement; provided, however, that if the sureties within five (5) days after giving them said notice of termination, do not give the City written notice of their intention to take over the performance of the agreement and do not commence performance thereof within five (5) days after notice to the City of such election, City may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable for the account, and at the expense of Contractor and the sureties shall be liable to City for any excess cost or damages occasioned City thereby; and, in such event, City may, without liability for so doing, take possession of and utilize in completing the work such materials, appliances, plant and other property belonging to Contractor as may be on the site of the work and necessary therefor.

11. Disputes Pertaining To Payment For Work:

Should any dispute arise respecting the true value of any work done, of any work omitted, or of any extra work which Contractor may be required to do, or respecting the size of any payment to Contractor during the performance of this contract, such dispute shall be decided by the City Engineer, and the decision of the latter shall be final and conclusive.

12. Permits, Compliance With Law:

Contractor shall, at Contractor's expense, obtain all necessary permits and licenses for the construction of each improvement, give all necessary notices and pay all fees and taxes required by law, except those City fees set forth in the Special Provisions Section 1.

13. Superintendence By Contractor:

Contractor shall give personal superintendence to the work on said improvement or have a competent foreman or superintendent satisfactory to the City Engineer on the work at all times during progress, with authority to act for him.

14. Inspection By City:

Contractor shall at all times maintain proper facilities and provide safe access for inspection by City to all parts of the work and to the shops wherein the work is in preparation.

15. Extra And/Or Additional Work And Changes:

Should City at any time during the progress of said work request any alterations, deviations, additions, or omissions from said specifications or plans or other contract documents, it shall be at liberty to do so, and the same shall in no way affect or make void the contract, but will be added to or deducted from the amount of said contract price as the case may be, by fair and reasonable valuation. Request for such change must be made in writing signed by the City

Engineer, shall be accompanied by plans and specifications for such purpose, shall be accepted in writing by Contractor and Contractor's surety.

In the event work is performed or materials furnished in addition to those set forth in Contractor's bid and the specifications herein, said work and materials shall be paid for at the unit price therein contained. Said amount shall be paid in installments as hereinafter provided.

16. Change Of Contract Price:

The contract price may only be changed by a contract change order. The value of any work covered by a contract change order for an adjustment in the contract price will be determined in the City's sole discretion as follows:

- (a) If the work performed is on the basis of unit prices contained in the contract documents, the change order will be determined in accordance with the provisions in Section 4-1.05, "Changes and Extra Work", of the Caltrans Standard Specifications; or
- (b) If the work performed is not included on the engineers estimate associated with a unit price, the change order will be by a mutually agreed lump sum; or
- (c) If the change order is not determined as described above in either 16 (a) or 16 (b), the change order will be determined on the basis of force account in accordance with the provisions below.

FORCE ACCOUNT

For work paid by force account, the Engineer compares the City's records to the Contractor's daily force account work report. When the Engineer and the Contractor agree on the contents of the daily force account work reports, the Engineer accepts the report and the City pays for the work. If the records differ, the City pays for the work based only on the information shown on the City's records.

If a subcontractor performs work at force account, accept an additional 2 percent markup to the total cost of that work paid at force account, including markups specified as below, as reimbursement for additional administrative costs.

The markups specified in labor, materials, and equipment includes compensation for all delay costs, overhead costs, and profit.

If an item's unit price is adjusted for work-character changes, the City excludes the Contractors cost of determining the adjustment.

Payment for owner-operated labor and equipment is made at the market-priced invoice submitted.

Labor

Labor payment is full compensation for the cost of labor used in the direct performance of the work plus a 5 percent markup. Force account labor payment consists of:

1. Employer payment to the worker for:
 - 1.1. Basic hourly wage
 - 1.2. Health and welfare
 - 1.3. Pension
 - 1.4. Vacation
 - 1.5. Training
 - 1.6. Other State and federal recognized fringe benefit payments
2. Labor surcharge percentage in *Labor Surcharge and Equipment Rental Rates* current during the work paid at force account for:
 - 2.1. Workers' compensation insurance
 - 2.2. Social security
 - 2.3. Medicare
 - 2.4. Federal unemployment insurance
 - 2.5. State unemployment insurance
 - 2.6. State training taxes
3. Subsistence and travel allowances paid to the workers
4. Employer payment to supervisors, if authorized

The 5 percent markup consists of payment for all overhead costs related to labor but not designated as costs of labor used in the direct performance of the work including:

1. Home office overhead
2. Field office overhead
3. Bond costs
4. Profit
5. Labor liability insurance
6. Other fixed or administrative costs that are not costs of labor used in the direct performance of the work

Materials

Material payment is full compensation for materials the Contractor furnishes and uses in the work. The Engineer determines the cost based on the material purchase price, including delivery charges, except:

1. A 5 percent markup is added
2. Supplier discounts are subtracted whether the Contractor takes them or not
3. If the Engineer believes the material purchase prices are excessive, the City pays the lowest current wholesale price for a similar material quantity
4. If the Contractor procured the materials from a source the Contractor wholly or partially own, the determined cost is based on the lower of the:
 - 4.1. Price paid by the purchaser for similar materials from that source on Contract items
 - 4.2. Current wholesale price for those materials

5. If the Contractor does not submit a material cost record within 30 days of billing, the determined cost is based on the lowest wholesale price:
 - 5.1. During that period
 - 5.2. In the quantities used

Equipment Rental

Equipment rental payment is full compensation for:

1. Rental equipment costs, including moving rental equipment to and from the change order work site using its own power.
2. Transport equipment costs for rental equipment that cannot be transported economically using its own power. No payment is made during transport for the transported equipment.
3. 5 percent markup.

If the Contractor wants to return the equipment to a location other than its original location, the payment to move the equipment must not exceed the cost of returning the equipment to its original location. If the Contractor uses the equipment for work other than work paid by force account, the transportation cost is included in the other work.

Before moving or loading the equipment, obtain authorization for the equipment rental's original location.

The Engineer determines rental costs:

1. Using rates in *Labor Surcharge and Equipment Rental Rates*:
 - 1.1. By classifying equipment using manufacturer's ratings and manufacturer-approved changes.
 - 1.2. Current during the work paid by force account.
 - 1.3. Regardless of equipment ownership; but the City uses the rental document rates or minimum rental cost terms if:
 - 1.3.1. Rented from equipment business the Contractor does not own.
 - 1.3.2. The Labor Surcharge and Equipment Rental Rates hourly rate is \$10.00 per hour or less.
2. Using rates established by the Engineer for equipment not listed in *Labor Surcharge and Equipment Rental Rates*. The Contractor may submit cost information that helps the Engineer establish the rental rate; but the City uses the rental document rates or minimum rental cost terms if:
 - 2.1. Rented from equipment business the Contractor does not own.
 - 2.2. The Engineer establishes a rate of \$10.00 per hour or less.
3. Using rates for transport equipment not exceeding the hourly rates charged by established haulers.

Equipment rental rates include the cost of:

- | | |
|---|----------------------------|
| 1. Fuel | 7. Repairs and maintenance |
| 2. Oil | 8. Depreciation |
| 3. Lubrication | 9. Storage |
| 4. Supplies | 10. Insurance |
| 5. Small tools that are not consumed by use | 11. Incidentals |
| 6. Necessary attachments | |

The City pays for small tools consumed by use. The Engineer determines payment for small tools consumed by use based on Contractor-submitted invoices.

The Engineer may authorize rates in excess of those in the *Labor Surcharge and Equipment Rental Rates* if:

1. The Contractor submits a request to use rented equipment
2. Equipment is not available from the Contractors normal sources or from one of the Contractors subcontractors
3. Rented equipment is from an independent rental company
4. Proposed equipment rental rate is reasonable
5. The Engineer authorizes the equipment source and the rental rate before the Contractor uses the equipment

Equipment on the Job Site

For equipment on the job site at the time required to perform work paid by force account, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to move the equipment to another location on the job site when the work paid by force account is completed
2. To load and unload equipment
3. Equipment is operated to perform work paid by force account and:
 - 3.1. Hourly rates are paid in 1/2-hour increments
 - 3.2. Daily rates are paid in 1/2-day increments

Equipment Not On the Job Site Required for Original-Contract Work

For equipment not on the job site at the time required to perform work paid by force account and required for original-Contract work, the time paid is the time the equipment is operated to perform work paid by force account and the time to move the equipment to a location on the job site when the work paid by force account is completed.

The minimum total time paid is:

1. 1 day if daily rates are paid
2. 8 hours if hourly rates are paid

If daily rates are recorded, equipment:

1. Idled is paid as 1/2 day
2. Operated 4 hours or less is paid as 1/2 day
3. Operated 4 hours or more is paid as 1 day

If the minimum total time exceeds 8 hours and if hourly rates are listed, the City rounds up hours operated to the nearest 1/2-hour increment and pays based on the hours shown the following table. The table does not apply when equipment is not operated due to breakdowns, in which case rental hours are the hours the equipment was operated.

Equipment Rental Hours	
Hours operated	Hours paid
0.0	4.00
0.5	4.25
1.0	4.50
1.5	4.75
2.0	5.00
2.5	5.25
3.0	5.50
3.5	5.75
4.0	6.00
4.5	6.25
5.0	6.50
5.5	6.75
6.0	7.00
6.5	7.25
7.0	7.5
7.5	7.75
≥8.0	hours used

Equipment Not On the Job Site Not Required for Original-Contract Work

For equipment not on the job site at the time required to perform work paid by force account and not required for original-Contract work, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to return the equipment to its source when the work paid by force account is completed
2. To load and unload equipment
3. Equipment is operated to perform work paid by force account

Non-Owner-Operated Dump Truck Rental

Submit the rental rate for non-owner-operated dump truck rental. The Engineer determines the payment rate. Payment for non-owner-operated dump truck rental is for the cost of renting a dump truck, including its driver. For the purpose of markup payment only, the non-owner-operated dump truck is rental equipment and the owner is a subcontractor.

The above markups shall constitute full compensation for all home office overhead, field office overhead, bond costs, profit, labor liability insurance, and other fixed or administrative costs that are not costs specifically designated as cost or equipment rental as stated above. The total payment made as provided above shall be deemed to be the actual cost of the work and shall constitute full compensation therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in conformance with the provisions in Section 5-1.13, "Subcontracting," an

additional markup of 2 percent will be added to the total cost of that extra work including all markups specified in this Section. The additional 2 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

17. Change Of Contract Time:

The contract time may only be changed by a contract change order. The value of any work covered by a contract change order for an adjustment in the contract time will be determined as follows:

- (a) Additional working days will be awarded where the amount of time is mutually agreed upon by Contractor and Engineer; or
- (b) Additional working days will be awarded where Contractor is prevented from completing any part of the work identified on the critical path and:
 - a. where the delay is caused by acts of public enemy, fire, floods, tsunamis, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargos, provided that Contractor shall notify Engineer in writing of the causes of delay within 15 days from the beginning of that delay; or
 - b. where the delay is caused by actions beyond the control of Contractor; or
 - c. where the delay is caused by actions or failure to act by Engineer.

Contractor shall not be entitled to an adjustment in contract time for delays within the control of Contractor. Delays resulting from and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

18. Inspection And Testing Of Materials:

Contractor shall notify City a sufficient time in advance of the manufacture of production materials to be supplied by Contractor under this contract in order that City may arrange for mill or factory inspection and testing of same.

Any materials shipped by Contractor from factory prior to having satisfactorily passed such testing and inspection by City's representative or prior to the receipt of notice from such representative that such testing and inspection will not be required shall not be incorporated on the job of said improvement. Contractor shall also furnish City, in triplicate, certified copies of all factory and mill test reports upon request.

19. Permits And Care Of The Work:

Contractor has examined the site of the work and is familiar with its topography and condition, location of property lines, easements, building lines, and other physical factors and limitations affecting the performance of this agreement. Contractor, at Contractor's expense, shall obtain any permission necessary for any operations conducted off the property owned or controlled

by City. Contractor shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.

20. Other Contracts:

City may award other contracts for additional work, and Contractor shall fully cooperate with such other Contractors and carefully fit Contractor's own work to that provided under other contracts as may be directed by the City Engineer. Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.

21. Payments To Contractor:

Payments are to be made to the Contractor in accordance with the provisions of Section 9 of the General Conditions of said specifications in legally executed and regularly issued warrants of the city, drawn on the appropriate fund or funds as required by law and order of the City Council thereof. The Contractor shall be administered a progress payment approximately every 30 calendar days from the time work begins according to the payment schedule furnished by the City Engineer at the time work begins.

Pursuant to Division 2, Part 5, Section 22300, *et seq.*, of the Public Contracts Code, the Contractor may request the right to substitute securities for any moneys withheld by the City of Turlock to ensure the performance required of the Contractor under the contract, or that the City of Turlock make payment of retentions earned directly into an escrow account established at the expense of the Contractor.

22. Contract Security:

Concurrently with the execution hereof, Contractor shall furnish on the forms provided (1) a surety bond in an amount equal to at least one hundred percent (100%) of the contract price as security for the faithful performance of this contract; and (2) a separate surety bond in an amount equal to at least one hundred percent (100%) of the contract price as security for the payment of all persons performing labor and furnishing materials in connection with this contract. Sureties on each of said bonds thereof shall be satisfactory to the City.

23. Hold-Harmless Agreement And Contractor's Insurance:

Contractor shall indemnify, defend, and hold harmless City and its elective and appointive boards, officers, agents, employees, and volunteers from and against all claims, damages, losses and expenses including attorney fees arising out of the performance of the work described herein, caused in whole or in part by any negligent act or omission of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence, or willful misconduct of City.

24. Contractor's Insurance:

Contractor shall not commence work under this Agreement until Contractor has obtained City's approval regarding all insurance requirements, forms, endorsements, amounts, and carrier ratings, nor shall Contractor allow any subcontractor to commence work on a subcontract until all similar insurance required of the subcontractor shall have been so obtained and approved. Contractor shall procure and maintain for the duration of this Agreement

insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Contractor, its agents, representatives, employees or subcontractors. Failure to maintain or renew coverage or to provide evidence of renewal may constitute a material breach of contract.

(a) Minimum Scope of Insurance: Coverage shall be at least as broad as:

(1) Insurance Services Office Commercial General Liability coverage (occurrence Form CG 00 01) with additional insured endorsements (form CG 20 10 for ongoing operations and CG 20 37 for products/completed operations), to be approved by the City of Turlock.

(2) Insurance Services Office Form CA 00 01 covering Automobile Liability, Code 1 (any auto).

(3) Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.

(4) Surety bonds as described below.

(5) Errors and Omissions/Professional Liability Insurance (if *Design/Build*).

(b) Minimum Limits of Insurance: Contractor shall maintain limits no less than:

(1) General Liability (including operations, products and completed operations): \$1,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

(2) Automobile Liability: \$1,000,000 per occurrence for bodily injury and property damage.

(3) Workers' Compensation: As statutorily required by the State of California.

(4) Employer's Liability: \$1,000,000 per accident for bodily injury or disease.

(5) Errors and Omissions/Professional Liability: \$1,000,000 per claim as needed for design/build.

(c) Deductibles and Self-Insured Retentions: Upon request of City, any deductibles or self-insured retentions must be declared to and approved by City. At the option of City, either: (1) the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects City, its elective and appointive boards, officers, agents, employees, and volunteers; or (2) Contractor shall provide a financial guarantee

satisfactory to City guaranteeing payment of losses and related investigations, claim administration and defense expenses.

(d) Other Insurance Provisions: The commercial general liability policy shall contain, or be endorsed to contain, the following provisions:

(1) City, its elective and appointive boards, officers, agents, employees, and volunteers are to be covered as additional insureds with respect to liability arising out of work or operations performed by or on behalf of Contractor, including materials, parts or equipment furnished in connection with such work or operations, which coverage shall be maintained in effect for at least three (3) years following the completion of the work specified in the contract. General liability coverage can be provided in the form of an endorsement to Contractor's insurance (at least as broad as CG 20 10 for ongoing operations and CG 20 37 for products/completed operations), or as a separate Owners and Contractors Protective Liability policy providing both ongoing operations and completed operations coverage.

(2) For any claims related to this project, Contractor's insurance coverage shall be primary insurance as respects City and any insurance or self-insurance maintained by City shall be excess of Contractor's insurance and shall not contribute with it.

(3) In the event of cancellation, non-renewal, or material change that reduces or restricts the insurance coverage afforded to City under this Agreement, the insurer, broker/producer, or Contractor shall provide City with thirty (30) days' prior written notice of such cancellation, non-renewal, or material change.

(4) Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of the Civil Code.

(e) Acceptability of Insurers: Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII or with an insurer to which the City has provided prior approval.

(f) Verification of Coverage: Consultant shall furnish City with original certificates and amendatory endorsements or copies of the applicable policy language effecting coverage required by this clause. All certificates and endorsements are to be received and approved by City before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive Contractor's obligation to provide them. City reserves the right, at any time, to require complete, certified copies of all required insurance policies and endorsements.

(g) Waiver of Subrogation: With the exception of professional liability, Contractor hereby agrees to waive subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss. The commercial general liability policy and workers' compensation policy shall be endorsed to contain a waiver of

subrogation in favor of City for all work performed by Contractor, its agents, employees, independent contractors and subcontractors. Contractor agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation.

- (h) Subcontractors: Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.
- (i) Surety Bonds: Contractor shall provide a Performance Bond and a Payment Bond.

25. Proof Of Carriage Of Insurance:

Contractor shall furnish City concurrently with the execution hereof, satisfactory proof of carriage of the insurance required, and that Contractor shall give City at least sixty (60) days prior notice of the cancellation of any policy during the effective period of this contract.

26. Wages & Hours Of Employment:

In the performance of this contract, eight (8) hours shall be the maximum hours of labor on any calendar day, and the minimum wages of compensation of persons performing labor in the execution of this agreement shall be the current prevailing scale of wages determined by the Director of the Department of Industrial Relations for the community.

The Contractor shall forfeit as penalty to the City, Twenty-five and no/100ths Dollars (\$25.00) to be paid to the City of Turlock for each workman employed in the execution of this agreement by him or by any subcontractor, for each calendar day during which any workman is required or permitted to labor more than eight (8) hours, in violation of provisions of Article 3, Chapter 1, Part 7, a Division 2, of the Labor Code of the State of California, and all amendments thereto.

27. Emergency - Additional Time For Performance - Procurement Of Materials:

If, because of war or other declared national emergency, the Federal or State Government restricts, regulates, or controls the procurement and allocation of labor or materials, or both, and if solely because of said restrictions, regulations or controls, Contractor is through no fault of the Contractor, unable to perform this agreement, or the work is thereby suspended or delayed, any of the following steps may be taken.

- (a) City may, pursuant to resolution of the Council, grant Contractor additional time for the performance of this agreement, sufficient to compensate in time, for delay or suspension.

To qualify for such extension in time, Contractor within ten (10) days of Contractor's discovering such inability to perform, shall notify City Engineer in writing thereof, and give specific reasons therefore; City Engineer shall thereupon have sixty (60) days within which to procure such needed materials or labor as is specified in this agreement, or permit substitution, or provide for changes in the work in accordance with other provisions of this agreement.

Substituted materials, or changes in the work, or both, shall be ordered in writing by City Engineer, and the concurrence of the Council shall not be necessary. All reasonable expenses of such procurement incurred by the City Engineer shall be defrayed by the Contractor; or

- (b) If such materials or labor cannot be procured through legitimate channels within sixty (60) days after the filing of the aforesaid notice, either party may, upon thirty (30) days' written notice to the other, terminate this agreement. In such event, Contractor shall be compensated for all work executed upon a unit basis in proportion to the amount of the work completed, or upon a cost-plus-ten-percent (10%) basis, whichever is the lesser. Materials on the ground, in process of fabrication or in route upon the date of notice of termination specially ordered for the project and which cannot be utilized by Contractor, shall be compensated for by City at cost, including freight, provided the Contractor shall take all steps possible to minimize this obligation; or
- (c) City Council, by resolution, may suspend this agreement until the cause of inability to perform is removed but for a period of not to exceed sixty (60) days.

If this agreement is not canceled, and the inability of Contractor to perform continues without fault on Contractor's part, beyond the time during which the agreement may have been suspended, as herein above provided, City Council may further suspend this agreement, or either party hereto may, without incurring any liability, elect to declare this agreement terminated upon the ground of impossibility of performance. In the event City declares this agreement terminated, such declaration shall be authorized by the City Council by resolution, and Contractor shall be notified in writing thereof within five (5) days after the adoption of such resolution. Upon such termination, Contractor shall be entitled to proportionate compensation at the agreement rate for such portion of the agreement as may have been performed, or

- (d) City may terminate this agreement, in which case Contractor shall be entitled to proportionate compensation at the agreed rate for such portion of the agreement as may have been performed. Such termination shall be authorized by resolution of the Council. Notice thereof shall be forthwith given in writing to Contractor, and this agreement shall be terminated upon receipt by Contractor of such notice.

In the event of the termination provided in this sub-paragraph (d), none of the covenants, conditions or provisions hereof shall apply to the work not performed, and City shall be liable to Contractor for the proportionate compensation last herein mentioned.

28. Provisions Cumulative:

The provisions of this agreement are cumulative, and in addition to and not in limitation of, any other rights or remedies available to City.

29. Taxes:

Contractor shall cooperate with City to the full extent possible to maximize the local allocation of California sales and use tax to the City. Such cooperation shall include but not be limited to:

(a) Use Tax Direct Payment Permits. Contractor shall apply for, obtain and utilize, to the maximum extent reasonable, a California Use Tax Direct Payment Permit.

(b) Purchases of \$500,000 or More. Contractor shall require vendors and suppliers located outside California from whom Contractor makes purchase of \$500,000 or more to allocate the use tax to the City.

Additional information regarding use tax and the Permit can be found in the State of California Board of Equalization, Sales and Use Tax Regulations, Regulation 1699.6, Use Tax Direct Payment Permits, or on the web site for the Board of Equalization at <http://www.boe.ca.gov/sutax/sutprograms.htm>

30. Notices:

All notices shall be in writing and delivered in person or transmitted by certified mail, postage prepaid.

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

**City of Turlock
City Engineer
156 S. Broadway, Suite 150
Turlock, CA 95380-5454**

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

Notices required to be given sureties of Contractor shall be addressed as follows:

31. CITY CONTRACT ADMINISTRATOR:

The City's contract administrator and contact person for this Agreement is:

Nathan Bray, P.E.

Principal Civil Engineer
Development Services Department
156 S. Broadway, Suite 150
Turlock, California 95380-5456
Telephone: (209) 668-6035
E-mail: nbray@turlock.ca.us

32. Interpretation:

As used herein, any gender includes each other gender, the singular includes the plural and vice versa.

33. Antitrust Claims:

The Contractor or subcontractor offers and agrees to assign to the City all rights, title and interest to any causes of action under Section Four of the Clayton Act and the Cartwright Act concerning antitrust claims.

34. USE OF CITY PROJECT NUMBER:

The Contractor or subcontractor agrees to use the aforementioned City project number on all maps, drawings, submittals, billing, and written correspondence that involve City staff or contracted consultants. Nothing in this section shall preclude the Contractor or subcontractor from using their own project numbers for their own internal use.

IN WITNESS WHEREOF, three identical counterparts of this agreement, consisting of a total of 21 pages, each of which counterparts shall for all purposes be deemed an original of said agreement, have been duly executed by the parties hereinabove named, on the day and year first herein above written.

CONTRACTOR

CITY OF TURLOCK, a municipal corporation

By: _____

By: _____

Gary Soiseth, Mayor

or

Print Name

Gary R. Hampton, City Manager

Address: _____

Date: _____

Phone: _____

APPROVED AS TO SUFFICIENCY:

Date: _____

By: _____

Michael G. Pitcock, P.E., Development
Services Director / City Engineer

Federal Tax ID or Social Security No:

APPROVED AS TO FORM:

By: _____

Phaedra A. Norton, City Attorney

Attach Contractor's Seal Here

ATTEST:

By: _____

Kellie E. Weaver, City Clerk

BOND FOR FAITHFUL PERFORMANCE

KNOW ALL BY THESE PRESENTS:

That _____, as Principal, and _____, incorporated under the laws of the State of _____, and authorized to execute bonds and undertakings as sole Surety, in the State of California, and held and firmly bound unto the City of Turlock, a municipal corporation of the State of California, in the sum of _____ Dollars (\$ _____) for the payment thereof, well and truly to be made, said Principal and Surety bind themselves, their administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that: Whereas the above bounden Principal has entered, or is about to enter, into a certain contract with the City of Turlock, entitled "**Agreement for City Project No. 1557, "Parking Lot Reconstruction,"**" a true and correct copy of which agreement is presently on file in the office of the City Clerk of the City of Turlock, which said agreement is hereby referred to and made a part hereof.

NOW, THEREFORE, if the above bounden Principal shall well and truly perform the work contracted to be performed under said contract, then this obligation shall be void, otherwise to remain in full force and effect.

No prepayment or delay in payment and no changes, extension, addition or alteration of any provision of said contract or in any plans and specifications referred to herein, and no forbearance on the part of the City shall operate to release the Surety from liability on this Bond, and consent to make such alterations without further notice to or consent by the Surety is hereby given, and the Surety hereby waives the provisions of Section 2819 of the Civil Code of the State of California.

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Dated this _____ day of _____, 20__.

(Principal)

By: X_____

By: X_____

(Surety)

By: X_____

By: X_____

Address:_____

(Zip)

Phone:_____

(Attach Acknowledgment
Both Principal's and Surety's
Attorney In Fact)

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BOND FOR LABOR AND MATERIAL

KNOW ALL BY THESE PRESENTS:

That _____, as Principal, and _____, incorporated under the laws of the State of _____ and authorized to execute bonds and undertakings as sole Surety, in the State of California, as Surety, are held and firmly bound unto any and all material, men, persons, companies or corporations furnishing materials, provisions, provender or other supplies used in, upon, for or about the performance of the work contracted to be executed or performed under the contract hereinafter mentioned, and all persons, companies or corporations renting or hiring teams, or implements or machinery, for or contributing to said work to be done, and all persons who perform work or labor upon the same, and all persons who supply both work and materials, and whose claim has not been paid by the Contractor, company, or corporations in the just and full sum of _____ Dollars (\$_____) for payment thereof, well and truly to be made, said Principal and Surety bind themselves, their administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that: Whereas the above bounden Principal has entered, or is about to enter, into a certain contract with the City of Turlock, entitled "Agreement for **City Project No. 1557, "Parking Lot Reconstruction,"** a true and correct copy of which agreement is presently on file in the office of the City Clerk of the City of Turlock, which said agreement is hereby referred to and made a part hereof.

NOW, THEREFORE, if the above bounden Principal or said Principal's subcontractors, fail to pay for any materials, provisions provender or other supplies, or teams, used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, the Surety will pay for the same, in an amount not exceeding the sum specified in this bond, provided that any and all claims hereunder shall be filled and proceedings had in connection therewith as required by the provisions of Sections 5100, et. seq., inclusive, of the Public Contracts Code of the State of California, and any amendments thereof; provided, also, that in case suit is brought upon this bond, a reasonable attorney's fee shall be awarded by the court to the prevailing party in said suit, said attorney's fee to be fixed as costs in said suit, and to be included in the judgment therein rendered.

No prepayment or delay in payment and no change, extension, addition, or alteration of any provision of said contract or in said plans and specifications agreed to between the Principal and the City, and no forbearance on the part of the City, shall operate to release the Surety from liability on this bond, and consent to make such alterations without further notice to or consent by

the Surety is hereby given, and the Surety hereby waives the provisions of Section 2819 of the Civil Code of the State of California.

Dated this _____ day of _____, 20__.

(Principal)

By: X_____

By: X_____

(Surety)

By: X_____

By: X_____

Address:_____

(Zip)

Phone:_____

(Attach Acknowledgment
Both Principal's and
Surety's Attorney In Fact)

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SPECIAL PROVISIONS

City Project No: 1557

PARKING LOT RECONSTRUCTION

SECTION 1 SPECIFICATIONS AND PLANS

SPECIAL NOTES:

1. Official bid documents including plans and specifications are available online at <http://www.cityofturlock.org/capitalprojects>. All bids submitted for this project must conform to the requirements of the official bid documents, including plans and specifications.

1.01 SPECIFICATIONS:

The work described herein shall be done in accordance with the current City of Turlock Standard Specifications and the current 2010 Editions of the State of California, Department of Transportation Standard Specifications and Standard Plans (with exception that English units are to be used in place of metric) and in accordance with the following Special Provisions.

The Contract Documents are complementary; what is required by one is as binding as if required by all.

It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to City.

Clarifications and interpretations of the Contract Documents shall be issued by Engineer.

In case of conflict or discrepancy between any of the Contract Documents, the order of documents listed below shall be the order of precedence, with the first item listed having the highest precedence.

1. Contract Change Order (Modifications or changes last in time are first in precedence).
2. Addenda to Contract Agreement
3. Contract Agreement
4. Permits
5. Special Provisions
6. Notice Inviting Bids and Instructions to Bidders
7. Project Drawings
8. City of Turlock Standard Specifications
9. Caltrans Standard Specifications
10. City of Turlock Standard Drawings
11. Caltrans Standard Plans

With regard to discrepancies or conflicts between written dimensions given on drawings and the scaled measurements, the written dimensions shall govern.

With regards to discrepancies or conflicts between large-scale drawings and small-scale drawings, the larger scale shall govern.

With regards to discrepancies or conflicts between detailed drawings and referenced standard drawings or plans, the detailed drawings shall govern.

In the event where provisions of codes, safety orders, contract documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.

Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in these specifications, the special provisions, or the plans, the Contractor shall apply to the Engineer in writing for such further explanations as may be necessary and shall conform to them as part of the contract. All responses from the Engineer shall also be in writing. In the event of any doubt or question arising respecting the true meaning of these specifications, the special provisions or the plans, reference shall be made to the Engineer, whose decision thereon shall be final.

1.02 CONTRACTOR'S RESPONSIBILITY:

The Contractor shall examine carefully the site of the work and the plans and specifications therefore. The Contractor shall investigate to their satisfaction as to conditions to be encountered, the character, quality and quantity of surface, subsurface materials or obstacles to be encountered, the work to be performed, materials to be furnished, and as to the requirements of the bid, plans and specifications of the contract.

1.03 COMPLETENESS AND ACCURACY OF PLANS AND SPECIFICATIONS:

Pursuant to the California Public Contract Code, the bidder is required to review architectural or engineering plans and specifications prior to submission of a bid, and report any errors and omissions noted by Contractor to the architect, engineer or owner five days prior to the bid opening date.

SECTION 2 PROPOSAL REQUIREMENTS AND CONDITIONS

2.01 GENERAL:

The Contractor's attention is directed to the "Notice to Contractor" for the date, time and location of the mandatory Pre-Bid meeting, if applicable.

The bidder's attention is directed to the provisions in Proposal for this bid for the requirements and conditions which the bidder must observe in the preparation of and the submission of the bid.

The bidder's bond shall conform to the bond form in the Bid book for the project and shall be properly filled out and executed. The bidder's bond form included in that book must be used.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Bid book. Signing the Bid book shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub-recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of Title 49 CFR (Code of Federal Regulations) part 26 in the award and administration of US DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance. Failure of the bidder to fulfill the requirements of the Special Provisions for submittals required to be furnished after bid opening, including but not limited to escrowed bid documents, where applicable, may subject the bidder to a determination of the bidder's responsibility in the event it is the apparent low bidder on a future public works contracts.

2.02 EXISTING UTILITIES, FACILITIES, AND SITE CONDITIONS:

The actual sizes, locations and materials of existing utilities and facilities shown on the plans may vary from what is shown on the plans. Attention is directed to the possible existence of underground facilities not indicated on the plans or in the special provisions. Contractor shall be responsible for verifying the locations and nature of the existing utilities, protecting them from damage and notifying Engineer of their location and nature.

Contractor shall examine carefully the site of the work. It is assumed that Contractor has investigated and is satisfied as to the conditions to be encountered as to the character, quality and quantities of work to be performed.

Although the City of Turlock's soil conditions are homogenous and sandy in nature, various subsurface conditions such as hardpan, and ground water may be encountered. The City of Turlock will not be held responsible in any way for the type and character of subsurface conditions encountered. If a subsurface report is desired by Contractor, it will be Contractor's responsibility and expense to verify the subsurface conditions by boring or other means necessary prior to bidding and/or performing work. Attention is directed to Section 5.22, "Preservation of Property," of these special provisions during boring and other miscellaneous operations.

Full compensation for furnishing all labor, materials, tools, equipment (including dewatering devices), and incidentals, and for doing all the work involved with and/or in verifying existing utilities, facilities, site and subsurface conditions as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore

SECTION 3 AWARD AND EXECUTION OF CONTRACT

3.01 GENERAL:

The Contractor's attention is directed to the provisions in the Contract for the requirements and conditions concerning award and execution of contract.

The contract shall be executed by the successful bidder and shall be returned, together with the contract bonds and insurance, to the City so that it is received within 10 working days after the bidder has received the contract for execution. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address:

Attention: Yolanda Gardini
City of Turlock, Engineering Division
156 S Broadway, Suite 150
Turlock, CA 95380

Bid protests are due in writing by the fifth calendar day after the bid opening and are to be delivered to the following address:

Nathan Bray, PE
156 S Broadway Suite 150
Turlock, CA 95380

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose bid complies with all the requirements prescribed.

SECTION 4 BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES

Attention is directed to Section 6 “Time For Performance” of the Contract.

At no time shall construction begin prior to the issuance of the Notice to Proceed. Any work performed prior to the Notice to Proceed shall be done at the Contractor’s own risk and payment will not be made therefor.

The Contractor shall follow the sequence of construction and progress of work as specified in Section 5.23, “Order of Work,” of these Special Provisions.

Should the Contractor choose to work on a Saturday, Sunday or Legal Holiday as defined in Section 5.16 “Working Hours,” of these Special Provisions, the Contractor shall reimburse the City of Turlock the actual cost of engineering, inspection, testing, superintendent, and/or other overhead expenses which are directly chargeable to the contract. Should such work be undertaken at the request of the City, reimbursement will not be required.

Attention is directed to Section 9 “Liquidated Damages” of the Contract.

A pre-construction meeting will be held between Contractor and City prior to the beginning of construction. The exact time and place of this conference will be determined by City after award of the construction contract.

City shall furnish to Contractor five hard copies of the Contract Documents and plans. Contractor may produce additional copies as needed at Contractor’s expense.

SECTION 5 GENERAL

5.01 LABOR NONDISCRIMINATION:

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM (GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7 1.01A(4), "Labor Nondiscrimination," of the Caltrans Standard Specifications, which is applicable to all nonexempt state contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The Specifications are applicable to all nonexempt state construction contracts and subcontracts of \$5,000 or more.

5.02 PREVAILING WAGE:

Attention is directed to Section 7-1.02K "Labor Code," of the Caltrans Standard Specifications.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county Stanislaus in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at 156 S. Broadway St, Turlock, CA 95380 and available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov/DLSR/PWD>.

5.03 (Not Used)

5.04 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES:

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8 1.07, "Delays," of the Caltrans Standard Specifications.

5.05, 5.06, 5.07 (Not Used)

5.08 SUBCONTRACTING:

No subcontract releases the Contractor from the contract or relieves the Contractor of their responsibility for a subcontractor's work.

If the Contractor violates Pub Cont Code § 4100 et seq., the City may exercise the remedies provided under Pub Cont Code § 4110. The City may refer the violation to the Contractors State License Board as provided under Pub Cont Code § 4111.

Each subcontract must comply with the contract.

Each subcontractor must have an active and valid State contractor's license with a classification appropriate for the work to be performed (Bus & Prof Code, § 7000 et seq.).

At the pre-construction meeting, prior to starting work, Contractor shall submit a complete listing of subcontractors and the value of the work each subcontractor will perform. This list shall contain all information identified on Exhibit 12-G of the Local Assistance Procedures Manual.

Before subcontracted work starts, submit a Subcontracting Request form.

Do not use a debarred contractor; a current list of debarred contractors is available at the Department of Industrial Relations' Web site.

Upon request by the Engineer, immediately remove and not again use a subcontractor who fails to prosecute the work satisfactorily.

5.09 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS:

A prime contractor or subcontractor shall pay any subcontractor not later than 10 days of receipt of each progress payment in accordance with the provision in Section 7108.5 of the California Business and Professions Code concerning prompt payment to subcontractors. The 10 days is applicable unless a longer period is agreed to in writing. Any delay or postponement of payment over 30 days may take place only for good cause and with the agency's prior written approval. Any violation of Section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanction and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

5.10 PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS::

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

subcontractor in the event of a dispute involving late payment or nonpayment by the prime contractor, deficient subcontract performance, or noncompliance by a subcontractor.

5.11 PAYMENTS:

Attention is directed to Section 19, "Payments to Contractor," of the Contract.

At the end of each month the Contractor shall submit a proposed progress invoice. The invoice shall delineate each bid item, the amount of work performed for the invoice period (previous month) and the total amount of work performed to date. A sample invoice with all of the required items will be given to the Contractor at the pre-construction meeting.

The Engineer will review the progress invoice and after any changes the Engineer makes, will issue an official invoice for the Contractor to sign. The Contractor shall sign the official invoice and return to the Engineer. After the Engineer receives the signed, official invoice, the progress payment will be processed.

Retention in the amount of 5% of the progress payment amount shall be held from all progress payments. Retention will be released 35 days after the Notice of Completion has been filed, insofar as no stop notices were filed.

5.12 (Not Used)

5.13 GUARANTY:

Attention is directed to Section 9-4, "Guaranty," of the City of Turlock Standard Specifications.

5.14 PUBLIC SAFETY:

In addition to any other measures taken by Contractor pursuant to the provisions of the Standard Specifications and the General Conditions, Contractor shall install temporary precast concrete barrier rail between any lane carrying public traffic and any excavation, obstacle or storage area when the following conditions exist:

Excavations: Any excavation, the near edge of which is 12 feet or less from the edge of the lane, except;

- (a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
- (b) Excavations less than one foot deep.
- (c) Trenches less than one foot wide for irrigation pipe or electrical conduit or excavations less than one foot in diameter.
- (d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
- (e) Excavations in side slopes where the slope is steeper than 4:1.

- (f) Excavations protected by existing barrier or railing.

At the end of each working day, if a difference of 0.50 feet exists between the elevation of the existing pavement and the elevation of any excavation within 2 feet of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose, however, once the placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of the existing pavement and tapered at a slope of 4:1 or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 4:1 slope, regardless of the number of times it is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the cost for other contract items of work and no additional compensation will be allowed therefore.

Personal vehicles of Contractor's employees shall not be parked on the traveled way or shoulders, including any section closed to public traffic. Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25 foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment.

A minimum of one paved traffic lane, not less than 12 feet wide, shall be open for use by public traffic in each direction of travel. The full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays, after 4:00 p.m. on Fridays and the day preceding designated legal holidays and when construction operations are not actively in progress.

5.15 SOUND CONTROL REQUIREMENTS:

Sound control shall be in accordance with Section 7 1.01I, "Sound Control Requirements," of the Caltrans Standard Specifications and these special provisions.

The noise level from Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dba at a distance of 50 feet. This requirement in no way relieves Contractor from responsibility for complying with local ordinances regulating noise level.

Said noise level requirements shall apply to all equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety law for the protection of personnel.

Full compensation for conforming to the requirements of this section 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.

5.16 WORKING HOURS:

Contractor's working hours shall be between 7:00 a.m. and 5:00 p.m., Monday through Friday, excluding legal holidays.

Contractor shall notify Engineer 48 hours prior to beginning work.

Contractor shall not work outside the above-mentioned working hours without prior written consent of Engineer.

Designated legal holidays are: January 1st, the third Monday in January, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, the day after Thanksgiving, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When a designated legal holiday falls on a Saturday, the preceding Friday shall be a designated legal holiday.

5.17 UNDERGROUND SERVICE ALERT REQUIREMENTS:

Contractor shall contact Underground Service Alert of Northern California at least 48 hours in advance of any construction activity, will or could damage or affect any underground utility or subsurface improvement, and obtain an inquiry identification number. Contractor shall notify Underground Service Alert in the event of change in the project limits or change in original work previously shown on the plans or indicated in the specifications. Contractor shall not commence construction prior to City Inspector receiving City's notice from USA North regarding this construction activity.

5.18 DUST CONTROL:

Dust Control shall conform to the provisions in Section 10, "Dust Control", of the Standard Specifications and these special provisions.

Full compensation for Dust Control will be considered as included in the various contract items of work requiring Dust Control, as determined by Engineer, and no separate payment will be made therefor.

5.19 WATERING:

Watering shall be in accordance with Section 17, "Watering," of the Caltrans Standard Specifications.

Full compensation for Watering will be considered as included in the various contract items of work requiring Watering, as determined by Engineer, and no separate payment will be made therefor.

5.20 USE OF HYDRANTS FOR CONSTRUCTION PURPOSES:

City will permit the use of a hydrant for construction purposes provided that the following are abided by:

1. A spanner wrench shall be the only type of wrench used on fire hydrants.
2. Contractor shall be liable for the damages to or loss of all hydrants and associated water lines and equipment which result from the use of this equipment.
3. Water shall only be used within City limits.
4. The vehicle must be approved by Engineer for approved backflow device.
5. Contractor shall pay a deposit on a water meter provided by the City. After the project ended the Contractor shall return the meter to the City for the release of the deposit.

However, use of city hydrants does not exempt Contractor from providing a water truck where hydrants cannot be utilized due to unsafe working conditions as deemed by Engineer.

5.21 PROGRESS SCHEDULE:

Contractor shall furnish City with a Critical Path Method progress schedule. The progress schedule shall show the construction activities extending for the duration of the working days. Any deviation from the outline must be approved by Engineer. Contractor shall not be allowed to start construction activities until the progress schedule is accepted by Engineer.

5.22 PRESERVATION OF PROPERTY:

The work performed in connection with various existing facilities shall be in accordance with Section 7-8, "Preservation of Property," of the Standard Specifications and these special provisions.

Due care shall be exercised to avoid injury or damage to existing improvements or facilities, utility facilities, adjacent property, and roadside trees, shrubs and other plants that are to remain in place.

Roadside trees, shrubs and other plants that are not to be removed and pole lines, fences, signs, markers and monuments, buildings and structures, conduits, pipelines under or above ground, sewer and water lines, sprinkler systems above or below ground, all roadway facilities, and any other improvements or facilities within or adjacent to the right-of-way shall be protected from injury or damage, and if ordered by Engineer, Contractor shall provide and install suitable safeguards, approved by Engineer, to protect such objects from injury or damage. If such objects are injured or damaged by reason of Contractor's operations they shall be replaced or restored at Contractor's expense. The facilities shall be replaced or restored to a condition as good or better as when Contractor entered upon the work, or as good as required by the specifications accompanying the contract, if any such objects are a part of the work being performed under the contract. Engineer may make or cause to be made such temporary repairs as necessary to restore to service any damaged facility. The cost of such repairs shall be borne by Contractor and may be deducted from any moneys due or to become due to Contractor under the contract.

The fact that any underground facility is not shown upon the plans shall not relieve Contractor of his responsibility under Section 2.02, "Existing Utilities and Facilities", of these provisions. It shall be Contractor's responsibility, pursuant thereto, to ascertain the location of such underground improvements or facilities that may be subject to damage by reason of his operations.

Full compensation for furnishing all labor materials, tools, equipment, and incidentals, and for doing all the work involved in protecting or repairing property as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5.23 ORDER OF WORK:

Order or work shall be in accordance with the provisions in Section 5-1.05, "Order of Work," of the Caltrans Standard Specifications and these special provisions.

5.24 AS-BUILTS:

When the job is complete, Contractor shall provide City with as-built drawings. These as-built drawings shall show any and all differences (revisions, additions, etc.) between the signed improvement plans and the installed improvements. The Contractor shall identify all utilities that are located in the field. The as-builts will consist of redlined signed improvement plans. The NOC will not be issued until acceptable as-builts have been received by the Engineer.

5.25 SURVEYING:

Construction survey staking shall be provided by City. Contractor shall provide a staking request no less than 1 week prior to Contractor starting work and not less than 48 hours before the staking is required to continue construction. The Contractor shall provide unimpeded access to the site and allow City survey crew to perform their work.

Contractor shall protect all survey stakes and markers during construction. If survey stakes and/or markers are damaged or destroyed during the course of construction, by vandalism or by any other means, Contractor may submit a request to have the survey re-staked. If re-staking is required, Contractor shall be back charged at the fully burdened hourly rate for the survey crew and shall fully reimburse City for all necessary materials and equipment.

5.26 TESTING:

Unless otherwise noted, City of Turlock will supply all acceptance testing. Coordination of said testing is the responsibility of Contractor through the project's inspector. The Contractor shall provide at least 24 hours' notice to the Engineer in advance of needing acceptance testing. If the Contractor request testing and the Contractor is not ready for the testing to occur, the Contractor shall be back charged the cover the cost of the testing firm.

At sites chosen by the project inspector, City's testing laboratory will conduct all tests. Contractor shall supply any necessary equipment and or labor required to obtain all samples for the completion of the testing process.

City of Turlock shall compensate the testing laboratory for all initial tests. Secondary and all other follow-up tests required due to failure of initial testing shall be reimbursed to City of Turlock based on the following schedule:

Water sample test: \$300.00 Per Test

Compaction test: \$100.00 Per Test

5.27 SUBMITTALS:

General submittals shall be made in accordance with Section 5.30, "Internet Based Construction Management System," of these special provisions. If a physical copy of a submittal is required, the following shall apply.

Before making submittals, Contractor shall ensure that products and materials will be available in the quantities and in the time required by the Contract and the approved outline of construction activity. Each submittal shall clearly identify, by highlighting, arrows or other defined and permanent mark, the products and materials proposed for use.

All Submittals shall be made to Engineer by Contractor, including those generated by subcontractors and suppliers. Contractor shall carefully review all subcontractor and supplier submittals before submitting to Engineer for review. Submittals received from sources other than Contractor's office shall be returned without action. If a submittal contains extraneous information, unmarked options or is incomplete, it will be returned to Contractor for correction and require re-submittal.

Submittals will be processed by Engineer within ten (10) working days after receipt from Contractor. Engineer will review submittals for general conformance with the Contract Documents and standards. Such review by Engineer shall not relieve Contractor or any subcontractor of any responsibility for full compliance with the Contract Documents. Unless specifically authorized to do so by Engineer, Contractor shall not procure, manufacture, or fabricate any part of the contract work until submittals related to said contract work have been favorably reviewed by Engineer.

Contractor shall deliver five copies of each submittal to Engineer. Each submittal shall contain, at a minimum, the following information:

1. Title page including the following information:

Project Number and Name.

Name of Contractor.

Name of subcontractor (if applicable).

Description of item.

Item Number on Bid Schedule.

Date of Submittal.

Contractor's initials and date indicating approval of item for submittal to Engineer.

2. Index Sheet (For submittals containing information on multiple components. Each component shall be cross-identified with reference to a divider tab number).

3. Divider Tabs (For submittals containing information on multiple components. Tab numbers shall correspond to the index sheet for each component in the submittal).

4. The brochure, product data sheet or catalog cut (For each component in the submittal, separated by their respective divider tabs).

5. For shop drawings, Contractor shall submit five (5) clean, low background reproducible prints. Shop drawings larger than 11 x 17 in. shall be rolled, not folded.

6. Submittals that involve engineering computations or original design work shall show the name, the California State registration number, seal, and signature of the Professional Engineer certifying that such computations or design work are correct and in conformance with applicable standards, codes and accepted engineering practices.

7. For product samples, Contractor shall submit two (2) representative samples, one of which may be retained for the duration of the project or indefinitely at the discretion of Engineer. Although

a reasonable attempt will be made to maintain the samples in good condition, neither City nor its representative will be responsible for the condition of the samples if returned to Contractor.

8. For material samples, unless a specific quantity is called for in the contract documents, Contractor shall submit a representative sample of the material, which may be retained for the duration of the project or indefinitely at the discretion of Engineer.

9. Certificates of compliance shall be submitted by Contractor to Engineer for those materials and products for which no sample and test results are specified. Certificates of compliance shall include the following information:

Statement that the product complies with the respective contract specifications.

Producer's name and address, product trade name and catalog number (if applicable), place of product origin, quantity of product to be furnished, and related contract plans and specification section numbers.

A certified copy of test results pertaining to the product from a certified independent testing laboratory. At the option of Engineer certified test results shall be signed and sealed by a Professional Engineer licensed to practice in the state of California.

Contractor shall submit Material Safety Data Sheets (MSDS) for all materials used or stored on the site that possess a MSDS, including materials used by Contractor for maintenance of equipment.

5.28 NOTICE OF POTENTIAL CLAIM:

Attention is directed to Section 5-1.43 "Potential Claims and Dispute Resolution," of the Caltrans Standard Specifications.

5.29 PRESERVATION OF EXISTING MONUMENTS:

Preservation of existing monuments shall be Contractor's responsibility. Contractor shall notify Engineer of all monuments that may/will be disturbed by construction operations. Engineer will tie off said monuments and provide Contractor a notice to proceed.

Once Contractor is finished with its construction operations, Engineer will relocate the monuments. Contractor shall install a monument will with concrete collar at each location which shall conform to the provisions in Section 22-1 "Survey Monuments" and Drawing M-1 "Monument Detail", of the Standard Specifications and these special provisions.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with protecting existing monuments as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5.30 INTERNET BASED CONSTRUCTION MANAGEMENT SYSTEM:

General

The Engineer and Contractor shall utilize Virtual Project Manager (<http://www.virtual-pm.com/>), herein after called VPM, for submission of all data and documents (unless specified otherwise in this Section) throughout the duration of the Contract. VPM is an electronic project management system accessible through the Internet used to create, share, and review construction management documentation. VPM is provided by the Engineer at no cost to the Contractor. VPM will be made available to all Contractors' personnel, subcontractor personnel, suppliers, consultants, Engineer, and any of Engineer's representatives or agents. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, electronic notification of project activity, and overall management of contract documentation. VPM shall be the primary means of project information submission and management.

The Engineer will establish the Contractor's access to VPM by enabling access and assigning user profiles to Contractor personnel, including subcontractors and suppliers, as requested by Contractor. All authorized personnel shall have an individual user profile; no joint-use or shared user profiles will be allowed. Each user profile shall be assigned to a user group and have specific permission settings and privileges based on the user's need within VPM. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on VPM shall be the responsibility of the Contractor.

The Contractor shall use computer hardware and software that meets the requirements of the VPM system. As recommendations are modified by VPM, the Contractor will upgrade their system(s) to meet or exceed the recommendations. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The Contractor shall ensure its own connectivity to VPM through their internet service provider.

The Contractor shall be responsible for the validity of the information they place in VPM, for the training of their personnel to understand and utilize VPM, as well as the provision and accessibility of adequate resources to connect with VPM. Accepted users shall be knowledgeable in the use of computers, including Internet browsers, email programs, and the Portable Document Format (PDF) document type. The Contractor shall utilize the existing forms in VPM to the maximum extent possible. If a form does not exist in VPM the Contractor must include their own form or a form provided by the Engineer as an attachment to a submittal, RFI, or other document within VPM. Note that only the following file types are accepted as attachments to documents within VPM: PDF files, Microsoft Word (DOC) files, Microsoft Excel (XLS) files, picture files (JPG, TIFF, BMP, JPEG, etc.). PDF documents will be created through electronic conversion prior to uploading, such as through a "print to file" feature or "save as pdf" feature, rather than optically scanned whenever possible.

Contractor shall provide a list of key VPM personnel for the Engineer's acceptance. The list shall include the following information: first name, last name, address, title, office phone number, cell phone number, and email address. The Engineer is responsible for adding and removing users from the system and establishing read, write, and approval permission levels.

Company Documents

This area is reserved for general documentation not related to a specific project. Only the Engineer shall post content in this area. Examples of content found in this area are: the City of Turlock

Standard Specifications and Drawings, the 2010 Caltrans Standard Specifications, and the 2010 Caltrans Standard Plans. All files are in PDF format.

Project Summary

The project summary tab provides an overall summary of the project. It includes the current weather, the working days remaining and a summary of work for the past week. The summary of work is generated from the City's project inspector and the daily logs. This tab is for information only and the Contractor shall not take any action here.

Task Manager

The project schedule the Contractor submits is converted into a format that is uploaded by the Engineer into the task manager tab. The Contractor is responsible for providing schedule updates to the Engineer whenever the work progress in a manner different than the approved schedule.

Change Order Manager

The change order manager tab shall be used to track project change orders. Any potential change orders shall be tracked as a Request for Information (RFI) in the RFI tab. Once the Engineer agrees that a RFI will result in a contract change order, a new contract change order shall be created by the Engineer in the change order manager tab. The Engineer will finalize the contract change order through this tab. Once the change order is finalized, the Engineer will present the contract change order at a City Council meeting. After City Council approval the Engineer will make payment on the contract change order.

Transmittals

The transmittal tab shall be used to communicate general project information amongst all parties as well as used by the Contractor in the submission of certified payroll reports. The Engineer will upload the project-specific information including: bid documents, conformed plans, conformed specifications and the Notice to Proceed to the transmittal tab.

The Contractor shall submit certified payroll reports on a weekly basis through the transmittal tab. Each week shall have a separate transmittal where all the certified payroll reports and statements of non-performance for each contractor shall be posted.

Submittals

All submittals shall be submitted through the submittal tab. The preferred document type is PDF.

Before making submittals, the Contractor shall ensure that products and materials will be available in the quantities and in the time required by the Contract and the approved schedule of activities. Each submittal shall be legible and clearly identify, by highlighting, arrows or other defined and permanent mark, the products and materials proposed for use.

All submittals shall be generated from the prime contractor and any submittals that are uploaded by subcontractors or suppliers will not be reviewed. Contractor shall carefully review all subcontractor and suppliers submittals before submitting it to the Engineer for review. If a submittal contains extraneous information, unmarked options or is otherwise incomplete, it will be rejected and the

Contractor shall make corrections and upload the resubmittal. Any resubmittal shall be made to the same transmittal item in VPM.

Submittals shall be processed by the Engineer within ten working days after upload to VPM. The Engineer will review submittals for general conformance with the Contract Documents and standards. Such review by the Engineer shall not relieve the Contractor of any responsibility for full compliance with the Contract Documents. Unless specifically authorized to do so by the Engineer, the Contractor shall not procure, manufacture, or fabricate any part of the contract work until submittals related to said contract work have been approved by the Engineer.

Each submittal shall have a unique title that is comprised of the item followed by a comma and the section of the specifications that reference the item (e.g. Minor Concrete, Section 8.01). The submittal type shall either be project materials or project information. The submittal description shall be used to identify any pertinent information or list a description of the item being submitted.

Certificates of compliance shall be submitted through the submittal tab. The submittal type shall be “certificate of compliance”.

The Contractor shall submit progress invoices on the last working day of the month through the transmittal tab (select “progress invoice” for the type). The Engineer will review the submitted content and if found acceptable the Engineer will upload an official invoice for the Contractor to sign. The Contractor shall sign in blue ink and upload the signed invoice to the same transmittal where the Engineer will then process for payment.

RFIs

The RFI tab shall be used to request information from the Contractor to the Engineer. The Contractor shall create a RFI upon recognition of any event or question of fact arising from the contract work. The RFI type for this submittal shall be “Request for Information.” The Engineer will also utilize the RFI tab in a similar manner when there is a question for the Contractor; this RFI type shall be “Response Required.”

The Engineer will respond to a RFI submitted by the Contractor within five days. The Contractor shall proceed with the work unless otherwise ordered. The Contractor may protest the Engineer’s response by submitting a claim in accordance with Section 5.28 “Notice of Potential Claim” of the special provisions.

If the Engineer states the RFI leads to a change in scope, change in conditions, differing site conditions or extra work; a contract change order will be issued.

Daily Logs

The daily log tab is used by the City to document the activities of the work, any correspondence or direction given in the field, safety concerns and general comments about the project. The Contractor may view the contents of this tab for reference purposes. The information entered into the daily log tab is used to populate the project summary tab.

WSWD

The weekly statement of working days will be posted to the WSWD tab. VPM automatically generates the WSWD from the information entered into the daily log tab. The WSWD shows the working days and non-working days charged for the reporting week, any time adjustments, a work completion date with the remaining working days left in the contract and the controlling activities for the week.

The Contractor will be allowed 15 days from the last working day of the weekly statement to protest in writing the correctness of the statement. The Contractor shall submit a transmittal stating what is being protested and the reasons for protest. The Engineer will respond to the protest. The Contractor may protest the Engineer's response by submitting a claim in accordance with Section 5.28 "Notice of Potential Claim" of the special provisions.

SECTION 6 (BLANK)

SECTION 7 (BLANK)

SECTION 8 (BLANK)

SECTION 9 DESCRIPTION OF WORK

The work consists, in general of: Sawcut and removal of existing asphalt parking lot and concrete flatwork; construct new parking layout including preparation of subgrade for new asphalt structural section and concrete planters; install new lighting system including charging station; install new landscaping and irrigation system; incorporate Bio-Filtration stormwater planter, retention system and overflow system per City of Turlock MS4 requirements; provide parking lot striping including ADA marking and signage; surface repair (in kind) of existing street, curb and gutter, and sidewalk; and other associated work.

The work includes all necessary labor, materials, tools, equipment and any incidentals needed to perform the improvements as shown on the contract plans.

SECTION 10 CONSTRUCTION DETAILS

10.01 MOBILIZATION & DEMOBILIZATION

Mobilization is intended to compensate the Contractor for operations including, but not limited to, those necessary for the movement of personal, equipment, supplies and incidentals to / from the project site; for the payment of premium cost and insurance for the project; for any necessary costs of acquisition of equipment, including purchase and mobilization expense; and for any other work and operations which must be performed or costs that must be incurred incident to the initiation of meaningful work at the site and for which payment is not otherwise provided in the contract.

PAYMENT

Payment for mobilization will be made at the contract lump sum price which will be limited to five percent of the total base bid price. Partial payments under this item will be made in accordance with the following provisions:

The first payment of the lump sum price for mobilization will be fifty percent of the contract lump sum price and will be paid with the first request provided that all submissions required are submitted by the Contractor to the satisfaction of the Engineer.

The second payment of the lump sum price for mobilization will be twenty five percent of the contract lump sum price and shall be included in the second pay request.

The third and final payment of the lump sum price for mobilization will be included in the final pay request.

10.02 CONSTRUCTION PROJECT SIGN

Contractor shall furnish and install 8'x 4' project sign as detailed in the project plans at locations within the project site as directed in the field. Project signs shall have a white background with black lettering, borders, graphics and lines. The Engineer shall provide all necessary funding information at the preconstruction meeting. The Contractor shall install project signs before performing any other work on the site. Contractor shall remove all project signs and fill postholes after all punch list items have been completed and signed off by the City Inspector.

PAYMENT

The Lump Sum contract price paid for construction project sign shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in constructing, installing and removing construction project signs, complete in place, as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.03 REMOVE EXISTING IMPROVEMENTS (DEMOLITION)

Concrete, asphalt concrete and all other items designated on the plans to be removed or must be removed in order to install the improvements as shown on the plans, shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-10 of the Standard Specifications. Saw-cut all concrete and asphalt materials surfaces prior to removal.

The LF or SF contract price paid for Sawcut Asphalt or Concrete, Remove Existing Asphalt and Remove Existing Concrete shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in Demolition and removal of existing improvements as shown on the plans, specified in the standard specifications and these special provisions, and as required to install proposed improvements, and as directed by Engineer.

10.04 SHORING:

Contractor shall install a shoring system for the protection of workers and shall conform to Cal-OSHA requirements. Contractor shall submit shoring system to the Engineer for review and approval. Contractor shall not start activities that require shoring to be in place before the shoring system is accepted and approved by the Engineer.

PAYMENT

The contract lump sum price paid for Shoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in installing the shoring, complete in place, as shown on the plans, and as required by law, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

10.05 EARTHWORK:

Earthwork shall conform to the provisions in Section 19, "Earthwork", of the Caltrans Standard Specifications and these special provisions.

Surplus excavated material shall become the property of Contractor and shall be disposed of outside the right-of-way and shall conform to the provisions in Section 7-10, "Disposal of Materials Outside the Right of Way", of the Standard Specifications.

All import borrow shall be backfill material type "E" as described in Section 19-3.06 of the Caltrans Standard Specifications. All backfill material shall be compacted at 95% relative compaction for the entire depth of imported material. The minimum compacted section shall be six inches and shall be composed of import borrow, existing material, or a combination of both.

PAYMENT

The contract lump sum price paid for Earthwork shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in importing, excavating, hauling, compacting, and removing the earthwork as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.06 MINOR CONCRETE:

All items of minor concrete shall conform to Section 90-2 "Minor Concrete," of the Caltrans Standard Specifications, the provisions of Section 13, "Concrete Construction" of the City of Turlock Standard Specifications and shall conform to the information provided on the project plans and in these special provisions as applicable.

Contractor shall submit a certificate of compliance for all minor concrete.

Lines, grades, dimensions and general construction of curb & gutter, valley gutter, curb only, reinforced concrete planter wall, reinforced concrete planter footing and sidewalk shall conform to the City of Turlock Standard Drawings.

MEASUREMENT

Quantities of Minor Concrete – Valley Gutter and Concrete Flatwork, to be paid for by the square foot will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

Quantities of Minor Concrete – 6" Vertical Curb and Gutter and Planter Curb, to be paid for by the linear foot will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

Quantities of Minor Concrete – 6” Reinforced Concrete Bio-Filtration Planter Wall, to be paid for by the linear foot will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

Quantities of Minor Concrete – 6” Thick Reinforced Concrete Bio-Filtration Planter Floor/Footing, to be paid for by the square foot will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

PAYMENT

The contract price paid per square foot for Minor Concrete (Valley Gutter, Concrete Flatework and Reinforced Concrete Bio-Filtration Planter Floor/Footing) or linear foot for Minor Concrete (6” Vertical Curb and Gutter, 6” Vertical Planter Curb and Reinforced Concrete Bio-Filtration Planter Wall) shall include full compensation for furnishing all labor, material (including adhesive, reinforcing steel and dowels for anchoring, and expansion joint material), tools, equipment and incidentals, and for doing all the work involved in constructing Minor Concrete, complete in place, as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.07 TRUNCATED DOME (RETROFIT):

The Contractor shall install retrofit detectable warning surfaces at the locations identified on the plans, in accordance with the manufactures recommendations. Detectable warning surfaces shall conform to the provisions of Section 13, “Concrete Construction” of the City of Turlock Standard Specifications and the 2010 ADA Standards.

Detectable warning surfaces shall be “ARMOR-TILE” or approved equal.

The Contractor shall install detectable warning surfaces in a manner that extends the entire width of the opening of the ramp for a depth of 3 feet.

The Contractor shall prep the concrete surface at the proper location and install the detectable warning surface in accordance with the manufacture’s recommendations.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with Truncated Dome (Retrofit) as specified above, shall be considered as included in lump sum price paid for the ADA Parking Stall Striping, Signage and Marking contract item of work and no additional compensation will be allowed therefore.

10.08 STORM DRAIN PIPE (12”, 12” PERFORATED, 6” PERFORATED BIO-FILTRATION UNDERDRAIN SYSTEM)

Contractor shall install storm drain pipe in accordance with the Standard Specifications and Drawings, the project plans and these special provisions. Pipe material shall be 6” and 12” PVC SDR-26 and factory perforated where shown on the plans. Contractor shall trench in accordance with Section 14, “Trenching and Backfilling”, and Standard Drawing T-2 of the Standard Specifications and these special provisions.

MEASUREMENT

Quantities of Storm Drain Pipe (12") to be paid for by the linear foot shall be calculated on the basis of the dimensions shown on the plans, in the horizontal plane, and adjusted by the amount of change order by the Engineer. Specifically included in the measurement and payment of storm drain pipe is the trenching, excavation and replacement of any existing improvements that are disturbed due to the installation of the pipe.

Quantities of Storm Drain Pipe (12" Perforated) to be paid for by the linear foot shall be calculated on the basis of the dimensions shown on the plans, in the horizontal plane, and adjusted by the amount of change order by the Engineer. Specifically included in the measurement and payment of 12" Perforated Storm Drain Pipe is the trenching, excavation, installation in 4' x 4' rock trench, rock bedding and backfill, permeable filter fabric, backfill above rock trench and compaction.

- Rock trench bedding/backfill to be 1½"-2" drain rock conforming to CalTrans Standard Section 68-1.025, Class 1, Type B.
- Permeable filter fabric shall conform to CalTrans Standard Section 68-1.028.

Quantities of Storm Drain Pipe (6" Perforated Bio-Filtration Underdrain System) to be paid for by the linear foot shall be calculated on the basis of the dimensions shown on the plans, in the horizontal plane, and adjusted by the amount of change order by the Engineer. Specifically included in the measurement and payment of storm drain pipe is the trenching, excavation, overflow piping with NDS Atrium Grate, 6" perforated pipe, 6" and 12" pipe fittings, installation, and placement of Class 2 permeable aggregate (no fines) backfill, 2" layer "pea gravel" and Bio-Treatment (BSM) topsoil.

- Class 2 permeable aggregate, no fines, shall conform to CalTrans Standard Section 68-1.025 or equivalent.
- "Pea gravel" aggregate shall conform to ASTM No. 8.
- Bio-Treatment (Bioretention) topsoil: Bioretention soil shall achieve a long-term infiltration rate of at least 5 inches per hour and shall also support vigorous plant growth. Bioretention soil shall be a mixture of fine sand and compost, measured on a volume basis:
 - a) 60%-70% sand (ASTM C33)
 - b) 30%-40% compost: A well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC).

Certification from soil supplier shall be submitted for approval.

PAYMENT

The contract price paid per linear foot for Storm Drain Pipe (12", 12" Perforated or 6" Perforated Bio-Filtration Underdrain System) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the storm drain pipe and import materials complete in place, as shown on the plans, and as required by law, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

10.09 STORM DRAIN MANHOLE, 48”:

This work includes construction of a storm drain manhole, including rim adjustment to finish grade.

Storm Drain Manhole, 48” shall conform to the provisions in Section 17-1.06, “Precast Manhole Sections”, of the Standard Specifications and these special provisions.

The base for the manhole shall be cast in place with concrete meeting the specifications for minor concrete in accordance with Section 90, “Portland Cement Concrete”, of the Caltrans Standard Specifications and these special provisions.

Manhole frames and covers shall conform to the provisions in Section 16-1.13, “Manhole Frames and Covers”, of the Standard Specifications and these special provisions.

PAYMENT

The contract price paid per each for Storm Drain Manhole, 48” shall include full compensation for furnishing all labor, material (including constructing base for manhole and all frames and covers), tools, equipment and incidentals, and for doing all the work involved in constructing Manholes, complete in place, as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.10 LANDSCAPE IRRIGATION WATER SERVICE:

This work includes construction of a new 1” Water Service and Meter for the landscape irrigation system.

1” Water Service and Meter shall conform to the provisions in Section 15-11 “Service Lines $\frac{3}{4}$ Inch and 1 Inch Services”, Section 15-12, “Curb Stop for $\frac{3}{4}$ Inch and 1 Inch Water Service With Meter Box”, Section 15-13, “Corp. Stop for $\frac{3}{4}$ Inch and 1” Inch Water Service”, Section 15-16, “Water Meters”, and Standard Drawing No. W-9 of the Standard Specifications. The meter box shall be a Christy B-16 with Christy FL16D lid.

PAYMENT

The contract price paid per each for 1” Water Service and Meter shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in constructing 1” Water Service and Meter, complete in place, as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.11 HOT MIX ASPHALT:

Hot Mix Asphalt (HMA) shall conform to the provisions in Section 39, “Hot Mix Asphalt,” of the Caltrans Standard Specifications.

The HMA construction process shall be standard. The aggregate gradation shall be $\frac{1}{2}$ ” and the HMA type shall be type A. The binder shall be PG 70-10.

The minimum lift thickness shall be three times the maximum aggregate gradation size or 2” whichever is greater.

Contractor shall tack coat all surfaces to receive HMA and shall conform to the Caltrans Standard Specifications Section 39-1.09C "Tack Coat."

PAYMENT

The contract price paid per square foot for Asphalt Concrete Pavement (0.20'AC/0.35'AB) or Asphalt Concrete Pavement (Trench Surface Repair Section in Existing Pavement) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in placing, compacting, and quality-control of Asphalt Concrete Pavement as shown on the plans, as specified in Standard Specifications and these Special Provisions, and as directed by the Engineer.

10.12 AGGREGATE BASE:

Class II Aggregate base course under Asphalt Concrete shall be Class 2 conforming to the provisions in Section 26 "Aggregate Base", of the Caltrans Standard Specifications, Section 12-2.05 of the Standard Specifications and these special provisions. Class 2 aggregate base shall be compacted to 95 percent relative compaction.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with Aggregate Base as specified above, shall be considered as included in the unit prices paid for Asphalt Concrete Pavement (0.20'AC/0.35'AB) or Asphalt Concrete Pavement (Trench Surface Repair Section in Existing Pavement) and no additional compensation will be allowed therefore.

10.13 PAVEMENT REINFORCING FABRIC

Geosynthetic Pavement Interlayer shall conform to the provisions in Section 39-1.09D, "Geosynthetic Pavement Interlayer," of the Caltrans Standard Specifications.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with Pavement Reinforcing Fabric as specified above, shall be considered as included in the various contract items of work requiring Pavement Reinforcing Fabric and no additional compensation will be allowed therefore.

10.14 ADJUST FRAMES AND COVERS TO GRADE:

Frames and covers of new and existing manholes, valve boxes, monuments, etc, shall be adjusted to grade and shall conform to the provisions in Section 12-1.12, "Adjusting Manhole Frames, Monuments and Valve Boxes", of the Standard Specifications and these special provisions.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with Adjusting Frames and Covers to Grade as specified above, shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

10.15 PAVEMENT STRIPING AND MARKINGS:

All pavement striping and markings shall conform to Section 84, "Traffic Stripes and Pavement Markings," of the Caltrans Standard Specifications. All striping and markings shall be Highway rated paint and shall conform to Section 84-3, "Painted Traffic Stripes and Pavement Markings," of the Caltrans Standard Specifications.

Pavement markings, including ADA markings, shall be measured in accordance with the details shown on the project plans. Parking stall striping shall be measured by the linear foot, respective to the detail(s) on the project plans.

PAYMENT

Payment for Pavement Striping and Marking shall be included in the lump sum contract items "Parking Stall Striping and Marking" and "ADA Parking Stall Striping, Signage and Marking as shown on the bid form, and shall be considered full compensation for performing all work required to install pavement markings and parking stall striping as shown on the project plans, in accordance with these special provisions and as directed by the Engineer, and no additional compensation will be allowed therefore.

10.16 ADA STRIPING, SIGNAGE AND MARKING:

Placement of ADA Parking Stall Striping, Signage and Marking shall conform to the requirements of the California Building Code, Title 24, Part 2, Division 5, Section 11B-502 Parking Spaces, Section 11B-502.3.3 Marking and Section 11B-502.6 Identification and as shown in the respective detail(s) on the project plans.

Marking of International Symbol of Accessibility shall conform to Figure 11B-703.7.2.1.

PAYMENT

Payment for ADA Striping, Signage and Marking shall be included in the lump sum contract item "ADA Parking Stall Striping, Signage and Marking" as shown on the bid form, and shall be considered full compensation for performing all work required to install pavement markings, parking stall striping and signage as shown on the project plans, in accordance with these special provisions and as directed by the Engineer, and no additional compensation will be allowed therefore.

10.17 WATER POLLUTION CONTROL:

Contractor shall adhere to project erosion control plans. Contractor shall implement BMP's before construction occurs. Contractor shall maintain BMP's in good working condition at all times.

PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved with erosion control as specified above, shall be considered as included in the lump sum contract price paid for Water Pollution Control and no additional compensation will be allowed therefore.

10.18 SURFACE MOUNTED BICYCLE RACKS:

Surface mounted bicycle racks shall be "Orion" bike rack by Madrax, ORNS-2-SF-G, powder coated green color as specified on the project plans.

PAYMENT

The contract price paid per each for Surface Mounted Bicycle Rack shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in constructing Surface Mounted Bicycle Rack(s), complete in place, as shown on the plans, specified in the standard specifications and these special provisions, and as directed by Engineer.

10.19 FINAL CLEANUP:

Upon completion of the work, the Contractor shall remove all equipment, debris, and shall leave the site in a neat clean condition to the satisfaction of the Engineer. The Contractor shall clean the area of all construction related materials and sweep the entire project area including sidewalk and gutter thoroughly. All construction signs, cones, barricades, and conflicting markings shall be removed. At the request of the Contractor, a final punchlist will be provided. After all items of the punchlist have been completed to the satisfaction of the Engineer, the Engineer will issue substantial completion. The accrual of working days will cease after substantial completion has been issued.

10.20 LANDSCAPING AND IRRIGATION SYSTEM:

This work includes the installation of the irrigation system and landscaping in accordance with Section 19 of the Standard Specifications and the project plans. See Section 2000 of these special provisions for Landscaping and Irrigation System specifications.

PAYMENT

The contract lump sum price paid for Irrigation and Landscaping shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all the work involved in constructing Landscaping and Irrigation, complete in place, as specified in the Standard Specifications and section 2000 of these Special Provisions, and as directed by Engineer.

10.21 SITE LIGHTING, CHARGING STATION, ELECTRICAL SYSTEM

This work includes the installation of the site lighting, charging station and electrical system (including service upgrade) in accordance with the project plans and these special provisions. See Section 16000 for Site Lighting/Electrical specifications.

PAYMENT

The contract lump sum price paid for Site Lighting, Charging Station, Electrical System shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the Site Lighting/Charging Station/Electrical system, complete in place, including the maintenance period, as shown on the plans, and as required by law, as specified in the Standard Specifications and Section 16000 of these Special Provisions, and as directed by the Engineer.

SECTION 11 WORK ZONE MOBILITY

POLICY:

To provide a smooth and efficient flow of traffic, while retaining safety through the roadway work zone.

TRAFFIC MANAGEMENT PLAN:

1. Temporary Traffic Control Plan

The Contractor shall develop and submit a temporary traffic control plan (TTCP) to the Engineer for review. The TTCP shall be prepared and signed by a person competent to perform said design. If the Engineer accepts the TTCP, the Contractor shall implement the TTCP.

The Contractor will be allowed to close lanes of traffic to accomplish the Work, provided that one lane in each direction is open to traffic. If the Work requires closure of lanes that would make it impossible to leave one lane in each direction open to traffic, the Contractor will be allowed to use flaggers and have one lane of traffic open. The Contractor will bear the entire cost of the flagging.

The Contractor will not be allowed to close the road to traffic at any point.

Contractor shall meet the requirements outlined in Section 11 of the City of Turlock Standard Specifications.

The Contractor shall bear the full cost of flagging operations.

The Contractor shall only be allowed to place traffic control devices for closures of lanes in areas where Work is occurring. If an area is not being worked on, the traffic control devices must not restrict traffic.

In times of low visibility (dark, foggy, etc.) the Contractor shall affix flashing beacons to all traffic control devices in a standard method.

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, Contractor shall immediately repair said component to its original condition or replace said component and shall restore the component to its original location.

The cost of repairing or replacing said traffic control devices shall be the responsibility of Contractor. The cost of supplying any and all traffic control devices shall be considered as included in other contract items of work and no additional compensation will be allowed therefore.

If the Contractor does not adhere to the accepted TTCP, the Engineer will shut down the Contractor for the remaining day and any subsequent days it take the Contractor to make traffic control devices adhere to the accepted TTCP. Such shut downs are not subject to additional working days.

SECTION 02000 LANDSCAPE AND IRRIGATION

SECTION 02810 - IRRIGATION

PART ONE - GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings, valves, sprinkler heads, and accessories.
- B. Control system.
- C. Backflow Prevention System.

1.02 RELATED SECTIONS

- A. Section 19 of the Standard Specifications; City of Turlock Standard Drawing No. L-12 for trenching detail for irrigation piping.
- B. Section 10.10 – Landscape Irrigation Water Service
- C. Section 02900 - Planting: Coordination with fine grading and soil preparation.
- D. Section 02920 – Finish Grading

1.03 MEASUREMENT AND PAYMENT

- A. Measurement and Payment for Work of this Section shall be as indicated in Section 10.20 of these special provisions.

1.04 REFERENCES

- A. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- B. ASTM D1784 - Specification for Rigid PVC Compounds and CPVC Compounds.
- C. ASTM D1785 - Standard Specification for PVC Plastic Pipe, Schedules 40, 80, and 120.
- D. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2004b.
- E. ASTM D2464 - Standard Specification for Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- F. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- G. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- H. ASTM D 2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2004.
- I. ASTM D3139 - Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
- J. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

- K. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- L. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2003.

1.05 DEFINITIONS

- A. Extra Wire: Control wire that is intended for future valve.
- B. Lateral Line: Pipe downstream of zone valve.
- C. Mainline: Pipe from backflow device to zone valves.
- D. Spare Control Wire: Control wire that is intended as a backup in case of faults or unknown conditions.

1.06 SYSTEM DESCRIPTION

- A. Contractor shall provide and install a complete irrigation system with the intent of the Drawings and Specifications. System shall provide 100% coverage to all planted areas in a uniform manner.

1.07 SUBMITTALS

- A. See Section 5.27 - Submittals, for submittal procedures.
- B. Shop Drawings: Prepare and submit the following fully dimensioned and labeled:
 - 1. POC Connection enclosure including all appurtenances and equipment, to scale of detail not less than 1" = 10'.
 - 2. Backflow prevention assembly.
 - 3. Controller assemblies including electrical.
 - 4. Layout plan for controller area.
- C. Product Data: Provide for all components incorporated into the Work and as requested to illustrate compliance with the Project Documents.
- D. Samples: Provide as requested.
- E. Test Reports as described in Part 3.
- F. Record Documents: Record actual locations of all concealed components, piping system, conduit, and other items listed below. Dimension from two permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
 - 1. Connection to existing water lines.
 - 2. Connection to existing electrical power.

3. Modifications to existing system.
4. Gate valves.
5. Routing of main line indicating all changes in direction and points along straight runs at intervals no more than 100'.
6. Sprinkler control valves.
7. Routing of control wiring.
8. Quick coupling valves.
9. Other related equipment as directed by the Landscape Architect.

G. Controller Charts: Provide color coded diagram of irrigation system as follows:

1. Prepare at a scale that will fit inside of controller door or in standard size 3-ring binder or spiral bound as directed by Owner.
2. Scale shall be legible and no less than 1" = 50'. Use multiple pages as required.
3. Identify the area of coverage of each remote control valve using a distinctively different translucent color drawn over the entire area of coverage.
4. Laminate all sheets with minimum 10 mil. plastic.
5. Submit and obtain approval of Landscape Architect prior to requesting final observation of irrigation system.

H. Operation and Maintenance Data:

1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions and requirements.
- B. Coordinate on-site storage with Owner.

- C. Handling of PVC Pipe and Fittings: Exercise care in handling, loading, unloading, storing and installation of PVC pipe and fittings. All PVC pipe shall be transported in a vehicle that allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded and, if installed, shall be replaced with new piping.

1.10 PROJECT CONDITIONS

- A. The Contractor shall not willfully install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such obstructions or differences should be brought to the attention of the Landscape Architect. In the event this notification is not performed, the irrigation Contractor shall assume full responsibility for any revision necessary.

1.11 REGULATORY REQUIREMENTS

- A. Requirements of Regulatory Agencies: All work and materials shall be in full conformance with the latest rules and regulations of the California Plumbing and Electric codes.
- B. Manufacturer's Directions: Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers of articles used in this contract furnish directions covering points not shown in the drawings and specifications.
- C. Underwriters Laboratories: Electrical wiring, controls, motors, and devices shall be UL listed, and so labeled.

1.12 PRE-INSTALLATION MEETING

- A. Convene one week prior to commencing work of this Section.
- B. Schedule after major components have been initially staked.

1.13 COORDINATION

- A. Coordinate the work with site backfilling, landscape grading and delivery of plant life.

1.14 SEQUENCE AND SCHEDULING

- A. Install all piping and provisions for equipment assemblies such as risers, swing joints, and nipples when subgrade has been established but prior to spreading any on-site or imported material over subgrade.
- B. Stage installation of work in area of stock piled material as necessary.

1.15 MAINTENANCE SERVICES

- A. Installer's Field Services: Prepare and start systems under provisions of Section 01710.
- B. Maintain system during plant establishment and turf grow-in period specified in Section 02900.

- C. Instruct Owner personnel on detailed operation of system.

1.16 EXTRA MATERIALS

- A. Furnish extra components:

1. Two valve keys for manual valves.
2. Two valve box keys.
3. Two keys for valve markers.
4. Two wrenches for each type head core and for removing and installing each type head.

1.17 WARRANTY

- A. The warranty for the sprinkler irrigation system shall be made in accordance with the following form.
- B. A copy of the warranty form shall be included in the operations and maintenance manual.
- C. The warranty form shall be retyped onto the Contractor's letterhead and contain the following information

- D. WARRANTY FOR SPRINKLER IRRIGATION SYSTEM

1. We hereby warrant that the sprinkler irrigation system we have furnished and installed is free from defects in materials and work quality, and the work has been completed in accordance with the drawings and specification. We agree to repair or replace any defects in material or work quality that may develop during the period of one year from the date of acceptance, except those that may be caused by ordinary wear and tear, unusual abuse or neglect. We also agree to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense, and we will pay the costs and charges therefore upon demand.

2. PROJECT: _____

3. CONTRACTOR: _____ PHONE
NO.: _____

4. ADDRESS: _____
BY: _____

5. _____

6. DATE OF ACCEPTANCE: _____
BY: _____

PART TWO - PRODUCTS

2.01 PVC PIPE AND FITTINGS

- A. PVC Materials: ASTM D1784, Type I Polyvinyl chloride plastic (PVC), cell classification 12454-B.
- B. Class 200 PVC Pipe: ASTM D2241 listed with NSF-PW Standard 61 and Standard 14.
- C. Class 315 PVC Pipe: ASTM D2241 listed with NSF-PW Standard 61 and Standard 14.
- D. Schedule 40 PVC Pipe: ASTM D1785 listed with NSF-PW Standard 61 and Standard 14.
- E. Flexible PVC Pipe: Agricultural Products Inc. 1174AG, Heavy Wall IPS Flex Vinyl (PVC) Pipe (C).
 - 1. 1/2" IPS: 0.840" O.D., 0.147" wall thickness
 - 2. 3/4" IPS: 1.05" O.D., 0.154" wall thickness
 - 3. 1" IPS: 1.315" O.D., 0.179" wall thickness
- F. PVC, Schedule 40 Socket Fittings: ASTM D2466 listed with NSF-PW Standard 61 and Standard 14.
- G. PVC, Schedule 80 Socket Fittings: ASTM D2467 and listed with NSF-PW Standard 61 and Standard 14.
- H. PVC, Schedule 80 Threaded Fittings: ASTM D2464 and listed with NSF-PW Standard 61 and Standard 14.
- I. Gasket Joints: Comply with ASTM F477 and ASTM D3139

2.02 STEEL PIPE AND FITTINGS

- A. Galvanized Pipe: Standard weight Schedule 40. Comply with ASTM A53.
- B. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe with threaded ends.
- C. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
- D. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
- E. Cast-Iron Flanges: ASME B16.1, Class 125.

- F. Cast-Iron Flanged Fittings: ASME B16.1, Class 125, galvanized.
- G. Galvanized Fittings: 150lbs. malleable iron, threaded. Comply with ASTM A53
- H. Ductile Iron Pipe and Fittings: Comply with Section 02510.
- I. Cast Iron Pipe and Fittings: Comply with Section 02510.

2.03 DRIPLINE PIPE AND FITTING

- A. Dripline: 5/8" polyethylene tubing with integral self-cleaning pressure compensating emitters.
- B. Dripline: As specified on the drawings. Fittings are to be by the same manufacturer and of type, style, and size to match dripline in accordance with manufacturer's recommendations.

2.04 PIPE SCHEDULE

- A. Water Service: Conform to City standards.
- B. Equipment Assemblies: Per referenced details.
- C. Irrigation Mainline:
 - 1. NPS 1/2" to 2": Schedule 40 PVC, solvent weld joints and fittings.
 - 2. NPS 2 1/2" and 3": Class 200 PVC, solvent weld joints and fittings.
- D. Lateral Lines:
 - 1. NPS 1/2" to 2": Schedule 40 PVC, solvent weld joints and fittings.
 - 2. NPS 2 1/2" and 3": As specified on the Drawings, solvent weld fittings.
- E. Sleeves: Schedule 40 PVC, solvent weld joints. Inside diameter shall be twice the outside diameter of pipe for which it is used.
- F. PVC Fittings: Schedule 40 PVC unless otherwise indicated.
- G. Swing Joint Assembly: Rainbird SA series, size and length as required.

2.05 EQUIPMENT

- A. Remote Control Valves: As specified on the Drawings.
- B. Ball Valves: Spears PVC Industrial Grade Compact Ball Valve
- C. Gate Valves:
 - 1. As specified on the Drawings.
 - 2. 3" to 12": Comply with City Standards for water.

- D. Quick Coupling Valves: As specified on the Drawings.
- E. Master Valve: As specified on the Drawings.
- F. Flow Sensor: As specified on the Drawings.
- G. Controllers:
 - 1. As specified on Drawings.
 - 2. Powder coat enclosure color as selected by Landscape Architect. Submit available standard colors for selection.

2.06 ACCESSORIES

- A. Control Wire: Copper, UL rated for direct burial, Type UF. Conform to NEC. Common shall be white and pilot wire shall be red. Spare control wires shall be of a different color approved by the Engineer.
 - 1. Pilot Wire: 14 Gauge
 - 2. Common Wire: 12 Gauge
- B. Control Wire Connectors: Water tight. Rain Bird Pen-Tite Connectors, 3M DBY ore DBR direct burial splice kits, or fusible heat shrinking tubing, as specified on the Drawings or as approved. Sized as required for wire size and quantities at each splice.
- C. Valve boxes: As indicated below. Provide one (1) 12" extension per box, unless different size otherwise indicated, by same manufacturer as box and stamp cover with identification of equipment or valve and controller number as applicable.
 - 1. Master Valve: Christy B36
 - 2. Flow Sensor: Christy B3 Utility Box
 - 3. Quick Coupler Valves: Christy B3 Utility Box.
 - 4. Gate Valves: Carson 1220 with T-cover and Bolt Down Loc-Kit, green.
 - 5. Remote Control Valves: Rainbird VB-JMB-H.
 - a. Extension: Rainbird VB-JMB-EXT-B.
 - 6. Stub-Outs: Christy N30 box with bolt down lid.
- D. Primer: Weldon P-70 PVC, IAMPO-UPC and NSF listed.
- E. Solvent Weld Cement:
 - 1. Comply with ASTM D2564, IAMPO-UPC and NSF listed. Compatible with pipe being joined and job site conditions.

- F. Galvanized Pipe Paint: Carbon elastic Paint No. 2221 by American Tar Company or equal.
- G. Thrust Blocks: As specified in the Drawings.
- H. Pull line/cord: Polypropylene braided line or Let-line #232 or equal of 1/8" diameter with a minimum break strength of 200 pounds.
- I. Remote Control Valve ID Tag: All vinyl, with embossed lettering and tie for valve connection. Christie, Ewing or equal.

2.07 IRRIGATION HEADS

- A. Drip Assemblies: As specified on the Drawings

PART THREE - EXECUTION

3.01 EXAMINATION

- A. Verify location of existing utilities.
- B. Verify that required utilities are available, in proper location, and ready for use.
- C. Verify that field conditions are acceptable and are ready to receive work.
- D. Verify location of underground utilities and facilities. Drawings may show utilities in some locations but do not necessarily represent all underground utilities and facilities. Obtain locations prior to start of Work.
- E. Verify locations of existing sleeves. Notify Landscape Architect of discrepancies in existing sleeve locations and system requirements.
- F. Beginning of installation shall signify acceptance of existing conditions.
- G. Verification of Existing Pressure:
 - 1. Verify existing static pressure prior to ordering irrigation components. Submit test results to Landscape Architect for further direction.

3.02 PREPARATION

- A. Call Underground Service Alert 48 hrs prior to start of work. Field mark underground utilities prior to excavation. Make provisions to protect underground utilities and facilities.
- B. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, utilities, and structures and as directed. Locate in landscape areas wherever possible
- C. Layout and stake locations of system components.
 - 1. Layout by Survey: At a minimum, the following shall be laid out by survey using a qualified surveyor.
 - a. Mainline

- D. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.
- E. Layout shall be reviewed by the Landscape Architect or Owner at pre-installation meeting prior to installation.

3.03 GENERAL

- A. Install all equipment in compliance with applicable codes and regulations and manufacturer's printed instructions and specifications.
- B. Provide all incidental materials, equipment, and components required for a complete and functional system even if such material, equipment, and components are not specifically included in the Drawings or Specifications.

3.04 TRENCHING

- A. Trench and backfill in accordance with Section 19 of the Standard Specifications and City of Turlock Standard Drawing No. L-12.
- B. Trench bottom shall be flat to ensure piping is supported continuously on an even grade.
- C. Where lines occur under paved areas, consider dimension to be below the subgrade.
- D. Trench Size:
 - 1. Width: As indicated on the Drawings.
 - 2. Depth as required to provide for bedding and minimum cover as specified. Coordinate depths of various pipe runs as required to minimize conflict. Maintain consistent depths of each of line except as pre-approved by Landscape Architect.
- E. Schedule of Minimum Pipe Cover:
 - 1. Water Service Line: Per City or other local Standards
 - 2. Mainline:
 - a. Pipe Sizes Less Than 4 inches: 24 inches.
 - b. Pipe 4 inches and Larger: 30 inches
 - 3. Lateral Lines: 18 inches.
 - 4. Control Wire: 24 inches.
 - 5. All Pipe and Control Wire Under Paving: 36 inches minimum. Provide additional depth as required to provide a minimum of 12 inches cover to bottom of subgrade in new paving areas.
- F. Trenching adjacent to existing trees shall be excavated by hand or machine boring as directed by the Landscape Architect. Comply with the City Standards.

- G. Trench to accommodate grade changes.
- H. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.05 PIPE INSTALLATION

A. General

1. Comply with manufacturer's printed instructions and recognized industry standards.
2. Pipe and equipment installed in trenches shall be fully supported by approved trench foundation material.
3. Pipe and equipment installed above grade shall be properly and securely anchored and supported by approved devices and means.
4. Pipe under paved areas shall be installed in PVC pipe sleeves.
5. Line Clearance: All lines shall have a minimum clearance of 6 inches from each other and from lines of other trades. Comply with applicable regulations for clearance between irrigation lines and other trades.
6. Parallel lines shall not be installed directly over one another.
7. Install pipe to allow for expansion and contraction without stressing pipe or joints.
8. Install trace wire as indicated in drawings.
9. Install 3" warning tape 12" above mainline.

B. PVC, Solvent-Cement Welded Joints

1. Comply with manufacturers' written specifications.
2. Comply with ASTM D2855 and ASTM F402

C. PVC, Threaded Joints:

1. Use teflon tape for plastic to plastic and plastic to galvanized joints. Hand tighten and use only light wrench pressure as required to produce sound, water tight joint.
2. Use pipe joint compound for galvanized to galvanized joints.

D. PVC, Gasket Joints:

1. Comply with manufacturers' written instructions.
2. Comply with ASTM D3139.

E. Galvanized Pipe:

1. Comply with industry standards.

2. Paint all below grade galvanized pipe with specified galvanized pipe paint.

F. Thrust Blocks:

1. Thrust blocks shall be cast-in-place concrete of the size and configuration appropriate for installation condition.
2. Comply with Standard Specifications and as indicated on the Drawings.
3. Leave thrust blocks exposed until pressure testing is complete.

3.06 EQUIPMENT INSTALLATION

A. Remote Control Valves:

1. Locate all valves as directed.
2. Install per applicable details.
3. Install after mainline has passed pressure test.
4. Flush mainline of all debris before installing valves.
5. Install each valve in a separate valve box.
6. After installation, re-pressurize mainline, check for leak, and eliminate all leaks.
7. Securely attach one ID tag per valve with number or lettering corresponding to valves station on controller schedule.

B. Manual Drain Valves: Install at all low points in system.

C. Controller:

1. Locate as directed.
2. Install and wire in conformance with manufacturer's published instructions and specifications
3. Construct concrete footings as indicated and as required to support the controller cabinet.
4. Wire only one valve per station.
5. Make connection to electrical supply. Conform to applicable regulations and codes. Provide dedicated breaker of proper size for each controller. Provide one (1) additional duplex outlet at each controller. All electrical work shall be performed by properly licensed electrician.

D. Remote Control Valve Control Wiring:

1. Above grade wire shall be installed in approved conduit. Extend conduit to the full required depth of cover. Transition from vertical to horizontal alignment shall be made with a sweep elbow.
2. Lay control wire in mainline trench immediately adjacent to mainline wherever possible. Bundle wires with electrical tape at 10 feet intervals. Do not tape to mainline.
3. Run a separate pilot wire to each control valve.
4. Run a common ground for all control valves on a common controller. Provide a separate ground wire for each controller.
5. Make splices in valve boxes only. Use specified connectors. Provide a 36-inch loop at each valve.
6. Extra Control Wire: Install for future valves, if any, where indicated on the Drawings. Extra control wire shall not be used as spares without approval from Landscape Architect.
7. Spare Control Wires:
 - a. Install one spare common wire the full length of the mainline.
 - b. Install spare control wires at a ratio of 1 per each 6 valves the full length of the mainline. Provide a 36-inch loop at each valve.
8. Label ends of control wire indicating controller, valve number, and station. Use waterproof marker.

E. Valve Boxes

1. Excavate to required subgrade.
2. Place drain rock to specified depth and width prior to setting support blocks and valve box. At a minimum, drain rock shall be 12 inches deep and shall be the full width and length of the box extending 3 inches past the edges of the valve box.
3. Set valve boxes plumb and square with adjacent structures and adjacent boxes.
 - a. Paved condition: Set box so that top of box is flush with adjacent paving.
 - b. Turf: Set box so that top of box is 1/2" above adjacent finish grade.
 - c. Landscape Condition: Set boxes so that top of box is 1" above adjacent finish grade.
4. Mark top of each box with approved designation of type of equipment housed within it. Use approved permanent means of marking. Identify zone number of remote control valves.

F. Quick Coupler

1. Locate 12" from paved surface unless approved otherwise.

3.07 FIELD QUALITY CONTROL

- A. Identify the following scheduled observations in the Progress Schedule and provide notifications to Landscape Architect and Owner prior to each as follows:
 1. Backflow assembly location: 48 hours.
 2. Pressure supply line installation and testing: 48 hours.
 3. Automatic controller location: 48 hours.
 4. Control wire installation: 48 hours.
 5. Lateral line and sprinkler installation: 48 hours.
 6. Coverage test: 48 hours.
 7. Final site review: 7 days.
- B. When observations have been conducted by other than the Landscape Architect or Designated Representative, show evidence in writing of when and by whom these observations were made.
- C. No site observations will commence without Record Drawing redline prints.
- D. Pressure Testing:
 1. General:
 - a. All hydrostatic pressure tests in the presence of the Landscape Architect or Owner representative. No pipe shall be completely backfilled until it has been inspected, tested and approved in writing.
 - b. Center load all pipe runs and secure as required to prevent damage to system during testing. Do not cover any joints or fittings.
 - c. Fill pipe with water a minimum of 24 hours prior to testing.
 - d. Furnish all force pumps and equipment required to conduct tests. Do not use system's booster pump to pressurize lines.
 - e. Conduct all pressure tests prior to spreading any soil amendment material.
 - f. Correct all deficiencies revealed by testing.
 2. Mainline: Prior to installation of electrical control valves, quick couplers or any other equipment that might prevent a proper test from being performed pressurize mainline to 150 pounds per square inch and maintain pressure for a period of 6 hours.

3. Lateral Lines: Prior to installation of heads, cap risers and swing joints and pressurize to 100 pounds per square inch and maintain pressure for a period of 2 hours.
 4. All Piping Under Paved Areas: pressurize to 150 pounds per square inch for a period of 2 hours and proved watertight prior to paving.
- E. Coverage Test: When the sprinkler irrigation system is completed, perform a coverage test in the presence of the Landscape Architect or Designated Representative to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from plans.
1. Perform in presence of Landscape Architect and Owner representative.
 2. Run each zone for sufficient length of time to demonstrate coverage and uniform application.
 3. Adjust system components as required to correct inadequate or non-uniform coverage.
- F. All tests that fail will require additional testing at Contractor's expense, including Landscape Architect's time and expenses, until accepted by Landscape Architect.
- G. Final Observation:
1. The Contractor shall operate each system in its entirety for the Landscape Architect or Designated Representative at time of final observation. Any items deemed not acceptable by the Landscape Architect or Owner, or not in compliance with these specifications and drawings, shall be reworked to the complete satisfaction of the Landscape Architect and Owner.
 2. The Contractor shall show evidence to the Landscape Architect that the Owner has received all accessories, charts, record drawings, and equipment as required before final observation can occur.

3.08 BACKFILLING

- A. Clean trenches of debris and deleterious material.
- B. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.
- C. Backfill only after specified tests have been performed and Engineer's acceptance has been obtained.
- D. Clean trenches of debris and rocks.
- E. Bed pipe as indicated on the Drawings.
- F. Place initial fill of select material as indicated on Drawings.
- G. Backfill with approved native soil free of rocks, sticks, debris and other deleterious material.

H. Compaction

1. In landscape areas match compaction of landscape area soil and as required to prevent settling.
2. Under areas to be paved compact to a minimum of 95% per ASTM D1557. Meet minimum compaction requirements for pavement section

3.09 TEMPORARY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the warranty as herein specified.

3.10 SYSTEMS STARTUP

- A. Adjust control system to achieve time cycles required.
- B. Adjust control system to achieve time cycles required to deliver proper precipitation rates for the various planting types. Adjust sequencing of stations such that the required watering can be accomplished during the Owner-specified watering time window.
- C. Change head and nozzle types as directed and as required to achieve proper coverage and precipitation rates.
- D. Adjust heads and valve pressures as required to provide proper irrigation coverage and precipitation rates.
- E. Adjust all sprinkler heads to prevent as much as possible any overspray onto walks and roadways. No spray is permitted on buildings.
- F. Radii shall not be reduced by more than 25% of the nozzle's radius as determined by manufacturer.

3.11 MAINTENANCE

- A. The entire sprinkler irrigation system shall be under full automatic operation for a period of seven days prior to any planting.
- B. The Landscape Architect or Owner Representative reserves the right to waive or shorten the operation period.
- C. Maintain system during the plant establishment period specified in Section 02900.

3.12 CLEANUP

- A. Cleanup shall be performed as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed or washed down, and any damage sustained to the work of others shall be repaired and work returned to its original condition.

3.13 OPERATING INSTRUCTIONS

- A. The Contractor shall train Owner's maintenance personnel in proper operation of all major equipment. Provide written evidence of the person or persons so trained.

3.14 DEMONSTRATION

- A. Instruct Owner's personnel in operation and maintenance of system. Use operation and maintenance material as basis for demonstration.

END OF SECTION

SECTION 02900 - PLANTING

PART FOUR - GENERAL

4.01 RELATED DOCUMENTS

- A. Project Plans

4.02 SECTION INCLUDES

- A. Trees.
- B. Shrubs.
- C. Ground covers.
- D. Plants.
- E. Topsoil and soil amendments.
- F. Fertilizers and mulches.
- G. Stakes and guys.

4.03 MEASUREMENT AND PAYMENT

- A. Measurement and Payment for Work of this Section shall be as indicated in Section 10.20 of these special provisions.

4.04 RELATED SECTIONS

- A. Section 02810 – Irrigation: Coordination with head, pipe, and equipment locations.
- B. Section 02920 – Finish Grading: Topsoil

4.05 SUBMITTALS

- A. See Section 5.27 - Submittals, for submittal procedures.
- B. Materials List:

1. Within 15 days of Award, submit documentation that specified plants have been ordered. Include names and addresses of suppliers, and make arrangements for Landscape Architect to inspect plants at supplier's nursery.
 2. Submit requests for substitutions with materials list.
- C. Delivery Tickets:
1. Submit for all plants installed as part of the Project.
 2. Include full botanical and common names of all plants.
- D. Product Data - Submit data on the following:
1. Soil amendments.
 2. Herbicides.
 3. Fertilizers.
 4. Substitutions for specified accessories.
 5. Root Barrier.
- E. Product certificates signed by manufacturers certifying that their products comply with specified requirements.
1. Manufacturer's certified analysis for standard products.
 2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
 3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.
- F. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.
1. Analysis of existing surface soil.
 2. Analysis of imported topsoil.
- G. Samples of each of the following:
1. 5 lb of mineral mulch for each color and texture of stone required for Project, in labeled plastic bags.
 2. Submit a 1 cubic foot sample of the following. Indicate supplier.
 - a. Organic matter.
 - b. Mulch.

- H. Planting schedule indicating anticipated dates and locations for each type of planting.
- I. Test Reports: Submit soil test results and recommendations.
- J. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

4.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.
- B. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."
- C. Plant nomenclature shall conform to that used in New Sunset Western Garden Book, 2000 edition or later, published by Sunset Publishing Corporation. Names and varieties not listed in this reference shall be those most commonly used in the nursery trade.
- D. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce satisfactory topsoil.
- E. Measurements: Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- F. Herbicides shall be applied by licensed applicator. Submit name, address, and license number of application firm.

4.07 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Trees and Shrubs: Deliver trees and shrubs in sizes as indicated in the drawings. Do not prune before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying

damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery.

- C. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Do not remove container-grown stock from containers before time of planting.
 - 2. Water root systems of trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

4.08 PROJECT CONDITIONS

- A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.
- C. Planting operations shall not be conducted under the following conditions:
 - 1. Freezing weather.
 - 2. Excessive heat.
 - 3. High winds.
 - 4. Excessively wet conditions.

4.09 SEQUENCING AND SCHEDULING

- A. Coordinate planting operations with other construction to avoid damage to plants by other trades.

4.10 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. Special Warranty: Warrant the following living planting materials for the following specified time period after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.
 - 1. Trees – 1 year.

- 2. Shrubs – 6 months.
- 3. Ground covers – Length of maintenance period.
- C. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.
- D. Replace planting materials that are in a substantially unhealthy condition (more than 25 percent of the plant dead or removed due to death of branches, etc.) at end of warranty period.
- E. A limit of one replacement of each plant material will be required, except for losses or replacements due to failure to comply with requirements.

4.11 MAINTENANCE

- A. Maintain trees, shrubs, groundcovers, and lawns by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Time period of the maintenance periods as specified on the drawings, or if not specified then a minimum of 3 months.

PART FIVE - PRODUCTS

5.01 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Landscape Architect.
- C. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

5.02 CONIFEROUS EVERGREENS

- A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.

5.03 GROUND COVERS AND PLANTS

- A. Provide ground covers and plants established and well rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated.

5.04 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth. Any topsoil added shall be thoroughly mixed with the existing site soil to a depth of 12" minimum (unless otherwise noted on drawings).
 - 1. Topsoil Source: Amend existing surface soil to produce topsoil. Supplement with imported topsoil when required.

5.05 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.
 - 1. Provide lime in the form of dolomitic limestone.
- B. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- G. Manure: Well-rotted, un-leached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- H. Water: Potable.

5.06 HERBICIDES

- A. EPA registered and approved, of type recommended by manufacturer.
- B. Surflan, Round-Up or approved equal.

5.07 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the compositions as indicated on the drawings or as recommended by the soil test (soil test recommendation to take precedence over drawings).

5.08 MULCHES

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Wood and bark chips – refer to drawings.
- B. Mineral Mulch: Hard, durable stone, washed free from loam, sand, clay, and other foreign substances, of following type, size range, and color:
 - 1. Rounded riverbed gravel or smooth faced stone.
 - 2. Crushed stone or gravel. – per plans.
- C. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.

5.09 STAKES AND GUYS

- A. Upright: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.
- B. Guy and Tie Wire: ASTM A 641, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.
- C. Guy Cable: 5-strand, 3/16-inch diameter, galvanized-steel cable, with zinc-coated turn buckles, 3-inch- long minimum, with two 3/8-inch- galvanized eyebolts.
- D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.
- E. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

5.10 LANDSCAPE EDGINGS

- A. Edging: Refer to drawings.

5.11 ROOT BARRIER

- A. Deep Root UB-24-2.

PART SIX - EXECUTION

6.01 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Start of work shall indicate Contractor's acceptance of existing conditions.

6.02 PREPARATION

- A. Conduct weed control measures as specified in the drawings.
- B. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, and secure Landscape Architect's acceptance before the start of planting work. Make minor adjustments as may be required.

6.03 PLANTING SOIL PREPARATION

- A. Soil Testing: confirm that required soil testing has been completed and that soil mixes and soil preparation specifications have been revised to reflect the recommendations of the soils laboratory as approved by Landscape Architect.
- B. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
- C. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
- D. For tree pit or trench backfill, mix planting soil before backfilling and stockpile at site.
- E. For planting beds and lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

6.04 GROUND COVER AND PLANT BED PREPARATION

- A. Till soil in beds to a minimum depth of 12 inches and mix with specified soil amendments and fertilizers.

6.05 EXCAVATION FOR TREES AND SHRUBS

- A. Pits and Trenches: Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.
 - 1. Container-Grown Trees and Shrubs: Excavate pits twice the width and 1½ the depth of the container.
- B. Mix subsoil removed from landscape excavations with soil amendment to use as backfill.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- E. Fill excavations with water and allow to percolate out before placing setting layer and positioning trees and shrubs.

6.06 PRE-EMERGENT HERBICIDE

- A. Apply herbicides in accordance with manufacturer's recommended rates and procedures.
- B. Apply to soil of all planting bed areas prior to placement of mulch.

6.07 PLANTING TREES AND SHRUBS

- A. Set container-grown stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.
 - 1. Carefully remove containers so as not to damage root balls.
 - 2. Place stock on setting layer of compacted planting soil.
 - 3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.
- B. Dish and tamp top of backfill to form a 3-inch-high mound around the rim of the pit (not in turf). Do not cover top of root ball with backfill.

6.08 TREE AND SHRUB PRUNING

- A. Prune, thin, and shape trees and shrubs as directed by Landscape Architect.

6.09 TREE AND SHRUB GUYING AND STAKING

- A. Upright Staking and Tying: Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating balls or root masses. Support trees with 2 strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree. Refer to staking detail in the drawings.
- B. Guying and Staking: Guy and stake trees exceeding 14 feet and more than 3-inch caliper unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches long, driven to grade. Attach flags to each guy wire, 30 inches above finish grade.

6.10 PLANTING GROUND COVER AND PLANTS

- A. Space ground cover and plants as indicated on the drawings.
- B. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

6.11 MULCHING

- A. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.
- B. Mulch: Apply the following average thickness of mulch per plans and finish level with adjacent finish grades. Do not place mulch against trunks or stems.
 - 1. Thickness: As indicated on drawings.

6.12 CLEANUP AND PROTECTION

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

6.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 02920 - FINISH GRADING

PART SEVEN - GENERAL

7.01 RELATED DOCUMENTS

- A. Project Plans

7.02 SECTION INCLUDES

- A. Weeding and finish grading of planting areas.
- B. Preparing subgrades for planting areas.
- C. Excavating and backfilling trenches for buried irrigation and associated electrical utilities and pits for buried irrigation components.

7.03 MEASUREMENT AND PAYMENT

- A. Measurement and Payment for Work of this Section shall be as indicated in Section 10.20 of these special provisions.

7.04 RELATED SECTIONS

- A. Section 02900 – Planting, finish grading, including placing and preparing topsoil for lawns and plantings.

7.05 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

- C. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Landscape Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Landscape Architect. Unauthorized excavation, as well as remedial work directed by Landscape Architect, shall be without additional compensation.
- E. Fill: Soil materials used to raise existing grades.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- H. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- I. Finish Grading: Finish grading shall consist of finishing surfaces by raking smoothly and evenly, removing, and disposal of extraneous matter to facilitate natural run-off water.

7.06 SUBMITTALS

- A. See Section 5.27 - Submittals, for submittal procedures.
- B. Samples, for the following:
 - 1. 12-by-12-inch sample of separation fabric.

7.07 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Landscape Architect and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Landscape Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Landscape Architect's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART EIGHT - PRODUCTS

8.01 SOIL MATERIALS

- A. General:
 - 1. Conform to the Geotechnical (Soils) Report prepared for the project.
 - 2. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

8.02 ACCESSORIES

- A. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile: made from polyolefins, polyesters, or polyamides: and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
 - 2. Tear Strength: 75 lbf (333N); ASTM D 4533.
 - 3. Puncture Resistance: 90 lbf (400N); ASTM D 4833.
 - 4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
 - 5. Apparent Opening Size: No. 30 (0.6 mm); ASTM D 4751.

PART NINE - EXECUTION

9.01 GENERAL

- A. Conform to the Geotechnical (Soils) Report prepared for the project.

9.02 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

9.03 EXPLOSIVES

- A. Explosives: Do not use explosives.

9.04 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditioned encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

9.05 EXCAVATION FOR IRRIGATION TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

9.06 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

9.07 IRRIGATION TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Place and compact initial backfill free of particles larger than 1 inch to a height of 4 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of irrigation piping or conduit to avoid damage or displacement of utility system.
- C. Coordinate backfilling with utilities testing.
- D. Place and compact final backfill of satisfactory soil material to finish grade.

9.08 FILL AND LANDSCAPE MOUNDING

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations. Mounding to be installed in natural undulating form and to the heights and extents as indicated on the drawings. Contractor to notify Landscape Architect when mounding has been completed for review and approval of mounding.

9.09 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 6 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 1. Under structures, steps, and pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
 2. Under walkways, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
 3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

9.10 LANDSCAPE GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

- B. Landscape Grading: Slope grades to direct water away from buildings and to prevent ponding. Provide positive drainage swales from all buildings, walkways, etc. to drainage catch basins or site drainage swales. No ponding is to be allowed. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading for Shrubs and Ground Cover: The finish grade of shrubbery and ground cover areas shall be 1½ inches below grade of adjacent pavement, walks, curbs, or headers and 3 inches below adjacent walls, except when drainage conditions may require flush grades, as directed by Landscape Architect.
- D. Immediately prior to planting operations, planting areas shall be cleaned of weeds, debris, rocks over 1 inch in diameter, and clumps of earth that will not break up. Adjust any areas disturbed by installation of sprinkler irrigation system.

9.11 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

9.12 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

SECTION 16000 SITE LIGHTING/ELECTRICAL

PART 1 - MEASUREMENT AND PAYMENT

- A. Measurement and Payment for Work of Section 16000 shall be as indicated in Section 10.21 of these special provisions.

SECTION 16050 BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 — GENERAL

1.01 SUMMARY

A. Section includes

1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under Division 16.

B. Related work under this section

1. Labor and materials required to furnish and install the electrical systems in a complete and operational fashion.
2. Carpentry, masonry, steel and concrete materials and labor required for construction of proper stands, bases and supports for electrical materials and equipment.
3. Cutting and patching of holes required by installation including flashing and counter-flashing of roof and exterior wall penetrations.
4. Excavating, pumping and backfilling required for installation.
5. Repair of damage to the premises resulting from construction activities under this Section to Owner's satisfaction.
6. Removal of work debris from construction activities to Owner's satisfaction.
7. Testing and cleaning of equipment installed.

C. Related sections

1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Section 16000 work, as applicable.
3. Consult all other sections, determine the extent and nature of related work and properly coordinate work specified herein with that specified elsewhere to provide a complete and working installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. CCR –California Code of Regulations
 - a. Title 8 –Industrial Relations; Division 1 –Department of Industrial Relations
 - 1) Chapter 3.2 -California Occupational Safety and Health Regulations (CAL/OSHA)
 - 2) Chapter 4 –Division of Industrial Safety
 - a) Subchapter 4 -Construction Safety Orders (CSO)
 - b) Subchapter 5 -Electrical Safety Orders (ESO)
 - b. Title 24 –California Building Standards
 - 1) Part 1 -Building Standards Administrative Code

- 2) Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - 3) Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - 4) Part 4 -California Mechanical Code (MEC); IAPMO Uniform Mechanical Code (UMC) with California amendments
 - 5) Part 5 -California Plumbing Code; IAPMO Uniform Plumbing Code (UPC) with California amendments
 - 6) Part 6 -California Energy Code
 - 7) Part 7 -California Elevator Safety Construction Code
 - 8) Part 9 -California Fire Code; International Fire Code (IFC) with California amendments
 - 9) Part 12 -California Reference Standards Code
2. CPUC –California Public Utilities Commission
 - a. GO-95; Rules for Overhead Electric Line Construction
 - b. GO-128; Rules for Construction of Underground Electric Supply and Communication Systems
 3. IEEE –Institute of Electrical and Electronic Engineers
 - a. C2; National Electrical Safety Code (NESC)
 4. NECA –National Electrical Contractors Association
 - a. 1; Standard Practices for Good Workmanship in Electrical Contracting
 - b. 4090; Manual of Labor Units
 5. All applicable local municipal codes and ordinances.
 6. Applicable rules and regulations of local utility companies.

1.03 SUBMITTALS

- A. See Section 5.27 - Submittals, for submittal procedures.
- B. Product data
 1. Prior to commencement of work and within 35 days after award of Contract, submit in ample time for approval in accordance with Division 1 a complete list of furnished equipment, material and shop drawings, including all substitutions. Partial or incomplete lists of materials will not be considered. Substitutions will be considered thereafter.
 - a. Where it is in the best interest of Owner, Engineer may give written consent to a submittal received after expiration of designated time limits or for an additional re-submittal.
- C. Closeout submittal
 1. Furnish three complete sets of maintenance and operating instructions bound in a binder and indexed to Owner. Start compiling data upon approval of materials and equipment. Final inspection will not be made until Engineer approves binders. Refer also to Division 1 for additional requirements.

2. Provide one of each tool required for proper equipment operation and maintenance provided under this Section. All tools shall be delivered to the Owner at project completion.
3. Provide two keys to Owner for each lock furnished under Division 16.
4. Record drawings
 - a. Upon completion of Work, furnish Engineer with complete sets of plans (not marked blueprints) upon which shall be shown all work installed under Contract, which are not in accordance with the Construction Documents. Refer to Division 1 requirements.
 - b. All symbols and designations used in preparing Record Drawings shall match those used in Construction Documents.

1.04 SUBSTITUTIONS

- A. If it is desired to make a substitution, the Contractor shall clearly identify each substitution on the submittal, and to submit complete information or catalog data to shown equality of equipment or material offered to that specified. Substitutions will be interpreted to be all manufacturers other than those specifically listed by model or catalog number within these Specifications and Drawings. No substitution will be allowed unless identified, requested and approved in writing. Materials of equal merit and appearance, in the opinion of the Engineer, will be approved for use. Architect and Engineer reserve the right to require originally specified items at no additional costs to Owner. Only one request for substitutions will be considered on each item of material or equipment.
- B. Acceptance of a substitute is not to be considered a release from the Specifications. Correct any deficiencies in an item, even though approved at the Contractor's expense.
- C. Responsibility for installation of approved substitution is included herein. Make any changes required for installation of approved substituted equipment without additional costs.
- D. Failure to comply with any of the requirements of the above will necessitate that the specified materials be submitted and supplied.

1.05 CHANGE ORDER PROPOSALS

- A. Shall comply with the requirements set forth by the General Conditions
- B. All change order proposals and requests, both additive and deductive, shall be accompanied by a detailed materials and labor breakdown for each specific task and/or item.
 1. All change order proposals and change orders, both additive and deductive, shall be based upon and be accompanied by a detailed materials and labor breakdown for each specific task and/or item. The breakdown shall include actual materials costs plus overhead and profit, as well as labor units base upon the most recent NECA Manual of Labor Units (NECA Index #4090) or equivalent publication for each specific task and item. Labor costs shall be computed as outlined within the General Conditions, based upon the NECA labor tables for each task required. Materials costs shall include actual Contractor invoice plus no more than 15% markup. The Owner and Contractor agree to the above change order cost procedure, for both additive and deductive change orders.

1.06 QUALITY ASSURANCE

- A. References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted

and published prior to bid submittal. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.

- B. Work and materials shall be in full accordance with the latest rules and regulations of applicable state of local laws or regulations and standards of following:
 - 1. National Fire Protection Association (NFPA)
 - 2. California Electrical Code (CEC)
 - 3. California Occupational Safety Health Act (Cal-OSHA)
 - 4. California State Fire Marshall (CSFM)
 - 5. California Code of Regulations (CCR)
 - 6. Electrical Safety Orders, CAC Title 8 (ESO)
 - 7. California Public Utilities Commissions, General Order 95 (GO-95)
 - 8. Applicable rules and regulations of local utility companies.
 - 9. NECA 1-2000, Standard Practices for Good Workmanship in Electrical Contracting
- C. All electrical equipment and material furnished under Division 16 shall conform to all CEC/NEC requirements and bear the Underwriters' Laboratories (UL) label where applicable.
- D. Nothing in the Construction Documents shall be construed to permit work not conforming to these Codes. Whenever the indicated material, workmanship, arrangement or construction is of high quality or capacity than that required by the above rules and regulations, the Construction Documents shall take precedence. Should there be any direct conflict between the rules and regulations and Construction Documents, the rules shall govern.
- E. All electrical equipment and material furnished under this Section shall conform to NEMA and ASTM standards, NEC/CEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.
- F. All electrical work shall conform to manufacturer's written instruction, and the NECA Standard Practices for Good Workmanship in Electrical Contracting and all published recommended practices at the time of project. The Contractor shall use the requirements within the Specifications whenever they exceed NECA guidelines.
- G. Follow manufacturer's direction where these direction cover points not included with the Construction Documents.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Packing, shipping, handling and unloading
 - 1. Damage to the equipment delivered to the site or in transit to the job shall be the responsibility of the Electrical Contractor.
 - 2. Equipment and material delivery of shall be scheduled as required for timely, expeditious progress of work.
- B. Storage and protection of job equipment is the responsibility Contractor.
- C. Comply with Division 1 requirements with regards to waste management and disposal.

1.08 PROJECT CONDITIONS

- A. Discrepancies

1. In the event of discrepancies with the Contract Documents, Engineer shall be notified with sufficient time as stated within Division 1 to allow the issuing of an addendum prior to the bid opening.
2. If, in the event that time does not permit notification of clarification of discrepancies prior to the bid opening, the following shall apply:
 - a. The drawings govern in matters of quantity and specifications govern in matters of quality.
 - b. In the event of conflict within the drawings and specifications involving quantities or quality, the greater quantity or higher quality shall apply. Such discrepancies shall be noted and clarified within the contractor's bid. No additional allowances will be made because of errors, ambiguities or omissions which reasonably should have been discovered during the bid preparation.
- B. Verify all power and communication utilities' requirements prior to commencement of any utility work. Make proper adjustments to the construction to satisfy the serving utility.
- C. Information shown relative to services is based upon available records and data, but shall be regarded as approximate only. Make minor deviations found necessary to conform to actual locations and conditions without extra cost. Verify locations and elevations of utilities prior to commencement of excavation for new underground installation.
- D. Exercise extreme care in excavating near existing utilities to avoid any damage thereto; be responsible for any damage caused by such operations. Contact all utility companies to obtain exact locations prior to commencement of construction.
- E. The electrical plans indicate the general layout and arrangement; the architectural drawings and field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design intent. Maintain all required working clearances.

1.09 SEQUENCING

- A. Coordinate work within phasing plans as provided by the Owner.

1.10 WARRANTY

- A. Furnish one-year minimum guarantee in accordance with and in form required under Division 1. Repair or replace as may be necessary any defective work, material, or part without cost to the Owner, include repair or replacement of other work, furnishing, equipment or premises caused by such repair or replacement of defective work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials mentioned herein or on Drawings require that the items be provided and of quality noted or an approved equal. All materials shall be new, full weight, standard in all respects and in first-class condition. Insofar as possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.
- B. Trade names or catalog numbers stated herein indicates grade or quality of material desired. Materials, where applicable, shall UL labeled and in accordance with NEMA standards.
- C. Dimensions, sizes and capacities shown are a minimum. Do not make changes without written permission of Engineer

PART 3 -EXECUTION

3.01 EXAMINATION

- A. Examine Construction Documents and Site; be familiar with types of construction where electrical installation is involved. Note carefully other sections of Specifications with their individual cross-references, standard details, etc.
- B. Any electrical work or materials shown either in Construction Documents, but not mentioned herein, or vice versa, shall be executed the same as if mentioned herein, in a workmanlike manner in accordance with all published NECA Standards of Installation.
- C. Coordinate work with other crafts to avoid conflicts, and check all outlet locations with Architectural and Mechanical drawings and specifications. Make minor adjustments without additional cost to Owner.
- D. Engineer will make clarifications and rulings concerning any obvious discrepancies or omissions in work prior and after bidding. Perform all work involved in correcting obvious errors or omissions after award of contract as directed by Engineer at Contractor's expense.
- E. Examine site dimensions and locations against Drawings and become informed of all conditions under which work is to be done before submitting proposals. No allowance will be made for extra expense due to error.
- F. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Construction Documents are for assistance and guidance, and exact locations, distance, levels, etc., will be governed by construction; accept same with this understanding.
- G. Horsepower of motors or wattage of equipment indicated in Construction Documents is estimated horsepower or wattage requirement of equipment furnished under other sections of Specifications. Size all feeders (conduit and wiring), motor starters, overload protection and circuit breakers to suit horsepower of motors or wattage of equipment actually furnished under various sections of specifications. However, in no case shall feeders and branch circuits (conduit and wiring) and circuit breakers be of smaller capacities or sizes than those indicated on Drawings or specified, unless approved in writing by Engineer.

3.02 PREPARATION

- A. Seal all exterior wall penetrations in an approved watertight manner and to the satisfaction of Engineer and Architect.
- B. Channels, joiners, hangers, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of 120 hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized

3.03 INSTALLATION

- A. Equipment identification
 - 1. Properly identify panelboards, remote control switches, push buttons, terminal boxes, etc. with a descriptive nameplate. Make nameplate with 3/32" laminated plastic with black background and white letters. Machine engraved letters 1/8" high for equipment in device box(es) and 1/4" high for panelboards, terminal cabinets or larger items. Punched strip type nameplates and cardholders in any form are not acceptable. Fasten nameplates with oval head machine screws, tapped into front cover/panel.

B. Working spaces

1. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders and CEC/NEC 110.26. In general provide 78" of headroom and 30" wide minimum clear workspace in front of panelboards and controls. In addition to the above, provide the following minimum working clearances:
 - a. 0V – 150V (line-to-ground) provide 36" minimum clear distance.
 - b. 151V – 600V (line-to-ground) provide 42" minimum clear distance.

C. Equipment supports

1. Anchor all electrical equipment to structure. Support systems shall be adequate to withstand seismic forces per CBC.

D. Excavating and backfilling

1. Excavate and backfill as required for installation of Work. Restore all surfaces, roadways, walks, curbs, walls existing underground installations, etc., cut by installations to original condition in an acceptable manner. Maintain all warning signs, barricades, flares and lanterns as required by ESO and local ordinances.
2. Dig trenches straight and true to line and grade, with bottom clear of any rock points. Support conduit for entire length on undisturbed original earth. Minimum conduit depth of pipe crown shall be 24" below finished or natural grade, unless otherwise noted.

E. Forming, cutting and patching

1. In new construction, General Contractor shall provide any special forming, recesses, chased, etc., and provide wood blocking, backing and grounds as necessary for the proper installation of electrical work. Be responsible for notifying General Contractor that such provision is necessary; layout work and check to see that it suits his requirements.
 - a. Provide metal backing plates, anchor plates and such that are required for anchorage of electrical work under Division 16; securely weld or bolt to metal framing. Wood blocking or backing will not be permitted in combination with metal framing.
2. Be responsible for proper placement of pipe sleeves, hangers, inserts and supports for this Work.

F. Concrete work

1. Provide concrete work related solely to electrical work. Concrete work, including forming and reinforcing steel installed for all electrical work, shall comply with all applicable requirements of Division 3, or in accordance with the State of California Standard Specifications issued by the Department of Transportation (CALTRANS).

3.04 REPAIR/RESTORATION

- A. Cutting, patching and repairing of existing construction to permit installation of work under Division 16 is the responsibility of Contractor. Repair or replace all damage to existing work in kind to Owner's satisfaction.
- B. Obtain Engineer's approval prior to performing any cutting or patching of concrete, masonry, wood or steel structure within building.

3.05 FIELD QUALITY CONTROL

- A. Inspection of work

1. Working parts shall be readily accessible for inspection, repair and renewal. The right is reserved to make reasonable changes in equipment location shown on Drawings prior to rough in without additional costs to the Owner.
 2. During construction all work will be subject to observation by the Engineer and his representatives. Assist in ascertaining any information that maybe required.
 3. Do not allow or cause any work installed hereunder to be covered up or enclosed before it has been inspected and approved. Should any work be enclosed or covered prior to approval, uncover work, and after it has been inspected and approved, restore work of all others to the condition in which it was found at the time of cutting, all without additional costs to Owner.
- B. Furnish all testing equipment as maybe required.
- C. Test all wiring and connections for continuity and grounds; where such tests indicate faulty insulation or other defects, locate, repair and re-test.
- D. Check rotation of all motors and correct if necessary.

3.06 CLEANING

- A. Repair or replace all broken, damaged or otherwise defective parts without additional cost to Owner, and leave entire work in a condition satisfactory to Engineer. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work; leave systems and equipment in satisfactory operating condition.
- B. Clean out and remove from the site all surplus materials and debris resulting from this work; this includes surplus excavated materials.

3.07 DEMONSTRATION

- A. At project completion, Contractor shall allot a period of not less than 8 hours for instruction of operating and maintenance personnel in the use of all systems installed under this Section. This time is in addition to any instruction time stated in the Specifications of other sections for other equipment (i.e., fire alarm, security, intercom, etc.). All personnel shall be instructed at one time, the Contractor shall make all necessary arrangements with manufacturer's representatives as may be required. Contractor, if any, for the above services shall pay all costs.

3.08 PROTECTION

- A. In performance of work, protect work of other trades as well as work under this Section from damage.
- B. Protect electrical equipment, stored and installed, from dust, water or other damage.

SECTION 16060 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 4 -GENERAL

4.01 SUMMARY

- A. Section includes
1. Provide all labor, materials and equipment necessary to complete the installation required for the item specified under this Section, including but not limited to power system grounding
- B. Related sections

1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
2. The requirements of this Section apply to all Section 16000 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

4.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 2. IEEE –Institute of Electrical and Electronic Engineers
 - a. 142; Recommend Practices for Grounding of Industrial and Commercial Power Systems
 3. NFPA –National Fire Protection Association
 - a. 780; Lightning Protection Code
 4. UL –Underwriters Laboratories, Inc.
 - a. 467; Grounding and Bonding Equipment

4.03 SYSTEM DESCRIPTION

- A. This Section provides for the grounding and bonding of all electrical and communication apparatus, machinery, appliances, components, fittings and accessories where required to provide a permanent, continuous, low impedance, grounded electrical system.
- B. Ground the electrical service system neutral at service entrance equipment as shown on the Drawings.
- C. Ground each separately derived system, as defined in CEC/NEC 250-5(d) and on the Drawings, unless specifically noted otherwise.
- D. Except as otherwise indicated, the complete electrical installation including the neutral conductor, equipment and metallic raceways, boxes and cabinets shall be completely and effectively grounded in accordance with all CEC/NEC requirements, whether or not such connections are specifically shown or specified.

4.04 SUBMITTALS

- A. See Section 5.27 - Submittals, for submittal procedures.
- B. Submit manufacturer's data for equipment and materials specified within this Section in accordance to Section 16050.

4.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

PART 5 — PRODUCTS

5.01 CONCRETE ENCASED GROUNDING ELECTRODE (UFER GROUND)

- A. #3/O AWG minimum bare stranded copper conductor.

5.02 DRIVEN (GROUND) RODS

- A. Copper clad steel, minimum 3/4" diameter by 10'-0" length, sectional type with copper alloy couplings and carbon steel driving stud; Weaver, Cadweld or equal.

5.03 INSULATED GROUNDING BUSHINGS

- A. Plated malleable iron body with 150°C molded plastic insulated throat and lay-in ground lug; OZ/Gedney BLG, Thomas & Betts #TIGB series or equal.

5.04 CONNECTION TO PIPE

- A. Cable to pipe connections; OZ/Gedney G-100B series, Thomas & Betts #290X series or equal.

5.05 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPICES

- A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds, Cadweld or equal, or high pressure compression type connectors, Cadweld, Thomas & Betts or equal.

5.06 BONDING JUMPERS

- A. OZ/Gedney Type BJ, Thomas & Betts #3840 series or equal.

5.07 GROUND CONDUCTOR

- A. Ground conductor shall be code size UL labeled, Type THWN insulated copper wire, green in color.

PART 6 — EXECUTION

6.01 INSTALLATION

- A. Grounding electrodes

1. Concrete encased grounding electrode (Ufer ground)

- a. Provide a #1/O AWG minimum bare copper conductor encased along the bottom of concrete foundation, footing or trench which is in direct contact with the earth and where there is no impervious waterproofing membrane between the footing and soil. The electrode shall extend through a horizontal length of 30' minimum and shall be encased in not less than 2" or more than 5" of concrete separating it from surrounding soil. The electrode shall emerge from the concrete slab through a protective non-metallic sleeve and shall be extended to BGB or as shown on Drawings.

2. Supplementary grounding electrode (ground ring, grid and driven rod)

- a. Provide as shown driven ground rod(s). Interconnect ground rod with structural steel and adjacent rods with code size bare copper conductor. Ground rods shall be space no less than 6'-0" on centers from any other electrode or electrodes of another electrical system.

3. Separately derived electrical system grounding electrode
 - a. Ground each separately derived system per CEC/NEC 250-26 or as shown on Drawings, whichever is greater.
 4. Metal underground water pipe
 - a. Contractor shall install an accessible grounding electrode conductor from the main incoming cold water line to BGB. The electrode conductor shall be sized per CEC/NEC Table 250-94 or as shown on Drawings, whichever is greater.
- B. Grounding electrode conductor
1. Provide grounding electrode conductors per CEC/NEC Table 250-94 or as shown on Drawings, whichever is greater.
- C. Power system grounding
1. Connect the following items using code size copper grounding conductors as shown on Drawings:
 - a. Concrete encased electrode (Ufer ground)
 - b. Ground rod(s)
 - c. Incoming cold and fire water pipes
 - d. Gas pipe
 - e. Structural steel
 - f. Distribution transformer secondary
- D. Equipment Bonding/ Grounding
1. Provide a code sized copper ground conductor, whether indicated or noted on the drawings, in each of the following:
 - a. All power distribution conduits and ducts
 - b. Distribution feeders
 - c. Motor and equipment branch circuits
 - d. Device branch circuits
 2. Provide a separate grounding bus at distribution panelboards, loadcenters, switchboards and motor control centers. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35V above ground.
 3. Metallic conduits terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
 4. Provide bonding jumpers across expansion and deflection coupling in conduit runs, pipe connections to water meters and metallic cold water dielectric couplings.
 5. Provide ground wire in flexible conduit connected at each end via grounding bushing.
 6. Provide bonding jumpers across all cable tray joints.
 7. Bond each end of metallic conduit longer than 36" in length to grounding conductor using a #6 AWG pigtail.

6.02 FIELD QUALITY CONTROL

- A. Contractor using test equipment expressly designed for that purpose shall perform all ground resistance tests in conformance with IEEE guidelines. Contractor shall submit typewritten records of measured resistance values to Engineer for review and approval prior to energizing the system.
- B. Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth. Furnish and install additional bonding and add grounding electrodes as required to comply with the following resistance limits:
 - 1. Resistance from ground bus to ground electrode and to earth shall not exceed 5 ohms unless otherwise noted.
 - 2. Resistance from the farthest panelboard, loadcenter, switchboard or motor control center ground bus to the ground electrode and to earth shall not exceed 20 ohms maximum.
- C. Inspection
 - 1. The Engineer or Inspector prior to encasement, burial or concealment thereto shall review the grounding electrode and connections.

END OF SECTION

SECTION 16120 – CONDUCTORS AND CABLES

PART 7 — GENERAL

7.01 SUMMARY

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary for the installation of all conductors and cables under this Section related to lighting, power, mechanical, control and signal systems.
- B. Related sections
 - 1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - 2. The requirements of this Section apply to all Section 16000 work, as applicable.
 - 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

7.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. ASTM -American Society for Testing and Materials
 - a. B3; Standard Specification for Soft or Annealed Copper Wire
 - b. B8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

- c. B787/B787M; Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation
- d. D1000; Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
- 2. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
- 3. UL -Underwriters Laboratories, Inc.
 - a. UL 83; Thermoplastic-Insulated Wire and Cables
 - b. UL 486A 486B; Wire Connectors
 - c. UL 486C; Splicing Wire Connectors
 - d. UL 486D; Standard for Insulated Wire Connector Systems For Underground Use Or In Damp Or Wet Locations
 - e. UL 486E; Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
 - f. UL 493; Thermoplastic-Insulated Underground Feeders and Branch Circuit Cables
 - g. UL 510; Standard for Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
 - h. UL 854; Service-Entrance Cables
- 4. NEMA –National Electrical Manufacturer’s Association
 - a. WC 70-1999; Nonshielded Power Cables Rated 2000 Volts or less for the Distribution of Electrical Energy
- 5. IEEE –Institute of Electrical and Electronic Engineers
 - a. 82; Standard Test Procedure for Impulse Voltage Tests on Insulated Conductors

7.03 DELIVERY

- A. Wire shall be in original unbroken package. Obtain approval of Inspector or Engineer before installation of wires.

PART 8 — PRODUCTS

8.01 BUILDING WIRE

- A. Conductor material
 - 1. Provide annealed copper for all wire, conductor and cable of not less than 98% conductivity.
 - 2. Wire #8 AWG and larger shall be stranded.
 - 3. Wire #10 AWG and smaller shall be solid.
- B. Insulation material
 - 1. All insulated wire, conductor and cable shall be 600 Vac rated.
 - 2. Feeder and branch circuits larger than #6 AWG shall be type THW, XHHW or THHN/THWN.

3. Feeder and branch circuits #6 AWG and smaller shall be type TW, THW, XHHW or THHN/THWN.
4. Control circuits shall be type THW or THHN/THWN.
5. Wires shall bear the UL label, be color-coded and marked with gauge, type and manufacturer's name on 24" centers.

8.02 FLEXIBLE CORDS AND CABLES

- A. Provide flexible cords and cables of size, type and arrangement as indicated on Drawings.
- B. Type S flexible cords and cable shall be manufactured in accordance with NEC Article 400 and composed of two or more conductors and a full sized green insulated grounding conductor with an outer rubber or neoprene jacket.
- C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as a integral connector component or an independently supported unit.
- D. Suspended flexible cords and cables shall incorporate safety spring(s).

8.03 WIRE CONNECTIONS AND TERMINATIONS

- A. Electrical spring wire connectors
 1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-sectional steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.
 2. Self-striping pigtail and tap U-contact connectors are not acceptable.
- B. Compression type terminating lugs
 1. Provide tin-plated copper high compression type lugs for installation with hand or hydraulic crimping tools as directed by manufacturer. Notch or single point type crimps are not acceptable.
 2. Two hole, long barrel lugs shall be provided for size #4/O AWG and larger wire where terminated to bus bars. Use minimum of three crimps per lug where possible.
- C. Splicing and insulating tape
 1. Provide black, UV resistant, self extinguishing, 7 mil thick vinyl general purpose electrical tape per UL 510 and ASTM D1000. 3M Scotch 33 or equal.
- D. Insulating putty
 1. Provide pads or rolls of non-corrosive, self-fusing, 125 mil thick rubber putty with PVC backing sheet per UL 510 and ASTM D1000. 3M Scotchfil or equal.
- E. Insulating resin
 1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. 3M Scotchcast 4 or equal.
 2. Use resin with thermal and dielectric properties equal to the cable's insulating properties.
- F. Terminal strips
 1. Provide box type terminal strips in the required quantities plus 25% spare. Install in continuous rows.

2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.
 3. Identify all terminals strips and circuits.
- G. Crimp type connectors
1. Provide insulated fork or ring crimp terminals with tinned electrolytic copper-brazed barrel with funnel wire entry and insulation support.
 2. Fasten crimp type connectors or terminals using a crimping tool recommended by the manufacturer.
 3. Provide insulated overlap splices with tinned seamless electrolytic copper-brazed barrel with funnel wire entry and insulation support.
 4. Provide insulated butt splices with tinned seamless electrolytic copper-brazed barrel with center stop, funnel wire entry and insulation support.
- H. Cable ties
1. Provide harnessing and point-to-point wire bundling with nylon cable ties. Install using tool supplied by manufacturer as required.
- I. Wire lubricating compound
1. UL listed for the wire insulation and conduit type, and shall not harden or become adhesive.
 2. Shall not be used on wire for isolated type electrical power systems.
- J. Bolt termination hardware
1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE Grade 5; or silicon bronze alloy ASTM B-9954 Type B.
 2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.
 3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, conforming to ANSI B27.2. SAE or narrow series shall be used.
 4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.
 5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:
 - a. 1/4" bolt – 125 A
 - b. 5/16" bolt – 175 A
 - c. 3/8" bolt – 225 A
 - d. 1/2" bolt – 300 A
 - e. 5/8" bolt – 375 A
 - f. 3/4" bolt – 450 A

PART 9 — EXECUTION

9.01 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

9.02 INSTALLATION

- A. All wire, conductor, and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient conditions.
- B. Feeders and branch circuits in wet locations shall be rated 75°C minimum.
- C. Feeders and branch circuits in dry locations shall be rated 90°C minimum.
- D. Minimum conductor size
 - 1. #12 AWG copper for all power and lighting branch circuits.
 - 2. #14 AWG copper for all line voltage signal and control wiring, unless otherwise indicated.
 - 3. Aluminum conductors may be substituted on the basis of equal performance for sizes greater than #10 AWG with the approval of Engineer.
- E. Remove and replace conductors under the following conditions at no additional costs to the Owner:
 - 1. Installed within wrong specified conduit or raceway.
 - 2. Damaged during installation.
 - 3. Of insufficient length to facilitate proper splice of conductors

9.03 WIRING METHODS

- A. Install wires and cable in accordance with manufacturer's written instructions, as shown on Drawings and as specified herein.
- B. Install all single conductors within raceway system, unless otherwise indicated.
- C. Parallel circuit conductors and terminations shall be equal in length and identical in all aspects.
- D. Provide adequate length of conductors within electrical enclosures and neatly train to termination points with no excess. Terminate such that there is no bare conductor at the terminal.
- E. Splice cables and wires only in junction boxes, outlet boxes, pull boxes, manholes or handholes.
- F. Group and bundle with tie wrap each neutral with it's associated phase conductors where more than one neutral conductor is present within a conduit.
- G. Install cable supports for all vertical feeders in accordance with NEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.
- H. Seal cable where exiting a conduit from an exterior underground raceway with a non-hardening compound (i.e., duct seal or equal).
- I. Provide UL listed factory fabricated, solder-less metal connectors of size, ampacity rating, material, type and class for applications and for services indicated. Use connectors with temperature ratings equal or greater than the conductor or cable being terminated.
- J. Stranded wire shall be terminated using fittings, lugs or devices listed for the application. Under no circumstances shall stranded wire be terminated solely by wrapping it around a screw or bolt.

- K. Flexible cords and cables supplied as part of a pre-manufactured assembly shall be installed according to manufacturer's published instructions.

9.04 WIRING INSTALLATION IN RACEWAYS

- A. Install wire in raceway after interior of building has been physically protected from weather, and all mechanical work likely to injure conductors has been completed.
- B. Pull all conductors into raceway at the same time.
- C. Use UL listed, non-petroleum base and insulating type pulling compound as needed.
- D. Completely mandrel all underground or concrete encased conduits prior to installation.
- E. Completely and thoroughly swab raceway system prior to installation
- F. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors smaller than #1 AWG.
- G. Wire pulling
 - 1. Provide installation equipment that will prevent cutting or abrasion of insulation during installation.
 - 2. Maximum pull tension shall not exceed manufacturer's recommended value during installation for cable being measured with tension dynamometer.
 - 3. Use rope made of non-metallic material for pulling.
 - 4. Attach pulling lines by means of either woven basket grips or pulling eyes attached directly to the conductors.
 - 5. Pull multiple conductors simultaneously within same conduit.

9.05 WIRE SPLICES, JOINTS AND TERMINATIONS

- A. Join and terminate wire, conductors and cables in accordance with UL 486, NEC and manufacturer's instructions.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Make splices, taps and terminations to carry full conductor ampacity without perceptible temperature rise, and shall be made mechanically and electrically secure.
- D. Terminate wires in terminal cabinets using terminal strips, unless otherwise indicated.
- E. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere within panel or cabinet.
- F. Encapsulate splices in wet locations using specified insulating resin kits.
- G. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as feed conductor with at least 6 inches of tail, all neatly packed within box.
- H. Where conductors are to be connected to metallic surfaces, coated surfaces shall be cleaned to base metal surface before installing connector. Remove lacquer coating of conduits where ground clamps are to be installed.
- I. Branch circuits (#10 AWG and smaller) connectors shall comply with 2.01.D.2 and 2.01.D.2 above.

J. Branch circuits (#8 AWG and larger)

1. Join or tap conductors using insulated mechanical compression taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over-wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of joint.
2. Terminate conductors using mechanical compression lugs in accordance with manufacturer's recommendation or as specified elsewhere.
3. Field installed compression connectors for 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.
4. Insulate splices and joints with materials approved for the particular use, location, voltage and temperature.

K. Termination hardware assemblies

1. Al/Cu lugs connected to aluminum plated or copper bus shall be secured with steel bolt, flat washer (two per bolt), Belleville washer and nut.
2. Copper lugs connected to copper buss shall bus shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.
3. The crown of Belleville washers shall be under the nut.
4. Bolt assemblies shall be torque to manufacturer's recommendations. Where manufacturer recommendation is not obtainable, the following shall be used:
 - a. 1/4" -20 bolt at 80 inch-pound torque
 - b. 5/16" -18 bolt at 180 inch-pound torque
 - c. 3/8" -20 bolt at 20 inch-pound torque
 - d. 1/2" -20 bolt at 40 inch-pound torque
 - e. 5/8" -20 bolt at 55 inch-pound torque
 - f. 3/4" -20 bolt at 158 inch-pound torque

9.06 IDENTIFICATION

- A. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.
- B. Provide all terminal strips with each individual terminal identified using specified vinyl markers.
- C. In manholes, pullboxes and handholes provide tags of embossed brass type with cable type and voltage rating. Attach tags to cable with slip-free plastic cable lacing units.
- D. Color coding
 1. For 120/208 Volt (or 120/240 Volt), 1 phase, 3 wire systems:
 - a. Phase A – Black
 - b. Phase B – Red
 - c. Neutral – White
 - d. Ground – Green
 2. For 120/208 Volt, 3 phase, 4 wire systems:

- a. Phase A – Black
 - b. Phase B – Red
 - c. Phase C – Blue
 - d. Neutral – White
 - e. Ground – Green
3. For 277/480 Volt, 3 phase, 4 wire systems:
- a. Phase A – Brown
 - b. Phase B – Orange
 - c. Phase C – Yellow
 - d. Neutral – Gray
 - e. Ground – Green
4. Switch leg individually installed shall be the same color as the branch circuit to which they originate, unless otherwise indicated.
5. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

9.07 FIELD QUALITY CONTROL

- A. Supply labor, materials and test equipment required to perform continuity and ground tests.
- B. Electrical testing
 - 1. Perform feeder and branch circuit insulation test after installation and prior to connection to device.
 - 2. Tests shall be performed by 600 Vdc megger for a continuous 10 seconds from phase-to-phase and phase-to-ground.
 - 3. Torque test conductor connections and terminations for conformance to Specifications.
 - 4. If any failure is detected, locate failure, determine cause and replace or repair cable to Engineer's satisfaction at no additional costs.
 - 5. Furnish test results in type written report form for review by Engineer.

END OF SECTION

– GENERAL SECTION 16130 –RACEWAYS AND BOXES

PART 10 -

10.01 SUMMARY

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to electrical conduits; outlet, junction and pull boxes; and related supports.
- B. Related sections

1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 16060 – Grounding and Bonding for Electrical Systems
2. The requirements of this Section apply to all Section 16000 work, as applicable.
3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

10.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 1. ANSI –American National Standards Institute
 - a. C33.91; Specification for Rigid PVC Conduit
 - b. C80.1; Specification Rigid Steel Conduit, Zinc-Coated
 - c. C80.3; Specification for Electrical Metallic Tubing, Zinc-Coated
 - d. C80.6; Intermediate Metal Conduit (IMC), Zinc-Coated
 2. CCR –California Code of Regulations, Title 24
 - a. Part 2 -California Building Code (CBC); International Building Code (IBC) with California amendments
 - b. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 3. NECA –National Electrical Contractors Association
 - a. 101, Standard for Installing Steel Conduit (Rigid, IMC, EMT)
 - b. 111, Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) (ANSI)
 4. NEMA –National Electrical Manufacturer’s Association
 - a. FB 1; Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
 - b. FB 2.10; Selection and Installation Guidelines for Fittings for Use with Non-flexible Electrical Metal Conduit or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing)
 - c. FB 2.20; Selection and Installation Guidelines For Fittings for Use With Flexible Electrical Conduit and Cable
 - d. OS 1; Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
 - e. OS 3; Selection and Installation Guidelines for Electrical Outlet Boxes
 - f. RN 1; Polyvinyl-Chloride Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
 - g. TC 2; Electrical Plastic Tubing and Conduit
 - h. TC 3; PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - i. TC 14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

5. OSHPD Anchorage Pre-approvals
 - a. OPA-0003; Superstrut Seismic Restraint System
 - b. OPA-0114; B-Line Seismic Restraints
 - c. OPA-0120; Unistrut Seismic Bracing System
 - d. OPA-0242; Power-Strut Seismic Bracing System
6. UL –Underwriter’s Laboratories, Inc.
 - a. 1; Standard for Flexible Metal Conduit
 - b. 6; Rigid Metal Electrical Conduit
 - c. 360; Standard for Liquid-Tight Flexible Steel Conduit
 - d. 514A; Metallic Outlet Boxes, Electrical
 - e. 514B; Fittings for Conduit and Outlet Boxes
 - f. 651; Schedule 40 & 80 PVC Conduit
 - g. 797; Electrical Metallic Tubing
 - h. 1242; Intermediate Metal Conduit
 - i. 1684; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

10.03 SYSTEM DESCRIPTION

- A. Furnish, assemble, erect, install, connect and test all electrical conduits and related raceway apparatus required and specified to form a complete installation.

10.04 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 5.27 - Submittals.

10.05 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. Installation shall conform to the NECA installation guidelines unless otherwise indicated within this Section

PART 11 — PRODUCTS

11.01 MATERIALS

- A. Conduits and Fittings
 1. Rigid steel conduit (RMC)
 - a. Conduit: Standard weight, mild steel pipe, and zinc coated on both inside and outside by a hot dipping or sheardizing process manufactured in accordance with UL 6 and ANSI C80.1 specifications.
 - b. Fittings (couplings, elbows, bends, etc.)
 - 1) Shall be steel or malleable iron.

- 2) Coupling and unions shall be threaded type, assembled with anti-corrosion, conductive and anti-seize compound at joints made absolutely tight to exclude water.
- c. Bushings
 - 1) Insulating bushings: Threaded polypropylene or thermosetting phenolic rated at 150°C minimum.
 - 2) Insulating grounding bushing: Threaded cast body with insulating throat and steel “lay-in” ground lug.
 - 3) Insulating metallic bushing: Threaded cast body with plastic insulated throat rated at 150°C minimum.
2. Coated rigid steel conduit (CRMC)
 - a. Conduit: Equivalent to RMC with a Polyvinyl chloride (PVC) coated bonded to the galvanized outer surface of the conduit. The bonding between the PVC coating and conduit surface shall be ETL PVC-001 compliant. The coating thickness shall be a minimum of 40mil.
 - b. Fittings (couplings, elbows, bends, etc.)
 - 1) Equivalent to RMC above with bonded coating same as conduit.
 - 2) The PVC sleeve over fittings shall extend beyond hub or coupling approximately one diameter or 1 1/2” whichever is smaller.
 - c. Bushing equivalent to RMC above.
3. Intermediate metallic conduit(IMC)
 - a. Conduit: Intermediate weight, mild steel pipe, meeting the same requirements for finish and material as rigid steel conduit manufactured in accordance with UL 1242 and ANSI C80.6 specifications.
 - b. Fittings (couplings, elbows, bends, etc.) equivalent to RMC above.
 - c. Bushing equivalent to RMC above.
4. Electrical metallic tubing (EMT)
 - a. Conduit: Cold rolled steel tubing with zinc coating on outside and protective enamel on inside manufactured in accordance with UL 797 and ANSI C80.3 specifications.
 - b. Couplings: Steel or malleable iron with compression type fastener via a nut.
 - c. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
5. Rigid non-metallic conduit (PVC)
 - a. Conduit: PVC composed Schedule 40, 90°C manufactured in accordance with NEMA TC 2 and UL 651 specifications.
 - b. Fittings: Molded PVC, slip on solvent welded type in accordance to NEMA TC 3.
6. Flexible metallic conduit (FMC)
 - a. Conduit: Continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 1.

- b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
- 7. Liquidtight flexible metallic conduit (LFMC)
 - a. Conduit: PVC coated, continuous, flexible steel spirally wound with zinc coating on both inside and outside in accordance with UL 360.
 - b. Connectors: Steel or malleable iron with compression type fastener via a nut with plastic insulated throat rated at 150°C minimum.
- 8. Miscellaneous Fittings and Products
 - a. Conduit sealing bushings: Steel or cast malleable iron body and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Supplied with neoprene sealing rings between body and PVC sleeve.
 - b. Watertight cable terminators: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel screws and zinc plated cast iron locking collar.
 - c. Watertight cable/cord connectors: Liquidtight steel or cast malleable iron body with sealing neoprene bushing and stainless steel retaining ring.
 - d. Expansion fittings: Multi-piece unit of hot dip galvanized malleable iron or steel body and outside pressure bussing design to allow a maximum of 4" movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. UL listed for both wet and dry locations.
 - e. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve, internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling to provide minimum of 3/4" movement and 30 degrees deflection from normal. UL listed for both wet and dry locations.
 - f. Conduit bodies: Raintight, malleable iron, hot-dip galvanized body with threaded hubs, stamped steel cover, stainless steel screws and neoprene gasket.
 - g. Other couplings, connectors and fittings shall be equal in quality, material and construction to items specified herein.
- B. Boxes
 - 1. Outlet boxes
 - a. Standard: Galvanized one-piece of welded pressed steel type in accordance with NEMA OS 1 and UL 514. Boxes shall not be less than 4" square and at least 1 1/2" deep.
 - b. Concrete: Galvanized steel, 4" octagon ring with mounting lug, backplate and adapter ring type in accordance with NEMA OS 1 and UL 514. Depth as required by application.
 - c. Masonry: Galvanized steel, 3.75" high gang box in accordance with NEMA OS 1 and UL 514.
 - d. Surface cast metal: Cast malleable iron body, surface mounted box with threaded hubs and mounting lugs as required in accordance with NEMA OS 1 and UL 514. Furnish with ground flange, steel cover and neoprene gasket.
 - 2. Pull and junction boxes
 - a. Sheet metal boxes: Standard or concrete outlet box wherever possible; otherwise use 16 gauge galvanized sheet metal, NEMA 1 box sized per CEC with machine screwed cover.

- b. Cast metal boxes: Install standard cast malleable iron outlet or device box when possible.
- c. Flush mounted boxes: Install overlapping cover with flush head screws.
- d. In-ground mounted pull holes/boxes: Install pre-cast concrete box, sized per Drawing or CEC with pre-cast or traffic rated lid.

C. Pull line/cord

- 1. Polypropylene braided line or Let-line #232 or equal of 1/8" diameter with a minimum break strength of 200 pounds.

PART 12 — EXECUTION

12.01 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of wire and cable installation to verify conformance with manufacturer and specification tolerances. Do not commence with work until all conditions are made satisfactory.

12.02 PREPARATION

A. Conduit

- 1. Provide all necessary conduit fittings, connectors, bushings, etc. required to complete conduit installation to meet the CEC/NEC and intended application whether noted, shown or specified within.
- 2. Location of conduit runs shall be planned in advance of the installation and coordinated with other trades.
- 3. Where practical, install conduits in groups in parallel vertical or horizontal runs that avoid unnecessary offsets.
- 4. All conduits shall be parallel or at right angles to columns, beams and walls whether exposed or concealed.
- 5. Install exposed conduit as high as practical to maintain adequate headroom. Notify Engineer if headroom will be less than 102".
- 6. Do not obstruct spaces required by Code in front of electrical equipment, access doors, etc.
- 7. The largest trade size conduit in concrete floors and walls shall not exceed 1/3 thickness or be spaced a less than three conduit diameters apart unless permitted by Engineer. All conduits shall be installed in the center of slab or wall, and never between reinforcing steel and bottom of floor slab.
- 8. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
- 9. When installing underground conduits to specified depth; depth shall be taken from finished grade as it will be at project completion. Should finish grade be above existing grade by an amount equal to or greater than specified depth, conduit shall be installed not less than 6" below existing grade.
- 10. Verify that information concerning finish grade is accurate, for should the underground run be less than the specified depth, Contractor may be required to re-install conduit to meet the required depth.

11. Unless otherwise specified, underground conduits shall be installed with top side not less than 24" below finished grade; this depth applies to all conduits outside of building foundations including those under walks, open corridors or paved areas.
12. Utility company service conduits installation depth shall be as directed by their respective specifications and requirements.

B. Boxes

1. Before locating outlet boxes, check Construction Documents for type of construction and make sure that there is no conflict with other equipment. Locate outlet boxes as shown and locate so as not to interfere with other Work or equipment.
2. Install all outlet boxes flush within walls, ceiling and floors except where installed within non-finished rooms, cabinetry, attic spaces or as indicated on Drawings.
3. Locate pull boxes and junction boxes within concealed, accessible locations where possible.
4. Adjust position of outlet boxes within masonry wall to accommodate course lines.

12.03 INSTALLATION

A. Conduit

1. Minimum conduit size shall be 3/4" unless otherwise indicated.
2. All conduit work shall be concealed unless otherwise indicated. Exposed conduits shall be permitted within unfinished rooms/spaces to facilitate installation.
3. Install conduit in complete runs prior to installing conductors or cables.
4. Make long radius conduits bends free from kink, indentations or flattened surfaces. Make bends carefully to avoid injury or flattening. Bends 1 1/4" size and larger shall be factory made ells, or be made with a manufactured mechanical bender. Heating of steel conduit to facilitate bending or that damage galvanized coating will not be permitted.
5. Remove burrs and sharp edges at end of conduit with tapered reamer.
6. Protect and cover conduits during construction with metallic bushings and bushing "pennies" to seal exposed openings.
7. Assemble conduit threads with anti-corrosion, conductive, anti-seize compound and tighten securely.
8. Install conduits shall that no traps to collect condensation exist.
9. Fasten conduit securely to boxes with locknuts and bushings to provide good grounding continuity.
10. Install pull cords/line within any spare or unused conduits of sufficient length to facilitate future cable installation.
11. Penetrations
 - a. Locate penetrations within structural members as shown on Drawings and as directed by Architect or Engineer. Should it be necessary to notch any framing member, make such notching only at locations and in a manner as approved by Engineer.
 - b. Do not chase concrete or masonry to install conduit unless specifically approved by Engineer.
 - c. Cutting or holes

- 1) Install sleeves for cast-in-place concrete floors and walls. After installing conduit through penetration, seal using dry-pack grouting compound (non-iron bearing, chloride free and non-shrinking) or fire rated assembly if rated floor or wall. Use escutcheon plate on floor underside to contain compound as necessary.
 - 2) Cut holes with a hole saw for penetrations through non-concrete or non-masonry members.
 - 3) Provide chrome plated escutcheon plates at all publicly exposed wall, ceiling and floor penetrations.
- d. Sealing
- 1) Non-rated penetration openings shall be packed with non-flammable insulating material and sealed with gypsum wallboard taping compound.
 - 2) Fire rated penetration shall be sealed using a UL classified fire stop assembly suitable to maintain the equivalent fire rating prior to the penetration.
 - 3) Use escutcheon plates to hold sealing or fire rated compound as necessary.
- e. Waterproofing
- 1) Make penetrations through any damp-proofed/waterproofed surfaces within damp/wet locations as such as to maintain integrity of surface.
 - 2) Install specified watertight conduit entrance seals at all below grade wall and floor penetrations.
 - 3) At roof penetrations furnish roof flashing, counter flashing and pitch-pockets compatible to roof assembly.
 - 4) Where possible conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration's exterior side.
 - 5) Make penetrations through floors watertight with mastic, even when concealed within walls or furred spaces.

12. Supports

- a. Conduits shall be support and braced per OSHPD pre-approved anchorage systems when those methods are implemented and installed.
- b. Sizes of rods and cross channels shall be capable of supporting 4 times and 5 times actual load, respectively. Anchorage shall support the combined weight of conduit, hanger and conductors.
- c. Support individual horizontal conduit 1 1/2" and smaller by means of 2 hole straps or individual hangers.
- d. Galvanized iron hanger rods sizes 1/4" diameter and larger with spring steel fasteners, clips or clamps specifically design for that purpose for 1 1/2" conduits and larger.
- e. Support multi-parallel horizontal conduits runs with trapeze type hangers consisting of 2 or more steel hanger rods, preformed cross channels, 'J' bolts, clamps, etc.
- f. Support conduit to wood structures by means of bolts or lag screws in shear, to concrete by means of insert or expansion bolts and to brickwork by means of expansion bolts.

- g. Support multi-parallel vertical conduits runs with galvanized Unistrut, Power-Strut or approved equal type supports anchored to wall. Where multi-floored conduits pass through floors, install riser clamps at each floor.
- h. Maximum conduit support spacing shall be in accordance with NECA Standard of Installation:
 - 1) Horizontal runs:
 - a) 3/4" and smaller at 60" on centers, unless building construction prohibits otherwise, then 84" on centers.
 - b) 1" and larger at 72" on centers, unless building construction prohibits otherwise or any other condition, then 120" on centers.
 - 2) Vertical runs:
 - a) 3/4" and smaller @ 84" on centers.
 - b) 1" and 1 1/4" @ 96" on centers.
 - c) 1 1/2" and larger @ 120" on centers.
 - d) Any vertical condition such as shaftways and concealed locations for any sized conduit, 120" on centers.
- i. Anchorage for RMC/IMC supports unless otherwise specified:
 - 1) < 1" IMC/RMC = #10 bolt/screw.
 - 2) 1" IMC/RMC = 1/4" bolt/screw.
 - 3) 1 1/2" and 2" IMC/RMC = 3/8" bolt/screw.
 - 4) 3" IMC/RMC, 4" EMT = 1/2" bolt/screw.
 - 5) > 3"IMC/RMC = 5/8" bolt/screw.
- j. Anchorage for EMT supports unless otherwise specified:
 - 1) < 1 1/2" EMT = #10 bolt/screw.
 - 2) 1 1/2" EMT = 1/4" bolt/screw.
 - 3) 2, 2 1/2" and 3" EMT = 3/8" bolt/screw.
 - 4) 4" EMT = 1/2" bolt/screw.
 - 5) > 4"EMT = 5/8" bolt/screw.

B. Boxes

1. Install boxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.
2. Install additional pull boxes, not shown on Drawings, in sufficient quantities to facilitate pulling of conductors and cables such that total spacing does not exceed 150 feet or 270 degrees, total; and maximum pulling tension will not be exceeded.
3. Install plaster rings on all outlet boxes in stud walls or in furred, suspended or exposed ceilings. Covers shall be of a depth suited for installation.
4. Provide gasketed cast metal cover plates where boxes are exposed in damp or wet locations
5. Install access door for boxes installed within concealed locations without access.

6. Install approved factory made knockout seal where knockouts are not present.
7. Refer to Architectural interior elevations and details shown for exact mounting heights of all electrical outlets. In general, locate outlets as shown or specific and complies with Americans with Disabilities Act:
 - a. Convenience outlets: +18”AFF or +6” above counter or splash.
 - b. Local switches: +48”AFF or +6” above counter or splash.
 - c. Telecommunication outlets: +18”AFF or +48”AFF for wall telephone or intercom device.
 - d. Verify all mounting heights with Architectural Drawings, and where heights are not suited for construction or finish please consult Engineer or Architect.
8. Use conduit bodies to facilitate pulling of conductor or cables or change conduit direction. Do not splice within conduit bodies.
9. Enclose pull box with additional rated gypsum board as necessary to maintain wall’s original fire rating.
10. Install galvanized steel coverplates on all open boxes within dry listed areas.
11. Install in-ground pull holes/boxes flush to grade finish at finished areas or 1” above finished landscaped grade. Seal all conduits terminating in pull hole/box watertight. Install and grout around bell ends where shown. Cover and lids shall be removable without damage to adjacent finish surfaces.
12. Support
 - a. Accurately place boxes for finish, independently and securely supported by adequate blocking or manufacturer channel type heavy-duty box hangers for stud walls. Do not use nails to support boxes.
 - b. Support boxes independent of conduit system.
 - c. Mount boxes installed within ceilings to 16 gauge metal channel bars attached to main runners or joists.
 - d. Support boxes within suspended acoustical tile ceilings directly from structure above when light fixture are to be installed from box.
 - e. Use auxiliary plates, bar or clips and grouted in place for masonry, block or pour-in-place concrete construction.

12.04 APPLICATION

A. Conduit

1. RMC/IMC suitable for all damp, dry and wet locations except when in contact with earth. IMC not suitable for hazardous locations as stated within CEC/NEC.
2. CRMC suitable for damp or wet locations, concealed within concrete or in contact with earth.
3. EMT suitable for exposed or concealed dry, interior locations.
4. PVC suitable for beneath ground floor slab, except when penetrating, and direct earth burial. Do not run exposed within concrete walls or in floor slab unless indicated on Drawings or per Engineer’s permission.

5. FMC suitable for dry locations only for connections to motors, transformers, vibrating equipment/machinery, controllers, valves, switches and light fixtures in less than 6 foot lengths.
 6. LFMC application same as FMC above but for damp or wet locations.
- B. Termination and joints
1. Use raceway fittings compatible with associated raceway and suitable for the location.
 2. Raceways shall be joined using specified couplings or transitions where dissimilar raceway systems are joined.
 3. Conduits shall be securely fastened to cabinets, boxes and gutters using (2) two locknuts and insulating bushing or specified insulated connector. Where joints cannot be made tight and terminations are subject to vibration, use bonding jumpers, bonding bushings or wedges to provide electrical continuity of the raceway system. Use insulating bushings to protect conductors where subjected to vibration or dampness. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.
 4. Terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
 5. Stub freestanding equipment conduits through concrete floors for connections with top of coupling set flush with finished floor. Install plugs to protect threads and entrance of debris.
 6. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating within interior switchboard, panel, cabinet or gutters. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.
 7. Where conduits enter building from below grade inject into filled raceways pre-formulated rigid 2 lbs. density polyurethane foam suitable for sealing against water, moisture, insects and rodents.
 8. Install expansion fitting or expansion/deflection couplings per manufacturer's recommendations where:
 - a. Any conduit that crosses a building structure expansion joint; secure conduit on both sides to building structure and install expansion fitting at joint.
 - b. Any conduit that crosses a concrete expansion joint; install expansion/deflection at joint.
 - c. Any conduit greater than 1-1/4" is routed along roof top in runs greater than 100 feet; install expansion fittings every 100 feet.
 - d. Engineer may allow FMC or LFMC in lieu of expansion fitting or expansion/deflection couplings on conduits 2" and smaller within accessible locations upon further review and written consent.
- C. Boxes
1. Standard type suitable for all flush installations and all dry concealed locations.
 2. Concrete type suitable for all flush concrete installations.
 3. Masonry type suitable for all flush concrete and block installations.
 4. Surface cast metal type suitable for all exposed damp and wet surface mounted locations, and dry surface mounted locations less than 96" from finished floor

SECTION 16140– WIRING DEVICES

PART 13 — GENERAL

13.01 SUMMARY

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to wiring devices.
- B. Related sections
 - 1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - a. 16060 – Grounding and Bonding for Electrical Systems
 - 2. The requirements of this Section apply to all Section 16000 work, as applicable.
 - 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

13.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. Federal Specification
 - a. W-C-596; Connector, Electrical, Power, General Specification for
 - b. W-S-896; Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification)
 - 2. NEMA –National Electrical Manufacturer’s Association
 - a. WD 1; General Color Requirements for Wiring Devices
 - b. WD 6; Wiring Devices-Dimensional Requirements
 - 3. UL -Underwriters Laboratories, Inc.
 - a. 20; General-Use Snap Switches
 - b. 498; Standard for Attachment Plugs and Receptacles
 - c. 943; Standard for Ground-Fault Circuit-Interruptioners
 - d. 1449; Standard for Transient Voltage Surge Suppressors

13.03 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 5.27 - Submittals.

13.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.

PART 14 — PRODUCTS

14.01 SWITCHES

A. Wall switches

1. Specification grade, quiet, AC rated, mechanical, snap type with silver alloy contacts, and shall comply with NEMA WD-1 and Fed. Spec W-S-896.
2. Rating shall be 20A at 120/277Vac, unless otherwise shown.
3. Handles shall be nylon; color shall be compatible with adjacent wall finish.
4. Manufacturers and types
 - a. Single pole, single throw
 - 1) Cooper Wiring Devices #CSB120, Hubbell #CSB120, or equal.
 - b. Double pole, single throw
 - 1) Cooper Wiring Devices #CSB220, Hubbell #CSB220, or equal.
 - c. Three way
 - 1) Cooper Wiring Devices #CSB320, Hubbell #CSB320, or equal.

B. Wall dimmer switches

1. Linear slide type dimmer with smooth and continuous square law dimming curve that complies with UL 20 and is UL listed for the specified load.
2. Dimmers shall have power failure memory to bring lights back on at same level prior to power interruption.
3. Dimmers shall incorporate air-gap switch accessible with wall plate installed.
4. Furnish dimmer switch of rating to connected loads; de-rate as required by manufacturer's information for ganged installations.
5. Coverplate shall be snap-on type with no visible attachments or fins. Color shall be compatible with adjacent wall finish.
6. Manufacturer and type
 - a. Lutron Nova series or approved equal.

14.02 RECEPTACLES

A. Standards

1. Specification grade, NEMA 5-15R configuration grounding type, rated 15A at 125/250Vac that conform to NEMA WD-6 and Fed. Spec W-C-596.
2. At dedicated receptacle locations and as otherwise noted, use specification grade, NEMA 5-20R configuration grounding type, rated 20A at 125/250Vac that conform to NEMA WD-6 and when possible Fed. Spec W-C-596.
3. Specialty receptacles shall conform to NEMA WD-6 and UL standards as applicable.

B. Color

1. General purpose receptacle face shall be nylon; color shall be compatible with adjacent wall finish, unless otherwise indicated.

C. Receptacle types

1. General purpose duplex
 - a. Provide self-grounding back and side wired with binding head staked terminal screws and break-off strip for two circuit wiring.
 - b. Use Cooper Wiring Devices #5262, Hubbell #5262, or equal for NEMA 5-15R.
 - c. Use Cooper Wiring Devices #5362, Hubbell #5362, or equal for NEMA 5-20R.
2. Ground fault circuit interrupter (GFCI) duplex
 - a. Provide 20A, 125Vac receptacle consisting of NEMA 5-20R duplex device with integral solid state sensing and signaling circuitry capable of detecting and interrupting a maximum 5mA line-to-ground fault current in approximately 1/40th of a second per UL 943.
 - b. Provide visual device with trip indication, manual reset and test mechanisms per UL 943.
 - c. Device shall be capable of point of use and multi-outlet protection.
 - d. Use Cooper Wiring Devices #XGF20, Hubbell #GF53, or equal.

14.03 WALL PLATES

A. Interior locations

1. Finished Areas: 0.032" stainless steel, brushed or satin finish with required number of openings for location.
2. Exposed Areas: galvanized, raised type.

B. Exterior: die-cast copper-free aluminum, gasketed, raintight cover UL listed for exterior and wet locations while in use. Use Hubbell #WP8M (duplex), #WP26M (GFCI) or equal.

C. Screws shall match plate.

D. Tamper resistance receptacles shall have exposed screws of temper resistant type.

E. Individual, gangable wall plates are not acceptable where two or more devices are installed at one location.

PART 15 — EXECUTION

15.01 PREPARATION

A. Coordinate device heights with architectural drawings and details.

B. Locate switches on latch side of door, unless otherwise indicated.

15.02 INSTALLATION

A. Mount and align device and wall plates level and plumb. Insure wall plates fit flat against wall and tight against device without strain on plate.

B. Comply with manufacturer's instructions regarding termination of conductors to wiring device.

C. Provide wall plates for all outlet boxes with devices.

D. Install blank wall plates on all outlet boxes in which no device is present or installed.

SECTION 16490 – OVERCURRENT PROTECTION DEVICES

PART 16 — GENERAL

16.01 SUMMARY

- A. Section includes
 - 1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to overcurrent protection devices.
- B. Related sections
 - 1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 - 2. The requirements of this Section apply to all Section 16000 work, as applicable.
 - 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

16.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 - 1. CCR –California Code of Regulations, Title 24
 - a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
 - 2. Federal Specification
 - a. W-C-375; Circuit Breakers, Molded Case, Branch Circuit And Service
 - 3. NEMA –National Electrical Manufacturer’s Association
 - a. AB 1; Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
 - b. PB 2.2; Application Guide for Ground Fault Protective Devices for Equipment
 - 4. UL -Underwriters Laboratories, Inc.
 - a. 248; Low Voltage Fuses
 - b. 468; Wire Connectors
 - c. 508E; IEC Type "2" Coordination Short Circuit Tests
 - d. 489; Molded-Case Circuit Breakers and Circuit Breaker Enclosures
 - e. 943; Standard for Ground-Fault Circuit-Interrupters

16.03 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 5.27 - Submittals.
- B. Production test of circuit breakers upon request of Engineer.

- C. Submittal shall show the following information: circuit breaker numbering, circuit breaker type and short circuit rating, provisions for future circuit breakers, bussing, including neutral and ground, ratings and enclosure dimensions and trims.
- D. Provide arc flash analysis for the power system, based upon the submitted switchboard, in accordance with NFPA 70E requirements, prepared and signed by a California Registered Professional Electrical Engineer. Submit this analysis within 30 days of acceptance of the submitted distribution power submittal package. Include all costs in the bid.

16.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. The manufacturing facility shall be registered by Underwriters Laboratories Inc. to the International Organization for Standardization ISO 9002 Series Standards for quality.

16.05 DELIVERY, STORAGE AND HANDLING

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

PART 17 — PRODUCTS

17.01 FUSES

- A. All power distribution fuses shall be time-delay, high interrupting (200kAIC minimum) and current limiting type, unless otherwise indicated. All fuses shall be of same manufacturer and model.
 - 1. Motor branch circuit fuses (0 – 600A): UL Class RK5 dual element, time delay type shall be size for UL 508E “Type 2” coordination for the motor controller. Coordinate fuse selection with motor starter overload relay heaters as required.
 - 2. General purpose feeder fuses (0 – 600A): UL Class RK1 dual element, time delay type shall be size per Drawings.
- B. Control and instrumentation fuses shall of type and rating as recommended by equipment manufacturer, suitable for fuse blocks or holders installation.

17.02 MOLDED CASE CIRCUIT BREAKERS

- A. General
 - 1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
 - 2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
 - 3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication.

4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker after installation.
 5. Circuit breakers shall have an RMS interrupting capacity not less than shown on Drawings, or if not shown shall not be less than:
 - a. 25kA for 480V systems
 - b. 22kA for 240V (or less) systems
 6. Each circuit breaker shall be equipped with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit breaker tripping mechanism for maintenance and testing purposes.
 7. Circuit breakers shall be equipped with UL Listed electrical accessories as noted on Drawing. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.
 8. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
 9. Circuit breakers shall be constructed with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable mechanical type lugs. Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper and aluminum conductors. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating in the CEC.
 10. All circuit breakers shall be capable of accepting bus connections.
- B. Thermal-Magnetic Circuit Breakers
1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
 2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true RMS sensing and thermally responsive to protect circuit conductor(s) in a 40°C ambient temperature.
 3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
- C. Electronic Trip Circuit Breakers
1. Circuit breaker trip system shall be a microprocessor-based true RMS sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on Drawings.
 2. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
 3. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and adjustment positions shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 80% (or 100% where noted on Drawings) of their ampere rating continuously.

4. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent of all other adjustments.
 - a. Instantaneous Pickup
 - b. Long Time Pickup
 - c. Long Time Delay
 - d. Short Time Pickup
 - e. Short Time Delay
 - f. Ground Fault Pickup (when specified with ground fault protection)
 - g. Ground Fault Delay (when specified with ground fault protection)
5. A means to seal the trip unit adjustments in accordance with CEC/NEC 240-6(b) shall be provided.
6. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
7. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
8. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. Indication of inherent ground fault current flowing in the system shall be provided on circuit breakers with integral ground fault protection. All current values shall be displayed in true RMS with 5% accuracy.
9. Equipment Ground Fault Protection shall be provide where noted on Drawings.
 - a. Circuit breakers shall be provided with integral equipment ground fault protection for grounded systems. The circuit breaker shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
 - b. A separate neutral current transformer shall be provided for three-phase, four-wire systems.
 - c. Ground fault sensing system shall be residual sensing type.
 - d. The trip system shall include a ground fault memory circuit to sum the time increments of intermittent ground faults above the pickup point.
 - e. A means of testing the ground fault system to meet the on-site testing requirements of CEC/NEC 230-95(c) shall be provided.
 - f. Local visual trip indication for a ground fault trip occurrence shall be provided.
 - g. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.
10. Circuit breaker trip system shall be equipped with an externally accessible test port. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.

17.03 INSULATED CASE CIRCUIT BREAKERS

- A. Circuit breaker trip system shall be a microprocessor-based true RMS sensing design with sensing accuracy through the thirteenth (13th) harmonic. Sensor ampere ratings shall be as indicated on Drawings.
- B. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
- C. Circuit breakers shall have an RMS interrupting capacity not less than shown on Drawings, or if not shown shall not be less than:
 - 1. 65kA for all frame sizes at 208V
 - 2. 65kA for all 800A - 2,000A frames at 480V
 - 3. 100kA for all 3,000A - 4,000A frames at 480V
- D. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and switch adjustments shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 100% of their ampere rating continuously.
- E. The following time/current response adjustments shall be provided. Each adjustment shall have discrete settings and shall be independent from all other adjustments.
 - a. Instantaneous Pickup
 - b. Long Time Pickup
 - c. Long Time Delay
 - d. Short Time Pickup
 - e. Short Time Delay
 - f. Ground Fault Pickup (when specified with ground fault protection)
 - g. Ground Fault Delay (when specified with ground fault protection)
- F. Circuit breakers with adjustable short-time function shall be provided with instantaneous adjustment and 30 cycle short-time withstand ratings. Short-time withstand ratings shall be specified in RMS symmetrical amperes, as shown on the Drawings.
- G. A means to seal the rating plug and trip unit adjustments in accordance with CEC/NEC 240-6(b) shall be provided.
- H. Local visual trip indication for overload, short circuit and ground fault trip occurrences shall be provided.
- I. An ammeter to individually display all phase currents flowing through the circuit breaker shall be provided. All current values shall be displayed in True RMS with 5% accuracy.
- J. Long Time Pickup indication to signal when loading approaches or exceeds the adjusted ampere rating of the circuit breaker shall be provided.
- K. True two-step stored energy mechanism with five (5) cycle closing time shall be provided. All circuit breakers shall have multiple CHARGE/CLOSE provisions allowing the following sequence: CHARGE, CLOSE, RECHARGE, OPEN/CLOSE/OPEN
- L. Local control pushbuttons to OPEN and CLOSE circuit breaker shall be provided. Color coded visual indication of contact position (OPEN or CLOSED) shall be provided on the face of the circuit breaker. Local manual charging following CLOSE operation shall be provided. Color coded

visual indication of mechanism CHARGED and DISCHARGED position shall be provided on the face of the circuit breaker. Visual indicator shall indicate CHARGED only when closing springs are completely charged.

- M. Each circuit breaker shall be electrically operated to permit remote CHARGE, CLOSE, and OPEN capabilities. Electrically operated circuit breaker shall be equipped with charge contact switch for remote indication of mechanism charge status.
- N. All circuit breakers shall be equipped with electrical accessories as noted on Drawings.
- O. Provide the following interlocking capabilities:
 - 1. cell door interlock
 - 2. key interlock for main-tie-main
 - 3. lock off
- P. Circuit breaker trip system shall be equipped with an externally accessible test port. Disassembly of the circuit breaker shall not be required for testing. Test set shall be capable of verifying the operation of all trip functions with or without tripping the circuit breaker.
- Q. Equipment Ground Fault Protection shall be provided where noted on Drawings.
 - 1. Circuit breakers shall be provided with integral equipment ground fault protection for grounded systems. The circuit breaker shall be suitable for use on three-phase, three-wire circuits where the system neutral is grounded but not carried through the system or on three-phase, four-wire systems.
 - 2. A separate neutral current transformer shall be provided for three-phase, four-wire systems.
 - 3. Ground fault sensing system shall be residual sensing type.
 - 4. The trip system shall include a ground fault memory circuit to sum the time increments of intermittent ground faults above the pickup point.
 - 5. A means of testing the ground fault system to meet the on-site testing requirements of CEC/NEC 230-95(c) shall be provided.
 - 6. Local visual trip indication for a ground fault trip occurrence shall be provided.
 - 7. The ground fault sensing system shall be provided with Zone Selective Interlocking (ZSI) communication capabilities compatible with other thermal magnetic circuit breakers equipped with ground fault sensing, electronic trip circuit breakers with integral ground fault sensing and external ground fault sensing systems as noted on Drawings.

17.04 DRAWOUT INSULATED CASE CIRCUIT BREAKERS

- A. Main circuit breaker shall meet the same requirements of insulated case circuit breakers and be individually drawout mounted where shown on Drawings.
- B. Sturdy drawout rails shall be permanently attached to the sides of the breaker compartment and retract into the compartment when not in use.
- C. When fully withdrawn, the circuit breaker shall permit access for inspection and testing. Circuit breaker(s) shall also be removable from the rails completely.
- D. When the circuit breaker is in the Connected, Test, or Disconnected positions, or when the circuit breaker is removed from the compartment, the compartment door shall be able to be fully closed and secured.

- E. A removable crank shall be supplied for racking the circuit breaker between the Connected, Test, or Disconnected positions.

PART 18 — EXECUTION

18.01 PREPARATION

- A. Notify Engineer no later than 10 working days for adjustable circuit breaker settings not shown within Drawings. Submit to Engineer the following information:
 - 1. Panel, switchboard name/ID
 - 2. Circuit breaker identifier (i.e., main circuit breaker, load served, etc.)
 - 3. List of necessary settings (i.e., trip settings, time delays, etc.)

18.02 INSTALLATION

- A. Install equipment and their accessories in to manufacturer's instructions, pertinent Codes, and with recognized industry practices to insure device operates properly.
- B. Tighten electrical connectors and terminals in accordance to manufacturer's requirements. Where the manufacturer does not have published torque tightening values, comply with the requirements of UL 468.

18.03 FIELD QUALITY CONTROL

- A. Check tightness of circuit breaker connections using a calibrated torque wrench or torque screwdriver per manufacturer's written specifications.
- B. Obtain the services of an independent testing company who shall provide quality control and adjustments as well as tests for
 - 1. Check each circuit breaker above 100A on a 225A frame for long-time and short-time delay pickup and instantaneous pickup.
 - a. Instantaneous pickup current shall be determined by 4 cycles or less.
 - b. Perform timing test with 300% of breaker trip unit rated current.
 - c. Adjust unit if required, so that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.
 - 2. Test and calibrate ground fault protection trip and pickup time on 225A frame breakers and larger.
- C. Physically test key interlock systems to check for proper functionality.
- D. Check and set where required all protective device settings in accordance with approved coordination study settings and conduct ground fault acceptance tests.

18.04 ADJUSTING

- A. Adjust all operating mechanisms for free mechanical movement per manufacturer's specifications.
- B. Adjust circuit breaker trip and time delay settings to values indicated as instructed by Engineer.
 - 1. Check each circuit breaker above 100A, long-time and short-time delay pickup and instantaneous pickup. Instantaneous pickup current shall be determined by 4 cycles or less. Perform timing test with 300% of breaker trip unit rated current. Adjust unit if required, so

that the tripping characteristics are within the limits of the published time-current characteristic curves for that particular trip unit.

2. Main circuit breaker ground fault setting shall be per CEC/NEC 230-95(a) or as directed by Engineer.

18.05 PROTECTION

- A. When directed by Engineer provide physical means to “permanently fix” settings for rotary and DIP type switches with a thin coat of clear lacquer.

18.06 CLEANING

- A. Remove marks, dirt and debris from installed equipment surfaces for “new like” appearance.

END OF SECTION

SECTION 16500 – LIGHTING

PART 19 — GENERAL

19.01 SUMMARY

- A. Section includes
 1. Provide all labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to fixtures, lamps, standards, bases, hangers, supports, reflectors, glassware, lenses, auxiliary equipment, ballasts and sockets.
- B. Related work under this section
 1. Where items specified in other Section 16000 sections conflict with the requirements of this Section, the most stringent requirement shall govern.
 2. The requirements of this Section apply to all Section 16000 work, as applicable.
 3. Consult all other sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

19.02 REFERENCES

- A. Comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
 1. ANSI -American National Standards Institute
 - a. C78; American National Standard for Electric Lamps
 - b. C81; American National Standard for Electric Lampholders
 - c. C82; American National Standard for Lamp Ballasts
 - d. C136; American National Standard for Roadway and Area Lighting Equipment
 2. California Codes of Regulations

- a. Part 3 -California Electrical Code(CEC); NFPA 70 National Electrical Code (NEC) with California amendments
- b. Part 6 -California Energy Code
- 3. IESNA –Illuminating Engineering Society of North America
 - a. RP-16; Nomenclature and Definitions for Illuminating Engineering
- 4. NECA –National Electrical Contractors Association
 - a. NECA/IESNA 500, Recommended Practice for Installing Indoor Commercial Lighting Systems
 - b. NECA/IESNA 501, Recommended Practice for Installing Exterior Lighting Systems
 - c. NECA/IESNA 502, Recommended Practice for Installing Industrial Lighting Systems
- 5. UL -Underwriter’s Laboratories, Inc.
 - a. 935; Standard for Fluorescent-Lamp Ballasts
 - b. 1029; Standard for High-Intensity-Discharge Lamp Ballasts
 - c. 1574; Standard for Track Lighting Systems

19.03 SUBMITTALS

- A. Submit manufacturer’s data for materials specified within this Section in accordance to Section 5.27 - Submittals.
- B. Substituted fixtures shall be submitted with manufacturer’s specification sheet and published photometric reports, verified by testing to IES and NEMA standards under controlled laboratory conditions.

19.04 QUALITY ASSURANCE

- A. All materials, equipment and parts comprising the materials specified herein shall be new and unused, bearing UL labels where applicable.
- B. Installation shall conform to the following standards:
 - 1. NECA/IESNA 501, Recommended Practice for Installing Exterior Lighting Systems

19.05 DELIVERY, STORAGE AND HANDLING

- A. Handle carefully to avoid damage to internal components, enclosure and finish.
- B. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional cover to protect enclosure in harsh environments.

19.06 WARRANTY

- A. Furnish one-year guarantee in accordance with and in form required under Section 16050.

PART 20 — PRODUCTS

20.01 GENERAL

- A. Fixtures shall be of the types, wattages and voltages shown on Drawings.
- B. Fixtures shall be UL listed as an entire assembly and for the installed location.

- C. Luminaire recessed in fire rated ceiling shall conform to UL Standards, equipped with yoke where in tee ceiling and field fabricated fire protection box in accordance with latest UL Fire Resistance Directory.
- D. Deliver fixtures and other lighting equipment complete with suspension accessories, canopies, castings, sockets, holders, reflectors, ballasts, diffusing material, louvers, frames, and recessing boxes all wired and assembled.
- E. Hangers: Swivel-type to allow for free movement of 45 degrees from vertical at canopy and at luminaire housing. Steel tube hangers shall include a 1/16-inch diameter galvanized wire cord or equivalent (100-pound break strength) in stem assembly attached to luminaire housing and building structure. Attach loop with C-type tool applied compression splice.

PART 21 — EXECUTION

21.01 EXAMINATION

- A. Locate all lighting fixtures by reference to Drawings, both electrical and architectural.
- B. Report proposed changes for luminaire locations found necessary due to interference with structure, pipes, ducts, and other items to Owner's representative for direction before installation. Luminaires specified with overall lengths are subject to change. Adjust as directed by Owner's representative.
- C. Contractor shall be responsible to coordinate with ceiling installation trade. This will assure that proper fixture type will be furnished to match ceiling system specified.

21.02 INSTALLATION

- A. Luminaires shall be properly grounded per CEC Article 410, Parts 17 through 21.
- B. Install all luminaires true and plumb. Support and mount in accordance manufacturer's instructions and with CEC Article 410, Parts 16 and 76.

21.03 CLEANING

- A. Clean all glass and plastic and polish all visible metal parts before submitting job to Owner's representative for final acceptance. Remove all fingerprints and dirt from exposed surfaces. Replace scratched or damaged components.