



# **COMPTON COMMUNITY COLLEGE DISTRICT**

1111 E. Artesia Blvd., Compton, CA 90221

## **CONSTRUCTION MANUAL**

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### **COMPTON COMMUNITY COLLEGE DISTRICT- COMPTON FOOTBALL FIELD**

**June 15, 2015**

**COMPTON COMMUNITY COLLEGE DISTRICT**  
**CAMPUS FOOTBALL FIELD**

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**SECTION 01 74 16 - STORM WATER POLLUTION PREVENTION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Preparation, implementation and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharges of pollutants from the construction site into the receiving waters. This includes elimination of non-storm water pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas.
- B. Compliance with all local, state and federal regulations governing storm water discharges associated with construction activities such as, but not limited to clearing, excavating, grading, demolition and other land disturbances.
- C. Payment of application and annual fees required by the State Water Resources Control Board (SWRCB) for the duration of the construction of the Project.
- D. Submittal of all Permit Registration Documents (PRDs) through the SWRCB SMARTS online system.
- E. Certification that the construction project has met all of the conditions of the General Construction Storm Water Permit (GCSWP).

**1.02 REFERENCES**

- A. National Pollutant Discharge Elimination System (NPDES) General Permit No CAS000002.
- B. State Water Resources Control Board (SWRCB) Water Quality Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ.
- C. California Stormwater Quality Association, Stormwater Best Management Practice Handbook, Construction, latest edition.

**1.03 RELATED DOCUMENTS**

- A. Project Contract, including General, Special and Supplementary Conditions and other General Requirements.

**1.04 ACRONYMS AND DEFINITIONS**

BMP	Best Management Practice.
CAN	Corrective Action Notice.
CASQA	California Stormwater Quality Association.
COI	Change of Information.
DWQ	Division of Water Quality.

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CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities.
ELAP	Environmental Laboratory Accreditation Program.
LARWQCB	Los Angeles Regional Water Quality Control Board.
LRP	Legally Responsible Person (OWNER).
NOI	Notice of Intent.
NOT	Notice of Termination.
NPDES	National Pollutant Discharge Elimination System.
OEHS	LAUSD Office of Environmental Health and Safety.
PRDs	Permit Registration Documents, including NOI, Risk Assessment, Site Map, SWPPP, Annual Fee, Signed Certification Statements.
REAP	Rain Event Action Plan.
RISK LEVEL	As defined by CGP.
QSD	Qualified SWPPP Developer (work by Owner)
QSP	Qualified SWPPP Practitioner (work by Contractor)
QRE	Qualifying Rain Event, is an event that produces 0.5 inches of precipitation with a 48 hour or more period between rain events.
SMARTS	Storm Water Multiple Application and Report Tracking System ( <a href="http://smarts.waterboard.ca.gov">smarts.waterboard.ca.gov</a> ).
SWPPP	Storm Water Pollution Prevention Plan.
SWRCB	State Water Resources Control Board.
WPCD	Water Pollution Control Drawings.
WDID	Waste Discharge Identification Number.

1.05 SUBMITTALS

- A. Owner shall submit the Notice of Intent and all Permit Registration Documents and the Notice of Intent fee required by SWRCB.
- B. Owner shall prepare and submit the Storm Water Pollution Prevention Plan for this project to the State Water Resources Control Board (SWRCB) via SMARTS.
- C. The Owner's QSD shall prepare the SWPPP, including the WPCD, Risk Level Determination, and Post Construction Water Balance Calculation. Copies of these

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documents shall be provided to the Contractor. Contractor at his discretion may accept SWPPP as is, modify it, or develop his own.

- D. The Contractors QSP shall submit electronic copies of weekly and quarterly inspections, annual reports, compliance certifications, and test results.
- E. The Contractors QSP shall submit the annual report. The General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.
- F. Within 90 days of when construction is complete or ownership has been transferred, the Contractors QSP shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Storm Water Pollution Prevention Plan: The Owner shall provide the quality, grade and type of materials as specified in Stormwater Best Management Practice Handbook, Construction, latest edition, and State Water Resources Control Board (SWRCB) Water Quality Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ.
- B. Contractor shall provide and have available on-site during construction activities a non-stormwater sampling kit suitable for obtaining storm water and non-stormwater quality grab samples. Kit shall include containers and preservatives appropriate for the pollutants known or expected to be in the stormwater. Required sampling equipment shall be adequate to capture and transport samples to a local ELAP State certified water testing lab.
- C. Contractor shall provide a rain gauge on site to record readings during site inspections.

### PART 3 - EXECUTION

#### 3.01 SWPPP IMPLEMENTATION

- A. The Contractor shall hire a Qualified SWPPP Practitioner (QSP), as defined by the Construction General Permit, to implement the Storm Water Pollution Prevention Plan to be consistent with the requirements of SWRCB Water Quality Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ.
- B. The Contractor is responsible for the following:
  - 1) Install perimeter controls and sediment control BMPs prior to starting construction work at the site.

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- 2) Install effective erosion control BMPs at the jobsite.
- 3) Protect exposed dirt, such as stockpiles, landscaping areas, and hillsides.
- 4) Properly manage non-storm water discharges such as ground water, broken utility lines and fire hydrant testing per CGP requirements.
- 5) Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drains.
- 6) Revise the SWPPP to suit changing site conditions and also when properly installed systems are ineffective.
- 7) Adjust BMP's locations and layouts in accordance to construction progress to assure compliance to regulations.
- 8) Notification and Report: If pollution occurs in the work area for any reason or when the Contractor becomes aware of any violation of this Section, correct the problem and immediately notify the Inspector. In addition, submit a written report to the Owner's QSP within seven (7) calendar days describing the incident and the corrective actions taken. If either the Inspector or QSP is first to observe pollution or a violation, the Contractor shall also explain in the written report why the Work was inadequately monitored.
- 9) Revise SWPPP to suit changing site conditions and also when properly installed systems are ineffective.
- 10) Upon Substantial Completion: Maintain and leave post-construction storm water pollution prevention controls in place and remove those that are not needed as determined by the QSD and OAR.

**3.02 MONITORING**

- A. The Contractors QSP shall conduct examination of storm water pollution prevention controls according to the monitoring requirements identified for the projects risk level as defined by the Construction General Permit.
- B. The Contractor shall prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.

**3.03 SWPPP LIABILITIES AND PENALTIES**

- A. Review of the inspection logs by the Owner shall not relieve the Contractor from liabilities arising from non-compliance with storm water pollution regulations.
- B. Payment of Penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the Owner.
- C. Compliance with the Clean Water Act and the State Water Resources Control Board (SWRCB) Water Quality Order 2009-0009-DWQ pertaining to construction activities is the sole responsibility of the Contractor. For any fine(s) levied against the Owner due to non-compliance by the Contractor, the Owner will have the option to either require payment by Contractor of, or deduct from any payments due the Contractor, the total amount of the fine(s) levied on the Owner and associated costs.



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3.04 SWPPP CLOSEOUT

- A. Verify the following prior to Substantial Completion of SWPPP:
- 1) Elements of the SWPPP have been completed.
  - 2) Final stabilization of site, as defined by the GCP, has been demonstrated.
  - 3) There is no potential for construction related storm water pollutants to be discharged into site runoff.
  - 4) Construction related equipment and temporary BMPs have been removed from site.
  - 5) Rubbish, debris, and waste materials have been removed and legally disposed of off the Project site.
  - 6) Post-Construction BMP Maintenance Plan has been established.

END OF SECTION

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### SECTION 02 21 33- PHOTOGRAPHIC DOCUMENTATION

#### PART 1- GENERAL

##### 1.1 SECTION INCLUDES

- A. Stages of construction.
- B. Disputes and claims.
- C. Quality and quantity of photographs.
- D. Identification of photographs.
- E. Digital video recordings.
- F. Aerial photography.

##### 1.2 RELATED SECTIONS

- A. Section 02 22 00, Existing Conditions Assessment.
- B. Section 31 09 13, Geotechnical Instrumentation and Monitoring.

##### 1.3 STAGES OF CONSTRUCTION PHOTOGRAPHS

- A. The Contractor shall take photographs at all construction milestones and at each of the following stages of construction:
  - 1. Before commencement of clearing, demolition, and subsurface work.
  - 2. Upon completion of clearing and demolition.
  - 3. Upon completion of subsurface work.
  - 4. Monthly during performance of the Work, or more frequently as needed.
  - 5. Upon completion of the Work.
- B. Furnish photographs of at least three different views or vantage points taken to illustrate each milestone and stage of construction, inclusive of items on the critical path.
- C. Furnish a sufficient number of photographs each month until completion of the Work to illustrate progress. Location of views shall be as agreed by the Contractor and the Contracting Officer.
- D. Quality and Quantity of Photographs

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1. Submit photographs as prints and in digital format uploaded to the Authority's web portal. Digital photographs shall be in pdf or jpg format.
2. Photographic prints shall be standard commercial quality, color prints, on single weight, glossy paper.
3. Size of Prints: 5 by 7 inches in size.
4. Quantity of Prints: Furnish one print of each photograph.

### 1.4 IDENTIFICATION OF PHOTOGRAPHS

- A. Each photograph shall be identified with an unobtrusive time and date indicator and GPS coordinates (geo-tagged).
- B. The following information shall be printed on the back of each print furnished and furnished for each digital photograph file:
  1. Title of Contract and Contract Number.
  2. Identification of subject shown.
  3. Station point of camera and direction of view.

### 1.5 DIGITAL VIDEO RECORDINGS

- A. Provide digital video recordings of all construction milestones and the following events:
  1. Prior to construction to document conditions within the work area and adjacent areas.
  2. Start of construction, including clearing and grubbing and demolition operations, as applicable.
- B. Provide digital video recordings showing pre-construction and post-construction condition of all inbound and outbound haul routes for movement of excavated materials, import of fill materials, and transport of concrete to the Jobsite, including all lanes, curbs, and gutters.
- C. Upload recordings to Authority's web portal. Recordings shall be in a format and quality acceptable to the Contracting Officer. Recordings shall be uploaded no less frequently than monthly. Recordings shall include a complete, clearly spoken English narration of the events and locations being recorded. Recordings shall show an unobtrusive time and date indicator and GPS coordinates (geo-tagged). The narration of each recording shall lead off with the following identifying information:
  1. Title of Contract and Contract Number.
  2. Time and date recording was initiated.
  3. Identification of subject shown.

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4. Station point of camera and direction of view.

### 1.6 AERIAL PHOTOGRAPHS

- A. Furnish color aerial photographs of the entire Jobsite taken prior to the start of construction, monthly after the start of construction, and at the conclusion of construction.
- B. Photo Scale: Photographs shall be 9 inch x 9 inch at a maximum scale of 1 inch = 200 feet. Photographs at the conclusion of construction shall be at 1 inch = 100 feet.
- C. Measurement Accuracy: Industry accepted standard.
- D. Overlaps: Overlap between consecutive photographs in each flight strip will be 20 percent. The deviation range in forward overlap will not exceed plus or minus five percent. The lateral overlap shall be 20 percent. The deviation range in lateral overlap will not exceed plus or minus five percent.
- E. Identification: Label aerial photographs with the same identifying information specified in Article entitled "Identification of Photographs" herein.
- F. Quality and Quantity of Photographs:
  1. Digital photographs shall be in jpg format.
  2. Photographic prints shall be standard commercial quality, color prints, on glossy paper.
  3. Quantity of Prints: Furnish two print of each photograph.

### PART 2- PRODUCTS

Not used.

### PART 3- EXECUTION

Not used.

END OF SECTION

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### SECTION 02 22 00 – EXISTING CONDITIONS ASSESSMENT

#### PART 1- GENERAL

##### 1.1 SECTION INCLUDES

- A. Preconstruction inspection.

##### 1.2 COORDINATION

- A. Coordinate the requirements of Section 31 09 13, Geotechnical Instrumentation and Monitoring, which requires early monitoring to detect possible movement of structures and other features in periods prior to construction. Document placement of monitoring devices and existing conditions at the time of placement of devices in a Preconstruction Condition Survey Report as specified herein.

##### 1.3 SUBMITTALS

- A. Submit copies of the Preconstruction Condition Survey Report. Depending on the staging of the Work, submit separate Preconstruction Condition Survey Reports for specific areas, as applicable.
- B. Transmittal of the Preconstruction Condition Survey Report shall be signed by the Contractor's design team's geotechnical engineer.

##### 1.4 AUTHORITY PARTICIPATION IN PRECONSTRUCTION INSPECTION

- A. Make arrangements for access to building or facility through the Contracting Officer or directly with owner of building or facility, as applicable.
- B. Notify the Contracting Officer prior to performing preconstruction inspection of buildings and structures. Make arrangements with the Contracting Officer and make such inspection at times convenient to the Contracting Officer.
- C. Contracting Officer will participate in the conditional inspection of buildings or structures in the vicinity of the Work, which may possibly be affected by the Work. These surveys shall be conducted to:

1. Define and document existing property conditions.

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2. Assist the Contractor and the Authority in resolving possible disputes over property conditions.

### 1.5 PRE-CONSTRUCTION INSPECTION

A. Prior to construction, conduct a preconstruction inspection survey of existing facilities, structures, and environmentally sensitive areas on or in the vicinity of the Worksite that may be damaged or adversely affected by construction activities. The inspection shall form the basis from which negative impacts such as new cracks, new damage, new settlement, and worsening of existing progressive cracks will be measured. Perform the following tasks and incorporate into the preconstruction inspection:

1. Document the inspection with videos, photographs, sketches, and narratives and assemble into an inspection report. Videos may include audio commentary.
2. Document existing conditions which may be damaged or adversely affected by construction activities.
3. Document vegetation densities, where applicable.
4. Document pre-existing damage, leaks, and cracks agreed to and documented by the Contractor and the Contracting Officer as pre-existing.

B. Coordinate with monitoring requirements specified in Section 31 09 13, Geotechnical Instrumentation and Monitoring.

C. Photographs shall comply with requirements specified in Section 02 21 33, Photographic Documentation. Video recordings shall comply with the requirements specified in Section 02 21 33, Photographic Documentation, under the Article entitled "Digital Video Recordings".

### 1.6 PRODUCTS

Not Used.

### 1.7 EXECUTION

Not Used.

END OF SECTION

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**SECTION 02 41 00 - DEMOLITION**

**PART 1- GENERAL**

**1.1 SUMMARY**

A Provisions of the General and Supplementary Conditions and Division One apply to this section.

B Section Includes: Furnishing all labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:

- 1 Protecting existing work to remain.
- 2 Disconnecting and capping utilities.
- 3 Removing debris and equipment.
- 4 Removal of items indicated on Drawings.
- 5 Salvageable items to be retained by the Owner as indicated on the drawing.

C Related Sections:

- 1 Section 31 10 00: Site Clearing.

**1.2 QUALITY ASSURANCE**

A Comply with the following:

- 1 Applicable codes, ordinances, regulations of local, municipal, state and federal authorities having jurisdiction.
- 2 Obtain necessary permits and notices, post where required.
- 3 Comply with safety requirements of the local fire department.
- 4 Comply with ANSI A10.6.
- 5 Comply with Standard Specification for Public Works Construction, latest edition.

B Notify affected utility companies before starting Work and comply with their requirements.

C Carefully perform demolition work, by skilled workers experienced in building demolition procedures, using appropriate tools and equipment. Perform work, at all times, under the direct supervision of a supervisor approved by the Owner Inspector.

D Coordinate demolition with other trades to ensure correct sequence, limits, and methods of proposed demolition. Schedule work to create least possible inconvenience to the public and to facility operations.

E Pre-Demolition: Conduct conference at Project site 7 days prior to scheduled demolition.



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- 1 Conference agenda shall include review and discussion of requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations and Project conditions.
- 2 Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly related work. Submit minutes of meeting to Owner's Representative for Project record purposes.

1.3 DEFINITIONS

A Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to location as directed by Owner's Representative.

C Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

D Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Owner's Representative, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.4 OWNERSHIP OF MATERIALS

A Ownership of Materials: Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.5 PROJECT CONDITIONS

A Drawings may not indicate in detail all demolition work to be carried out. Carefully examine existing conditions to determine full extent of demolition required.

B Repair damage due to demolition activities to existing improvements to remain at no additional cost to the Owner. Repair or replace as directed by the Owners Inspector.

C Take measures to avoid excessive damage from inadequate or improper means and methods, or improper shoring, bracing or support. Repair or replace any resulting damage at no additional cost to the owner as directed by the Owner Inspector.

D If conditions are encountered that vary from those indicated, notify the Owner Inspector for instructions prior to proceeding. Owner assumes no responsibility for actual condition of structures to be demolished.

E Inform Owner immediately upon discovery of asbestos products, radioactive materials, toxic wastes or other hazardous materials. Do not remove hazardous materials without Owner authorization.

F Adjacent roadways/passageways:

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- 1 Maintain fire department access through all phases of the project.
- 2 Obstruction of streets, walks or other adjacent facilities will not be allowed.

1.6 DIG ALERT NOTIFICATION

- A Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at 811 for information on buried utilities and pipelines.
- B Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.
- C Call at least Two (2) full working days prior to digging.
- D If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).
- E The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.
- F If caught digging without a Dig Alert ticket you can be fined as much as \$50,000 per California government code 4216.

PART 2- PRODUCTS

2.1 HANDLING OF MATERIALS

- A Items scheduled for salvage by the Owner shall be delivered to a location designated by the Owner's Authorized Representative. Items shall be cleaned, packaged and labeled for storage.
- B Items scheduled for reuse shall be stored on site in a dry location and protected from damage, soiling and theft.

PART 3- EXECUTION

3.1 GENERAL

- A Protection:
- 1 Do not begin demolition until safety partitions, temporary fencing, barricades, warning signs and other forms of protection are installed.
  - 2 Provide safeguards, including warning signs, lights and barricades, for protection of occupants and the general public during demolition.
  - 3 Provide and maintain fire extinguishers. Comply with requirements of governing authorities.

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- 4 Maintain existing utilities which are to remain in service and protect from damage during operations.

B Safety: If at any time safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the Owner Inspector. Do not resume demolition until directed by the Owner Inspector.

C Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances

D Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations. Do not create hazardous or objectionable conditions, such as flooding and pollution, when using water.

E Water for Dust Control: Contractor shall obtain and pay for all water required for his dust control operations. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the Water Department to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.

F An 6-foot high, chain link fence and gates, shall be erected prior to any demolition operations at the construction limits perimeter. Coordinate the exact location with Owner.

G Debris Removal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

H Progress Cleaning: Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

3.2 PREPARATION

A Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.

B Utilities:

- 1 The Drawings do not purport to show all below-grade conditions and objects on the site. Contractor shall perform field investigations as necessary to establish location of underground utility services and other features affecting earthwork.
- 2 Mark location of underground utilities on asphalt pavement with paint
- 3 Disconnect and cap utility services; comply with requirement of governing authorities.
- 4 Contractor shall arrange and notify utility company in advance of date and time when service needs to be disconnected.
- 5 Do not commence demolition operations until associated disconnections have been completed.

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- 6 Should utilities and other below-grade conditions be encountered which adversely affect the Work, discontinue affected Work and notify Owner's Representative and Architect and request direction. Unforeseen conditions will be resolved in accordance with provisions of the General Conditions of the Contract.
- 7 Should a utility line or structure be damaged, immediately notify the responsible utility company or agency and notify Owner's Representative and Architect.
- 8 Repair or replace all damaged utility lines and structures as directed by the responsible utility company or agency.
- 9 Repair or replacement of damaged utility lines and structures whose location or existence has been made known to the Contractor shall be at no change in the Contract Time and Contract Price.

C Structures to be demolished shall be inspected for hazardous materials. Such materials shall be removed and disposed of before general demolition begins.

D Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner's Representative and Authority Having Jurisdiction (AHJ). Provide temporary services during interruptions to existing utilities, as acceptable to Owner's Representative and to Authority Having Jurisdiction (AHJ).

3.3 EXPLOSIVES

A Explosives: Use of explosives will not be permitted.

3.4 DEMOLITION

A Demolition, General:

- 1 Except where noted on the demolition plans, the Contractor shall raze, remove and dispose of all buildings and foundations, structures, paving, fences and other obstructions that lie wholly or partially within the demolition limits identified on the demolition plans.
- 2 Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
- 3 Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner's Representative and Authority Having Jurisdiction (AHJ). Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- 4 Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.
- 5 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
- 6 Protect existing site improvements, appurtenances, and landscaping to remain.

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- 7 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- 8 **Structural Stability:** Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of buildings to be demolished and adjacent buildings to remain. Strengthen or add new supports when required during progress of demolition.
- 9 **Below-Grade Construction:** Demolish foundation walls and other below-grade construction, as follows:
  - 10 Remove below-grade construction, including foundation walls and footings, to bottom of footing or foundation wall.
  - 11 Completely remove below-grade construction, including foundation walls and footings.
  - 12 **Filling Below-Grade Areas:** Completely fill below-grade areas and voids resulting from demolition of buildings and pavements with existing soil or clean imported soil.
  - 13 **Damages:** Promptly repair damages to adjacent facilities caused by demolition operations.
  - 14 Unless otherwise indicated on the plans, remove all demolished material from the site and dispose of at approved disposal sites. Comply with all requirements for recycling of demolished material as called for in Division 1 of this Specification. The contractor shall obtain necessary permits for the transportation of material from the site.

### 3.5 CLEANING

- A Clean existing materials to remain, using appropriate tools and materials.
- B Protect adjacent materials and equipment during cleaning operations.

### 3.6 PATCHING AND RESTORATION

- A **Patching:** Where removals leave holes and damaged surfaces that will be exposed in the completed construction, such holes and damaged surfaces shall be patched and restored to match adjacent finished surfaces.
  - 1 Where new finish construction is applied over existing holes and damaged surfaces, patching and restoration shall be performed to the extent to make the substrate suitable for the provision of new finish construction.
  - 2 Surfaces of patched and restored areas shall be flush with the adjacent existing surfaces and shall closely match existing adjacent surfaces in texture and finish.
- B **Restoration of Site Finishes:**
  - 1 **Concrete paving:** Where it is necessary to excavate a trench across make a cut in concrete paved areas, cut concrete cutting saw, full depth of paving.

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- 2 Bituminous paving: Where it is necessary to excavate a trench across make a cut in bituminous paved areas, either first score paving with a concrete cutting saw, in neat straight lines, prior to removing paving or make straight cuts with pneumatic spade.
- 3 Restoration of paving: Restore all paved areas to their original condition using material of like type and quality as the removed paving. Paving in public ways shall conform to applicable requirements of authorities having jurisdiction. Repaired surfaces shall match existing adjacent paving except minimum depth shall be 3-1/2 inches where existing paving is less than 3-1/2 inches.
- 4 Restoration of landscape planting: Restore soil and plant materials to match original condition, including additional topsoil, topsoil grading and preparation, new plant materials and plant maintenance during establishment period.

3.7 MAINTENANCE

- A Install and maintain all erosion control devices, including gravel bags, fiber rolls and other features called for in the Storm Water Pollution Prevention Plan and Temporary Erosion Control Plans.

3.8 CLEAN-UP/DISPOSAL

- A Debris shall be dampened by fog water spray prior to transporting by truck.
- B Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
- C Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where scheduled. Continuously clean-up and remove items as demolition work progresses. Do not allow waste and debris to accumulate in building or on site.

END OF SECTION

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**SECTION 03 20 00 - CONCRETE REINFORCEMENT**

**PART 1- GENERAL**

**1.1 SUMMARY**

- A Section Includes:
  - 1 Reinforcing bars for cast-in-place concrete.
  - 2 Reinforcing mesh for cast-in-place concrete.
  - 3 Reinforcing Bars for masonry.
- B Related Work Specified Elsewhere:
  - 1 Concrete Formwork: Section 03 10 00.
  - 2 Cast in Place Concrete: Section 03 30 00..

**1.2 REFERENCES, CODES AND STANDARDS:** The following references, codes and standards are hereby made a part of this Section shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Latest adopted edition of references and codes adopted by the Governing Agency shall apply. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A Specifications for Structural Concrete for Buildings – ACI 301.
- B American Concrete Institute (ACI) – ACI 318, Building Code Requirements for Reinforced Concrete.
- C American Concrete Institute (ACI) – 315, “Manual of Standard Practice for Detailing Reinforced Concrete Structures”.
- D Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
- E CRSI 63 - Recommended Practice for Placing Reinforcing Bars.
- F CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature
- G American Welding Society (AWS) – AWS D1.4, D1.12 “Structural Welding Code.”
- H International Building Code with State of California amendments (CBC).

**1.3 SUBMITTALS:**

- A Shop Drawings: Submit including complete layouts, sections, and details for congested conditions, typical bending diagrams and offsets, splice lengths and locations, proposed layout where vertical and horizontal bars intersect, and wherever welding is proposed, detailed to conform to AWS and CBC requirements. After approval of initial submission, subsequent submittals may be waived.
- B Product Data.

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C Chemical Analysis: Provide for bars to be welded, in accordance with 2013 CBC Table 1705A.3, 1904A.3 and ACI 318 3.5.2

### PART 2- PRODUCTS

#### 2.1 MATERIALS

- A Reinforcing bars: ASTM A615, Grade 60, unless otherwise indicated on drawings.
- B Reinforcing bars for welding: ASTM A706, Grade 60.
- C Welded steel wire fabric conforming to ASTM A185 or A497 as indicated on the structural drawings.
- D Shear studs: Low carbon steel, C1015 in accordance with ASTM-A108.
- E Mechanical Couplers or Splice Devices: Lenton, Barlock, Cadweld.

#### 2.2 FABRICATION OF REINFORCING BARS:

- A Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.

### PART 3- EXECUTION

#### 3.1 INSTALLATION OF REINFORCING:

- A Provide an allowance of 1% of total reinforcing tonnage for fabrication and placement as directed by Structural Engineer of Record.
- B Provide additional reinforcing bars at wall and slab openings as required. Before placing bars, and again before concrete is placed, clean bars of loose mill scale, oil, or any other coating that might destroy or reduce bond.
- C Securing in Place: Accurately place bars and wire tie in precise position where bars cross. Bend ends of wire ties away from the forms. Wire tie bars to corners of ties and stirrups. Support bars according to the current edition of "Recommended Practice for Placing Bar Supports" of Concrete Reinforcing Steel Institute, using approved accessories and chairs. Place precast concrete cubes with embedded wire ties to support reinforcing steel bars in concrete placed on grade and in footings. Use care not to damage vapor barriers where they occur.
- D Clearances: Maintain minimum clear distances between reinforcing bars and face of concrete as indicated on plans or directed.
- E Splices: Do not splice reinforcing bars at the points of maximum stress except where indicated. Lap splices as shown or required to develop the full strength or stress of bars. Stagger splices in horizontal wall bars at least 24" longitudinally in alternate bars and opposite faces.
- F Splice Devices: Install in accordance with manufacturer's written instructions.
- G Wire Fabric Placement: Place fabric in sheets as long as practical, lapping adjoining pieces at least one full mesh plus 2", 9", or 1.5 times the development length, whichever is greater and tie with 16 gage wire. Offset end laps in adjacent widths to prevent continuous laps. Extend fabric to within 1-inch of edge at slabs on grade. Cut mesh at expansion joints and full depth control joints.



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H Field Welding of Bars: As specified for fabrication.

I Maintaining Bars In Position: Take adequate precautions to assure that reinforcing position and spacing is maintained during placement of concrete.

END OF SECTION

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**SECTION 11 68 33 – FOOTBALL FIELD EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes
  - 1. Equipment as scheduled
  - 2. Installation of required concrete footings

**1.2 SUBMITTALS**

- A. Shop drawings, certified and stamped by manufacturer's engineer, showing plan layout of equipment, footing, mounting bolts dimensions, anchorages, and related installation detail for each type of equipment specified.
- B. Product data on operating equipment, characteristics and limitations.
- C. Product data.
- D. Three samples of materials and finishes.
- E. Manufacturer's installation instructions.
- F. Operation and maintenance data. Including data for maintaining operating equipment, type and frequency of lubrication, general instructions for maintaining finishes and prevention of deterioration.

**1.3 QUALITY ASSURANCE**

- A. Manufacturer: company with minimum 5-years experience manufacturing athletic equipment for high school project similar in scale and complexity to those required for this project.

**1.4 WARRANTY**

- A. Provide a 2-Year Warranty against defect in materials and installation commencing on Date of Certified Completion on equipment. Upon written notice from Owner they shall promptly, without cost, and with least practicable inconvenience to Owner correct such defects.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Manufacturers. Products of following manufacturers form basis for design and quality intended.
  - 1. Porter Athletic Equipment Company, Chatsworth, CA
  - 2. Draper, Inc., Spiceland, IN
  - 3. AALCO, St. Louis, MO

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4. Jaypro Sports Inc., Waterford, CT
5. PW Athletic Equipment, Prescott, AZ
6. Aluminum Athletic Equipment (AAE), West Conshohockern, PA
7. Spalding Equipment/BPI/American Athletic, Inc., Jefferson, IA
8. Sportsfield Specialties Inc., Delhi, NY
9. ACO Polymer Products, Inc.
10. Or equal, approved in accordance with Division 01, General Requirements, for substitutions.

**2.2 MATERIALS**

- A. Concrete for Footings: Minimum 4500 psi compressive strength at 28 days and maximum 4-inch slump at placement.
- B. Reinforcing Steel: Provide cage reinforcement of No. 5 deformed bars in accordance with ASTM A 615, Grade 60, unless otherwise indicated.
- C. Athletic Equipment
  1. See Schedule of Athletic Equipment in Section 3.4 below.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

- A. Verify that structural supports, anchor bolts and backing are ready to receive work.
- B. Verify that proper power supply is available.
- C. Beginning installation means acceptance of existing conditions and preparatory work of others.

**3.2 INSTALLATION**

- A. Install system and components in accordance with manufacturer's instructions.
- B. Install internal electrical wiring, conduits, junction boxes, transformers, circuit breakers and auxiliary components required.
- C. Support and anchor equipment and component assemblies per manufacturer's instructions.
- D. Install concrete footings according to manufacturer's details.

**3.3 TEST AND ADJUST**

- A. Test and adjust systems for proper function.

**3.4 SCHEDULE OF ATHLETIC EQUIPMENT**

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A. Communications Box

1. Base: Combox 3500 as manufactured by Sportsfield Specialties, Inc., Delhi, NY. P.O. Box 231, 41155 State Highway 10, Delhi, NY, 13753. (888) 875-3343.
  - a. Box: 3/16" (0.1875") Aluminum Construction, Welded Frame with Open Bottom Having the Following Attributes:
    - 1) 30"L x 18"W x 14"H (Full Size) Custom Sizes Available Upon Request
    - 2) 1/8" (0.125") Aluminum Adjustable Main Cover Support Ledge
    - 3) 3/16" (0.1875") Aluminum Removable Divider Panel (Full Size Only)
    - 4) Integrated Synthetic Infill Turf Attachment Ledge and ComBox® +Patented Infill Retainer System with Flexible Gasket Seals (Synthetic Infill Turf Installation Applications Only)
    - 5) 1" PVC Drain Stub for Positive Drainage Connection.
  - b. Main Cover and Hand Hole(s): 1/8" (0.125") Aluminum Construction with the Following Attributes:
    - 1) ComBox® + Patented Infill Retainer System with Flexible Gasket Seals (Synthetic Infill Turf Installation Applications Only)
    - 2) Pad Lockable Main Cover and Turn Lockable Hand Hole(s)
    - 4) Wire Feed Cutouts Between Main Cover and Hand Hole(s)
    - 5) Designed to Allow Synthetic Turf or Synthetic Track Material to be Adhered Directly to the Aluminum Surface with Synthetic Adhesive and/or Mechanical Fasteners Determined by Others
    - 6) Main Cover and Hand Hole(s) Style Synthetic Turf
  - c. Included Accessories:
    - 1) Stainless Steel Leveling Bolts
    - 2) Stainless Steel Assembly Hardware
    - 3) Factory Provided 3/8" Perforated Drainage Holes in Main Cover and Hand Hole(s) (Synthetic Infill Turf and Natural Grass Installation Applications Only)
    - 4) Model Specific Installation Instructions

B. General

1. Grooming Machine: as Manufactured by Sportsfield Specialties, Inc, Delhi, NY P.O. Box 231, 41155 State Highway 10, Delhi, NY 13753 (888) 875-3343
  - a. Components
    - 1) GroomAll

END OF SECTION

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## SECTION 13 48 15 - VARIABLE FREQUENCY DRIVE PUMP STATION

### SCOPE OF WORK

It is the intention of this specification to describe a self-enclosed automatic pump station for a turf irrigation system. This shall be accomplished by using a completely prefabricated pump station conforming to the following specifications. Supply shall be either flooded, (less than 30' TDH), suction lift, or city water booster. The water supply type shall be identified in the accompanying Technical Specifications and shall call out the suction lift or incoming pressure in feet of head, (TDH).

The pumping station shall be Green Tech Pump Assembly 25 as manufactured by John Deere Green Tech.

### SECTION 1: GENERAL

1.1 The pump station performance at enclosure limits shall be as noted in the technical specifications. The capacity, discharge pressure, maximum water lift or pump inlet pressure if a booster system and intake line dimensions shall be per the technical specifications. The pump shall operate at no more than 3600 RPM. The power supply to the station shall be as noted in the technical specifications.

1.2 The station shall be completely wired, piped, dynamically flow and pressure tested prior to shipment.

1.3 Operational sequence: The pump shall activate automatically upon detecting a drop in pressure in the irrigation main line if it is a flooded or suction lift application and by recognizing flow if it is a city water booster application or a remote start signal. Operation shall be maintained at an adjustable minimum demand. The pump shall be automatically retired when the demand falls below the minimum adjustable set point for an adjustable time delay.

1.4 Construction: Construction shall be of modular form utilizing a base structurally adequate to support pumps, piping, and electrical equipment as a single integral assembly. All nuts, bolts washers, and fasteners shall be stainless steel, zinc or cadmium plated for corrosion resistance.

### SECTION 2: PUMP AND MOTOR

#### 2.1 PUMP

Pump shall be electric motor driven, horizontal centrifugal with mechanical shaft seal, volute case and impeller. The shaft seal shall be a self-adjusting mechanical type to prevent leakage and eliminate the need for a drain piping. The volute case shall be precision machined from gray cast iron and engineered to modern hydraulic standards. It shall be possible to rotate the discharge connection to any of four positions. A heavy cast iron bracket shall maintain alignment between the motor and volute case. The impeller shall be an enclosed type and balanced to provide smooth operation. The impeller shall be keyed to the shaft and locked with a special cap screw and washer. The motor shaft is to be manufactured from high grade steel and of reduced length to increase shaft rigidity, extend bearing life, and reduce the overall length of the pump and motor assembly. The pump shaft shall be protected with a replaceable stainless steel sleeve. The pump, motor and impeller shall be removable from the back of volute case for service without disturbing the plumbing.

#### 2.2 MOTOR

Pump motor shall be a squirrel cage induction horizontal solid shaft type. The pump impeller shall be direct mounted and keyed to the motor shaft with a stainless steel protective sleeve. The temperature rise of the motor shall be to NEMA Standard for class B or Class F insulation. Radial and thrust bearings of ample capacity to accommodate the hydraulic thrust of the pump shall be incorporated into the motor.

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## SECTION 3: PIPING MANIFOLD, VALVES, GAUGES AND OTHER MECHANICAL EQUIPMENT

### 3.1 FABRICATED PIPING

All fabricated piping shall conform to ASTM specifications A53 for Grade B welded or seamless schedule 40 pipe. All welded flanges shall be forged steel, slip-on or weld neck type. All welded fittings shall be seamless, ASTM Specification A234, with pressure rating not less than 150 PSI.

#### 3.1a BY-PASS PIPING SYSTEM (Booster Application Only)

A fabricated full flow bypass shall be constructed of ASTM specification A53 Grade B welded or seamless schedule 40 pipe. All welded flanges shall be forged steel, slip-on or weld neck type. All welded fitting shall be seamless, ASTM Specification A234, with pressure rating not less than 150 PSI. Full flow bypass shall be complete with 3 butterfly isolation valves to allow for complete isolation and bypass of the pump. All valves shall be installed inside the enclosure for vandal resistance.

### 3.2 CHECK VALVE

On flooded suction and booster stations the pump check valve shall be cast iron bodied with a spring loaded single disc. Check valves shall be sized according to the maximum discharge flow of the pump. Pressure drop across the check valve shall not exceed 2.5 PSI at full flow. On suction lift stations the check valve will be removed and a pressure rated foot valve will be supplied to attach on the end of the suction pipe.

### 3.3 STATION DISCHARGE ISOLATION VALVE

Pump shall be isolated by means of a butterfly valve after the check valve and before the piping exits the station enclosure. Isolation valves shall be butterfly type with ten position lever, rated for 200 PSI WOG working pressure. Trim shall include stainless steel stem, bronze or nickel coated iron streamlined disk with full faced resilient seat design to eliminate need for flange gaskets.

### 3.4 DRAIN VALVES

Drains shall be provided from all low points in the system and shall consist of 1/4" petcocks or ball valves.

### 3.5 PRESSURE GAUGES

Pressure gauges shall be located upstream and downstream of the pump for easy reading of the intake and discharge pressure. Pressure gauges shall be 304 stainless steel case and bezel construction. Gauges shall be 2-1/2" diameter, liquid filled. Pressure sensing connection shall be 1/4" NPT lower gauge connection.

## SECTION 4: ELECTRICAL CONTROLS

### 4.1 MAIN STATION DISCONNECT AND FUSING

A three-pole, service rated main station disconnect shall be mounted in a separate NEMA 4 enclosure outside the pump station enclosure to completely isolate the pump station electrical system from incoming power.

### 4.2 PUMP THERMAL SWITCH

The temperature of the pump shall be sensed by a thermal switch. The thermal switch shall be located on the pump volute. Externally mounted snap disc type thermal switches will not be accepted. The thermal switch shall activate upon a temperature rise above 120 degrees Fahrenheit.

### 4.3 FLOW SENSOR

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The pump station discharge manifold shall incorporate an insertion type, pulse frequency output flow sensor for continuous output to pump station controls. The flow sensor output pulse shall be conditioned and fed directly to the processor for conversion and display in Gallons Per Minute and totalize. Flow sensor accuracy shall be no less than 2% for flow velocities ranging from 1 - 30 feet per second.

#### 4.4 PRESSURE TRANSDUCER

A solid state pressure transducer shall provide a noise free, linear output proportional to discharge pressure. Transducer shall be solid state, strain gauge type with integral voltage regulating and output accuracy not less than 0.5%. Transducer shall be constructed of stainless steel and rated for the maximum pump station discharge pressure.

#### 4.5 VARIABLE FREQUENCY DRIVE (VFD)

The variable frequency drive shall be IGBT based with selectable carrier frequency up to 15 KHZ. The VFD shall include terminals for incoming power, motor output power and control terminals. The VFD shall generate a sine-coded, variable voltage/frequency, three-phase output for optimum speed control. The VFD shall incorporate power loss ride-through. VFD protective features shall include current limit, short circuit protection, electronic motor overload protection and ground fault protection. The VFD shall have push button programming display for easy access to operation parameters. VFD must be designed for operation in 50 degree C temperature condition.

#### 4.6 NATIONAL ELECTRICAL CODE STANDARDS

Electrical controls shall conform to National Electrical Code Standards.

#### CONTROL ALARMS:

#### 4.7 LOW SYSTEM PRESSURE SAFETY SHUTDOWN

When the station discharge pressure remains below an adjustable set point for the time called out in the Technical Specifications, the pumps will be de-energized and remain so until the alarm is manually reset. The Low Pressure alarm will be indicated on the processor display.

#### 4.8 HIGH SYSTEM PRESSURE SAFETY SHUTDOWN

When the station discharge pressure remains above an adjustable set point for the time called out in the Technical Specifications, the pumps will be de-energized and remain so until the alarm is manually reset. The High Pressure alarm will be indicated on the processor display.

#### 4.9 HIGH PUMP VOLUTE TEMPERATURE SHUTDOWN

If the pump volute case temperature rises above 120 degrees F. for the pre-programmed time, the pump will be de-energized and remain so until the alarm is manually reset. The High Temperature alarm will be indicated on the processor display.

#### 4.10 MOTOR OVERLOAD SHUTDOWN

If the over current condition lasts longer than the pre-programmed limit the motor will be de-energized and remain so until the alarm is manually reset. The overload alarm will be indicated on the processor display.

#### 4.11 PHASE LOSS (THREE PHASE POWER SUPPLIES ONLY)

The controls will sense a phase loss on the incoming power supply. If the phase loss is for longer than the

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drive ride through time, the motor will be de-energized and remain so until the alarm is manually reset. The Phase Loss alarm will be indicated on the processor display.

### 4.12 VFD FAULT SHUTDOWN

The VFD shall sense additional internal faults that will cause the VFD to shutdown for system protection. These faults will be indicated on the processor display.

### 4.13 LIGHTNING ARRESTOR

The main power supply to the pump station shall be equipped with a secondary lightning arrestor having a breakdown current rating of not less than 60,000 Amps at 14,000 Volts discharge. Power supplies 300 Volts and less shall use a 300 Volt arrestor with an 800 Volt spark-over Voltage. Power supplies up to 600 Volts shall use a 600 Volt rated arrestor with a 1,000 Volt spark-over Voltage.

### 4.14 CORROSION INHIBITING MODULES

Corrosion inhibiting modules shall be installed in the main electrical control enclosure in accordance with the manufacture's recommendations.

## SECTION 5: MOUNTING BASE AND ENCLOSURE

### 5.1 MOUNTING BASE

Construction shall include a fabricated base assembly to support all components during shipping and to serve as the installed mounting base. Pump station base shall be formed from a single sheet of 1/4" plate resulting in a seamless, one piece base with rounded edges and corners. Height is to be 3-1/2" inches. The base shall be strategically reinforced beneath as required to provide additional support and strength. The base shall be drilled and tapped allowing the pump to be secured to the base. The base shall be shot blasted to bare metal prior to painting process.

### 5.2 ENCLOSURE

Construction shall include a weather resistant, 14 gauge or equivalent, all metal enclosure. The front side of the enclosure shall have oversized cooling vents. The enclosure is to be supplied with a two internally mounted gas struts that shall extend to keep the access door open. All components are to be accessible from top and front sides with the door completely open. Enclosure is to be suitable for mounting to the pump station base and shall include openings for suction and discharge piping.

### 5.3 EXHAUST FAN

For the purpose of cooling the pump motor, switchgear and control logic, an exhaust fan shall be located inside the pump enclosure, mounted to the enclosure lid. The exhaust fan shall be activated upon pump start and shall run until the pump stops. The fan shall be black die-cast aluminum construction with UL94V-0 rated polycarbonate propeller and rated for not less than 240 CFM. Fan motor shall be permanent split capacitor type with stainless steel ball bearings, class B insulation and automatic thermal protection.

## SECTION 6: PAINTING

Painting of the entire pump station shall consist of a multi-step coating system which includes metal preparation, rust inhibitive baked epoxy prime coat, and a two part ultraviolet light insensitive baked polyurethane finish having total dry film thickness of not less than 5 mils. Prime coat and finish coat shall be baked at 165 degrees for not less than 30 minutes to achieve a high gloss, corrosion resistant finish. Exterior pump station components shall be painted medium green. Electrical control enclosure shall be appliance white.



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## SECTION 7: AVAILABLE OPTIONS (To Be Called For In The Technical Specifications Detail)

### 7.1 REMOTE START SIGNAL

The pump station control system will be activated by up to 3 separate incoming remote start signals. When no signal is present the pumping system will satisfy the pressure set point and shut down. Technical Specifications must define number of incoming signals, (Max of 3).

### 7.2 DROP PIPES

The inlet and discharge piping system will be attached to dual 90 degree drop pipes to provide below grade connection to a suction pipe or city water supply pipe or below grade connection to a discharge main line. Drop pipe sizes, connection fitting style and depth of bury will be shown on the project drawings.

### 7.3 SUCTION PIPE ASSEMBLY (Suction Lift Models Only)

A HDPE floating suction pipe with foot valve will be supplied. It will be supplied with the necessary mating fitting to the pump station inlet pipe and will include an adjustable float and foot valve. Suction pipe diameter and length will be called out in the Technical Specifications Detail.

### 7.4 FULL FLOW BYPASS (Booster Models Only)

A full flow bypass piping system is available for booster models. Pump bypass piping will have three isolation butterfly valves to allow city water pressure and flow to be directed around the pump. This allows isolation of the pump and motor for service without disrupting the irrigation system supply.

### 7.5 STAINLESS STEEL BASE AND MARINE GRADE ALUMINUM ENCLOSURE

The pump station will be supplied with a stainless steel base and marine grade aluminum enclosure provided as unpainted. Painting Sandstone or John Deere Green Tech Medium Green option must be called out in the Technical Specification Detail.

### 7.6 SOUND ATTENUATING FOAM

The pump station enclosure interior will include 1" thick close cell foam. The foam will be cut and shaped to cover as much of the interior surface as possible. Vent louvers will remain open.

### 7.7 SERVICE DISCONNECT

The incoming high voltage disconnect can be supplied as a Dead Front style.

### 7.8 PUMP ENCLOSURE HEATER

The pump station enclosure will include a thermostatically controlled 500 watt heater. The heater will include its own fan for air movement. The heater will have circuit protection.

### 7.9 ALARM LIGHT

The station will include a vandal resistant red alarm light in the disconnect door. It is a common alarm light to be activated by any station control alarm.

## SECTION 8: TESTING

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The pump station and all its component parts shall undergo a complete hydraulic and electrical test prior to shipment from the factory. Testing shall be dynamic and include operation over the entire flow range of the pump station under specified suction and net discharge pressure conditions. A plot containing actual flow, pressure, KW consumption and motor RPM shall be furnished as part of the owners manual.

**SECTION 9: OWNERS MANUAL**

Complete start up instructions shall be provided by the manufacturer in the form of an owners manual.

**SECTION 10: WARRANTY**

The manufacturer shall warrant the pump station to be free of defects for one year from date of start up or fifteen months after shipment, whichever occurs first. Failures caused by lightning strikes, power surges, vandalism, operator abuse, or acts of God are excluded from warranty coverage.

**END OF SECTION**

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**SECTION 31 10 00 - SITE CLEARING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all site clearing work as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.
- B. Removal of surface debris; removal of paving and curbs; removal of trees, shrubs, and other plant life; topsoil excavation; and repair of damaged vegetation and/or irrigation systems/system components.
- C. Removal of concrete and bituminous surfacing.

**1.2 RELATED SECTIONS**

- A. Section 01 74 16: Storm Water Pollution Prevention.
- B. Section 31 22 00: Grading.

**1.3 REFERENCE STANDARDS**

- A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

**1.4 REGULATORY REQUIREMENTS**

- A. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work. The Owner shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.
- B. Perform all work of this Section in strict accordance with applicable Government Codes and Regulations especially meeting all safety standards and requirements of CAL/OSHA, County of Los Angeles and the City of Compton. Provide additional measures, added materials and devices as may be needed as directed by the Owner Representative at no added cost to the Owner.
- C. Comply strictly to Rule 1404, South Coast Air Quality Management Owner.
- D. Coordinate clearing Work with utility companies.

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1.5 PROJECT CONDITIONS

- A. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- B. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- C. Do not direct vehicle or equipment exhaust towards protection zones.
- D. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

- 2.1 Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Section 31 22 00 – Grading, part 2.1C.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. Protect and maintain benchmarks and survey control points from disturbance during construction.
- C. Identify a waste area for placing removed materials.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Refer to specification 01 74 16 –Storm Water Pollution Prevention and the project Water Pollution Control Plans & Details.

3.3 PROTECTION

- A. Protect existing structures and site improvements indicated to remain from damage by approved methods and/or as authorized by the Owner Representative. Removal of all protections shall be when work of this Section is completed or when so authorized by the Owner Representative.
- B. Protect Existing Utilities indicated or made known to remain traversing the job-site and serving existing adjacent facilities.
- C. Protect Existing Trees and Shrubs indicated to remain by providing temporary surrounding fencing so located a sufficient distance away so that trees and shrubs will not be damaged by site-clearing operations.

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1. **Protection Barrier:** A protection barrier shall be installed around the shrubs or trees to be preserved. The barrier shall be constructed of a durable fencing material, such as plastic construction fencing, snow fence, or chain link. The barrier shall be placed at or beyond the drip line. "Drip line" as referred to herein means a line which may be drawn on the ground around the tree directly under its outermost branch tips and which identifies that location where rainwater tends to drip from the tree. Placement of barrier to be approved by Owner Representative (Grounds Supervisor). If barrier is placed inside the drip line, then 3/4 inch plywood must be placed over the root zone up to the drip line. The fencing shall be maintained in good repair throughout the duration of the project, and shall not be removed, relocated, or encroached upon without permission of the Owner Representative (Grounds Supervisor).
2. **Storage of Materials:** There shall be NO storage of materials or supplies of any kind within the area of the protection barriers. Concrete, cement, asphalt materials, block, stone, sand and soil shall not be placed within the drip line of the tree(s).
3. **Fuel Storage:** Fuel storage shall NOT be permitted within 150 feet of any tree to be preserved. Refueling, servicing and maintenance of equipment and machinery shall NOT be permitted within 150 feet of protected trees.
4. **Vehicles/equipment:** NO parking or driving of vehicles or storage of equipment shall be permitted within the drip line of any tree to be preserved.
5. **Debris and Waste Materials:** Debris and waste from construction or other activities shall NOT be permitted within protected areas. Wash down of Concrete, cement or asphalt handling equipment, in particular shall NOT be permitted within 150 feet of protected areas.
6. **Grade Changes:** Grade changes can be particularly damaging to trees. Any grade changes should be approved by the Owner Representative (Grounds Supervisor) before construction begins and precautions taken to mitigate potential injuries.
7. **Damages:** Any damages or injuries to the preserved trees (including pruning or cutting of such trees not in conformity with the International Society of Arboricultural Pruning Guidelines and ANSI A300 Pruning Standards) shall be reported immediately to the Owner Representative (Grounds Supervisor). Severed roots shall be pruned cleanly to healthy tissue, using proper pruning tools. Broken branches/limbs shall be pruned according to International Society of Arboricultural Pruning Guidelines and ANSI A300 Pruning Standards. In the event that any damage, injury, improper pruning or cutting of a protected tree is deemed to be so substantial as to require its replacement (such determination to be made in the sole discretion of the Owner Representative), Contractor shall replace such tree with the same species and variety of tree, up to a box size of 48 inches, or if no such replacement is available, with a substitute species or variety as determined in the sole discretion of the Owner Representative. Any replacement tree shall be approved in advance by the Owner Representative. The value of the tree to be replaced shall be determined by a Certified Arborist selected by Contractor from the Owner's approved list of Registered Consulting Arborists. To the extent that the value of the replaced tree as determined by the Certified Arborist exceeds the cost of the replacement tree, Contractor shall be liable to Owner for such difference in value in addition to all costs associated with replacement of the damaged tree.
8. **Removal of Existing Tree or Shrub:** Prior to removing or cutting any trees designated for removal, the contractor shall coordinate with the Owner's Ground Supervisor. In the event that Contractor, a Subcontractor, Sub-Subcontractor, material supplier or anyone else performing the Work of the Contract willfully, negligently or mistakenly removes any tree or shrub not designated for removal, Contractor shall immediately report such removal to

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the Owner Representative (Grounds Supervisor). Contractor shall replace such tree with the same species and variety of tree, up to a box size of 48 inches, or if no such replacement is available, with a substitute species or variety as determined in the sole discretion of the Owner Representative. Any replacement tree shall be approved in advance by the Owner Representative. The value of the tree to be replaced shall be determined by a Certified Arborist selected by Contractor from the Owner's approved list of Registered Consulting Arborists. To the extent that the value of the replaced tree as determined by the Certified Arborist exceeds the cost of the replacement tree, Contractor shall be liable to Owner for such difference in value in addition to all costs associated with replacement of the damaged tree.

9. Unauthorized Tree Removal or Injury: Criminal Penalties: Reference is made to California Penal Code §384a which provides that any person who willfully or negligently cuts, destroys, mutilates or removes any tree or shrub or portion thereof growing on public land without a written permit from the owner of said public land is guilty of a misdemeanor, subject to a fine of up to \$1,000, imprisonment in county jail for up to 6 months, or both. Contractor is advised that, in addition to all remedies provided herein and in the Contract Documents, the Owner shall cooperate with appropriate authorities in prosecuting and enforcing Penal Code §384a and other criminal sanctions as appropriate concerning trees and shrubs located on Owner property.
  10. Preventive Measures: Before construction begins fertilization of the affected areas to be applied at a rate to be determined by the Owner Representative (Grounds Supervisor).
- D. Protect bench marks, survey control points, and existing structures from damage or displacement.
- E. Protection of Persons and Property (existing structures and site improvements):
1. Provide barricades, warning signs at open depressions and holes on adjacent property and public accesses.
  2. Provide operating warning lights during hours from dusk to dawn each day or as otherwise required.
  3. Protect existing remaining structures, utilities, sidewalks, pavements other facilities from damage as caused by settlement, undermining, washout or other hazards created by site-clearing operations of this Section.
- F. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors and to others performing work on or near the job-site.
- G. Maintain access to the job-site at all times.
- 3.4 CLEARING AND GRUBBING
- A. Clear areas required for access to site and execution of Work.
  - B. Remove all rubbish and debris existing and resulting from work operations of this Section as soon as possible, do not allow to pile up. Do not burn rubbish and debris on the job-site.
  - C. Where active utility lines need to be capped or plugged, perform such work in accordance with requirements of the Utility Company.

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**3.5 REMOVAL**

- A. Remove field grass, debris, rock, and extracted plant life from site.
- B. Excavate and remove associated plumbing piping.
- C. Prior to demolition work, the Contractor shall notify the Owner Representative to identify the existing items for salvage purposes. The materials identified for salvage shall be returned to the Owner in a timely manner agreed upon by the Owner Representative.

**3.6 CONCRETE AND BITUMINOUS SURFACE REMOVAL**

- A. Where noted on the construction drawings, break up and completely remove all existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to limits indicated to be removed. All cutting shall be done to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1-1/2", unless otherwise specified. Remove any concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match the existing.
- B. Removed concrete and bituminous materials shall be disposed of off-site unless otherwise noted on the construction drawings. All such items to be removed shall be disposed of off the property in a legal manner.
- C. Bituminous pavement saw cutting shall conform to the provisions of Section 300-1.3.2 (a) of the Standard Specifications. The residue resulting from the saw cutting operations shall not be permitted to flow beyond the specific work location and shall be removed the same day.
- D. Removal of concrete curb / curb & gutter covered by this section shall include saw-cutting and removal of a twelve (12") inch wide section of the adjacent bituminous pavement.
- E. When saw cutting concrete curb / curb & gutter, the cuttings shall be continuously wet vacuumed to prevent the materials from entering catch basins, storm water conveyances, or waters of the State. Vacuumed cuttings shall be disposed of according to applicable regulations.
- F. Concrete curb and concrete curb and gutter shall be removed to the lines, grades and locations shown on the plans in accordance with Section 300-1.3.2 of the Standard Specifications.
- G. Concrete removal in sidewalk and driveway areas shall extend to existing score lines unless specifically indicated otherwise on the Plans or in the Project Special Provisions, or unless otherwise approved by the Engineer.
- H. Reinforcing or other steel may be encountered in portions of concrete to be removed. No additional compensation will be allowed for the removal of concrete containing reinforcing or other steel.
- I. In those areas where existing bituminous surfacing is removed to make way for new planting or lawn areas, remove soil 6" below existing exposed soil surface. Removed soil may be used only as fill under buildings or other areas to be paved, only if approved by the Owner Inspector. Legally dispose of off site, if material is not approved as fill material.

**3.7 REPAIRS**

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- A. During demolition and construction, ensure that trees, shrubs and other plant material and vegetation are protected inside and outside of the work zone and that the vegetation is being watered, maintaining the proper moisture content according to the season. Failed vegetation, including sod, due to lack of water, and/or plant material destroyed during construction period are to be replaced to equal or better size and condition at no additional cost to the Owner.
- B. If the irrigation system is damaged or modified during construction, it shall be repaired to the Owners standards, and shall be in equal or better condition than prior to damage or modification. All repairs shall be, inspected and approved by the Owner Representative (Grounds Supervisor) prior to backfilling or covering of said repairs. The Owner representative requires forty-eight hours prior notice, when contractor requests inspection of completed repairs. All repairs shall be made so as to ensure proper operation prior to the close of the contract at no additional cost to the Owner.
- C. Controller Wires: If damaged, cut or removed, repair by splicing, soldering and silicone sealing. To ensure proper operation, reconnect the wires to the valve to correspond with the map on the controller to the correct station.
- D. Hydraulic Tubes: If damaged/cut or removed, repair by replacing the tubing using equal or better material.
- E. Valves: If damaged, repair/replace with equal or better material. All valves are to be flushed/cleaned thoroughly.
- F. Mainlines: If damaged, repair/replace with equal or better material. All lines are to be flushed/cleaned thoroughly.
- G. Lateral Lines: If damaged, repair/replace with equal or better material. All lines are to be flushed/cleaned thoroughly.
- H. Irrigation Heads: If damaged, repair/replace with equal or better material. All heads are to be flushed and filters cleaned thoroughly.
- I. Controllers: If damaged repair/replace with equal or better material.
- J. Backflow Prevention Devices: If damaged, repair/replace with equal or better material.
- K. Gate/Ball/Quick Coupler Valves: If damaged repair/replace with equal or better material.
- L. Valve Boxes: If damaged, repair/replace with equal or better material. Concrete boxes and concrete lids with the appropriate markings for identification shall be used. The top of the box shall be buried below finish grade, equal to existing depth or deeper. The top of the valve stems shall be 6" below the underside of the top of the box.
- M. Construction in grass areas: Sod shall be removed by sod cutting at a soil depth of 2", stored on site, and watered on a daily basis. Upon completion of work, stored sod shall be reinstalled over the areas disrupted due to construction. An option may be to bypass cutting the sod, however at the completion of the project, finish grading and installation of new Hybrid Bermuda GN -1 sod over the areas disrupted by construction shall be required.

**3.8 EXCESS MATERIALS DISPOSAL**

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.



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- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

3.9 SITE CLEANUP

- A. Cleanup of branches, limbs, logs, or any other debris resulting from any operations shall be promptly and properly accomplished. The work area shall be kept safe at all times until all operations are completed. Under no circumstances shall the accumulation of brush, limbs, logs, or other debris be allowed in such a manner as to result in a hazard to the public. All debris shall be cleaned up each day before the work crew leaves the site, unless permission is given by the Owner to do otherwise. All lawn areas shall be raked, all streets and sidewalks shall be swept, and all brush, branches, rocks or other debris shall be removed from the site. Areas are to be left in a condition equal to or better than that which existed prior to the commencement of operations.

END OF SECTION

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**SECTION 31 22 00 - GRADING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. The work of this section shall include excavation, unclassified cut, unclassified fill, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled, and all other work necessary to complete the rough grading of the site. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Geotechnical Engineer. Included with this Work are the following:
1. General exterior grading, cutting and filling.
  2. Excavating and backfilling trenches.
  3. Shoring plan guidelines.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
1. Section 01 71 23 - Field Engineering.
  2. Section 01 74 16 - Storm Water Pollution Prevention
  3. Owner provided Geotechnical Report.

**1.02 DEFINITIONS**

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.
- D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- E. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below ground surface.
- G. Utilities include underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

**1.03 SUBMITTALS TO CONSTRUCTION MANAGER**

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

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- B. Product data for the following:
  - 1. Each type of plastic warning tape.
- C. Test Reports: In addition to test reports required under field quality control, submit the following:
  - 1. One optimum moisture-maximum density curve for each soil sample.
  - 2. Laboratory analysis of each soil material proposed for fill or backfill from borrow sources.
- D. Excavation support & protection (shoring) shop drawings for informational purposes: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1.04 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. 2013 California Building Code, Title 24, Part 2, Volume 2 of 2, Appendix J, Grading.
  - 2. ASTM D422 - Method for Particle Size Analysis of Soils
  - 3. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
  - 4. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop.
  - 5. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
  - 6. ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
  - 7. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
  - 8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
  - 9. AASHTO T217 - Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Meter.
  - 10. ASTM D4829 - Expansion Index Test.
- B. The work provided herein shall conform to and be in accordance with the Contract Plans as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
- C. Comply with all requirements of permit for export of soil from site. Permit is to be obtained and paid for by Contractor. Furnish copies of all permits and licenses required by the City to Owner's representative.
- D. Professional Observation: A soils engineer will be retained by the Owner for purposes of inspection, testing and approval of all work under this section. Perform work of this Section under inspection and approval of the soils engineer. Give soils engineer not less than 48 hours advance notice of readiness for inspection.

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- E. The soils engineer will have the authority over all filling, grading, and compaction operations, including interruption of work if deemed necessary due to improper work
- F. Pre-Grading Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
  - 1. Before commencing earthwork operations, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

**1.05 CONSTRUCTION MONITORING**

- A. All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a Geotechnical Engineer, including;
  - 1. Observation of all site preparations;
  - 2. Observation of shoring installation, if needed;
  - 3. Observation of all site excavations;
  - 4. Test and approval of all import soil;
  - 5. Observation of placement of all compacted fills and backfills;
  - 6. Observation of all surface and subsurface drainage systems;
  - 7. Observation of all foundation and pile excavations;
  - 8. Observation of subgrade preparation for paved and building areas.
- B. The Geotechnical Engineer of Record should be notified at least three (3) days in advance of the start of construction. A joint meeting between the Contractor and Geotechnical Engineer is recommended prior to the start of construction to discuss specific procedures and scheduling. The Geotechnical Engineer should be present to observe the soil conditions encountered during construction, to evaluate the applicability of the recommendations presented in the Soils Report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein. The Geotechnical Engineer of Record should inspect and approval all imported backfill material prior to its placement as backfill, approve the subgrade beneath all fills, fill placement and bottom of all foundation excavations before concrete or steel is placed.
- C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Civil Engineer at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

**1.06 IMPORT AND EXPORT OF EARTH MATERIALS**

- A. Fees: Pay as required by government authority having jurisdiction over the area.
- B. Bonds: Post as required by government authority having jurisdiction over the area.

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- C. Hauling Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

**1.07 TRUCK HAUL ROUTE**

- A. A proposed truck haul route is to be submitted to the City of Compton Public Works Department for review and approval. Upon approval, an approved copy shall be returned to the Contractor. The Contractor shall post an approved copy on the job site. All trucks working that project shall also carry a copy. If a truck(s) is found not to be carrying an approved copy, the Contractor shall be subject to a Notice of Noncompliance (stop work order)
- B. All trucks must cover their dirt with an acceptable tarp during transport for dust containment. Provisions for street sweeping and watering will also be required unless an active wheel washing facility proves that they are un-necessary to the satisfaction of the Engineer.
- C. All truck haul routes, as approved, are good only for the project time period, and trucks shall have to comply with the approved route only. If during the progress of the project an alternate route is needed, the Contractor shall submit a new plan. The haul route application shall contain the following information:
  - 1. Map showing the proposed route
  - 2. Project name
  - 3. Grading Contractor's name, address and phone number
  - 4. Type of material being hauled
  - 5. Encroachment or construction permit number

**1.08 DIG ALERT NOTIFICATION**

- A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at 811 for information on buried utilities and pipelines.
- B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.
- C. Call at least Two (2) full working days prior to digging.
- D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).
- E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.
- F. If caught digging without a Dig Alert ticket you can be fined as much as \$50,000 per California government code 4216.

**1.09 PROJECT CONDITIONS**

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- A. Data: Maps, boring logs, geotechnical and foundation investigation reports, and like reference data, not included in Contract Documents but made available to Contractor by Architect or Owner are for information only, and the Architect and Owner assume no responsibility for any conclusions Contractor may draw from such information. Should questions or issues arise, contact Architect or Owner for clarification.
- B. Contractor shall determine existing conditions under which the Contractor will operate in performing the Work
- C. A limited geotechnical investigation report prepared by GeoTek, Inc (Report No. 1337-CR), dated June 8, 2015 (and amendments) has been prepared for this project. Prior to bidding or performing the work of this project, contractor shall obtain a copy of this report, and shall thoroughly familiarize himself/herself with its contents. Any information obtained from such report, or any information given on any drawings as to subsurface soil conditions or to elevations of existing elevations or elevations of underlying rock, is approximate only, is not guaranteed, and does not form a part of the contract, unless specifically referenced in the Contract Documents. The Contractor is required to make a visual inspection of the Project Premises and must (and is permitted to) make whatever tests the Contractor deems appropriate to determine and assess the underground condition of the soil. No claims for allowances or damages because of the Contractor's negligence or failure in acquainting itself with the conditions of the Project Premises as described herein will be recognized by the Owner.
- D. **WARNING: OWNER DOES NOT WARRANT THE SOILS AT THE PROJECT SITE. SOILS INVESTIGATION REPORT IS PROVIDED FOR CONTRACTORS INFORMATION ONLY. CONTRACTOR HAS CONDUCTED AN INDEPENDENT INVESTIGATION OF THE PROJECT SITE AND THE SOILS CONDITIONS OF THE SITE. OWNER DOES NOT WARRANT THE SOILS CONDITIONS OF THE SITE AND CONTRACTOR IS FULLY RESPONSIBLE TO ASCERTAIN SITE CONDITIONS FOR THE PURPOSES OF DETERMINING CONSTRUCTION MEANS AND METHODS PRIOR TO COMMENCING CONSTRUCTION. THE SOILS INVESTIGATION REPORT IS NOT A CONTRACT DOCUMENT.**
- E. Information on Drawings does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- F. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during earthwork operations.
  - 1. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult Utility Owner immediately for direction. Cooperate with Owner and Utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of Utility Company.
  - 2. Do not interrupt existing utilities serving facilities occupied or used by Owner, or others, except when permitted in writing by Owner's Representative, and then only after acceptable temporary services have been provided.
  - 3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut off of services if lines are active.
- G. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.

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- H. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify Owner's Representative in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, without cause for extra compensation.

**PART 2 - PRODUCTS**

**2.01 SOIL MATERIALS**

- A. General: All soils materials to be used throughout the site shall be approved for use by the Geotechnical testing engineer. Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. No earthwork analysis has been completed with respect to the volumes of soils to be excavated, placed, or imported in order to provide the finished grades shown on the plans. The Contractor is solely responsible for verifying the earthwork quantities necessary to complete the project.
- C. For earthwork volume estimating purposes, an average shrinkage volume of 10 to 15 percent and subsidence of 0.10 feet may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation and debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.
- D. Satisfactory Soil Materials: Soils approved by the testing geotechnical engineer and free of rock or gravel larger than 8 inches in any dimension, debris, waste, vegetation and other deleterious matter and as approved by the Geotechnical Engineer. Rocks or hard lumps larger than approximately 8 inches in diameter should be broken into smaller pieces or should be removed from the site.
- E. Borrow / Imported Fill Material: Soil excavated from site or imported conforming to requirements for fill material.
1. Materials for the fill shall be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than is recommended by the geotechnical consultant, and shall be approved by the geotechnical consultant.
  2. Imported materials should consist of clean, granular material with a low expansion potential, corresponding to an expansion index of 20 or less as evaluated in accordance with ASTM Standards (CBC, 2013). Import material should be submitted to the geotechnical engineer for review prior to importing to the site.
- F. Backfill & Native Fill Materials: The existing on-site soils have been determined to be suitable for being used for backfilling purposes.
- G. Base Course Material For Use Under Asphalt Pavement: Crushed base material shall consist of materials that meet any of the provisions listed below.
1. Crushed Aggregate Base (CAB) per Section 200-2.2, 3/4" maximum of the Standard Specifications for Public Works Construction (Green Book).
- H. Engineered Fill: Satisfactory Soil Materials / Borrow Fill Material, as described above, placed in lifts no greater than 8 inches thick (loose measurements) and each lift moisture conditioned to a minimum of 2% points above optimum moisture content. All engineered fill should be densified to a minimum relative compaction of 90 percent per ASTM D 1557.

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I. Bedding Material for Trenches:

1. Bedding sand shall be as defined by Standard Specifications, Section 200-1.5, and shall be free of expansive material and organic matter. Bedding material for utility lines outside the property lines shall be as required by the agency having jurisdiction. On-site soils are not considered suitable for bedding or shading of utilities.
2. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30. All of the sand bedding shall be compacted to 90 percent of maximum density as indicated in the Contract Documents by mechanical means. Flooding and jetting shall not be permitted without prior written approval from the Geotechnical Engineer. Where sheeting or shoring is used densification of the bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone, unless the sheeting or shoring is to be cut off or left in place. Pipe bedding material shall be placed in horizontal layers not exceeding (8) eight inches.

J. Backfill Material for Trenches:

1. The on-site soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials (EI less than 20) and mechanically compacted to at least 90% of the maximum dry density of the soils.

2.02 ACCESSORIES

- A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film metallic warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

1. Tape Colors: Provide tape colors to utilities as follows:

- a. Red: Electric.
- b. Yellow: Gas, oil, steam, and dangerous materials.
- c. Orange: Telephone and other communications.
- d. Blue: Water systems, with "Caution: Water Line Below."
- e. Green: Sewer systems, with "Caution: Sewer Line Below."
- f. Green: Storm systems, with "Caution; Storm Drain Line Below."

2.03 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN

- A. The CONTRACTOR shall have at the Worksite, copies or suitable extracts of: Construction Safety Orders, Tunnel Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The CONTRACTOR shall comply with provisions of these and all other applicable laws, ordinances, and regulations.
- B. Before excavating any trench 5 feet or more in depth, the CONTRACTOR shall submit a detailed plan to the Owner showing the design of shoring, bracing, sloping, or other revisions to be made for the Workers' protection from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the



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plan shall be prepared by a registered Civil Engineer. No excavation shall start until the OWNER has accepted the plan and the CONTRACTOR has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the OWNER.

- C. The INSPECTOR will provide a competent person trench/excavation certification form to the CONTRACTOR. It shall be completely filled out before any worker has access to trench or excavation and returned to the INSPECTOR before the end of the first working day. The CONTRACTOR shall certify by this form the name of the competent person administering the Work, the soil classification, and the type of excavation protective system provided and/or installed.
- D. The CONTRACTOR shall completely fence all excavations to provided protection against anyone falling into the excavation and to the satisfaction of the INSPECTOR. The fencing shall be in place at all times except when workers are present and actual construction operations are in progress.
- E. The fencing material shall be chain link fabric or welded wire fabric (6x6-W9xW9 minimum) and 6 feet high, constructed according to one of the following:
  - 1. Tensioned fencing material and have top and bottom tension wires securely fastened to driven steel posts or other equally rigid elements at a maximum spacing of 12 feet; or
  - 2. Untensioned fencing materials securely fastened to extended trench shoring elements at a maximum spacing of 8 feet and fastened to continuous top and bottom rails constructed of nominal 2 in x 4 in lumber or equally rigid material. Framed panels with suitable supporting elements fastened together to form a continuous fence may also be used.
- F. Payment for performing all work necessary to provide safety measures shall be included in the prices bid for other items of work except where separate bid items for excavation safety are provided, or required by law.

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**3.01 PREPARATION**

- A. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.
- B. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.
- C. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.
- D. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

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- E. A 6 foot high, temporary chain link fence with visual screen and gates, (pair 26' wide, minimum) shall be erected prior to any grading operations at the construction limits perimeter. Coordinate the exact location with Architect and OWNER.

**3.02 DEWATERING**

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Any water entering an excavation shall be immediately pumped out and the exposed excavation allowed to dry.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

**3.03 GRADE STAKES**

- A. The Contractor shall utilize laser-controlled equipment for the grading of this project.
- B. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the OWNER. Contractor shall notify the OWNER at least 48 hours before staking is to be started. The OWNER will determine if work is ready for staking.
- C. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
- D. Protect and maintain stakes in place until their removal is approved by the OWNER. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.
- E. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

**3.04 EXCAVATION**

- A. Open excavations may be cut vertically to a maximum depth of no more than 4 feet. Excavations extending between 4 and 10 feet deep should be shored or sloped back from the base of the excavation to at least a one and one-half horizontal to one vertical (1:5H:1V) slope or flatter. If excavations dry out, sloughing will occur. No excavation should be made within a 1:5:1 line projected outward from the toe of any existing footing or structure.
- B. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork", except as modified herein.
- C. In preparation for grading, the construction areas should be cleared of surface vegetation, concrete, pavement and any loose surficial soils. Any unsuitable material encountered should be properly disposed of and not incorporated into any new fill.
- D. Excavate to the depths, lines and grades indicated on the approved Grading Plan. Excavate sufficiently over-size to permit installation and removal of concrete forms and other required work. Should soil of inadequate density and bearing capability be

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encountered at the elevations indicated on the drawings, or where new fill is to be placed upon existing loose fill material exposed by excavation, the excavation shall be carried to the depth required to attain soil of bearing quality as determined by the Geotechnical Engineer.

- E. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the scarification depths, shown on the construction drawings for asphalt concrete pavement and concrete pavement structural sections, have been achieved prior to re-compaction.
- F. Surplus earth not needed for filling and grading shall be disposed of in a legal manner off the site.
- G. All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1970, and the Construction Safety Act should also be followed.
- H. Bills of lading or equivalent documentation will be submitted to the Owner on a daily basis.
- I. Upon completion of import operations, provide the Owner a certification statement attesting that all imported material has been obtained from the identified source site.

### 3.05 SCARIFICATION IN SYNTHETIC TURF AREAS

- A. FOR AREAS OF SYNTHETIC TURF SUPPORT, THE NATIVE SOILS UNDER PROPOSED CRUSHED AGGREGATE BASE SHOULD BE SCARIFIED TO A DEPTH OF AT LEAST 12 INCHES, MOISTURE CONDITIONED TO AT LEAST 2% OVER OPTIMUM AND DENSIFIED TO AT LEAST 90% RELATIVE COMPACTION PER ASTM D1557.

### 3.06 EXCAVATION, BACKFILL & COMPACTION FOR UTILITIES

- A. Field conditions may require deviations from information indicated on Drawings. Such changes in work shall be covered by a Change Order, indicating an increase or decrease in the Contract sum.
- B. Before excavation, Contractor shall contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.
- C. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans will be made, and the Contractor will be paid for any additional work resulting from such change in line or grade.
- D. Trenches, ditches, pits, sumps, and similar items which are outside the barricaded working area shall be barricaded to conform to Cal OSHA standards.
- E. Trenches over 5'-0" in depth shall conform to the Construction Safety Orders of the California Division of Industrial Safety, see Section 2.3 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN.

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- F. Safe and suitable ladders which project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. One ladder shall be provided for each 50 feet of open trench, or fraction thereof, and be so located that workers in the trench need not move more than 25 feet to a ladder.
- G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.
- H. All trenches should be backfilled with approved fill material compacted to relative compaction of not less than 90 percent of maximum density determined in accordance with ASTM D 1557. Backfill shall be placed in layers not exceeding 8" (inches) in thickness.
- I. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.
- J. Do not excavate trenches parallel to footings closer than 18" from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9" above bottom of footings.
- K. If soft, spongy, unstable, or other unsuitable material is encountered upon which the bedding material or pipe is to be placed, this material shall be removed to a depth ordered by the Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the Plans or Specifications, will be paid for as provided in the Bid. If the necessity for such additional bedding material has been caused by an act of failure on the part of the Contractor or is required for control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding.
- L. Unless indicated otherwise on the plans are within this specification, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 4 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Maximum allowances at the sides for trenching shall be 12 inches. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.
- M. Where portions of existing structures, walks, paving, etc. must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work.
- N. Provide a minimum clear dimension of 6 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.
- O. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.
- P. Bedding material immediately around a utility line and to a point 6 inches above the line should consist of sand, fine-grained gravel, or cement slurry to support the line and protect it.

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- Q. Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 6" (inches) above the top of pipe. Compaction requirements in this area must meet 90%.
- R. Bedding material shall first be placed on a firm and unyielding subgrade so that the pipe is supported for the full length of the barrel. There shall be 4-inch minimum of bedding below the pipe barrel and 1-inch clearance below a projecting bell for sewer, storm drain and water pipe. The material in the bedding zone shall be placed and densified by mechanical compaction only.
- S. Mechanically compacted backfill shall comply with section 306-1.3.2 of the Standard Specifications for Public Works Construction.
- T. Fill voids with approved backfill materials as shoring bracing and sheeting is removed.

**3.07 INSPECTION & TESTING AT TRENCHES**

- A. Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Engineer and shall be at NO cost to the Owner.
- B. The Inspector or Geotechnical Engineer will inspect all subgrades and excavations prior to placing bedding & backfill materials.
- C. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.
- D. Utility backfill compaction test shall be performed in accordance with ASTM D1557, method "C".
- E. Utility backfill in place density test per ASTM D 1556 (sand cone) or other test method as considered appropriate by the Geotechnical Engineer.
- F. Hydrostatic pressure tests shall be done only after backfill has been placed and final compaction has been achieved.

**3.08 APPROVAL OF SUBGRADE**

- A. Notify Geotechnical Engineer when excavations have reached required over-excavation subgrade.
- B. When Geotechnical Engineer determines that unforeseen unsatisfactory soil is present, continue work only after receiving direction from the Contracting Officer.
- C. Reconstruct subgrades damaged by rain, accumulated water or construction activities as directed by the Soils Engineer.

**3.09 UNAUTHORIZED EXCAVATION**

- A. Fill of unauthorized excavation below bottoms of foundations or wall footings will be engineered fill.
- B. Fill unauthorized excavations under other construction as directed by the Soils Engineer.
- C. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.

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**3.10 STORAGE OF SOIL MATERIALS**

- A. After the site has been stripped of all debris, vegetation and organic materials, excavated on site soils may be reused as engineered fill provided they meet the satisfactory soils material conditions in Section 2.01, part D. High in-site moisture contents will require aeration prior to placement as engineered fill.
- B. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees. Cover to prevent wind-blown dust.

**3.11 PLACEMENT OF ENGINEERED FILL**

- A. Spreading and Compacting Fill Material:
  - 1. Engineered Fill shall be placed in lifts no greater than 8 inches thick (loose measurements) and each lift moisture conditioned to at least two percent over optimum and densified to at least 90% relative compaction per ASTM D1557.
- B. Compaction Testing:
  - 1. The Geotechnical Engineer's representative shall observe the excavation, filling, and compacting operations and shall make density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or moisture content of any layer of fill or portion thereof does not meet the specified density or moisture content, the particular layer or portions shall be reworked until the specified density and moisture content have been obtained.
  - 2. Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the Geotechnical Engineer's representative at any location and time as the Owner may determine.
  - 3. The Contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the testing personnel. The Contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.
  - 4. Test pits shall be excavated in the backfill by the Contractor as directed by the Engineer for the purpose of testing the backfill compaction. At the option of Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.
  - 5. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.
  - 6. When initial compaction testing performed by the Engineer indicates the required density has not been obtained, the Contractor shall re-compact or replace the backfill as necessary to meet the specified minimum density.

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7. The Contractor shall be responsible for rescheduling compaction testing with the Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance. Costs associated with retesting and scheduling delays shall be the sole responsibility of the Contractor. The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Owner and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

3.12 BACKFILL - GENERAL

- A. Backfill excavations promptly, but not before completing the following:
  1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
  2. Surveying locations of underground utilities for record documents.
  3. Testing, inspecting, and approval of underground utilities.
  4. Concrete formwork removal.
  5. Removal of trash and debris from excavation.
  6. Removal of temporary shoring and bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.13 GRADING

- A. The Contractor shall utilize laser-controlled equipment for the grading of this project.
- B. 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 existing adjacent grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
  3. Grade area for paving to a depth below finish grades indicated, equal to base and pavement thickness to be constructed.
  4. Cut banks neatly to required finish grades as cut progresses, or leave cuts full and finish grading by mechanical equipment, which will produce finish grades indicated on Drawings.
  5. Grade filled banks full and compact beyond grade of finish bank so that when trimmed to finish grades, soil is compacted to density specified for final slope face.
  6. Bring areas to be graded to approximate finish grades and then scarify, moisten and roll to obtain required density. Scarify, moisten and roll resulting high and low areas to obtain required finish grades by cutting and filling.
  7. Grade future planting areas so that, upon cultivation and fertilization, they will conform to finish grades indicated for planting areas.
  8. Protect all utilities.
- C. Site Grading: Finish subgrades to required elevations within the following tolerances:

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1. Field: Plus or minus (0.04-foot).
2. Walks: Plus or minus (0.04-foot).
3. Pavements: Plus or minus (0.04-foot)

**3.14 FIELD QUALITY CONTROL**

- A. A Geotechnical Engineer, designated by the Owner, will be engaged to perform continuous inspection of the placing and compacting of all fills and backfills within the limits of grading of this project. All work shall be done in accordance with the approved plans and these specifications and as recommended and approved by the Geotechnical Engineer. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the owner, inspector, architect and the civil engineer. Costs for all such inspections and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical Engineer in advance so that he may be present to perform his services as needed.
- B. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Architect at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.
- C. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
  1. Perform field in-place density tests according to ASTM D 1556 (sand cone method) or other test method as considered appropriate by Geotechnical Engineer.
    - a. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.
    - b. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
  2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
  3. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in place density test for each 150 feet or less of trench, but no fewer than two tests.
- D. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.
- E. Owner's inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.



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**3.15 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 lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved 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.

**3.16 MAINTENANCE**

- A. Install and maintain all temporary erosion control devices, including gravel bags, de-silting basins, inlet barricades, vehicle wash traps, and other features called for on the Erosion Control Plans and as required per specification 01 74 16 - Storm Water Pollution Prevention.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape to required tolerances, and compact to required density prior to further construction.

**3.17 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 the Owner's property.

END OF SECTION

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**SECTION 32 12 16 - ASPHALT PAVEMENT**

**PART 1 - GENERAL**

**1.1 REQUIREMENT**

- A. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated in the Contract Documents and specified herein.
- B. The following types of pavement shall be covered in this Section:
  - 1. Paving under synthetic turf field as indicated on Construction Documents.
- C. Related Sections:
  - 1. Section 31 22 00: Grading.

**1.2 QUALITY ASSURANCE**

- A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
- B. The Owner's inspector shall test the temperature of each batch of asphaltic concrete prior to placement. At the time of delivery to the work site, the temperature of mixture shall not be lower than 260 degrees F or higher than 320 degrees F, the lower limit to be approached in warm weather and the higher in cold weather. If asphaltic concrete temperature is not within these tolerances the affected batch shall be rejected. Any and all costs due to the rejected asphaltic concrete shall be the responsibility of the paving contractor.

**1.3 ESTABLISHMENT OF GRADES**

- A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the Owner. Contractor shall notify the Owner at least 48 hours before staking is to be started. The Owner will determine if work is ready for staking.
- B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
- C. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.
- D. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn

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string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

- E. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

**1.4 SUBMITTALS**

- A. **Mix Designs:** The CONTRACTOR shall formulate a job-mix formula using the Hveem method in accordance with Standard Specifications Section 203-6.2 and submit it to the ENGINEER for approval. The resultant mixture shall have Hveem properties conforming to Standard Specifications Section 203-6.4.3.

- B. **Samples:**

- 1. Prior to the delivery of specified aggregate to the site, the CONTRACTOR shall submit samples of the material for the INSPECTOR's acceptance in accordance with Standard Specifications Section 4-1.4. Samples shall be typical of materials to be furnished from the proposed source and in conformance with the specified requirements.
- 2. Aggregate base gradation and quality certifications shall be dated within 30 days of the submittal.

- C. **Certificates**

- 1. Twenty days prior to the delivery of aggregates, asphalt materials, and paving mixes to the project site, the Contractor shall submit to the Engineer certificates and test results of compliance of such materials with these specifications.
- 2. Submit certificates of compliance from the supplier for bituminous materials for paint binder, asphaltic concrete, and seal coat.
- 3. Submit weigh master's certificates or certified delivery tickets for each truck load of asphaltic material delivered to the project site.
- 4. Upon completion of the weed control treatment, and as a condition for final acceptance, furnish a written certificate stating the brand name of the sterilant and the manufacturer, and that the sterilant used had at least the minimum required concentration, and that the rate and method of application complied in every respect with the conditions and standards contained herein.

**1.5 QUALITY CONTROL**

- A. **Asphaltic Concrete Producers Qualifications:** Use only materials furnished by a bulk asphaltic concrete producer regularly engaged in production of hot mix, hot laid bituminous concrete.
- B. **Applicator Qualifications:** Paving machine and roller operators shall be fully trained and experienced in the installation of asphaltic concrete paving on projects of similar size and complexity.
- C. **Regulatory Requirements:** The quantity of volatile organic compounds (V.O.C.) used in weed killer, seal coat, primer and other materials shall not exceed the limits permitted under the current regulations of the local authorities having jurisdiction.

**1.6 ENVIRONMENTAL LIMITATIONS**

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- A. Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:
1. Tack Coats: Minimum surface temperature of 60 deg F.
  2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
  3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Base Course Material:

1. Crushed Aggregate Base (CAB) per Section 200-2.2, 3/4" maximum of the Standard Specifications for Public Works Construction (Green Book).

B. Asphalt Surfacing Materials: Furnish asphalt meeting the following requirement, furnished from a commercial asphalt central mixing plant.

1. Paint Binder/Tack Coat: Asphalt emulsion shall be CSS-1 or CSS-1h and shall conform to the requirements of Standard Specifications Section 203-3 Emulsified Asphalt.
2. Asphalt Concrete Composition & Grading:
  - a. Surface course asphalt concrete shall conform to Standard Specification Section 203-6.4.3, Type D2, with asphalt content of 4.8% to 6.5%.
  - b. Base course asphalt concrete, in all areas, shall conform to Standard Specification Section 203-6.4.3, Type C2, with asphalt content of 4.6% to 6.0%.
  - c. Asphalt performance grade shall be PG-64-10.
  - d. At least two courses of asphalt shall be laid when Type D2 asphalt pavement is greater than 1-1/2 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of 1-1/2 inches.
  - e. At least two courses of asphalt shall be laid when Type C2 asphalt pavement is greater than 3 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of two inches (2").

C. Weed Control:

1. The soils sterilant shall be in accordance with current EPA acceptable standard and the California Department of Pesticide Regulations for soils sterilant. Sterilant shall be selected as appropriate for the environment in which it is to be placed. Contractor shall be licensed with the State of California to apply sterilant. Sterilant shall be commercial grade for commercial application. Payment for soil sterilization will include full compensation for application and all materials and incidental work required.
2. Apply Dow Elanco Spike 80DF, or approved equal, to subgrade prior to asphalt paving. Spike 80DF weed control should be applied at the rate of seven pounds per acre. If another manufacturer is used follow their recommendations.

D. Headers and Stakes:

1. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated on construction drawings
2. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.
3. Nails: Common, galvanized, 12d minimum.

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**PART 3 - EXECUTION**

**3.1 HEADERS**

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of adjacent undisturbed earth.
- C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of 2-12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and anchorage as required to fasten headers in place

**3.2 SUBGRADE PREPARATION**

- A. See section 31 22 00, Grading, part 3.07 & 3.08, for subgrade preparation under asphalt.

**3.3 APPLICATION GENERAL**

- A. Finish elevations, extent of asphalt paving and locations of type of asphalt and class of base shall be as indicated and specified herein and on the Construction Documents. Bring subgrade elevations sufficiently below the finish elevations of the paving so as to accommodate the thickness of paving and base.

**3.4 STERILANT APPLICATION**

- A. Place herbicide below base course. Meet the applicable environmental control requirements. Apply as directed by the manufacturer's printed instructions just before application of the base course. Sterilant shall not be applied within two feet of planting areas.

**3.5 APPLICATION OF BASE COURSE**

- A. Install base course material, encompassing spreading and compacting, in accordance with the S.S.P.W.C. Section 301-2, Untreated Base.
- B. After preparing the subgrade as specified in 3.5.A, all traffic on the subgrade shall be avoided. Should it be necessary to haul over the prepared subgrade, the CONTRACTOR shall drag and roll the traveled way as frequently as may be necessary to remove ruts, cuts, and breaks in the surface. All cuts, ruts, and breaks in the surface of the subgrade that are not removed by the above operations shall be raked and hand tamped. All equipment used for transporting materials over the prepared subgrade shall be equipped with pneumatic tires.

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- C. Continued use of sections of prepared subgrade for hauling, so as to cut up or deform it from the true cross-section, will not be permitted. The CONTRACTOR shall protect the prepared subgrade from all traffic.
- D. Maintain the surface in its finished condition until the succeeding layer is placed.

**3.6 PLACING ASPHALT CONCRETE SURFACING:**

- A. Asphalt binder (tack coat) shall be applied to all existing pavement surfaces to be overlaid and/or joined per section 302-5.4 of the Standard Specifications. Asphalt binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer. A layer of asphalt binder (tack coat) shall be applied to all vertical-cut faces and between subsequent AC lifts.
- B. Asphalt Concrete Pavement:
  - 1. All work shall be in accordance with Section 302-5 of the Standard Specifications, except as noted herein. Asphalt concrete work shall include full-depth patching and variable thick asphalt concrete transition areas. The Contractor shall, on a daily basis, provide the Inspector with copies of certificates of weight for all materials delivered to the job site and/or incorporated in the work. At no time shall the coarse aggregate that has segregated from the mix be scattered across the paved mat.
  - 2. Asphalt concrete shall not be placed on any surface, which contains ponded water or excessive moisture in the opinion of the Engineer. If paving operations are in progress and rain or fog forces a shut down, loaded trucks in transit shall return to the plant, and no compensation will be allowed therefore. The Contractor shall furnish and use canvas tarpaulins to cover all loads of asphalt from the time that the mixture is loaded until it is discharged from the delivery vehicle, unless otherwise directed in writing by the Engineer
  - 3. The Inspector will examine the base before the paving has begun. The Contractor will correct any deficiencies before the paving is started.
  - 4. Asphalt concrete of the class indicated in Section 2.B.2 shall be laid in courses conforming to S.S.P.W.C. Table 302-5.5(A) unless otherwise stated herein.
  - 5. At least two courses of asphalt shall be laid when Type D2 asphalt pavement is greater than 1-1/2 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of 1-1/2 inches.
  - 6. At least two courses shall be laid when Type C2 asphalt pavement is greater than 3 inches. The surface course shall be a minimum thickness of one inch (1") and a maximum of two inches (2").
  - 7. Successive courses may be laid upon previously laid courses as soon as the previous course has cooled sufficiently to show no perceivable displacement under equipment or loaded material delivery trucks and a tack coat has been applied.
  - 8. Wherever AC pavement does not terminate against a curb, gutter, or another pavement, the Contractor shall provide and install a redwood or pressure treated Douglas fir header at the line of termination.
  - 9. Smoothness of asphalt shall conform to section 302-5.6.2 of the Standard Specifications.
  - 10. Density shall conform to the below requirements:
    - a. In-place density of the Asphalt Concrete will be based on test results from a nuclear gauge and core samples taken in accordance with CTM 375, "Determining the in Place Density and Relative Compaction of Asphalt Concrete Pavement" except as modified below. The Inspector will determine when core sample testing shall be completed.
    - b. Asphalt Concrete shall be compacted to not less than 95.0 percent for a single test and not less than an average in place density of 96.0 percent relative compaction

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of the Laboratory Test Maximum Density as determined by, Caltrans Testing Method (CTM) 375 except as modified by these specifications.

- c. The materials testing laboratory, paid for by the contractor, will obtain random samples of the hot mix asphalt material from behind the paving machine in accordance with Caltrans Testing Method (CTM) 125, "Methods for Sampling Highway Materials and Products in Roadway Structural Sections", to determine the Laboratory Test Maximum Density of the asphalt mixture in accordance with CTM 308.
  - d. Asphalt Concrete compaction shall be accepted based upon passing tests taken from the nuclear gauge. In the event that the nuclear gauge testing presents failing results, then core samples will be the determination for the in place density and acceptance or rejection of the compaction.
  - e. When core testing is to be performed to determine the relative compaction after nuclear gauge testing has not produced passing tests, the materials testing laboratory will obtain four 4" diameter core specimens (or four 6" diameter core specimens) for determination of relative density of the completed pavement. The four cores shall represent the sample frequency requirements specified in CTM 375.
11. Pavement at all longitudinal joints shall have a Field Density of 95%, as described in 302-5.6.2 of the Standard Specifications. When the test results of the field cores are less than 95% Relative Compaction, the Contractor shall remove a 1 foot wide section on each side of the longitudinal joint. The Contractor shall replace the removed pavement with an asphalt mix that meets the job specification at no additional cost to the Owner.

**3.7 FLOOD TESTING**

- A. Flood Test: Before acceptance, all pavements shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Depressions where the water ponds to a depth of more than 1/8-inch shall be filled or the slope corrected to provide proper drainage. The edges of the fill shall be feathered and smoothed so that the joint between the fill and the original surface is invisible. No standing water shall remain 1-hour after test.

**3.8 FIELD QUALITY CONTROL**

- A. Replace or repair deficient and damaged asphalt paving.
- B. All paving shall drain properly before being accepted. Upon completion, the pavement shall be true to grade and cross section. When a 10 foot straightedge is laid on the finished surface parallel to the centerline of the roadway, the surface shall not vary from the edge of the straightedge more than 1/8 inch, except at intersections or at changes of grade. Any areas that are not within this tolerance shall be brought to grade immediately following the initial rolling. There shall be no variation greater than 1/4 inch plus or minus from a 10 foot straight edge, except at grade changes. The paving material in the area to be repaired shall be removed, by an approved method, to provide a minimum laying depth of 1 inch, or 2 times the maximum size aggregate, whichever is greater, of the new pavement at the join line. Repairs shall not be made to pavement surface by feather-edging at the join lines. All expenses for pavement repair up shall be borne by the Contractor at NO cost to the Owner.

**3.10 PROTECTION**

- A. Protect the Work of this section until Substantial Completion.

**3.11 CLEAN UP**

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- A. Clean all debris and unused materials from the paving operation. Clean all surfaces that have been spattered or defaced as a result of the paving operation. Asphalt or asphalt stains which are noticeable upon surfaces of concrete, or materials which will be exposed to view, shall be promptly and completely removed. Cleaning shall be done in a manner that will not result in any discharge of contaminated materials into any catch basin. All expenses for clean up shall be borne by the Contractor at NO cost to the Owner.

END OF SECTION



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**SECTION 32 13 13 – SITE CONCRETE WORK**

**PART 1 - GENERAL**

**1.01 THE REQUIREMENT**

- A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, in accordance with the requirements of the Contract Documents.
- B. The following types of concrete shall be covered in this Section:
  - 1. Portland cement concrete pavement, flatwork, curbs, mow strips, catch basins, pipe bedding and encasements, and equipment pads.

**1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS**

- A. Comply with the reference specifications of the GENERAL REQUIREMENTS.
- B. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction (“GREENBOOK”), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the “Standard Specifications”.
- C. Comply with the current provisions of the following Codes and Standards.
  - 1. Federal Specifications:
    - a. UU-B-790A (Int.Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).
  - 2. Standards:
    - a. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete.
    - b. ACI 301 Specifications for Structural Concrete for Buildings.
    - c. ACI 315 Details and Detailing of Concrete Reinforcement.
    - d. ACI 318 Building Code Requirements for Reinforced Concrete.
    - e. ACI 347 Recommended Practice for Concrete Formwork.
    - f. ACI 350 Recommended Practice for Sanitary Structure.
    - g. ASTM C 31 Practices for Making and Curing Concrete Test Specimens in the Field.
    - h. ASTM C 33 Specification for Concrete Aggregates.
    - i. ASTM C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.

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- j. ASTM C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete.
- k. ASTM C 42 Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- l. ASTM C 78 Specification for Flexural Strength.
- m. ASTM C 88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
- n. ASTM C 94 Specification for Ready-Mixed Concrete.
- o. ASTM C 114 Method for Chemical Analysis of Hydraulic Cement.
- p. ASTM C 131 Test Method for Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- q. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregate.
- r. ASTM C 143 Test Method for Slump of Portland Cement Concrete.
- s. ASTM C 150 Specification for Portland Cement.
- t. ASTM C 156 Test Method for Water Retention by Concrete Curing Materials.
- u. ASTM C 157 Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
- v. ASTM C 172 Specification for Sampling Fresh Concrete.
- w. ASTM C 192 Method of Making and Curing Concrete Test Specimens in the Laboratory.
- x. ASTM C 260 Specification for Air-Entraining Admixtures for Concrete.
- y. ASTM C 289 Test Method for Potential Reactivity of Aggregates (Chemical Method).
- z. ASTM C 311 Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
- aa. ASTM C 494 Specification for Chemical Admixtures for Concrete.
- bb. ASTM C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- cc. ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

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dd.   ASTM E 119   Method for Fire Tests of Building Construction and Materials.

**1.03 CONTRACTOR SUBMITTALS**

A.    Submittals shall be made in accordance with GENERAL REQUIREMENTS.

B.    The following submittals and specific information shall be provided.

1.    Mix Designs: Prior to beginning the WORK, the CONTRACTOR shall submit to the ENGINEER, for review, and approval, preliminary concrete mix designs for each class and type of concrete specified herein. The mix designs shall be designed by an independent testing laboratory acceptable to the ENGINEER. All costs related to such mix design shall be borne by the CONTRACTOR.

a.    Each concrete mix submittal shall contain the following information:

- 1)    Slump on which the design is based.
- 2)    Total gallons of water per cubic yard.
- 3)    Brand, type, composition and quantity of cement.
- 4)    Brand type, composition and quantity of fly ash.
- 5)    Specific Gravity and gradation of each aggregate.
- 6)    Ratio of fine to total aggregate per cubic yard.
- 7)    Weight (surface dry) of each aggregate per cubic yard.
- 8)    Brand, type, and ASTM designation, active chemical ingredients and quantity of each admixture.
- 9)    Copy of the Building and Safety Research Report Approval for each concrete admixture.
- 10)   Air content.
- 11)   Compressive strength based on 7 day and 28 day compression tests, including standard deviation calculations, corroborative data (if applicable), and required average comprehensive strength per ACI 318, Section 5.
- 12)   Time of initial set.
- 13)   Certification stamp and signature by a Civil or Structural engineer registered in state of California.
- 14)   Certificate of Compliance for Cement.

2.    Certified Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall provide certified weighmaster delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the public weighmaster's signature, and the total quantities, by weight of cement, sand,

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each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

3. When a water reducing admixture is to be used, the CONTRACTOR shall furnish mix designs for concrete both with and without the admixture.
4. The CONTRACTOR shall furnish a Certificate of Compliance signed by the supplier identifying the type of fly ash and stating that the fly ash complies with ASTM C 618 and these Specifications, together with all supporting test data prior to the use of the fly ash the sample represents. The supporting data shall also contain test results confirming that the fly ash in combination with the cement and water to be used meets all strength requirements and is compatible with air-entraining agents and other admixtures.
5. The CONTRACTOR shall submit to the ENGINEER for review the design mix for fly ash concrete together with the design mix for portland cement (non-fly ash) concrete as specified in this Section.

### 1.04 QUALITY ASSURANCE

- A. Testing for Portland Cement Concrete shall be sampled and tested in accordance with the ASTM and California Tests listed in the Standard Specifications for Public Works Construction, 2012 Edition, Section 201-1.1.5.
- B. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
- C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the CONTRACTOR.
- D. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the Owner, and the CONTRACTOR shall provide assistance and facilities to the INSPECTOR in obtaining samples, and disposal and cleanup of excess material.
- E. Curbs and gutters shall be staked by a Land Surveyor licensed to practice in the State of California.
- F. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 347.
- G. Construction tolerances shall not violate dimensions, grades, slopes required by CBC for accessibility requirements. Adjust work accordingly to comply with requirements.

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- H. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

<u>Item</u>	<u>Tolerance</u>
Variation of the constructed linear outline from the established position in plan.	In 10 feet: 1/4-inch;
Variation from the level or from the grades shown.	In 10 feet: 1/4-inch;
Variation from the plumb	In 10 feet: 1/4-inch;
Variation in the thickness of slabs and walls.	Minus 1/8-inch; Plus 1/4-inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus 1/8-inch

**PART 2 - PRODUCTS**

**2.01 CONSTRUCTION MATERIALS**

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.
- D. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Conform to Section 303-5.2 of the Standard Specifications.
1. Use flexible or curved forms for curves of a 100-foot or less radius.
- E. Reinforcing Materials: As follows:
1. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document. Fabrication, sampling and jobsite handling shall conform to the requirements in ASTM Designation: D 3963, except the 2 samples shall be 30 inches long.
  2. Dowels:
    - a. Dowel bars shall be plain round smooth conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 except that the two samples required in ASTM Designation: D 3963/D 3963M shall be 18 inches long. Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete

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- b. Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one gallon per 15 square yards.
  - 3. Epoxy for bonding tie bars and dowel bars to portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class B shall be used when the internal temperature is from 40 °F to 60 °F. Class C shall be used when the internal temperature is above 60 °F, but not higher than recommended by the manufacturer. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Epoxy shall be applied in conformance with the manufacturer's recommendations.
    - a. Simpson Strong-Tie Set-XP Epoxy Adhesive (or approved equal) ICC-ES ESR-2508.
- F. Concrete Materials: As follows:
- 1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalis. The term "alkalis" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide ( $Na_2O + 0.658 K_2O$ ). These oxides shall be determined in accordance with ASTM C 114. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the ENGINEER. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the INSPECTOR.
  - 2. Concurrent with strength design criteria, concrete shall also be proportioned to provide the requisite durability to satisfy the exposure conditions imposed by either environment and/or service. Durability, in this context, refers to the ability of the concrete to resist deterioration from the environment or service in which it is placed. Concrete proportioned in accordance with ACI 318, chapter 4, Durability Requirements, will meet this criteria.
  - 3. Combined Aggregate: 1" maximum coarse aggregate size conforming to Grading C of Standard Specifications Section 201-1.3.2(A). Aggregates shall be obtained from pits acceptable to the INSPECTOR, shall be non-reactive, and shall conform to ASTM C 33.

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4. Water: Shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.
5. "Pea gravel" mix is not acceptable, unless specifically approved in writing by the Civil Engineer of Record prior to construction.

**G. Admixtures:**

1. The ENGINEER may require the use of admixtures or the CONTRACTOR may propose to use admixtures to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the CONTRACTOR's expense. The use and continued use of an admixture shall be approved by the ENGINEER. Admixtures specified herein, other than calcium chloride, shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
2. These admixtures shall not be used in greater doses than those recommended by the manufacturer or permitted by the ENGINEER. The permitted dosage of the admixture shall not exceed that which will result in an increase in the driving shrinkage of the concrete in excess of 20 percent when used in precast or prestressed concrete, or 10 percent when used in any other structural concrete. The strength of concrete containing the admixture in the amount of proposed shall, at the age of 48 hours and longer be not less than that of similar concrete without the admixture. The admixture shall not adversely affect the specified air content, unless permitted by the ENGINEER.
3. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as [Sika Chemical Corporation's Plastiment], [Master Builder's Pozzolith 300R], or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees F, a set accelerating admixture such as [Sika Chemical Corporation's Plastocrete 161FL], [Master Builder's Pozzolith 50C], or equal shall be used.
4. Low range water reducer shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a hydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
5. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G.
  - a. If the high range water reducing agent is added to the concrete at the batch plant, it shall be second generation type, [Daracem 100, as manufactured by W.R. Grace & Co.]; [Pozzolith 430R, as manufactured by Masterbuilders]; or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

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- b. If the high range water reducer is added to the concrete at the job site, it shall be used in conjunction with a low range water reducer and shall be [Pozzolith 400N and Pozzolith MBL82, as manufactured by Masterbuilders]; [WRDA 19 and WRDA 79, as manufactured by W.R. Grace & Co.]; or equal. Concrete shall have a slump of 3-inches  $\pm$  1/2-inch prior to adding the high range water reducing admixture at the job site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system.
  
- 6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 4 percent; provided that, when the mean daily temperature in the vicinity of the worksite falls below 40 degrees F for more than one day, the total air content provided shall be 5 to 6 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
  
- 7. Calcium Chloride: Except as otherwise provided herein, calcium chloride will not be permitted to be used in concrete.
  
- 8. Fly ash/pozzolan shall conform to ASTM C 618 and the following supplementary requirements:
  - a. Class F fly ash
    - o Loss on ignition, maximum 4 percent
    - o SO<sub>3</sub> content, maximum 3 percent
    - o Moisture content, maximum 1 percent
  
  - b. Class F fly ash, as a percent by weight of total cementitious material, shall not exceed 15 percent
  
  - c. When Sulfate Resistant or Special Exposure Concrete is specified, test results shall be submitted to the Engineer as specified in Section 2-5.3 of the Standard Specifications. The test result shall show that the fly ash to be used is effective in contributing to sulfate resistance in conformance with ASTM C618, Table 3 (optional physical requirements) as tested in accordance with ASTM C 1012. The data submitted shall be less than 6 months old.
  
- H. Curing Materials:
  - 1. Concrete curing compound shall conform to the requirements of ASTM C309 Type 1-D (clear or translucent with a fugitive dye), Class B (Resin Type Only), except the loss of water shall not exceed 0.15 kilograms per square meter in 24 hours nor 0.45 kilograms per square meter in 72 hours when tested in accordance with ASTM C 156. The CONTRACTOR shall provide, when requested by the ENGINEER, certified copies of vendor's test report showing compliance with ASTM C 309 and these specifications. The testing and the report shall be supplied without cost to the Agency. All compounds shall be



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furnished by the CONTRACTOR in sealed original containers labeled in accordance with ASTM C 309 and with the date of manufacture.

2. Polyethylene sheet for use as concrete curing blanket shall be white and conform to ASTM C 171. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.
3. Polyethylene-coated burlap for use as concrete curing blanket shall conform to ASTM C 171. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.

I. Expansion Joint Filler Material

1. Curb & Gutter: Nonextruding and Resilient Filler: Celotex "Flexcell", or approved equal, 1/4-inch thick material conforming to ASTM D 1751.
2. Concrete Walk and Slab: Joint filler material shall be preformed expansion joint filler conforming to the requirements of ASTM D994. A Certificate of Compliance for the joint filler material shall be furnished to the Engineer. The certificate shall be accompanied with a certified test report of the results of the required tests performed on the joint filler material within the previous 12 months prior to proposed use. The certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.
3. Silicone Joint Sealant: Premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant. Meets Federal specification TT-S-00230C. Meets ASTM C-920, Type S, Class 25 or 35; Grade NS, Use T or NT, Shore A Hardness (21 day) 35-45. A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.
  - a. Sika Corporation, Sikaflex-1A.
  - b. Tremco, Inc., Dymonic.
  - c. Tremco, Inc., Vulkem 116.
  - d. Bostik Construction Products Div., Chem-Calk 900.
4. Zip-Top Control Joints: NOT PERMITTED.

J. Related Materials: As follows:

1. Damp-proofing agent shall be an asphalt emulsion, Sonneborn Hydrocide 660, or approved equal.
2. Epoxy adhesives shall be the following products for the applications specified:

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- a. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur Hi-Mod Epoxy Adhesive, as manufactured by Sika Chemical Corporation, or approved equal.
  - b. For bonding hardened concrete or masonry to steel, Sikadur Hi-Mod Gel or approved equal.
- K. Curbs / Curb & Gutter Mix Design: At a minimum, concrete for curbs and curbs & gutters shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2, mix class 520-C-2500.
- 1. Compressive Strength: minimum of 2,500 psi at 28 days compressive strength.
  - 2. Slump Limit: 4 inches at point of placement.
  - 3. Cement per cu yard (sacks): 5.5 (minimum).
  - 4. Air Content: 4% +/- 1% percent
- L. Slurry Mix Design:
- 1. Compressive Strength: 100 psi at min. 28 days compr. strength.
  - 2. Slump Limit: 5 inches at point of placement.
  - 3. Cement per cu yard (sacks): 1.0
  - 4. Aggregate Gradation: "E" per S.S.P.W.C. table 201-1.3.2(A).
  - 5. Air Content: 4% +/- 1% percent.

**PART 3 - EXECUTION**

**3.01 PREPARATION OF SURFACES FOR CONCRETING**

- A. General: Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Subgrade Preparation:
  - 1. Prior to placement of concrete, the upper twelve (2) inches of exposed native subgrade should be reworked to a minimum 90 percent relative compaction and moisture conditioned to at least 2% over optimum.
- C. The compacted surface shall be firm, hard and unyielding. The term "firm, hard and unyielding" as used in S.S.P.W.C. Section 301-1.3 shall mean that when the heaviest construction and hauling equipment used on the project drives over the subgrade, no permanent deformation shall occur either before or during pavement construction. On areas where the underlying material appears to be wet or soft, or where it deflects under wheel loads, the Contractor shall employ excavation and work techniques which do not worsen the subgrade condition.

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- D. The above subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.
- E. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for concrete pavement structural sections, have been achieved prior to re-compaction.
- F. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- G. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and ACCEPTED by the INSPECTOR at least 24 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- H. All inserts or other embedded items shall conform to the requirements herein.
- I. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the INSPECTOR before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- J. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. In concrete shear-walls, suspended slabs and roof slabs, the interface surface at construction joints shall be roughened to a full amplitude of one quarter inch. The hardened surface shall be cleaned of all latent foreign material and washed clean, prior to the application of an epoxy bonding agent.
- K. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the ENGINEER.
- L. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to

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placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

- M. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- N. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.
- O. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

**3.02 HANDLING, TRANSPORTING, AND PLACING**

- A. General: Placing of concrete shall conform to the applicable requirements of ACI 301 and the requirements of this Section.
- B. The total elapsed time between the addition of water at the batch plant and the completion of the discharge of the P.C.C. from the mixer shall not exceed 90 minutes. All P.C.C. remaining in the mixer after said 90-minute time limit shall be rejected and removed from the project site.
- C. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- D. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of concrete pavement should not proceed unless testing gives a reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.
- E. All pull boxes, meter boxes, valve covers and manholes shall be adjusted to proposed finish grade prior to placement of the P.C.C.
- F. Dowel Placement:
  - 1. Dowel bars shall be centered on the joint within a tolerance of  $\pm 2$  inches in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the

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transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.

2. Dowel bars shall be placed at longitudinal joints as shown on the plans. Dowel bars shall be placed as shown on the plans by using mechanical insertion. When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used.
  
- G. Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by the project inspector, all subject to the observation of the engineer or architect.
  
- H. Casting New Concrete Against Old: An approved epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations. This provision shall not apply to joints where waterstop is installed.
  
- I. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the INSPECTOR. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.
  
- J. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.
  
- K. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.
  
- L. Cold Weather Placement: Earth foundations shall be free from frost or ice when concrete is placed upon or against them. Fly ash concrete shall not be placed when the air temperature falls below 50 degrees F.

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- M. A transverse construction joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next contraction joint location. If sufficient concrete has not been mixed to form a slab to match the next contraction joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.
- N. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. The finished surface shall be free from humps, sags, blemishes or other irregularities Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
- O. Broom Finish Type:
1. Surfaces Sloped Less than 6%: Provide a medium salt (medium broom) finish by drawing a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.
  2. Surfaces Sloped greater than 6%: Provide a slip resistant (heavy broom finish) by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- P. Joints:
1. Joints: Joints in concrete curb, gutter, and walk shall be designated as expansion joints and control joints. Joints for concrete flatwork shall be provided as shown on the architectural plans. Expansion joints for swales, curbs / curb & gutter shall be placed at no greater than 30 feet on center or as indicated on construction drawings.
    - a. Expansion Joints: Provide 1/2" premolded joint filler, material meeting Section 2.011 herein. Construct expansion joints in conformance with Standard Specification Section 303-5.4.2 and the details on the construction documents.
      - 1) Extend expansion joint fillers full-width and depth of joint, and 1/4" below finished surface where joint filler is indicated. If no joint sealer is called for, place top of premolded joint filler flush with top of concrete or curb.
      - 2) Where silicone joint sealer is noted on the construction documents, the premolded joint filler strips shall be placed 1" below the surface of the concrete or curb, the full width of the expansion joint. The remainder of all joints shall be filled to within 1/4" below the surface of the concrete with the silicone joint sealant.
      - 3) Provide expansion joint filler strips, with elastomeric sealer, between p.c.c. walk and curb, p.c.c. walk and buildings, & p.c.c.

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walk and retaining walls and at locations noted on the construction documents. The depth of the filler strip shall be the depth of the p.c.c. walk plus 1 inch with the top set flush with the specified grade of the top of curb or walk.

b. Control Joints:

- 1) Control joints in site work concrete shall comply with Standard Specification Section 302-6.5.4, except that the configuration of the joint, shall be as indicated on the construction documents.
- 2) Control joints in concrete curbs, sidewalks and gutters shall comply with Standard Specification Section 303-5.4.3, except that the joint configuration shall be as indicated below.
- 3) Location: As shown on construction documents, but in any case not more than ten (10) feet O.C. both ways in concrete sidewalks. In swales and gutters, including gutter integral with curb, joints shall be at regular intervals not exceeding ten (10) feet. Where integral curb and gutter is adjacent to concrete pavement, the joint shall be aligned with the pavement joints where practical.

- Q. Protection: In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control film. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

**3.03 TAMPING AND VIBRATING**

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate

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concrete excessively or to work it in any manner that causes segregation of its constituents.

**3.04 CURING**

- A. Comply with 2013 California Building Code, Title 24, Part 2, Volume 2, Section 1905A.11.
  - 1. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by curing as herein specified.
  - 1. Provide moisture-curing by the following methods:
    - a. Keep concrete surface continuously wet by covering with water.
    - b. Continuous water-fog spray.
    - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.
  - 2. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs, as follows:
    - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid, floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
- C. Concrete slabs and paving shall be properly cured and protected against damage and defacement of nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water starting not later than two hours after final troweling. Surface of finish shall be kept continuously wet for at least ten days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.
- D. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line



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or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense. Exclude traffic from concrete paving for at least 7 days after placement.

- E. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

**3.05 PUMPING OF CONCRETE**

- A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. Pumping Equipment: The pumping equipment must have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the site during pumping.
- C. The minimum diameter of the hose (conduits) shall be 4-inches.
- D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.
- E. Aluminum conduits for conveying the concrete will not be permitted.
- F. Proportioning: Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein.
- G. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible.
- H. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.
- I. Water and slump requirements shall conform to the requirements of this Section.
- J. Cement and admixtures shall conform to the requirements of this Section.
- K. Field Control: Concrete samples for slump per ASTM C 143 and test cylinders per ASTM C 31 and C 39.

**3.06 TREATMENT OF SURFACE DEFECTS**

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced.

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1. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.
- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair purposes shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.
- C. Holes left by tie-rod cones shall be reamed so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with non-shrink grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with non-shrink grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
- E. Prior to filling any structure with water, all cracks that may have developed shall be repaired to the satisfaction of the ENGINEER. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.
- F. The finished surface shall be free from humps, sags, blemishes or other irregularities.

**3.07 FIELD QUALITY CONTROL**

- A. Correction of Mix Design for Failed Concrete Tests: If the compressive cylinder strength test for in place PCC yields test results below the specified 28-day PCC compressive strength and the Engineer determines a corrective change is necessary, the Contractor shall, at its own expense, make corrective changes in the mix proportions. The Engineer shall approve the changes in the mix proportions or PCC placement procedures, before any additional PCC is placed on the job.
- B. Flood Tests: Before final acceptance, and after concrete has thoroughly cured, all concrete pavement, including swales and curb & gutter, shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Concrete work where water ponds and does not run off in a reasonable amount of time (1-hour), shall be removed to the nearest score or joint line and replaced to provide proper drainage. Full compensation for complying with this requirement shall be considered as included in the Contract Unit Price for cement concrete pavement.

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**3.08 CARE AND REPAIR OF CONCRETE**

- A. General: The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense.
  
- B. The contractor shall barricade and protect placed Portland Cement Concrete from all damage, marks, mars and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored or defective shall be replaced at the contractor's expense.

END OF SECTION

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**SECTION 33 11 00 – SITE WATER DISTRIBUTION SYSTEMS**

WATER SERVICE NOTE: WATER SERVICE MUST BE MAINTAINED TO ALL USERS WITHIN THE CONSTRUCTION AREA AT ALL TIMES. IF THE PRIMARY SOURCE OF WATER IS INTERRUPTED, A TEMPORARY SECONDARY SOURCE SHALL BE SUPPLIED BY THE CONTRACTOR, APPROVED BY THE LOCAL WATER DEPARTMENT. ANY EXPENDITURES INCIDENTAL THERETO SHALL BE BORNE BY THE CONTRACTOR. THE WATER SHALL BE SAFE FOR DRINKING IN ACCORDANCE WITH PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS.

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section describes general requirements, products, and methods of execution relating to domestic water systems. Unless otherwise noted, this section does not apply to irrigation water systems.
- B. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.
- C. Section Includes:
  - 1. Piping and specialties for underground domestic water.
  - 2. Trenching Requirements: Conform to the requirements of Section 31 22 00 – Grading.
  - 3. Hydrostatic Pressure, Leakage & Disinfection Testing.

**1.02 SUBMITTALS**

- A. Water Pressure Confirmation Letter:
  - 1. After award of contract and before any water system materials are ordered from suppliers or delivered to the job site, submit to the Owner a letter verifying that a dynamic water pressure test at the water points of connection has been performed.
  - 2. A dynamic water pressure test is performed to measure the water pressure at a point of connection with water in motion through the point of connection. Static water pressure testing, no water movement, shall not be acceptable.
  - 3. The dynamic water pressure test shall be performed at the points of connection using the full flow volume (maximum demand) as indicated on the plans.
  - 4. In the letter identify the water point of connections tested, the date of the test, time of the test, flow rate at which the test was performed and the measured dynamic water pressure in PSI.
  - 5. If any discrepancies between the measured water pressure and the information shown on the plans are found, immediately notify the Architect of Record.

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6. Failure to perform the dynamic water pressure test, or failure to report pressure discrepancies, shall place the full responsibility for all costs including revisions to the design, water equipment re-sizing, and additional equipment quantities on the Contractor.
- B. Product Data: Manufacturer's catalog data for materials. Include technical data for piping, gaskets, joints and couplings, backflow devices, booster pumps, controller cabinets, gate valves and valve boxes.
- C. Certificates: Certificates attesting that tests set forth in referenced publications have been performed and the performance requirements have been satisfied.

**1.03 LICENSES, PERMITS & FEES**

- A. The Contractor installing the water lines shall have a Class "C-34", "C-36" or Engineering "A" Contractors license valid in the State of California.
- B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work. The Owner shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of potable water systems, materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. California Plumbing Code, CPC, 2013 Edition.
- C. The work provided herein shall conform to and be in accordance with the Contract Plans as well as the Standard Specifications for Public Works Construction ("Green Book"), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

**1.05 SEQUENCING AND SCHEDULING**

- A. Coordinate with other utility work.

**1.06 PRODUCT HANDLING**

- A. Store items above ground on platforms, skids or other approved supports.
- B. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- C. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- D. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging points.
- E. Protect coating and linings on pipes, fittings and accessories from damage. Do not drag pipe to trench. Repair coatings or linings damaged.

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**1.07 DRAWINGS**

- A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.
- C. In case of a difference in the specifications or drawings, or between the specifications and the drawings or in the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

**1.08 EXAMINATION OF PREMISES**

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

**1.09 PROTECTION**

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

**1.10 LOCATIONS**

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

**1.11 SUBMITTAL DATA**

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- A. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixtures and equipment schedules.
- B. Manufacturer's submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
- C. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- D. A list of names is not a valid submittal. To be valid, all submittals must:
  - 1. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
  - 2. Include all pertinent construction, installation, performance and technical data.
  - 3. Have all copies marked to indicate clearly the individual items being submitted.
  - 4. Have each item cross-referenced to the corresponding specified item and be marked to show how differences will be accommodated.
  - 5. Contain calculations and other detailed data justifying how the item was selected for proposal. Data must be completed enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
  - 6. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.
  - 7. In addition to the material and equipment submittals, the Contractor shall provide shop drawings of all underground utilities complete with all appurtenances and indicate exact location by dimension to grading plan, submit for review prior to installation.

**1.12 INSPECTION**

- A. Notice shall be given to the Owner's Inspector at least 48 hours before starting construction.
- B. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

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- C. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.
- D. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

**1.13 SUBSTITUTIONS**

- A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.
- B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

**1.14 TURNOVER ITEMS**

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect
- B. Controller Charts:
  - 1. Provide one controller chart for each automatic controller. Chart shall show the area covered by the particular controller. The areas covered by the individual control valves shall be indicated using colored highlighter pens. A minimum of six individual colors shall be used for the controller chart unless less than six control valves are indicated.
  - 2. Owner's authorized representative must approve record drawings before controller charts are prepared.



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3. The chart is to be a reduced copy of the actual "record" drawing. In the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a readable size.
  4. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils in thickness.
- C. Operation and Maintenance Manuals:
1. Two individually bound copies of operation and maintenance manuals shall be delivered to the Owner's authorized representative at least 10 calendar days prior to final inspection. The manuals shall describe the material installed and the proper operation of the system.
  2. Each complete, bound manual shall include the following information.
  3. Index sheet stating Contractor's address and telephone number, duration of guarantee period, list of equipment including names and addresses of local manufacturer representatives.
    - a. Operating and maintenance instructions for all equipment.
    - b. Spare parts lists and related manufacturer information for all equipment

**1.15 GUARANTEES**

- A. The Contractor shall guaranty the work against defective material or workmanship for a period of one (1) year from the date of completion of the contract and/or acceptance for the work by the Owner. Damage due to acts of God or from sabotage and/or vandalism is specifically exempted from the guaranty. When defective material and/or workmanship are discovered which require repairs to be made under this guaranty, all such work shall be done by the Contractor at his own expense and shall be within five (5) working days after written notice of such defects has been given to him/her by the Owner. Should the Contractor fail repair such defective material or workmanship within five (5) working days thereafter, the Owner may cause the necessary repairs to be made and charge the Contractor with the actual cost of all labor and materials required.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship and shall not be less than one (1) year. See specific equipment specifications for extended warranty requirements.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Pipe:
  1. Pipe size 4 inches and larger.
    - a. Ductile Iron Pipe (DIP): Pressure Class 350 pipe conforming to AWWA/ANSI C151/A21.5, cement-mortar lining conforming to AWWA/ANSI C104/A21.4,

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with standard thickness per AWWA/ANSI C150/A21.50. U.S. Pipe, American Cast Iron Pipe Company (ACIPCO), or approved equivalent.

- b. Polyvinyl Chloride Pipe (PVC): Pressure Class 235, DR 18, spigot and gasket bell end, conforming to AWWA C900, with equivalent cast-iron pipe outer diameter (O.D.). Acceptable manufacturers: J-M Manufacturing Blue Brute, Vinyl Tech, Diamond Plastic, PW Pipe, or approved equal.
2. 2.5 to 3 inches in diameter - Polyvinyl chloride (PVC) 1120, SDR 13.5, class 315, and conforming ASTM D2241. Solvent joints conforming to the requirements of ASTM D2672.
  3. 2 inches in diameter or less - Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 80, meeting ASTM D 1785 standards.
- B. Fittings:
1. 2.5 inch to 3 inch: All fittings shall be manufactured in one piece of injection molded PVC compound meeting ASTM D1784. Fittings shall be Class 315 and conform to requirements of SDR 13.5. Fittings shall be designed to withstand a minimum of 630 psi quick burst pressure at 73 degrees F., tested in accordance with ASTM D1599.
  2. 2 inches in diameter or less fittings shall conform to ASTM D 2467 "Socket-Type" PVC Plastic Type Fittings, Schedule 80.
  3. Ductile Iron: Ductile iron fittings shall be supplied in accordance with AWWA Standard C110, Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. for Water and Other Liquids", or AWWA Standard C153, "Ductile Iron Compact Fittings, 3 In. Through 24 In for Water Service". All fittings shall have mechanical joints unless otherwise specified on Construction Plans.
    - a. Mechanical joints shall conform to the requirements of AWWA Standard C111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."
    - b. Flanged fittings shall conform to the requirements of AWWA Standard C110 or C153. Flanges shall be drilled to ANSI B16.1, 125 lb standard bolt template. The 250 lb. Flanges, when required, shall be drilled to ANSI B16.1, 250 lb. standard bolt template.
    - c. Where restrained joints are indicated on the plans, push-on "Tyton" joints shall be restrained with "Field-Lok" gaskets as manufactured by U.S. Pipe or approved equal.
    - d. Ductile iron pipe fittings shall be manufactured or supplied by American Ductile Iron Pipe (a division of American Cast Iron Pipe Company, Birmingham, Alabama), U.S. Pipe & Foundry Company, Tyler Pipe/Union Foundry, Griffin Pipe Products Company, Sigma Corporation, Star Pipe Products Co., or approved equal.
- C. Gaskets for Ductile Iron Pipe:
1. Gaskets for Ductile Iron Pipe: Gaskets for flanged joints shall be full faced, cut from 1/8 inch thick Nitrile Rubber (Buna-N), bolt holes pre-punched, conforming to the requirements of ANSI /ASME B16.2.1. Gaskets shall be manufactured or supplied by Tripac Fasteners, Long Beach Industrial Gaskets, or approved equal.

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- D. PVC & Mechanical Pipe Couplings, Joints and Jointing Materials:
1. Pipe joints on plastic pipe 3-inch and under shall be solvent cement joints conforming to ASTM D 2564, primer according to ASTM F 656. Solvent and primer shall not be more than one year old.
  2. All couplings shall be manufactured from the same materials and in compliance with the specifications set forth herein before for PVC pipe.
  3. PVC C-900 Pipe: joints shall be integral, bell and spigot gasketed joints.
    - a. Provide each PVC C-900 Pipe joint connection with an elastomeric gasket suitable for the bell or coupling installation.
    - b. An elastomeric gasket shall be designed with a retainer ring which "locks" the gasket into integral bell groove and shall be installed at the point of manufacturer. Gasket shall be in conformance with ASTM F477.
    - c. Gaskets for push on joints and compression type joints or mechanical joints for connections between pipes and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.
    - d. Solvent weld joints are NOT PERMITTED.
  4. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111/A21.11 unless otherwise noted on Construction Documents.
- E. Lining and Coating for Ductile Iron & Fittings:
1. The interior of all ductile iron pipe and fittings shall be factory cement mortar lined in accordance with AWWA Standard C104. Lining materials shall conform to ASTM C-150, Type II.
  2. All buried ductile iron pipe and fittings shall have a factory applied bituminous coating of not less than 1 mil in thickness as specified in AWWA C151. The coating shall be free from blisters and holes; shall adhere to the metal surface at ambient temperatures encountered in the field.
  3. Cement mortar lining and bituminous coating of pipe or fittings in the field is not permitted.
- F. Bolts and Nuts for Mechanical Joints, Flanged Fittings, Flexible Couplings & Restraint Devices:
1. All bolts and studs shall be Type 316 Stainless Steel per ASTM A193 Grade B8M, project ends of bolts ¼ to 3/8 inch beyond nut.
  2. All nuts and washers shall be Type 316 Stainless Steel per ASTM A194 Grade 8M, provide 1 washer per nut.
  3. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, Minnesota Mining and Manufacturing EC 244, Koppers Bitumastic (Super-Tank) 505, or an approved equal.

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4. Stainless steel parts shall not be coated except for the threaded portion, which will be assembled with a liberal coat of anti-seize compound.
  5. All bolts shall be lubricated with anti-seize compound.
- G. Master Control Valve:
1. Rain Bird brass irrigation valve, 300BPE or approved equal. Install at locations shown on plans in standard rectangular valve box.
- H. Flow Sensor:
1. John Deere Green Tech plastic flow sensor included as part of the switch assembly wire to controller using two control wires installed inside a standard rectangular valve box.
- I. Air Release Valves:
1. Mainline air release valves shall be constructed of brass body and plastic ball.
  2. Mainline air release shall be of the manufacturer, size, and type indicated on the drawings.
- J. Gate Valves:
1. LEEMCO Gate Valve, LMV Series, model LMV-XXBB (bell x bell), epoxy fused ductile iron, sizes 3" and 4" per mainline with a 2" AWWA operating nut and restraints.
- K. Automatic Controller:
1. Automatic controller shall be of the manufacturer, size, and type indicated on the drawings.
  2. Automatic controller shall be a satellite controller with all required equipment to provide flow sensing and communication with the Owner's central control system.
  3. Automatic controller shall be a pre-assembled unit and equipped with all components indicated on the plans.
  4. Controller enclosure shall be of the manufacturer, size, and type indicated on the drawings.
  5. Controller shall be grounded according to local codes using equipment of the manufacturer, size, and type indicated on the drawings; or as required by local codes and ordinances.
- L. Booster Pumps:
1. Booster pump shall be of the manufacturer, size, and type indicated on the drawings.
  2. The booster pump assembly shall include all down pipes to connect to the mainline piping below grade.
  3. The booster pump assembly shall include all pumps, valves, sensors, pressure regulators, assembly pipes, pump controls, VFD controls, skids and enclosures indicated on the plans.

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- M. Low Voltage Control Wiring:
1. Remote control wire shall be direct-burial AWG-UF type, size as indicated on the drawings, and in no case smaller than 14 gauge.
  2. Remote control wire shall be 14 AWG solid core twisted pair, type as indicated on the drawings.
  3. Connections shall of the manufacturer, size, and type indicated on the drawings.
  4. Common wires shall be white in color. Control wires shall be red (where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" plans located on controller door).
  5. Ground wires shall be green in color or bare copper and in no case smaller than 6 gauge.
- N. Valve Boxes, Risers and Lids for Buried Valves:
1. Valve boxes and cover shall be as shown on Construction Documents.
  2. Tops of boxes shall be set flush with finished turf grade or 2" above ground grades in shrubbery or groundcover areas.
  3. Valve boxes shall be marked "WATER" embossed above surface.
- O. Backflow Protection Device:
1. Provide backflow preventers as shown on the Construction Documents. Subject to Owner's approval. Backflow preventers on the fire water system shall be subject to approval by the local office of the fire marshal.
  2. All devices must be approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC Foundation). Information is available on the internet at: <http://www.usc.edu/dept/fccchr>
  3. Reduced Pressure Principle Assemblies (RPPA): Provide a cast-iron body RPPA consisting of two independently operating check valves with a pressure differential relief valve located between the two check valves, two shut-off valves and four test cocks. RPPA shall be tamper-proof and conform to AWWA C511.
    - a. Paint one coat Dunn Edwards Versaprime 42-44 and two coats Dunn Edwards Dark Blue. Apply paint after all testing and disinfection has passed, but prior to final acceptance by the Utility or Inspector.
  4. Backflow prevention assemblies (devices), shall be tested and certified by a certified backflow tester, and a test report shall be provided to the water agency having jurisdiction. Testing shall be performed in the presence of the inspector.
- P. Thrust Restraining Materials: All pipe bends and tees 3-inches and greater shall be restrained from movement by either the use of concrete thrust blocks or mechanical joint restraints. Restraint systems to be used on PVC C-900 pipe shall meet or exceed A.S.T.M. Standard F1674-96, "Standard Test Methods for Joint Restraint Products for Use with PVC Pipe," or the latest revision thereof. Restraint systems used on ductile pipe shall meet or exceed U.L. Standard 194. Underwriter Laboratories (U.L.) and/or Factory Mutual (FM)

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certifications are required on all restraint systems. All mechanical restraint devices shall be wrapped with 3 layers of 8-mil polyethylene after assembly.

1. Mechanical Joint Fittings:

- a. Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained. The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" across the flats hex head. The actuating bolt system shall have a torque-limiting head designed to break off at preset torque levels, thus insuring proper action of the restraining device. After removal of the torque-limiting head, a 1 1/4" hex head shall remain to facilitate the removal and re-assembly of the gland. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536, Grade 65-45-12 requirements. Wedge mechanisms shall be heat-treated ductile iron, hardened to at least 370 BHN hardness. The restraining mechanism shall have a pressure rating equal to that of the pipe on which it is used and shall have a safety factor of at least 2:1. The restraining gland shall conform to the requirements of ASTM F 1674, and UNI-B-13-94, "Recommended Performance Specification For Joint Restraint Devices For Use With Polyvinyl Chloride (PVC) Pipe."
- b. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

Manufacturer	PVC C-900 Pipe	Ductile Iron Pipe
EBBA Iron Sales, In	2000 PV	Megalug 1100
Romac Industries, In	Romagrip PVC	Romagrip DI
Star Pipe Products	Stargrip Series 4000	StargripSeries 3000
Uni-Flange Corporation	Series 1500	Series 1400

2. Bell and Spigot Harness:

- a. Restraint Devices for bell and spigot joints of PVC Pipe shall consist of split restraint rings, one installed on the spigot, connected to one installed on the pipe barrel behind the bell. The restraint devices shall incorporate a series of machined serrations (not "as cast") on the inside diameter to provide positive restraint, exact fit, 360° contact and support of the pipe wall. Restraint Devices shall be of ductile iron, ASTM A536, Grade 65-45-12 and connecting rods shall be of high strength, low alloy material in accordance with ANSI / AWWA C111/A21.11 unless specified as stainless steel in these specifications.
- b. All Restraint Devices shall have a water working pressure rating equivalent to the full rated pressure of the PVC Pipe they are installed on, with a minimum 2:1 safety factor in any nominal pipe size. In addition, they shall meet or exceed the requirements of Uni-B-13-94, "Recommended Performance Specification For Joint Restraint Devices For Use With Polyvinyl Chloride (PVC) Pipe." Notarized certification from the manufacturer of the restraint device shall be provided with submittals.
- c. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

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Manufacturer	PVC C-900 Pipe	Ductile Iron Pipe
EBBA Iron Sales, In	1600 Series	1700 Series
Romac Industries, In	611 Series	611 Series
Star Pipe Products	1100 Series	Not Approved
Uni-Flange Corporation	Series 1390	Not Approved

3. Push-On Pipe Bells & Plain End Pipe: Where restrained joints are indicated on the Construction Drawings for ductile iron pipe, push-on joints shall be restrained with "Field-Lok 350" gaskets as manufactured by U.S. Pipe or approved equal. "TR-Flex" restrained joint pipe as manufactured by U.S. Pipe or approved equal is also an acceptable option for restraint of push-on joints. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.

4. Flange Adapters:

a. Flange Adapters shall be manufactured from ductile iron per ASTM A536, Grade 65-42-12 and shall have bolt circles and bolt holes to meet ANSI B16.1 – Class 125 or Class 250 if required and shown on plans.

b. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

Manufacturer	PVC C-900 Pipe	Ductile Iron Pipe
EBBA Iron Sales, In	2100 Series	2100 Series
Romac Industries, In	Not Approved	Field Flange
Star Pipe Products	Not Approved	Series 200
Uni-Flange Corporation	Not Approved	Series 200/400/420

5. Concrete: Concrete for thrust blocks shall conform to Concrete Class 520-C-2500. If thrust block is to be disturbed or backfill is to be placed prior to developing its required strength, additional mechanical thrust restraining devices approved by the Civil Engineer shall be installed.

Q. Tracer Wire for Nonmetallic Pipes: Tracer wires shall be electrically continuous #12 soft drawn copper wire, Type TW, blue plastic covered for water system. Provide in sufficient length to be continuous over each installed section of nonmetallic pipe.

R. Polyethylene Encasement Film Wrap: All ductile iron pipe and fittings buried underground shall be protected with double wrapped plastic film in accordance with AWWA C105 "American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems" and each wrap shall be a minimum thickness of 0.008 in. (8 mils). All joints between plastic tubes shall be taped and secured with general purpose polyethylene tape, 2 inches wide and 10 mils thick (Scotchrap No. 50, Plicoflex No. 340, Protecto Wrap No. 200, Polyken No. 900, or approved equal).

S. Sleeve-type Flexible Transition & Flanged Couplings:

1. Sleeve-type couplings shall be in accordance with ANSI/AWWA C219 - Standard for Bolted Sleeve-type couplings for Plain-End Pipe, and shall be of stainless steel or ductile iron with stainless steel bolts, without pipe stop, and be of sizes to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 12 inches long for sizes greater than 30 inches, for standard steel couplings, and 16

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inches long for long-sleeve couplings. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket.

2. Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N," Grade 60, or equivalent suitable elastomer.
3. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D2000 - Classification System for Rubber Products in Automotive applications, AA709Z, meeting Suffix B13 Grade 3. All gaskets shall be compatible with the piping service and fluid utilized.
4. Bolts, nuts, & washers for couplings shall meet the requirements listed in Section 2.1K, herein. All cast components shall be fusion bonded epoxy coated per AWWA C213. After installation couplings shall be wrapped with 8-mil polyethylene wrap per AWWA C-105 and section 2.1M requirements listed herein.
5. Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket, which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
6. All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be in accordance with the AWWA M11 standard, or as indicated.
7. The following qualified product list identifies specified manufacturers models approved for:

Straight & Transition Couplings

Romac Industries, Inc.:	Style "501"
Ford Meter Box Co.:	Style "FC1" or "FC2A"
Smith-Blair:	400 Series
JCM Industries:	200 Series
Dresser	Style 62 or 162

Flanged Coupling Adapters

Romac Industries, Inc.:	Style "FCA 501" or "FC400"
Ford Meter Box Co.:	Style "FFCA"
JCM Industries:	300 Series
Smith-Blair:	Style "913"
Dresser	Style 227

**PART 3 - EXECUTION**

**3.01 CLEARANCES OF WATER LINE**

- A. Parallel to Sewer Line:



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1. Water lines 4 inches or less in diameter shall not be installed in a common trench with the building sanitary drain unless the bottom of the water line is at least 12 inches above the top of the building sanitary drain or where the water line is installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the building sanitary drain.
  2. Water mains larger than 4 inches in diameter shall be separated from the Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, in accordance with the requirement of the State of California, Human and Welfare Agency, Department of Health Services.
- B. Crossing Sewer Line:
1. A water main shall be separated from sanitary sewer in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2), unless modified herein.
  2. Install water main a minimum of 12 inches clear, above or below a sanitary sewer.
  3. A water main greater than 4 inches in diameter, crossing under a sanitary sewer line, shall be installed with all their joints located at least 10 feet away from each side of the sanitary sewer line.
  4. A water main greater than 4 inches in diameter, crossing over a sanitary sewer line, shall be installed with all their joints located at least 5 feet away from each side of the sanitary sewer line.
- C. Install all water mains no closer than 10 feet horizontally clear from the edge of sewage leach fields, seepage pits and septic tanks.

**3.02 LAYING OF PVC PRESSURE PIPE**

- A. Installations of pipe, bends, and fittings shall be in accordance with Section 3.3 for ductile iron bends and fittings and AWWA C-605, "Underground Installation of (PVC) Pressure Pipe and Fittings for Water" and/or the Uni-bell guideline UNI-PUB-9, "Installation Guide for PVC Pressure Pipe". PVC bends and fittings are not allowed. The Uni-Bell Handbook of PVC Pipe-Design and Construction shall be used for details of pipe installation practice except as follows and where noted otherwise on plans. Longitudinal bending of pipe sections is prohibited. Any directional change shall be accomplished through manufacturer approved 1 degree deflection of push on joints, 5 degree deflection with Certainteed – couplings, or ductile iron bends capable of withstanding 250 psi loads. A number 14 gauge, solid, soft drawn insulated copper tracer wire is required for PVC pipe installation. The tracer wire shall be wrapped around the pipe at 10-foot intervals and brought up inside each valve can to within 6 inches of the valve cover.
- B. Acceptable line and grade for piping: The pipe shall be laid true to the line and grade shown on the plans within acceptable tolerances. The tolerance on grade is 1 inch. The tolerance on line is 2 inches.
- C. A number 12 gauge, solid, soft drawn insulated copper tracer wire is required for PVC pipe installation on lines 2" and greater. The tracer wire shall be wrapped around the pipe at 10-foot intervals and brought up inside each valve can to within 6 inches of the valve cover.
- D. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into

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the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.

- E. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Inspector. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- F. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. The beveled end of any PVC pipe shall be cut off before the pipe is inserted into a mechanical joint bend or fitting. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.
- G. Should structural difficulties or Work of other trades prevent the running of pipes or the setting of equipment as indicated by Drawings, the necessary deviation will be allowed by the Owner's Inspector.
- H. All water piping shall be adequately supported. Burred ends shall be reamed to the full bore of the pipe or tube. Change in direction shall be made by the appropriate use of fittings. All piping, equipment, appurtenances and devices shall be installed in conformity with the provisions and intent of the California Plumbing Code.
- I. Install piping under streets and other obstructions that cannot be disturbed, by tunneling, jacking, or combination of both.
- J. When connecting plastic pipe to copper, brass, or steel material, provide a schedule 80 PVC nipple.
- K. Cure welded joints at least 15 minutes before moving or handling, and at least 24 hours before applying pressure to system, unless otherwise recommended by joint solvent manufacturer.
- L. Field inspection for plastic pipe and fittings shall follow section 306-1.2.12, Standard Specifications for Public Works Construction, latest edition.

### 3.03 CONNECTIONS TO EXISTING UTILITIES

- A. All tie-in locations shall be excavated a minimum of TWO (2) working days in advance of final connection to expose the affected portions of existing pipelines and to allow time for the necessary measurements, assembling of materials and equipment, and assuring that all pre-assembled piping and fittings will be compatible with the existing main.
- B. Changes or delays caused by the Contractor's failure to perform "Potholing" and interference location work shall not be eligible for extra work, compensation, or time extension.
- C. The Contractor shall immediately notify the Owner's Inspector in writing, upon learning of the existence or location of any utility facility omitted from or shown incorrectly on the contract drawings, or improperly marked or otherwise indicated. The Contractor shall provide full details as to depth, location, size and function of the utility in writing to the IOR and note it on the "as-built" plans.
- D. The Contractor shall not interrupt or disturb any utility facility in the public right-of-way without authority from the utility company or order from the Long Beach Water Department.

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- E. The Contractor shall furnish and place the necessary protection around a utility when protection is called for on the contract drawings, visible to the Contractor, or marked as such. The Contractor shall install the utility protection at no additional expense to the Owner.

**3.04 VALVES**

- A. Water valves shall be installed at locations shown on the Construction Drawing, or as directed by the Inspector. Valves shall be set plumb, and shall be stabilized and supported separately from the pipeline. Information regarding size, type, make, and number of turns to close shall be supplied to the Utility. All valves shall be covered with a valve box assembly. Valve boxes shall be plumb, centered over the valve nut, and supported separately from the valve body. Valve boxes shall be lowered to below paving grade level prior to street paving, and after final grade has been established by the final grade. In any event, Contractor shall ensure that all valve boxes will provide access to the operation of the valve by the Utilities' personnel. Valve boxes shall be flagged or barricaded during construction to divert traffic around their location.
- B. Wrap buried valves, 2-½ inches and larger, with two layers of 8-mil polyethylene wrap per AWWA C105.
- C. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, Minnesota Mining and Manufacturing EC 244, Koppers Bitumastic (Super-Tank) 505, or an approved equal.
- D. Stainless steel parts shall not be coated except for the threaded portion, which will be assembled with a liberal coat of anti-seize compound.

**3.05 BACKFLOW DEVICE ASSEMBLY**

- A. Install in accordance with manufacturer's recommendations. The horizontal run of all backflow assemblies shall be installed in a level position.
- B. Backflow preventer devices shall be tested and certified by the water agency having jurisdiction. Testing shall be performed in the presence of the IOR. Test reports shall be turned over to the IOR.
- C. Install thrust blocks and pipe support as required to support backflow assembly.

**3.06 CONTROLLER**

- A. The exact location of the controller shall be approved by the Architect or Owner's authorized representative before installation. The electrical service shall be coordinated with this location.
- B. The Contractor shall be responsible for the final electrical hook up to the controller.
- C. The water system shall be programmed to operate during the periods of minimal use of the design area.

**3.07 CONTROL WIRING**

- A. Low voltage control wiring shall occupy the same trench and shall be installed along the same route as the pressure supply lines whenever possible.
- B. Where more than one wire is placed in a trench, the wiring shall be taped together in a bundle at intervals of 10 feet. Bundle shall be secured to the mainline with tape at intervals of 20 feet.

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- C. All connections shall be of an approved type and shall occur in a valve box. Provide an 18-inch service loop at each connection.
- D. An expansion loop of 12 inches shall be provided at each wire connection and/or directional change, and one of 24 inches shall be provided at each remote control valve.
- E. A continuous run of wire shall be used between a controller and each remote control valve. Under no circumstances shall splices be used without prior approval.

**3.08 PROTECTION OF METAL SURFACES**

- A. All exposed surfaces of the valves, flanges, bolts, nuts, tie-rods, turn buckles, etc. in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling. In addition to this bitumastic coating, all iron or steel surfaces such as valves, flanges, bolts, nuts, couplings, shall be encased in 8 mil polyethylene wrapping in accordance with AWWA C105 "American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems".

**3.09 ELECTROLYSIS PREVENTION**

- A. Insulating (dielectric) couplings or 6-inch long brass nipples shall be installed at locations specified or as required. Dielectric insulators shall be provided to insulate dissimilar metal to metal contact. Flanges shall be provided with a complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at locations indicated or as required.
- B. Where steel or cast iron below grade connects to copper or brass piping above grade, the transition from steel or cast iron pipe to copper or brass pipe shall be installed in an above grade accessible location.
- C. Underground dielectric connections shall be in accessible yard boxes.
- D. Above ground dielectric connections shall be exposed.

**3.10 PIPELINE FLUSHING & HYDROSTATIC TESTING**

- A. General Requirements
  - 1. Hydrostatic testing and disinfecting (chlorination and flushing) of newly laid or repaired pipelines and appurtenances must be completed before the pipelines can be connected to the existing water distribution system. Pipelines and appurtenances shall remain isolated from the existing water distribution system during hydrostatic testing and disinfecting.
  - 2. All services, air release valves, and other appurtenances connected to the newly laid pipeline shall be pressure tested and disinfected at the same time as that of the pipeline. Care shall be taken to expel all air from the pipeline and services during any filling operation.
- B. Temporary Piping and Appurtenances for Flushing, Testing, and Disinfecting
  - 1. The Contractor and/or subcontractor shall supply all temporary piping, corporation and curb stops, test plates, bulkheads, plugs, pipe end caps, valves, fittings, calibrated meters, equipment, labor and method necessary for pressure testing, chlorinating, and flushing of the newly laid pipeline. The Contractor shall also provide

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any temporary piping, backflow devices, and appurtenances needed to carry potable water to the section of pipeline being flushed, pressure tested, or disinfected.

2. Corporation and curb stop taps used for flushing, pressure testing, and disinfecting shall comply with service tap requirements for ductile iron pipe. Unless specified otherwise, the tap shall be made at the top of pipe.

### 3.11 HYDROSTATIC (PRESSURE) TESTING

- A. After completion of the hydrostatic testing, the Contractor shall provide a signed copy of all test results to the Inspector. The Contractor and Inspector shall be present during the testing.
- B. Test PVC plastic water system in accordance with UBPPA UNI-B-3 for pressure and leakage. The amount of leakage from PVC piping shall not exceed the amounts given in UBPPA UNI-B-3, except that no leakage is permitted for joints installed with sleeve type mechanical couplings.
- C. Test water service lines in accordance with applicable requirements of AWWA C 600. No leakage is permitted.
- D. Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of 50 psi greater than the maximum working pressure of tested system. Provide and maintain hydrostatic test pressure for at least 2 hours to ensure no leakage of any portion of piping or appurtenances under pressure test.
- E. Repetition of Hydrostatic Test: If the leakage in the section of pipeline being tested exceeds the maximum allowable rate specified above, such section will be considered defective. The Contractor shall determine the points of leakage and make the necessary repairs at his expense. The subcontractor will then conduct another hydrostatic test. This procedure shall be continued until the leakage falls below the allowed maximum.
- F. After Satisfactory Hydrostatic Test:
  1. All valves shall be tested for leak proof tightness after the pipeline hydrostatic test with the test pressure on one side of the valve and atmospheric pressure on the other side.
  2. After test sections have successfully met the hydrostatic test requirements to the satisfaction of the Inspector, the entire pipeline or each test section shall be filled or shall remain filled with potable water until the pipeline is disinfected. Test plates, corporation stops, and other test facilities shall remain in place if needed for disinfecting or removed as directed by Inspector.
  3. Regardless of the hydrostatic test results, the Contractor shall repair all detectable leaks.

### 3.12 DISINFECTION PROCEDURES

- A. All potable water lines MUST be disinfected per the following requirements.
- B. The Contractor shall supply all materials, labor, equipment and methods necessary to disinfect the water main. The Contractor shall hire a State certified laboratory to perform the required bacteriological tests for the newly laid pipelines.

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- C. Preparation for Disinfecting Pipelines: Contractor shall tightly shut off every service connection served by the pipeline being disinfected at the curb stop before water is applied to the pipeline. Care should be taken to expel all air from the main and services during the filling operation.
- D. Inject solution of liquid chlorine or sodium hypochlorite and water containing at least 50 PPM of free chlorine into a system in a manner to ensure that entire system is completely filled with solution. During this procedure operate valves and test outlets for residual chlorine. Continue injection until outlets indicate at least 59 PPM of free chlorine.
- E. After injection, isolate system and hold solution in retention for a period of at least 8 hours. Perform tests for residual chlorine after retention. If such tests indicate less than 50 PPM of residual chlorine, repeat entire procedure. After satisfactory sterilization has been verified, flush entire system until all traces of chlorine have been removed or until chlorine content is no greater than in existing water supply.

**3.13 DISPOSAL OF TEST WATER**

- A. The disposal of all water used in flushing, hydrostatic testing, and disinfecting the sections of pipeline shall be the sole responsibility of the Contractor. The disposal of water shall, in all cases, be carried out in strict observance of the water pollution control requirements of the California Regional Water Quality Control Board.
- B. The Contractor shall obtain an NPDES permit and comply with that permit in his discharge of test water.
- C. The Contractor shall apply a reducing agent to the solution to neutralize residual chlorine or chloramines remaining in the water. Additionally, the flow of water from the sections of pipeline shall be controlled to prevent erosion of surrounding soil, damage to vegetation, altering of ecological conditions in the area, and damage to any construction or maintenance activity occurring in any ditch or storm drain downstream of discharge.

**3.14 CONNECTING TO EXISTING DISTRIBUTION SYSTEM**

- A. After all hydrostatic tests and disinfecting has been completed and demonstrated to comply with the Specifications, the Contractor shall connect newly laid pipeline to the existing distribution system.
- B. Where connections are to be made to an existing potable water system, swab or spray the interior surfaces of all pipe and fittings used in making the connections with a five (5) percent or greater hypochlorite solution as directed by the Inspector.
- C. As soon as the connection is completed, thorough flushing is required until all discolored water is removed.

**3.15 REMOVAL OF TEMPORARY PIPING AND APPURTENANCES**

- A. After the newly laid section of pipeline has been approved by the Inspector for connection to the existing distribution system, the Contractor shall disconnect and remove all temporary piping, fittings, test plates, backflow devices, and other appurtenances used for pressure testing, chlorinating, and flushing.
- B. Contractor shall remove and replace all stops used for testing and disinfecting of the pipeline with stainless steel repair clamps.

**3.16 CLEANING**

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- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.17 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

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**SECTION 33 40 00 - STORM DRAINAGE UTILITIES**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.
- B. Supply and installation of storm drain system as shown on the construction documents.

**1.2 SUBMITTALS**

- A. Product Data: Manufacturer's catalog data for all required materials. Include technical data for pipe, drain inlets, catch basins, grates, trench drain, gaskets, joints and couplings.
- B. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.

**1.3 RELATED SECTIONS**

- A. Trenching Requirements: Conform to the requirements of Section 31 22 00 – Grading.

**1.4 LICENSES, PERMITS & FEES**

- A. The Contractor shall have a Class "C-34", "C-36", "C-42" or Engineering "A" Contractors license valid in the State of California.
- B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work.
- C. The Owner shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.

**1.5 QUALITY ASSURANCE**

- A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2012 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications". In case of conflict between the "Standard Specifications", the General Conditions/Specifications and these Special Provisions, the General Conditions/Specifications and these Special Provisions shall have precedence.

**1.6 EXAMINATION OF PREMISES**

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a



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proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.7 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate with other utility work.

1.9 GUARANTEES

- A. The Contractor shall guaranty the work against defective material or workmanship for a period of one (1) year from the date of completion of the contract and/or acceptance for the work by the Owner. Damage due to acts of God or from sabotage and/or vandalism is specifically exempted from the guaranty. When defective material and/or workmanship are discovered which require repairs to be made under this guaranty, all such work shall be done by the Contractor at his own expense and shall being within five (5) working days after written notice of such defects has been given to him/her by the District. Should the Contractor fail repair such defective material or workmanship within five (5) working days thereafter, the District may cause the necessary repairs to be made and charge the Contractor with the actual cost of all labor and materials required.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.
- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship and shall not be less than one (1) year. See specific equipment specifications for extended warranty requirements.

1.10 DISPOSAL OF REMOVED MATERIALS

- A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.

1.11 SUBSTITUTIONS

- A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for

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review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

- B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.12 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, pipe invert locations, drain basins, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.13 INSPECTION OF WORK

- A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.
- B. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.
- C. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Wall Piping Materials
  - 1. Poly Vinyl Chloride (PVC) Sewer Pipe, ASTM D-3034, SDR-35. The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings SDR-35 shall be manufactured in accordance with ASTM Standards D-3034 and F-1336 or F-679. The PVC material shall have a minimum cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM D-1784.

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2. Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 40, meeting ASTM D 1785 standards. Fittings shall conform to ASTM D 2467 "Socket-Type PVC Plastic Type Fittings, Schedule 40.
- B. Pre-cast Concrete Catch Basins:
1. Christy Concrete Products, Inc.: 44100 Christy Street, Fremont, CA. 94538. Phone: (800) 486-7070, Fax: (800) 486-6804.
  2. Brooks Products, Inc.: 1850 Parco Avenue, Ontario, CA. 91761. Phone: (909) 947-7470, Toll Free: (888) 307-7470, Fax: (909) 947-7741.
  3. Eisel Enterprises Inc: 714 Fee Ana Street, Placentia, CA. 92870. Phone: (714) 993-1706.
- C. Grates & Covers:
1. All metal grates and covers must be vandal proof / bolt down type / galvanized.
  2. A.D.A. - Where noted on the plans install A.D.A. grates on catch basins. A maximum spacing between grating bars in accessible path of travel is 1/2 inch in the direction of travel, or 1/2 inch in either direction when the path of travel is not limited to one direction.
  3. Heel Proof - Where noted on the plans install heel proof grates on catch basins requiring a maximum 1/4 inch opening.
- D. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document.
- E. Concrete, Mortar and Related Materials: Conform to Section 32 13 13: Site Concrete Work.
- F. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.
- G. Paint and Protective Coatings
1. All storm drain hardware, including frames and covers, grates, protection bars, steps, etc., shall be protected from corrosion. Storm drain hardware made of cast iron shall be protected by painting with, or dipping in, a commercial grade asphalt paint. Storm drain hardware made of steel shall be galvanized.
  2. Hot-dip galvanize steel parts after fabrication and before installation, in accordance with Section 210 - Paint and Protective Coating of the Standard Specifications for Public Works Construction.

**PART 3 - EXECUTION**

**3.1 PIPELINE INSTALLATION**

- A. Install pipeline in a practical alignment and uniform slope to the point of connection as indicated on Construction Document. Prior to trench excavation, verify size, material, depth, and location of the point of connection. Notify Civil Engineer if point of connection elevation is different than that shown on construction drawing as it may affect the design of the system.
- B. Excavating, trenching, and backfilling are specified in Section 31 22 00: Grading.
- C. Jetting of backfill will not be allowed for consolidation of trench. Water shall be added to assist with trench compaction to obtain 90 percent relative compaction.
- D. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.

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- E. All storm drain pipelines, trench drains, catch basins and drain inlets shall be staked by a licensed surveyor and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.
- F. Refer to ASTM D 2321-00 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" or Uni-Bell PVC Pipe Association UNI-PUB-6 "Installation Guide for PVC Solid-Wall Sewer Pipe" for installation information on SDR-35 pipe.
- G. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- H. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- I. Concrete Placement: Place cast-in-place concrete according to ACI 318 and ACI 350R.
- J. Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work.
- K. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the option of the Engineer trench conditions are unsuitable.
- L. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.
- M. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Engineer. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- N. All grates, frames and covers for drain inlets, catch basins & trench drains shall be locked down to prevent theft after final construction.

**3.2 FIELD INSPECTION FOR PIPE & FITTINGS**

- A. Inspect interior of storm drain piping to determine whether line displacement or other damage has occurred. Inspect with the use of closed circuit television (cctv). The Contractor shall give the Inspector a minimum of 48 hours notice prior to this video inspection. A video tape of the inspected pipeline shall be delivered to the Inspector for approval.
  - 1. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Crushed, broken, cracked, or otherwise damaged piping.
    - c. Exfiltration: Water leakage from or around piping.
    - d. Infiltration: Water leakage into piping.
  - 2. Replace defective piping using new materials, and repeat inspections until defects

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- are within allowances specified.
3. Re-inspect and repeat procedure until results are satisfactory.
- B. Drainage pipes and inlets shall be flow tested prior to acceptance. Flood testing, including landscaped areas, required in presence of inspector to confirm drainage.

END OF SECTION

## SECTION 33 40 01- SPORTS SLOT STORM DRAIN SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED WORK

- A. sections includes but is not limited to:
  - 1. Excavation and backfill, cast-in-place concrete and mechanical equipment.

#### 1.2 SYSTEM DESCRIPTION –

- A. Modular trench drainage system manufactured from corrosion resistant polyester polymer concrete including interconnecting modular components.

#### 1.3 SUBMITTALS

- A. Manufacturer will submit, when required, shop drawings showing layout plan of the total drainage system listing all parts being provided with exact center-line dimensions suitable for installation. Copies of the manufacturer's recommended method of installation shall be submitted for review.

#### 1.4 PRODUCT HISTORY

- A. Manufacturer shall submit a list of installed projects, if required.

#### 1.5 WARRANTY –

- A. ACO provides a limited product warranty of one year based on installation according to manufacturer's installation instruction data.

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS

- A. Manufacturer shall be ACO Polymer Products, Inc.
  - 1. System 4000 or approved equal
    - a. PHYSICAL & MECHANICAL CHARACTERISTICS
      - i. Overall width - 6.10 inches (155mm)
      - ii. Internal width - 4.00 inches (102mm)
      - iii. Unit depth – 5.41 inches to 12.50 inches (137 mm -317 mm)
      - iv. Unit length - 39.37 inches (1000mm)
      - v. Compressive strength - 14,000 psi
      - vi. Flexural strength - 4,000 psi
      - vii. Water absorption rate - <0.1% by weight.
  - 2. In-Line Catch Basin model no. 05620 Outlet C
    - a. PHYSICAL AND MECHANICAL CHARACTERISTICS
      - i. Overall width – 6.10 inches (155mm)
      - ii. Internal width – 4.00 inches (102mm)
      - iii. Overall Depth – 23.00 inches (585 mm)
      - iv. Overall Length – 19.69 inches (500 mm)
      - v. Weight – 57.0 lbs
      - vi. Invert Depth – 21.63 inches (549 mm)
      - vii. Capacity -6.65 gallons and 530 GPM
      - viii. Compressive strength –

ix. Flexural strength -

B. ADA compliant to American Disabilities Act of 1990 Section 4.5.4

## 2.2 CHANNEL PROFILE

A. Each unit will feature a 'u' shape profile in the trench bottom and male to female interconnecting ends. Units shall have horizontal cast-in anchoring features on outside walls to ensure maximum mechanical bond to surrounding bedding material. Each unit shall be provided a black ADA Plastic grating from same manufacturer as slot drain body. The system shall have a varying dept to direct water flow to each catch basin. At radial locations,

## 2.3 RADIUS CHANNELS

A. Shall be manufactured to enable a radius of 36.5 meters, per IAAF guidelines.

## 2.4 CATCH BASINS

A. Shall be manufactured from polymer concrete, be 19.69" (500mm) in length and include a trash bucket (optional) and Quicklok bar and 6" oval to round adapter when specified on civil drawings.

## PART 3 - INSTALLATION

### 3.1 SITE PREPARATION

A. Excavate an area wide enough and deep enough to accommodate the ACO SPORT System 4000 channel, allowing a minimum of 4 inches (100mm) concrete encasement (minimum 3,000psi) on 3 sides to provide support on both sides as well as beneath channel. Top of channel must be evenly aligned to the surface of the surrounding slab. See installation section for haunch details for different loadings & pavement materials.

### 3.2 INSTALLATION

A. Channel sections are installed from the outlet or catch basins. Insert channels from above to allow ends to interconnect. Channel sections shall be placed on brick, rebar basket, or low slump concrete slurry to obtain correct finished elevation. Cutting will be made, if required, by masonry or concrete saw. Use tape or plastic to protect top surface of channel from concrete splash during concrete pour. Place concrete in a manner that will not dislodge the channels.

### 3.3 FINISHING AND CLEAN-UP

A. Following final set of concrete, remove protection covering the top of channel and thoroughly flush system to remove debris.

### 3.4 INSTALL PER MANUFACTURER

A. Install in strict accordance with manufacturer's recommendations and drawings. Details available at [www.acousa.com/install\\_drawings\\_sport.htm](http://www.acousa.com/install_drawings_sport.htm)