Conejo Recreation and Park District

KEY

1. Existing Tree(s) to Remain
2. Existing Multi-Use Path
3. Existing Conejo Creek Channel
4. Existing Utilities
5. Vegetated Swale with On-Site Retention
6. Porous Asphalt Parking Lot (1 ADA, 8 Standard Spaces)
7. Crosswalk
8. Porous Asphalt Pedestrian Path
9. Native Earth Equestrian Trail with Scored Concrete Crossing
10. Restroom - Single Occupancy with Drinking Fountain and Bottle Filling Station
11. Chumash Creek Themed Playground
12. Picnic Shade Structure
13. "Optional" Picnic Shade Structure
14. Backstop
15. Multi-Use Court
16. Sand Volleyball
17. Multi-Use Lawn
18. Fitness Node (6 Total)
19. Boardwalk
20. Vehicle Gate
21. Future Corral
22. Park Sign (Primary)
23. Park Sign (Secondary)
24. Picnic Area
25. Native/Drought Tolerant Landscape Planting
26. Bike Racks
27. Perimeter Fencing
28. Culvert

Conejo Creek Southwest Park

rrm design group

Specifications
6/28/2021

TABLE OF CONTENTS

Section 01 4000

Quality Control

PART 1 - GENERAL

1.01 Definitions

A. Soils Engineer and Testing Laboratory: The District will retain a qualified soils engineer and testing laboratory to perform tests and report on work as specified in the contract documents, and as otherwise required.

B. Testing Agency: An organization other than the testing laboratory, retained and paid by the District to perform tests and report on whether or not designated items of work comply with the requirements of the contract documents.

1.02 Tests

A. The District will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the District's representative and not by the Contractor.

B. The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied by him under the contract documents, which must by terms of the Contract be tested, in order that the District may arrange for the testing of same at the source of supply.

C. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.

D. The District will select and pay testing laboratory costs for all tests and inspections, but may be reimbursed by the Contractor for such costs under the contract documents.

1.03 Testing Laboratory

A. General: Services of a testing laboratory are required for work specified in various individual specification Sections.

B. Contractor Responsibilities:
   1. Contractor shall cooperate with testing laboratory personnel.
   2. Furnish copies of product test reports as specified.
   3. Furnish incidental labor and facilities:
      a. To provide access to work to be tested
      b. To obtain and handle samples at the project site or at the source of the product to be tested as requested by the testing lab
      c. To facilitate inspections and tests
      d. To facilitate storage and curing of test samples
      e. To fabricate testing samples as indicated

1.04 Test Reports

A. The testing laboratory will distribute reports as follows:
   1. Construction Manager (1 copy)
   2. Landscape Architect (1 copy)
   3. Applicable Consultants (1 copy each)
   4. State Agencies as appropriate
   5. District's Project Inspector

B. The Owner shall distribute reports in the same manner and number as for the testing laboratory.

1.05 Retesting

A. The District Representative shall have the right to order additional tests as instructed if he has reasonable doubt that materials comply with Specification requirements.
   1. If additional tests establish that materials comply with Specification requirements, costs for such tests will be paid by the District.
   2. If additional tests establish that materials do not comply with Specification requirements, costs for such retests shall be paid by the Contractor.

1.06 Inspection by the District

A. The District, Construction Manager and Architect shall, at all times, have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.

B. The District, Architect and Construction Manager shall have the right to reject materials and quality of work, which are defective, or to require their correction. Rejected work quality shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the District. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the District may correct same and charge the expense to the Contractor.

C. Should it be considered necessary or advisable by the District, Architect or Construction Manager, at any time before final acceptance of the entire work to make an examination of the work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to the fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
   1. Submit qualifications of observer to Architect 30 days in advance of required observations.
   2. Observer subject to approval of Architect.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

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

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

End of Section 01 4000

Section 01 5713

Temporary Erosion and Sediment Control

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Storm water pollution prevention and control related to construction activities.

E. Performance bond.

F. Compensation of District for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 31 2200 - Grading: Temporary and permanent grade changes for erosion control.

1.03 PERFORMANCE REQUIREMENTS

A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

C. Provide to District a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to District.

G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.

3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to District.

H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to District; remove deposited sediments; comply with requirements of authorities having jurisdiction.
2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to District; remove deposited sediments; comply with requirements of authorities having jurisdiction.

J. Open Water: Prevent standing water that could become stagnant.

K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 SUBMITTALS

A. See Article 9 of General Conditions - Submittals, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
1. Include:
a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
e. Other information required by law.
f. Format required by law is acceptable, provided any additional information specified is also included.
2. Obtain the approval of the Plan by authorities having jurisdiction.
3. Obtain the approval of the Plan by District.

C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 3 EXECUTION

2.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

2.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

2.03 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Clean out temporary sediment control structures weekly and relocate soil on site.

D. Place sediment in appropriate locations on site; do not remove from site.

2.04 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

End of Section 01 5713

Section 02 4100

Demolition

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Salvage of native boulders.

1.02 RELATED REQUIREMENTS

A. General Conditions - Article 5: Existance of Utilities at the Site.

B. General Conditions - Article 18: Diversion of Recyclable Water Materials.

C. General Conditions - Article 19: Removal of Hazardous Materials.

D. General Conditions - Article 27: Protection of Work and Property.

E. Section 31 1000 - Site Clearing: Vegetation and existing debris removal.

F. Section 31 2323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 2323 - Fill.

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from District.

C. Protect existing structures and other elements that are not to be removed.
   1. Prevent movement or settlement of adjacent structures.
   2. Stop work immediately if adjacent structures appear to be in danger.

3.02 TREE PROTECTION

A. Comply with the tree protection notes on the drawings.

3.03 SALVAGE NATIVE BOULDERS

A. If native boulders greater than 2 cubic-feet are unearthed during demolition activities, they shall be stockpiled on site for re-use on the project at the direction of the Owner or Landscape Architect. These boulders may be used in lieu of, or to supplement the boulders indicated in the Drawings. Contractor's bid shall not assume the presence of said boulders.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

End of Section 02 4100

Section 03 1000

Concrete Forming and Accessories

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.

C. Openings for other work.

D. Form accessories.

E. Form stripping.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions Division 01 Specification Sections, apply to this Section

B. Section 03 2000 - Concrete Reinforcing.

C. Section 03 3000 - Cast-in-Place Concrete.

D. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

D. ACI 347R - Guide to Formwork for Concrete; 2014.

E. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

A. See General Conditions - Article 9, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Review and approval will not include form strength and adequacy.

D. Keep an accurate record of the dates of removal of forms, form shores and reshores, and furnish copies to the SEOR.

1.05 QUALITY ASSURANCE

A. Construct forms according to ACI 347, "Guide to Formwork for Concrete," and conforming to tolerances of ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials"

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

D. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.03 FORMWORK ACCESSORIES

A. Form ties: Prefabricated rod, flat band, wire, internally threaded disconnecting ty pe, or equal, not leaving meatl within 1-1/2" of concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

1. Composition: Colorless, reactive, water-based or solvent-based compound.
2. Do not use materials containing diesel oil or petroleum-based compounds.
3. VOC Content: In compliance with applicable local, State, and federal regulations.
4. Products:
    a. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com/#sle.
    b. W. R. Meadows, Inc; Duogard: www.wrmeadows.com/#sle.

C. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

E. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Form Joints: Align joints and make watertight. Keep form joints to a minimum. Fill joints to produce smooth surfaces, intersections, and arises. Use polymer foam or equivalent fillers at joints and where forms abut or overlap existing concrete to prevent leakage of mortar.

E. Recesses, Drips, and Profiles: Provide smooth milled wood or pre-formed rubber or plastic shapes of types shown and required.

F. Cleanouts and Cleaning: Provide Temorary openings in all wall forms and other vertical forms for cleaning and inspection. Clean forms and surfaces to receive concrete prior to placing.

G. Re-Use: Clean and Recondition form material before re-use.

H. Coordinate this section with other sections of work that require attachment of components to formwork.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. All necessary pipe sleeves, anchors, or other required inserts shall be accurately installed as part of the work of other sections, according to Specification Section 03 30 00, Section 1.3.B for sumittal requirements related to this scope.

B. Obtain approval before framing openings in structural members that are not indicated on drawings.

C. Provide formed openings where required for items to be embedded in passing through concrete work.

D. Locate and set in place items that will be cast directly into concrete.

E. Conduits or pipes:
   1. Locate so as not to reduce strength of the concrete
   2. Do not place pipes, other than conduits, in a slab 4-1/2" thick or less in any case. Conduit buried in a concrete slab shall not have an outside dimension greater than 1/3 the slab thickness nor be placed below the bottom reinforcing or over the top reinf.
   3. Sleeves: Pipe sleeves may pass through the slab or walls if not exposed to rusting or other deterioration and are of uncouted or galvanized iron or steel. Provide sleeves of diameter large enough to pass any hub or coupling on pipe, including any insulation.
   4. Conduits may be embedded in walls only if the outside diameter does not exceed 1/3 the wall thickness, are spaced no closer than 3 diameters on centers and not impair the strength of the structure.

F. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

H. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

I. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

J. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Deflection: Limit Deflection of forming surfaces from concrete pressure to L/240.

C. Finish Lines: Position formwork to maintain hardened concrete finish lines within following permissible deviations.

1. Variation from Plumb:

In 10'-0"	1/4 inch
In any story or 20'-0"	3/8 inch
In 40'-0" or more	3/4 inch

2. Variation from Level or Grades Indicated

In 10'-0"	1/4 inch
In any story or 20'-0"	3/8 inch
In 40'-0" or more	3/4 inch

3. Cross-Sectional Dimensions

a.	Minus	1/4 inch
b.	Plus	1/2 inch

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and all superimposed loads as determined by testing field cured cylinders, but not sooner than specified in ACI 347 Section 3.6.2.3. Load supporting forms may be removed when concrete has attained 75 percent of required 28 day compressive strength, but no sooner than 3 days, provided construction is reshored. Vertical formwork for cast in place concrete walls may be removed no sooner than 1 day following concrete placement, provided that the contractor can demonstrate that no sloughing or sagging of concrete will occur.

1. Reshore structural members as specified per ACI 347.
2. Remove formwork progressively so unbalanced loads are not imposed on the structure.
3. Avoid damage to concrete surfaces during removal.
4. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.

End of Section 03 1000

Section 03 2000

Concrete Reinforcing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing Steel for Cast-in-Place Concrete Foundations

B. Reinforcing Steel for Cast-in-Place Concrete Slabs-on-Grade

C. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 05 1200 - Structural Metal Framing

D. Section 32 1313 - Concrete Paving

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

B. ACI 315 - Manual of Standard practice for Detailing Reinforced Concrete Structures; 2011.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

D. ACI SP-66 - ACI Detailing Manual; 2004.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).

H. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

I. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

J. CRSI (DA4) - Manual of Standard Practice; 2009.

K. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.06 DELIVERY STORAGE AND HANDLING

A. Comply with pertinent provisions of Division 01 Section 01 60 00 "Product Requirements," delivering materials in a timely manner to ensure uninterrupted progress.

B. Bundle bars, tag with identification, and transport and store so as not to damage any material. Use metal tags inicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken

C. Avoid exposure to dirt, moisture or conditions harmful to reinf.

1.07 EXTRA MATERIAL

A. Provide an allowance of an additional 10% of the total reinf. steel tonnage in addition to the quantities shown on the drawings. This additional steel shall be installed in sizes and locations as directed by the structural engineer.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Unfinished.
   3. Only to be used for conditions where bars will not be welded.

B. Reinforcing Steel: ASTM A706/A706M, Grade 60 (60,000 psi) deformed low-alloy steel bars.
   1. Unfinished.
   2. Used in all cases where welding of bars is required.

C. Reinforcement Accessories:
   1. Tie Wire: ASTM A82, Annealed copper bearing steel, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement. Standard manufactured products shall conform to the Concrete Reinforcing Institute, "Manual of Stand Practice," latest edition.
   3. Use dense precast concrete supports with embedded wire ties for reinforcement placed on grade. Elsewhere, use wire bar supports.

D. Welding electrodes: AWS D1.4, Table 5.1 and 5.3, low hydrogen electrodes, E8018 for Grade 60 Steel.

2.02 Re-bar Splicing:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars conforming to the requirements of ACI 318-11 Section 12.14.3; capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression. For reinf.

   All mechanical splices in Special Structural Walls, Special Moment Frames and Concrete Diaphragms shall be Type 2 conforming to the requirements of ACI 318-11 Section 21.1.6 & 21.11.7.4, capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression and develop the specified tensil strength of the spliced bar.
   1. Products:
      a. Dayton Superior Corporation; Bar Lock Coupler System: www.daytonsuperior.com (ICC-ESR 2481.
      b. Lenton Lock Couplers (IAPMO-ES 129).

B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.
   1. Products:
      a. Dayton Superior Corporation; _____: www.daytonsuperior.com/#sle.
      b. Lenton Form Savers (IAPMO-ES 129).

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Bending and Forming
   1. Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurous to materials
   2. Do not heat reinforcement for bending
   3. Bend bars No. 6 size and larger in the shop only.
   4. Bars with unscheduled kinks or bends are subject to rejection.
   5. Use only tested and approved bar materials

C. Welding: Use only ASTM A706 steel where welding is proposed. Perform welding where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low hydrogen electrodes. Preheat 6" each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld bars. Welding shall not be done on or within two bar diameters of any bent portion of a bar that has been bent cold. Welding of crossing bars shall not be permitted for assembly reinforcement unless authorized by the SEOR. Clean metal surfaces to be welded of all loose scale and foreign material. C
   1. Use only ASTM A706 steel where welding is proposed.
      a. Perform welding where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low hydrogen electrodes.
      b. Preheat 6" each side of joint.
      c. Protect joints from drafts during the cooling process; accelerated cooling is prohibited.
      d. Do not tack weld bars.
      e. Welding shall not be done on or within two bar diameters of any bent portion of a bar that has been bent cold.
      f. Welding of crossing bars shall not be permitted for assembly reinforcement unless authorized by the SEOR.
      g. Clean metal surfaces to be welded of all loose scale and foreign material.
      h. Clean welds each time electrode is changed and chip burned edges before placing welds
      i. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration to the base metal.
      j. Cut out welds or parts of welds found defective with chisel and replace with proper welding
      k. Fillet welds may be considered prequalified per AWS D1.4, section 6.1.2.
      l. Other welds are to be qualified per AWS D1.4 Section 6.1.2.
   2. Where ASTM A615 steel is to be used or occurs in existing elements and is to be welded
      a. Complete chemical analyses shall be performed to determine chemical composition and, for a new bar, provided in the mill certifications to determine weldability in accordance with ACI 318 Section 3.5.2 with modifications per AWS D1.4.
      b. The carbon equivalency (CE) shall be clearly defined and bars with a CE above 0.75 shall not be welded.
      c. Welding Procedure Specifications and supporting Procedure Qualification Records with required testing per AWS D1.4, shall be provided for review and approval prior to welding.

d. These WPS's and PQR's shall be specific to the CE as determined above, and shall, in addition to the other AWS requirement, include minimum and maximum preheat and interpass temperatures that are specified to the CE. This preheat and interpass temperature shall be strictly enforced in the field.
e. If separate shipments of bars vary the weldability, the process listed in the above requirements shall be repeated for these new bars.

D. Locate reinforcing splices not indicated on drawings at point of minimum stress. Review locations of splices with SEOR.

PART 3 EXECUTION

3.01 PLACEMENT

A. Before placing bars, and again before concrete is placed, clean bars of loose rust and/or mill scale, dirt, oil, or any other coating that may be deleterious or could reduce bond with the concrete.

B. Securing in place:
1. Accurately place bars and wire tie in precise position where bars cross.
2. Bend ends of wire ties away from the forms.
3. Wire tie bars to the corners of ties and stirrups.
4. Support bars according to the Concrete Reinforcing Steel Institute (CRSI) "Placing Reinforcing Bars," using approved accessories and chairs.
5. Place precast concrete cubes with embedded wire ties to supporting reinforcing steel bars in concrete placed on grade and in footings.
6. Take adequate precuations to ensure that reinforcing bar position and spacing is maintained during concrete placement.

C. Do not displace or damage vapor barrier.

D. Maintain concrete cover around reinforcing as follows:
1. Refer to Drawings for cover requirements

E. Splices:
1. Do not splice reinforcing bars at the points of maximum stress except where indicated.
2. Lap splices as shown or required to develop the full strength or stress of the bars.
3. Stagger splices in horizontal wall bars at least 48" longitudinally in alternate bars and opposite faces.

F. Field Welding: As specified for fabrication.

3.02 FIELD QUALITY CONTROL

A. Supervision: Perform Work to this Section under supervision of a capable superintendent.

B. An independent testing agency, as specified in Section 01 40 00, shall inspect installed reinforcement for conformance to contract documents before concrete placement.

C. Where welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the Testing Laboratory Welding Inspector in accordance with Chapter 17 of the CBC. The welding inspector shall make a systematic record of all welds:
1. Identification marks of welders;
2. List of defective welds;
3. Manner of correction of defects.

The welding inspector shall check the material, equipment details of construction and procedures as well as the welds. The inspector shall check the ability of the welder. The welding inspector shall furnish the structural eingeer and the enforcement agency with a verified report that the welding which is required to be inspected is proper and has been done in confromity with the approved plans and specifications. The welding inspector shall use all means necessary to determine the quality of the weld. The inspector may use gamma ray, magnaflux, trepanning, sonics or any other aid to visual inspection, which the inspector may deem necessary to assure the adequacy of the welding.

End of Section 03 2000

Section 03 3000

Cast-in-Place Concrete

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section Includes cast-in-place concrete, concrete materials, mixture design, placement procedures and finishes for the following:

B. Concrete formwork.

C. Concrete Footings

D. Concrete Headwalls

E. Curb and Gutter

F. Concrete reinforcement.

G. Joint devices associated with concrete work.

H. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.

I. Concrete curing.

J. Concrete Foundations

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

B. Section 03 2000 - Concrete Reinforcing.

C. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

D. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Cast-in-place concrete work will be paid for by the unit price method.

C. See Section 01 2200 - Unit Prices for additional unit price requirements.

D. Concrete - Vertical in Forms: Includes formwork as specified in Section 03 1000, reinforcement as specified in Section 03 2000, concrete, placement accessories, consolidating, and curing. Measurement by:
   1. Cubic yard.

E. Concrete - Miscellaneous Locations: Includes formwork as specified in Section 03 1000, reinforcement as specified in Section 03 2000, concrete, placement accessories, consolidating, and curing. Measurement by:
   1. Cubic yard.

1.04 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

F. ACI 305R - Hot Weather Concreting; 2010.

G. ACI 306R - Cold Weather Concreting; 2010.

H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

I. ACI 309R - Guide for Consolidation of Concrete

J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

L. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2015.

M. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).

N. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.

O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

Q. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

R. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

S. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

T. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

U. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

W. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes; 2001 (Reapproved 2012).

X. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

Y. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

Z. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.

AA. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

AB. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

AC. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012

AD. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

1.05 SUBMITTALS

A. See General Conditions - Article 9, for submittal procedures.

B. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

C. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.

D. Test Reports: Submit report for each test or series of tests specified.

1.06 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.
   1. Maintain one copy of each document on site.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Allowable Tolerances: Construct concrete conforming to the tolerances specified in ACI 117 "Recommended Tolerances for Concrete Construction and Materials", as applicable, unless exceeded by the requirements of regulatory agenciesor otherwise indicated or specified.

1.07 JOB CONDITIONS

A. Cold Weather Requirements:
   1. Follow recommendations of ACI 306R when concreting during cold weather.
   2. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. Surfaces, in which concrete is to come in contact with, shall be free from frost or ice. No frozen materials or materials containing ice shall be furnished.
   3. When placing concrete during freezing or near-freezing weather the mix shall have a temperature of at least 50 degrees F., but not more than 90 degrees F. when cement is added. Concrete shall be maintained at a temperature of at least 50 degrees F. for at least 72 hours after placing or until it has thoroughly hydrated. When necessary, concrete materials shall be heated before mixing. Special precautions shall be provided for protection of transit-mixed concrete.

B. Hot Weather Requirements:
   1. Follow recommendations of ACI 305R when concreting during hot weather.
   2. During hot weather, proper attention shall be provided for ingredients, production methods, handling, placing, protection and curing, to prevent excessive concrete temperatures or water evaporation which could impair required strength or durability.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.

2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.
   3. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type II - Moderate Portland type, low alkali. Provide Type V where concrete is in contact with soil corrosive to concrete. Use Type III from one batch by a single source for all architecturally exposed concrete.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33, C330, and C 227, from approved pits, free from vegetable matter and of opaline, feldspar, or siliceous magnesium substances; all washed, clean, hard, fine-grained sound crushed rock or gravel; not over 5 percent by weight of flat, thin, elongated, friable, or laminated pieces (pieces having major dimension over 5 times average dimension) or more than 2 percent by weight of shale or cherty material. Any suitable individual grading of coarse aggregate may be furnished, provided Grading of Combined Aggregate indicated in following table is obtained.

GRADING OF COMBINED AGGREGATE

Sieve Number or Size in Inches	1-1/2" Maximum (Percent)	1" Maximum (Percent)	3/4" Maximum (Percent)
Passing a 2"	-	-	-
Passing a 1-1/2"	95-100	-	-
Passing a 1"	70-90	90-100	-
Passing a 3/4"	50-80	70-95	90-100
Passing a 3/8"	40-60	45-70	55-75
Passing a No. 4	35-55	35-55	40-60
Passing a No. 8	25-40	27-45	30-46
Passing a No. 16	16-34	20-38	23-40
Passing a No. 30	12-25	12-27	13-28
Passing a No. 50	2-12	5-15	5-15
Passing a No. 100	0-3	0-5	0-5

C. Water: Water shall be potable and free from deleterious matter or shall otherwise satisfy the requirements of ASTM C1602.

D. Pozzolan: ASTM C618, Class F or N Fly Ash (Class C Not permitted) subject to the conditions of the CBC, containing two percent or less carbon. Fly ash shall not be used in excess of 15 percent by weight of total cement quantity for structural concrete. Where fly ash replacement is 25% or higher, maximum water-cement ratio shall be 0.45. Fly ash need not be included in lightweight concrete mix designs.

E. Fly Ash: ASTM C618, Class C or F.

Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.

F. Color(s): Omaha Tan, or approved equal.
1. Manufacturers:
   a. Davis Colors; Omaha Tan: www.daviscolors.com/#sle.
   b. L.M. Scofield Company; CHROMIX® Admixtures for Color-Conditioned® Concrete: www.scofield.com/#sle.
   c. Solomon Colors; Solomon ColorFlo Liquid Colors: www.solomoncolors.com/#sle.

G. Water: Clean, potable and not detrimental to concrete, complying with ASTM C94 and ASTM C1602

2.04 ADMIXTURES

A. Admixtures to be used in concrete shall be subject to prior approval by the Structural Engineer. Where more than one admixture is used, they shall be compatible. Use of admixtures shall be consistent throughout Work.

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

C. Air Entrainment Admixture: ASTM C260/C260M.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
1. Super-Plasticizers (High Range Water Reducers): ASTM C494, Type F. Capable of producing concrete which can be placed at 8 11 inch slump without segregation, capable of maintaining slump within 2" of that initially mixed for 2 hours, and of maintaining concrete temperature within 2 degrees F. from time of batching for 2 hours minimum.

E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
1. Only one brand. When used, are subject to approval of Structural Engineer of Record, and must reduce the mixing water at least 10 percent without entraining air in excess of 2 percent by volume. If the water reducing agent entrains more than 2 percent air, the water reduction shall be at least 12 percent, but in no case shall the water reducing agent entrain air in excess of 4 percent.

F. Water Reducing Admixture: ASTM C494/C494M Type A.
1. Only one brand. When used, are subject to approval of Structural Engineer of Record, and must reduce the mixing water at least 10 percent without entraining air in excess of 2 percent by volume. If the water reducing agent entrains more than 2 percent air, the water reduction shall be at least 12 percent, but in no case shall the water reducing agent entrain air in excess of 4 percent.

G. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
1. A crystalline permeability reducing admixture (PRAH) may be used in accordance with ACI 212.3R-10, where reduced concrete permeability is desired. Trial batches should be

performed to ensure that the plastic and hardened properties of concrete meet expectations.

2. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.

2.05 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
   3. non-gas-forming and free of oxidizing catalysts and inorganic accelerators, used as dry or damp pack, or mixed to a 20-second flow (CRC-C 611), without segregation or bleeding at any temperature between 45 degrees F and 100 degrees F.
   4. Low-Slump, Dry Pack Products:
      a. Drypack: Field mixture of I part Portland cement to 2 parts fine aggregate mixed to a damp consistency such that a ball molded in the hands will stick together and hold its shape. In lieu of field mixing, Contractor may use factory mixed drypack material, such as Master Builders "Set Grout." f'c shall be equal to 5,000 psi.

B. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.
   1. Minimum Compressive Strength at 7 days, ASTM C579: 12,000 pounds per square inch.

2.06 BONDING AND JOINTING PRODUCTS

A. Bonding Agent: "Weld-Crete," manufactured by Larsen Products Co., P.O. Box 2127, Rockville, MD 20852, Master Builders "Concresive," or equal.

B. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

C. Epoxy Bonding System:

D. Construction Joint Materials: "Key-Kold" or "Kwik-Joint," of profiles indicated.

E. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

F. Expansion Joint Fillers: Preformed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D 1751 and ASTM D1752.

G. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

2.07 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

2.08 CONCRETE MIXING

A. Furnish ready-mixed concrete from an approved commercial off-site plant. Conform to ASTM C 94, except materials, testing, and mix designs as specified herein. Use transit mixer trucks equipped with automatic devices for recording number of revolutions of drum. Comply with CBC Section, 1905.

B. Admixtures: All approved admixtures shall be introduced into the concrete at the batch plant. Field additions are not acceptable.

C. Slump: Adjust quantity of water so concrete at point and time of placing does not exceed the slumps per plans when tested according to ASTM C143. Use the minimum water necessary for workability required by part of structure being cast.

D. For compressive strength, density, fly ash content, slump, and water-cement ratio, refer to the general notes in the plans.

2.09 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
2. Water-Cement Ratio: Maximum 40 percent by weight.
3. Maximum Slump: 3 inches.
4. Maximum Aggregate Size: 1/2 inch.

2.10 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
1. Colored Concrete: Add pigments in strict accordance with manufacturer's instructions to achieve consistent color from batch to batch.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 GENERAL

A. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the inspector at least 24 hours before placing concrete; do not place concrete until inspected by the inspector.

B. Pouring Record: A record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the SEOR.

3.03 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Earth Subgrade: Dampen 24 hours before placing concrete, but do not muddy. Re-roll where necessary for smoothness and remove loose material.

C. Verify that forms are clean and free of rust before applying release agent.

D. Reglets and Rebates:
   1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.
   2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be 3/4 inch wide, unless otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.

E. Screeds: Install screeds accurately and maintain at required grade or slab elevations after steel reinforcement has been installed , but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

F. Screeds Over Vapor Barrier: Use weighted pad or cradle type screeds and do not drive stakes through the vapor barrier. Check with an instrument level, transit, or laser.

G. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

H. Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior surfaces of forms, exposed reinforcing, and from surfaces of mixing and conveying equipment.

I. Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce absorption and to help maintain concrete workability.

J. Gravel Fill: Recompact disturbed gravel and bring to correct elevation.

K. Sand Beds or Subslab Drainage Fill: Recompact disturbed material and bring to correct elevation.

L. All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.

M. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

N. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

O. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.04 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.05 PLACING CONCRETE

A. Sheet Vapor Retarders:
   1. Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
   2. Lap joints 6 inches and seal with manufacturer's recommended adhesive or tape.

B. Conveying and Placing:
   1. Place concrete in accordance with ACI 304R.
   2. Do not place concrete until reinforcing steel and forms or decks have been approved by the Inspector and other authorities having jurisdiction. Concrete shall be placed only under direct observation of the inspector. Do not place concrete outside of regular working hours, unless the inspector has been notified at least 48 hours in advance.
   3. Comply with CBC Sections 1905.9 and 1905.10.
   4. Concrete shall be conveyed from mixer to location of final placement by methods, which will prevent separation or loss of materials. Place concrete in horizontal layers not more than 18" thick within 90 minutes after water is first added to the batch.
   5. In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 5-feet for concealed concrete or over 3-feet for exposed concrete.
   6. Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.
   7. Concrete shall be thoroughly consolidated during placement, and shall be worked around reinforcement and embedded fixtures with mechanical vibrators.
   8. Where new concrete is placed against or on old or existing concrete, apply bonding agent to surface of old concrete prior to placement of new concrete.

C. Compaction and Screeding:
   1. Compacting: Compact each layer of the concrete as placed with mechanical vibrators or equivalent equipment. Transmit vibration directly to concrete and in no case through the forms unless approved. Accomplish thorough compaction. Supplement by rodding or spading by hand adjacent to forms. Compact concrete into corners and angles of forms and around reinforcement and embedded fixtures. Recompact deep sections with congestion due to reinforcing steel as required.
   2. Operation of Vibrators: Do not horizontally transport concrete in forms with vibrators nor allow vibrators to contact forms or reinforcing. Push vibrators vertically into the preceding layers that are still plastic and slowly withdraw, producing maximum obtainable density in concrete without creating voids or segregation. In no case disturb concrete that has partially set. Vibrate at intervals not exceeding two-thirds the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes segregation.
   3. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a

heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.

4. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of coarse aggregate.

D. Floating and Troweling:
   1. After concrete has been placed, struck off, consolidated, and restraightened, concrete shall not be worked further until ready for floating. Restraightening operation is best accomplished by use of 8 foot to 10 foot wide bull float. Power floating operations shall begin when the water sheen has disappeared, and when the mix has stiffened sufficiently to permit proper operation of power-driven float.
   2. Consolidate surface with power-driven floats. Hand floating with wood or cork faced floats shall be used in locations inaccessible to power driven machine. Surface shall be restraightened at this stage with ten foot highway straightedge applied at not less than two different angles.
   3. High spots shall be cut down and low spots filled during this procedure to produce planes checking true under straightedge in any direction. Uniformly slope surfaces to drains where occurs.
   4. Restraightening operation shall be followed by final float pass to uniform, smooth, granular texture.

E. Joints: Comply with CBC Section 1906.4. Locate joints in concrete only where shown or approved and obtain prior approval for points of stoppage of any pour. Clean and roughen surface of construction joints by removing entire surface and exposing 1/4" of clean coarse aggregate solidly embedded in mortar matrix by chipping, use of an approved retarder agent, or equal. Water and keep hardened concrete wet for not less than 24 hours before placing the next lift or abutting concrete. Cover the horizontal surfaces of existing or previously placed and hardened concrete with a 2" thick layer of fresh concrete of required mix less 50 percent of coarse aggregate just before balance of concrete is placed.

F. Vertical Elements: Stop placement of concrete in walls and columns 1 1/2" below bottom of beams or supported slabs. Stop placement at sills and heads of wall openings in the same manner. Allow concrete in vertical elements to be in place at least 2 hours and until vertical settlement has ceased before placing concrete for floor framing.

G. Correction of Segregation: Before placing next layer of concrete, and at the top of each placement for vertical elements, remove all concrete containing excess water or fine aggregate, or showing deficiency of coarse aggregate, and fill the space with compacted concrete of correct proportions. Comply with CBC Section, 1906.4.

H. Filling, Leveling and Patching:
   1. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.
   2. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.

I. Cement Base: Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.

J. Notify Architect not less than 24 hours prior to commencement of placement operations.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

M. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

N. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.06 EXPANSION AND CONSTRUCTION JOINTS

A. EXPANSION AND CONSTRUCTION JOINTS

1. Construction Joints: Details and proposed location of construction joints shall be as indicated on the Drawings, located to least impair strength of structure, in accordance with the following:
   a. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.
   b. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.
   c. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.
2. Expansion Joints: Provide expansion joints where indicated in walks and exterior slabs. Space approximately 20 feet apart, unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab.
3. Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.07 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.08 CONCRETE FINISHING

A. Soda and Acid Wash: Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have been furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.

B. Sacking: Exposed concrete curbs, and other similar surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.
   1. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.
   2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.

C. Exposed Formed Concrete: Rub surfaces with a carborundum brick or equal until smooth and free of form marks, offsets, and other defects, and in uniform planes. Wet rubbed surface and then brush coat with cement grout consisting of 1 part light-colored Portland cement to 2 parts fine aggregate and mixed with water to the consistency of thick paint. Cork or wood float grout to fill all pits, air bubbles, and surface holes. Scrape off excess grout and rub surface with burlap or equal to remove all grout film. After grout sets, again coat with same grout, cure, then brick and burlap rub as necessary to eliminate remaining defects and blemishes, and damp cure surfaces for not less than 3 days or longer if required for complete curing of concrete. Finish, clean, and cure each surface as a continuous operation. Produce uniformly plane smooth surfaces free of grout film, grout or rubbing marks, defects, or blemishes after painting or covering with a flexible type finish material. Unless otherwise indicated or specified, apply this finish on exposed formed concrete, exposed concrete at the building foundation, and where indicated or scheduled.

D. Sandblasting: Exterior concrete surfaces to receive stucco dash coat finish, where plywood or other smooth forms have been furnished, shall be uniformly sand-blasted with sharp quartz sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such surfaces shall be thoroughly washed with clean water after sandblasting.

E. Repair surface defects, including tie holes, immediately after removing formwork.

F. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

G. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

3.09 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. All curing shall be per CBC Section 1905.11. Keep forms containing concrete in a wet condition until removed. Keep concrete continuously moist for not less than 7 days after placement. Keep concrete above 50ºF and moist with a fine fog water spray until protected by curing media.

D. Forms containing concrete, top of concrete between forms, and exposed concrete surfaces after removal of forms shall be maintained in a thoroughly wet condition for at least 7 consecutive days after placing. Use the water curing method, curing sheet material, or a clear liquid membrane-forming curing compound except as otherwise specified.

E. During times of dry or excessive winds, high ambient temperature, low humidity, or other ambient conditions causing rapid drying, use specified evaporation retardant and finishing aid material according to the manufacturers instructions and cure concrete with a fine fog spray of water, or equal, applied both during and after finishing and continued until final curing operations are started.

F. Within 24 hours after finishing, exterior slabs and paving, and interior slabs to receive cement topping or mortar setting beds, shall be covered with sand to a depth of 2 inches and kept thoroughly wet for 7 days.
   1. Instead of sand covering, exterior walks and paving where no other surface treatment is specified, may be cured with clear liquid curing compound immediately installed in accordance with manufacturer's directions.

G. Where fly ash replacement is 20% or higher, floor slabs shall receive a 3 day moist cure and then 1 coat of approved curing compound. All other surfaces, with the exception of foundations, shall receive a coat of approved curing compound immediately after removal of formwork.

H. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.10 GROUTING AND DRYPACKING

A. Install as indicated or required. Where grouting and drypacking is part of the work of other sections, it shall conform to the following requirements, as applicable.

B. Drypacking: Mix materials thoroughly with minimum amount of water. Install drypack by forcing and rodding to fill voids and provide complete bearing under plates. Finish exposed surfaces smooth and cure with damp burlap or liquid curing compound.

C. Non-Shrink Grouting:
   1. Mixing: Mix the approved non-shrink grout material with sufficient water per manufacturers recommendations.
   2. Application: Surfaces to receive the non-shrink grout shall be clean, and shall be moistened thoroughly immediately before placing the mortar. Before grouting, surfaces to be in contact shall be roughened and cleaned thoroughly, all loose particles shall be

removed and the surface flushed thoroughly with neat cement grout immediately before the grouting mortar is placed. Place fluid grout from one side only and puddle, chain, or pump for complete filling of voids; do not remove the dams or forms until grout attains initial set. Finish exposed surfaces smooth, and cure as recommended by grout manufacturer.

3.11 FIELD QUALITY CONTROL

A. Provide free access to concrete operations at project site and cooperate with appointed firm.

B. Testing/Evaluation of Concrete: Conform to CBC and ACI. Testing Laboratory shall perform following tests. Samples for testing shall be obtained in accordance with ASTM C 172, and shall be taken from as close to point of placement as possible.

1. Compressive Strength Tests: Cast one set of three or more cylinders from each days placing and each 50 cubic yards, or fraction thereof, or not less than once for each 2,000 square feet of surface area for slabs and walls, of each strength of structural concrete. Date cylinders, assign record number, and tag showing the location from which sample was taken. Also record slump test result of sample. Do not make more than two series of tests from any one location or batch of concrete.
2. Test Cylinders: Samples will be made in accordance with ASTM C172. Cast cylinders according to ASTM C31; 24 hours later, store cylinders under moist curing conditions at about 70 F. Test according to ASTM C39 at 7 and 28 day ages. The remaining cylinder shall be kept in reserve in case tests are unsatisfactory.

C. Core Tests: Comply with CBC and ACI. If tests show that compressive strength of any concrete falls below required minimum at 28 day age, additional curing and testing of concrete which unsatisfactory test reports represent may be directed. Testing Laboratory shall take and test drilled cores as directed in accordance with ASTM C42. Contractor shall refill core holes with drypack concrete of the same compressive strength required for cored concrete. If core tests results are unsatisfactory, Contractor shall furnish required labor, equipment, and weights, and the Testing Laboratory shall conduct load testing on involved parts of building or structure as directed. Contractor shall bear additional curing and test costs, including Testing Laboratory costs, for concrete not meeting required compressive strength at 28 day age even if testing demonstrates that concrete has eventually attained required minimum compressive strength, and all costs for required corrections or removals and replacements as directed and required for approved construction.

D. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

E. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

F. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

3.12 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.13 CLEAN UP

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

3.14 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

End of Section 03 3000

Section 05 5000

Metal Fabrications

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items, including:

B. Handrails

C. Gabion

D. Vehicular Gate

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 06 1000 - Rough Carpentry

1.03 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of General Conditions, for payment procedures.

B. Components:
   1. Basis of Measurement: By the pound.
   2. Basis of Payment: Includes fabrication, finishing, and installation.

1.04 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

K. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.

L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

N. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.05 SUBMITTALS

A. See Article 9 of General Conditions - Submittals, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.

B. Bolts, Nuts, and Washers: Stainless steel.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES - STEEL

A. Fabricated steel items shall have the following finishes:
   1. Hot-dip galvanized, natural grey.
   2. Handrails; hot-dip galvanized, natural grey.

B. Prime paint steel items.
   1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

C. Prepare surfaces to be primed in accordance with SSPC-SP2.

D. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

E. Prime Painting: Two coats.

F. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.

G. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FINISHES - ALUMINUM

A. Class I Color Anodized Finish: AAMA 611 AA-C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; dark bronze.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

F. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply or brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).

G. At all galvanized products, clean all damaged areas and re-coat using specified galvanizing coating per manufacturer's criteria.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

End of Section 05 5000

Section 06 2000

Finish Carpentry

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items including gabion column, fencing, and boardwalk.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture damage.

1.05 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with installation of associated and adjacent components.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2.02 LUMBER MATERIALS

A. Hardwood Lumber: Redwood, Douglas Fir species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.03 FASTENINGS

A. Fasteners: Of size and type to suit application; _____ finish in concealed locations and _____ finish in exposed locations.

2.04 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.

C. Redry wood after pressure treatment to maximum ____ percent moisture content.

2.05 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9113.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

End of Section 06 2000

Section 09 9113

Exterior Painting

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and stains.

C. Materials for backpriming woodwork.

D. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Exposed steel surfaces such as structural steel elements
   3. Exposed galvanized metal surfaces such as sheet metal flashing, vents, and trim.

E. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
   6. Floors, unless specifically indicated.
   7. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   8. Glass.
   9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Section 06,2000 - Finish Carpentry.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

F. South Coast Air Quality Management District (SCAQMD) Rule 1113.

G. SSPC-SP 1 - Solvent Cleaning; 2015.

H. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

A. See Article 9 of General Conditions - Submittals, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals and roof tiles, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
b. Architectural coatings VOC limits of California.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to District.

2.02 PAINT SYSTEMS - EXTERIOR

A. Stain on Wood:
1. 2 coats stain.
2. Stain: Exterior Semi-Transparent Stain for Wood, Water Based;MPI #156.
a. Products;
1) Behr Premium Semi-Transparent Weatherproofing Wood Stain No. 5077 Tint Base.
2) PPG Paints Flood Pro Series Semi-Transparent Stain, FLD 812/832 Series.

2.03 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Exterior Plaster and Stucco: 12 percent.
2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

H. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

I. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

J. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.03 APPLICATION

A. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

End of Section 09 9113

Section 09 9750

Anti-Graffiti Coating

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all labor materials and equipment necessary for anti-graffiti coating on all exposed cast-in-place concrete.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete

1.03 SUBMITTALS

A. See General Conditions - Article 9, for submittal procedures.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
   3. Manufacturer's recommended application procedures which, when approved by the District, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.04 QUALITY ASSURANCE

A. Test Panel:
   1. Construct test panel and test product to be used, before full-scale application.
   2. Apply product using manufacturer-approved application methods, determining actual requirements for surface preparation, coverage rate, number of coats, and application procedures.
   3. After manufacturer's recommended cure time, review effectiveness of protections, compatibility with substrates, and ability to achieve desired results.
   4. Test panel location: inside project fencing, in an area that will not impede construction activities.
   5. Test panel size: 4-feet by 4-feet minimum.
   6. Test panel shall remain intact as referee sample, until work of this section is completed to the satisfaction of the District, at which time it shall be removed.
   7. Test panel may not become part of the Work.

1.05 PRODUCT HANDLING

A. Deliver materials to the job-site in satisfactory sealed containers with labels intact with manufacturer's name, brand name, type of material and batch number.

B. Store materials in suitable location where directed by the Architect, in original unopened containers in compliance with manufacturer's printed instructions.

C. Inspected for approval before containers are opened and any condemned materials to be removed from the job-site.

D. Protect anti-graffiti coating materials from exposure to weather or damage caused by other construction operations.

1.06 GUARANTEE

A. The Contractor shall furnish the Owner with a written guarantee that during a period of 2-years from date of completion and acceptance of the work, the coating will not turn white, peel, chip

or crack, and that the Contractor will without additional cost to the Owner, promptly make any repairs required as a result of ordinary wear and tear of the elements, and further guaranties that any defective material or work shall be properly repaired or replaced without additional cost to the Owner.

1.07 WARRANTY

A. Manufacturer shall provide a written warranty for 10-years to include material only when said materials are applied in accordance with manufacturer's guidelines. Refer to manufacturer for warranty policy.

1.08 MAINTENANCE

A. Extra Materials: Furnish CRPD with five (5) factory sealed 1-gallon containers of each of the following:
   1. Graffiti removal material recommended by the manufacturer for the substrate and the graffiti protection system specified.
   2. Restorer for the coating material specified, designed to restore graffiti resistance as required after five removals.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. Performance Criteria: Completed graffiti protection shall include the following performance criteria:
   1. Appropriate for use on concrete masonry materials.
   2. Flat nonglossy appearance.
   3. Non-yellowing and contain no waxes, urethanes or other yellowing resins.
   4. Shall cause little or no change in the appearance of the treated surface.
   5. Allow moisture vapor transmission.
   6. Dirt pickup shall not be increased by coating.
   7. Conform to all State and City waste disposal regulations including but not limited to those involving Proposition 65.
   8. Resistant to rain, weather, abrasion, peel, ultra-violet, and be clear and non-yellowing.

B. Products:
   1. "World's Best Graffiti Coating", manufactured by Urban Restoration Group US, Inc. www.graffitiremovalinc.com.
   2. "VandlGuard Ten", manufactured by Weatherman Products, Inc. www.rainguard.com.
   3. Approved equal. See requirements in Contract Documents.

C. After application of materials, a field demonstration or test will be performed to the satisfaction of the District, which will include:
   1. Spray paint applied to material to simulate graffiti.
   2. Allow to stand 14 days before removal.
   3. Removal by manufacturer's recommended process shall determine that at least 98% of the graffiti has been removed.

2.02 EQUIPMENT

A. All clear materials shall be applied by airless spray equipment. Tip size .015-.021.

PART 3 - EXECUTION

3.01 Surface Conditions

A. Examine the areas and conditions on which materials of this Section will be applied. Correct conditions detrimental to timely and proper completion of the work. Do not proceed with contracted work of this section until such detrimental conditions are corrected at no added cost to the Owner.

3.02 Environmental Conditions

A. Do not proceed with application of anti-graffiti materials when the ambient temperature is less than 45 degrees F., when low temperature of 40 degrees F. or less is predicted within a period of 24 hours, or if rain is expected in the next 24 hours.

B. Do not apply materials in rainy conditions or within 5 days after surfaces have become wet from rainfall or other moisture.

3.03 Inspection

A. Applicator shall notify manufacturer's representative a minimum of 72 hours prior to scheduled application for field inspection.

3.04 Application

A. Apply to all exposed cast-in-place concrete surfaces, except the following:
   1. Concrete flatwork/paving.
   2. Artificial rock in playground area.

B. Prepare surfaces and apply 2 coats per manufacturer's instructions.

C. Protection: Applicator shall be responsible for protection of this and all adjacent work from damage during application with dropcloths or other suitable materials.

3.05 Clean-up and Repairs

A. Required Clean-Up: Conform to provisions of Section 01 74 20. The Contractor shall carefully remove all protection materials from adjacent surfaces and any residue resulting from this operation. Completely remove oversprays and spills as soon as possible before curing and excess materials from the job-site.

B. Repairs: Any soiling of the work of this section shall be repaired by the installer of the anti-graffiti material at no added cost to the District.

End of Section 09 9750

Section 11 6813

Playground Equipment

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Playground layout (staking).

B. Concrete footings for playground equipment.

C. Playground equipment.

D. Location of each item of playground equipment is indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Footings for playground equipment.

B. Section 32 1816.13 - Playground Protective Surfacing: Protective surfacing in playground area.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

D. ASTM A513/A513M - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing; 2015.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

G. ASTM F1292 - Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment; 2009.

H. ASTM F1487 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2011.

I. CPSC Pub. No. 325 - Public Playground Safety Handbook; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Convene a meeting one week before starting earthwork for playground to discuss coordination between various installers.

1. Require attendance by personnel responsible for grading and installers of playground equipment, protective surfacing, footings, and adjacent work.
2. Include representatives of Contractor.
3. Notify Landscape Architect at least 2 weeks prior to meeting.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions, for submittal procedures.

B. See Section 01 3300 - Submittals, for submittal procedures.

C. Product Data: For manufactured equipment, provide manufacturer's product data showing materials of construction, compliance with specified standards, installation procedures, safety limitations, and the number of users permitted.
   1. Certifications: Provide International Play Equipment Manufacturers Association (IPEMA) certification that product complies with ASTM F1487, excluding section 10 and 12.6.1.

D. Shop Drawings: Detailed scale drawings showing play event layout, Use Zone perimeters, and fall height for each play event.
   1. Show locations and dimensions of footings and anchorage points.
   2. Clearly identify mounting elevations in relation to a fixed survey point on site and to subgrade elevation and depth of protective surfacing.
   3. Show locations of underground utilities, storm drainage system and irrigation system.
   4. Show locations of related construction such as walkways and roadways, fences, site furnishings, and plantings.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in District's name and registered with manufacturer.

1.06 SUBSTITUTIONS

A. Substitutions not permitted. See Special Conditions.

1.07 QUALITY ASSURANCE

A. Maintain one copy of the latest edition of ASTM F1487 and CPSC Pub. No. 325 at project site.

B. Manufacturer Qualifications: Company regularly engaged in manufacturing materials and products specified in this section, with not less than five years of experience.
   1. Provide documentation showing that playground equipment similar to that specified has been installed in at least five sites and in successful service for at least five years; provide addresses.

C. Installer Qualifications: Company certified by manufacturer for training and experience installing play events and equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store equipment to project site in accordance with manufacturer's recommendations.

B. Store materials in a dry, covered area, elevated above grade.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Landscape Structures, Inc. www.playlsi.com
   1. Contact: Scott Anderson. 818-735-3838. Scott@recwest.com

2.02 PLAYGROUND EQUIPMENT - GENERAL

A. Design Assumptions: Because the safety of the playground depends on strict compliance with design criteria, this information is provided for Contractor's information.
   1. Playground has been designed for children ages 2 through 12.
   2. If deviations from specified dimensions, especially fall heights, is required, obtain approval prior to proceeding; follow approval request procedure as specified for substitutions.

B. Mount equipment on concrete footings, unless otherwise indicated.

1. Playground protective surfacing constitutes a resilient layer installed over a subbase (non-resilient) that is installed over subgrade; top of footings and anchorage devices is to be covered by full depth of resilient portion of protective surfacing.
2. Protective Surfacing Depth: As indicated on drawings.
3. Provide supports as required to mount equipment at proper height above finish and sub-grades to allow installation of sufficient depth of protective surfacing; portion of support below top of surfacing must comply with specified requirements for equipment.
4. Paint portion of support that is intended to be installed below top surface of protective surfacing a different color, or mark in other permanent way, so that installers and maintainers of protective surfacing can easily determine whether sufficient depth has been installed.

C. Provide permanent label for each equipment item stating age group that equipment was designed for, manufacturer identification, and warning labels in accordance with ASTM F1487.

2.03 PLAYGROUND EQUIPMENT

A. Manufacturer Quote Number: 1127936-01-07.
   1. Quote number represents multiple play events. Contact manufacturer for complete list of equipment, colors, and materials.
      a. Do not order equipment until color selection has been approved by District in writing.
      b. Concrete Footings: Per manufacturer's instructions.

B. Comply with ASTM F1487 and CPSC Pub. No. 325; provide equipment complying with specified requirements for relevant age group(s).
   1. Provide components having factory-drilled holes; do not use components with extra holes that will not be filled by hardware or covered by other components.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that playground area has been graded to subgrade elevations required and that excess soil, rocks, and debris have been removed.

B. Verify that playground equipment footings have been installed in proper locations and at proper elevations.

C. Verify location of underground utilities and facilities in playground area; damage to underground utilities and facilities will be repaired at Contractor's expense.

3.02 PREPARATION

A. Stake location of playground elements, including Use Zone perimeters, perimeter of protective surfacing, access and egress points, hard surfaces, walls, fences, and structures, and planting locations.

B. Stake layout of entire Use Zone perimeter before starting any work and before subbase under resilient surfacing is laid.
   1. Verify that Use Zone perimeters do not overlap hard surfaces, whether currently installed or not.
   2. Verify that Use Zones are free of obstructions that would extend into resilient portion of protective surfacing.
   3. If conflicts or obstructions exist, notify Landscape Architect.

4. Do not proceed until revised drawings have been provided, showing corrected layout, and obstructions have been removed.

3.03 INSTALLATION

A. Coordinate work with preparation for and installation of protective surfacing specified in Section 32 1816.13; install resilient portion of protective surfacing after playground equipment installation.

B. Install concrete footings with top surface a minimum of 1/2 inch below required subgrade elevation.

C. Install in accordance with CPSC Pub. No. 325, ASTM F1487, manufacturer's instructions, and requirements of authorities having jurisdiction (AHJ).

D. Anchor equipment securely below bottom elevation of resilient surfacing layer.

E. Install without sharp points, edges or protrusions, entanglement hazards, pinch, crush, or shear points.

F. Do not modify play events on site without written approval of manufacturer.

G. Install required signage if not factory-installed.

3.04 FIELD QUALITY CONTROL

A. Obtain the services of the equipment manufacturer's field representative to review the finished installation for compliance with specified requirements and with design criteria to the extent known to the Contractor; submit report of field review.

B. District or District's representative will inspect playground equipment after installation to verify that playground meets specified design safety and accessibility requirements.

C. Repair or replace rejected work until compliance is achieved.

3.05 CLEANING

A. Restore adjacent existing areas that have been damaged from the construction.

B. Clean playground equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation; clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.

C. Clean playground area of excess construction materials, debris, and waste.

D. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction (AHJ).

End of Section 11 6813

Section 11 6833

Athletic Field Equipment

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outdoor basketball equipment.

B. Baseball backstop.

C. Volleyball equipment.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Footings for field equipment.

B. Section 09 9113 - Exterior Painting.

C. Section 31 2200 - Grading: Shaping subgrade to specified grade levels; removal of excess soil and rocks.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

1.04 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Product Data: Provide athletic field equipment manufacturer's product data indicating materials of construction, compliance with specified standards, installation procedures, and necessary safety limitations.

C. Shop Drawings: Submit detailed scale drawings showing athletic field equipment and perimeter layout.

D. Samples: Submit color chart for each item that color must be selected showing full range of colors and finishes.

E. Maintenance Data: Submit manufacturer's recommended maintenance instructions and list of replaceable parts for each athletic field equipment item, along with supplier's address and phone number.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in District's name and registered with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Athletic Field Equipment:
   1. Basketball: www.pwathletic.com
   2. Volleyball: www.lasteelcraft.com
   3. Baseball: www.lasteelcraft.com

2.02 PRODUCTS

A. Basketball:
   1. Backboard: #14 Heavy-Duty Solid Steel Fan
   2. Rim and Net: #44 Double Rim Goal w/ # 33 Chain Net

3. Post: #1540G Gooseneck Post 5-9/16" O.D., 4' Offset, Galvanized

B. Volleyball posts:
   1. LA-AGP-4 - 4-1/2" O.D. Heavy Duty All Game Post Set

C. Baseball backstop:
   1. LA-810-JH-4S Portable Backstop

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that athletic field equipment area has been graded to subgrade elevations required and that excess soil, rocks, and debris has been removed as necessary for installation of footings.

B. Verify that athletic field equipment footings have been installed in proper locations and at proper elevations.

C. Verify location of underground utilities and facilities in athletic field equipment area; damage to underground utilities and facilities will be repaired at Contractor's expense.

3.02 PREPARATION

A. Stake layout of athletic field equipment perimeter in accordance with approved shop drawings before starting any work.
   1. Verify that athletic field perimeters do not overlap hard surfaces, whether currently installed or not.
   2. Verify that athletic fields are free of obstructions.
   3. If conflicts or obstructions are found, notify Architect.
   4. Do not proceed with this work until revised drawings have been provided, showing corrected layout, and that any obstructions have been removed or corrections to layout have been made.

3.03 INSTALLATION

A. Install concrete footings with top surface a minimum of 1/2 inch below required subgrade elevation and slope top to drain, unless otherwise indicated.

B. Install athletic field equipment in accordance with manufacturer's instructions, and rules and regulations of specified athletic association indicated for this work.

C. Install backboards and goal posts plumb, level, and rigid using manufacturer provided attachment hardware, and ensure backstops are accurately positioned and free of vibrations.

D. Install athletic field equipment without sharp points, edges, or protrusions; entanglement hazards or pinch, crush, or shear points.

3.04 CLEANING

A. Clean athletic field equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation; clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.

B. Clean athletic field area of excess construction materials, debris, and waste.

C. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

3.05 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

End of Section 11 6833

Section 13 3300

Pre-Fabricated Restroom

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-Engineered, Pre-Fabricated Modular Restroom Building

1.02 REFERENCE STANDARDS

A. American Concrete Institute
   1. ACI-301R Specifications for Structural Concrete for Buildings
   2. ACI-315-92 Details and Detailing of Concrete Reinforcement

B. American Society for Testing and Materials (ASTM)
   1. ASTM-A-36 Specification for Structural Steel
   2. ASTM-A-615 Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
   3. ASTM-A-82-95 Specification for Steel Wire, Plain, for Concrete Reinforcement
   4. ASTM-C-150-97 Standard Specifications for Portland Cement
   5. ASTM-C-33-97 Standard Specifications for Concrete Aggregates
   6. ASTM-C-920-97 Specification for Elastomeric Joint Sealants

C. American Welding Society (AWS)
   1. AWS-D-1.4 Structural Welding Code-Reinforcing Steel

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Provide the work under the lump sum method. Lump sum price for each restroom includes over-excavation, imported base material, base preparation, concrete foundations if necessary, utility connections, trenching and backfilling, and all miscellaneous items of work for a complete installation of a fully operable restroom building.

1.04 SUBSTITUTIONS

A. See Article 9 of the General Conditions for substitutions.

1.05 DELIVERY AND HANDLING:

A. Delivery and handling of the modular structures shall be accomplished in such a manner as required to prevent damage to the products and their finishes.

1.06 WARRANTY:

A. Provid warranty against defects in materials or workmanship for a period of 1 (one) years from date of purchase.

PART 2 PRODUCTS:

2.01 MANUFACTURER:

A. Prefabricated and Preassembled WalCon restroom building (comfort station) herein specified are based on Models as manufactured by Wallis Concrete, LLC, or approved equal.

B. WalCon (www.walcon.com).
   1. Model: 1S-CW-1L-RC-GR-ADA with Photovoltaic Power System.

2.02 MATERIALS:

A. Precast Components: All concrete used in the precast walls, roof, and floor shall be minimum compressive strength of 5000 psi in 28 days and shall conform with the requirements of the ACI standard listed above. All fine and course aggregate shall conform to ASTM Spec. C-33. Cement shall be gray Portland cement type 1 and shall conform to ASTM Spec. C-150. The water used in the mix shall be clean and non-detrimental to the mix. The water-cement ratio shall not exceed 5 gal. Per bag of cement. A concrete mix review must be provided by an independent testing laboratory certified by the structural engineer.

B. Reinforcement: All reinforcing steel bars shall conform to ASTM 615 Grade 60 for deformed and plain billet -steel bars for concrete reinforcement (Fy=60 Ksi). Wire mesh and flat sheets used for reinforcing shall conform to ASTM 185 specifications for steel welded wire fabric, plain for concrete reinforcement.

C. Anchors, clips and fasteners: Conform to ASTM A325.
   1. Doors: Entrance Door shall be 3/0-6/8, 1- 3/4 inch thick pre-hung metal with a matching metal frame attached to the building in a permanent way. Curries model no. 707 is approved.
   2. The Entrance door shall have the following hardware:
      a. Stainless steel 10” x 34” kickplate (inside only)
      b. Yale, 5422 LN 626 lockset
      c. Hager SS Hinges-4 1/2” x 26D.
      d. Norton Unitrol 7500 Door Closure
      e. Brush Type Door sweeps
      f. Hager Model 412S ADA 5” Saddle Threshold
   3. Exterior Chase Door, shall be 3/0-6/8, 1 3/4 inch thick pre-hung metal with a matching metal frame attached to the building in a permanent way. Curries model no. 707 is approved.
      a. Yale, 5422 LN 626 lockset
      b. Hager SS Hinges-4 1/2” x 26D
      c. Norton Unitrol 7500 Door Closure
      d. Brush Type Door Sweep
      e. Hager Model 412S ADA 5” Saddle Threshold
   4. All door hardware and the position of the hardware on the door shall meet the requirements of the Americans with Disabilities Act (ADA).

D. Vents: Wall vents shall be shop made of 3/16” A-36 Carbon Steel then hot dipped galvanized. These vents shall be sight restrictive and shall be attached with tamper proof hardware. These vents shall be painted to the color selected by customer. Each vent has a free air flow area of 315 sq. inches.

E. Electrical / Solar: All Electrical Items shall be pre-wired as shown on drawings.
   1. See Manufacturer's drawings.

F. Signage: Molded plastic signs with etched surfaces shall have the international handicapped symbol and shall have raised braille characters. Signage shall comply with ADA requirements.

G. Toilet Accessories: Bradley 812-2 grab bars with safety grip finish, concealed mounting. Bradley Paper Towel Dispenser Model 235-11. The toilet paper dispenser shall be a Royce Rolls model #TP2. The Stainless Steel Mirror shall be a Sentry Mirror 18x30 with Plexiglas.

1. The Toilet Seat Cover Dispenser shall be a Bradley Model 583, the Sanitary Napkin Disposal shall be a Bradley Model 4722, and the Coat Hook shall be a Bradley Model BRA9134.
2. All accessories are to be mounted per ADAGG requirements.

H. Plumbing: Lavatories shall have a 1/2"copper to1/2 SS flex supply to the fixtures concealed in the plumbing chase. All fixtures shall have a shut-off valve in the plumbing chase, waste and vent lines shall be connected to the fixtures, with traps and vents where necessary for connection by general contractor to waste disposal lines. Waste piping shall be schedule 40 PVC.
1. Lavatories shall be an American Standard Regalyn 19" by 17" Wall Mounted Enameled Cast Iron Model 4867.001. Wash fountain shall have an American Standard metering faucet model 1340.105. Lavatory faucets shall not exceed 0.5 gpm at 60psi.
2. Toilets shall be an American Standard Madera 3043.001, 16.5" tall elongated toilet top spudded with a Zurn Exposed Flush Valve,Z6000 AV-WS1, 1.28 gal. The toilet is to be mounted per ADAGG accessibility requirements.

I. Exterior Drinking Fountain with Bottle Filling Station: Water supply location shall be 3/8" O.D. unplated copper tube connect stub 1-1/2" out from wall. Recommended waste outlet 1-1/4" O.D. drain. Electrical supply (3) wire recessed box, duplex outlet required.
1. Fountain shall be HAWS Model 1920FR with BP15 and 1001BP. https://www.hawsco.com/bottle-filling-station/

2.03 DESIGN AND FABRICATION:

A. The building structure design and fabrication shall be adequate to withstand wind loads, snow loads and seismic activity for the geographic region in which it will be installed and in accordance with governing building codes and the stresses and shocks common to buildings. Design calculations and shop drawings shall clearly state design loads and all criteria, safety factors, etc. used to arrive at a design load.

B. The forms for the precast components shall be constructed such that the finished components will have sharp definition, dimensional accuracy, and uniformity of shape and texture. Precast components shall be prefabricated to the sizes and shapes indicated on the project plans. No unfinished edges shall be exposed to view. The finished components shall be straight and square. Waxed, cracked, broken, spalled, stained, or otherwise defective units shall not be used. Components with imperfections in exposed surfaces shall not be used.

C. Reinforcing assemblies shall be prefabricated into single complete units with a minimum of 3/4 inch clearance from the edges and surfaces of the precast unit.

D. Placed and secured in the forms shall be all necessary anchors, clips, inserts, lifting devices, stud bolts, ties and any other device that is required for handling and installing the precast components and for the attachment of subsequent items.

E. Precast concrete components shall be cured in forms for a minimum of 24 hours, or until the concrete reaches 75 percent of design strength. All exposed surfaces must be covered to control the loss of moisture and temperature. After the precast component is removed from the form it must be covered or be moisture cured until the results of a 7 day compression test is available

F. All precast cover panels shall be attached to the walls in such a way as to form a continuous unit. Wall and floor reinforcing shall be permanently attached to each other. The welding procedure shall be approved by a professional engineer. All welding shall be done by welders having current valid certifications and having current experience in this type of welding. All

construction shall be per American Welding Society Codes and Recommendations. All exposed steel plate assemblies both inside and out shall be painted over the shop coat.

G. The finished floor shall be level along all walls. No area of the floor shall allow wastewater to accumulate. A non-absorbent tile shall be installed on the floor with a cove base no less than four inches in height.

2.04 FINISHES:

A. Exterior Walls: The exterior concrete walls of the building shall have a Stucco finish. Two coats of Modified Latex Paint - Benjamin Moore 'Tapestry Beige' (OC-32) or equal (tinted to customer requirements) applied at the factory. Inside surfaces of the walls shall receive an application of Super Spec Block Filler prior to any finish coats. Two coats of Benjamin Moore or equal 100% Acrylic Semi-Gloss House Paint applied at the factory.

B. Exterior Doors, Roof, Vents and Frames: Primed with a metal primer and shall have 2 coats of Gloss Enamel - Benjamin Moore 'Stampede' (979).

C. The exterior roof panels will be primed then two coats of Benjamin Moore paint or equal will be applied per the manufacturer recommendation. The first coat will be tinted to the customer specification and the second will be clear with UV protection.

D. All paint and sealers shall comply with the California Green Building Code Requirements.

E. Should caulking be used, it shall comply with the California Green Building Code Requirements.

PART 3 EXECUTION:

3.01 INSTALLATION

A. Safety data information must be supplied on all items used in the production and furnishing of this building and foundation. All technical specifications are to be delivered to the general contractor or contracting officer upon delivery of the building and foundation to the job site.

3.02 ORDER AND RESPONSIBILITIES

A. Coordinate with manufacturer to understand all responsibilities, coordination, and delivery of restroom. Contractor is responsible for preparing the site for the restroom.

B. After the utilities are connected to the plumbing in the chase area and before the lavatory faucet and toilet is activated, flush out the incoming water lines. There is a hose bib installed on the incoming water line. Connect a garden hose to this hose bib and turn it on. Allow the water to flow for enough time to clear the new line which was installed for this restroom. This will begin the process of clearing the line of debris and disinfecting chemicals.

C. Contractor shall flush all fixtures.

D. The toilet flush valve body may be opened and the diaphram removed. Replace the cap on the flush valve and slowly turn on the cut-off valve located adjacent to the flush valve body. This will allow water to run thru the service lines and out into the sewer and should remove any debris. Start with the fixture futherest away from the service water line.

E. The faucet at your lavatory is hydraulic and will turn off automatically. Take it apart per the manufacturers instruction and flush thru the lines which supply the water, be careful and follow the instructions when putting it back together. The screen at the base of the faucet may require cleaning periodically.

End of Section 13 3300

Section 13 3419

Metal Shade Structures

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated steel structure.

B. Exterior doors, windows, skylights, overhead doors, and louvers.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: footings.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Provide the work under the lump sum method. Lump sum price for each metal shade structure includes stamped shop drawings, over-excavation, imported base material, base preparation, concrete footings, utility connections, trenching and backfilling, and all miscellaneous items of work for a complete installation.

1.04 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

I. MBMA (MBSM) - Metal Building Systems Manual; Metal Building Manufacturers Association; 2012.

J. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

K. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. See Section 9 of the General Conditions for submittal procedures.

B. Product Data: Provide data on profiles, component dimensions, fasteners.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and

method of anchorage, installation, framing anchor bolt settings, sizes, and locations from datum, foundation loads and footing design; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Samples: Submit two samples of precoated metal panels for each color selected, illustrating color and texture of finish.

E. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

F. Project Record Documents: Record actual locations of concealed components and utilities.

1.07 SUBSTITUTIONS

A. No subs allowed. See Special Conditions.

1.08 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
   1. Design Engineer Qualifications: Licensed in California.

B. Perform work in accordance with AISC 360 - Specification for Structural Steel Buildings and MBMA (MBSM).

C. Perform welding in accordance with AWS D1.1/D1.1M.

D. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.

E. Erector Qualifications: Company specializing in performing the work of this section with minimum _____ years experience.

1.09 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Provide 10 year manufacturer warranty for defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pre-Engineered Buildings by Poligon; www.poligon.com.

2.02 STRUCTURES

A. Shade Structure:
   1. Description:Pre-engineered and pre-manufactured metal hexagonal shelter with cupola.
   2. Model: "HXE-24-CFB"
   3. Frame:
      a. Finish: Powder coated.
      b. Color: "Coastal Khaki." Verify with Owner.
      c. Posts: 8" square "CA"
   4. Roofing:
      a. Material: Multi Rib 24-guage galvanized steel.
      b. Color: "Evergreen". Verify with Owner
      c. Roof slope": 5 inches in 12 inches.
   5. Baseplate Cover: S43

2.03 PERFORMANCE REQUIREMENTS

A. Installed Thermal Resistance of Wall System: R-value of ____.

B. Installed Thermal Resistance of Roof System: R-value of ____.

C. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

D. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of ____ degrees F.

2.04 MATERIALS - WALLS AND ROOF

2.05 COMPONENTS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.02 ERECTION - FRAMING

A. Erect framing in accordance with AISC 360 Specifications for Structural Steel Buildings.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

A. Install cupola in accordance with manufacturer's instructions.

3.04 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

End of Section 13 3419

Section 21 1300

Fire Sprinkler System

PART 1-GENERAL

1.01 SUMMARY

A. This includes the following fire-suppression piping inside the building.
   1. Wet-pipe automatic fire sprinkler system .

B. This section includes the following fire-suppression piping inside the building:

C. Fire-suppression system design shall be done by a qualified C-16 licensed design-build firm.

1.02 SYSTEM DESCRIPTIONS

A. The building shall be protected per applicable portions NFPA 13R
   1. The system shall be monitored for water flow, low air pressure, and control valve(s) tamper.
   2. System to be equipped with a fire department connection.

B. Sprinkler heads in service areas may be exposed. All other areas to utilize pop down heads.

1.03 RELATED WORK

A. Section 28 3100 - Fire Sprinkler Monitoring and Alarm System

1.04 REFERENCE STANDARDS

A. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

B. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

D. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.

E. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

F. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

G. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

H. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2015.

I. ASTM F439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2013.

J. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR); 2013.

K. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.

L. NFPA 13R - Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies; 2016.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

O. UL 199 - Standard for Automatic Sprinklers for Fire-Protection Service; 2005.

1.05 PERFORMANCE REQUIREMENTS

A. Standard piping system component working pressure: Listed for at least 175 PSIG.

B. All materials in accordance with NFPA 13R

1.06 SUBMITTALS

A. Product data: For each product indicated.
   1. Sprinkler piping drawings: Working plans, prepared to applicable portions of NFPA-13 including hydraulic calculations.
   2. Field test reports and certificates.
   3. Field quality-control test reports.
   4. Operation and maintenance data sheets

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire hydrant flow test. The Contractor shall be responsible for performing all fire hydrant flow tests.
   1. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional contractor.

B. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with applicable portions of the following:
   1. NFPA 13R "Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height".

PART 2- PRODUCTS

2.01 PIPE AND FITTINGS

A. Threaded-End, Scheduled Steel Pipe: ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M.

B. Wet system- black pipe with factory- or field-cut threaded ends.

C. Dry system- hot dip galvanized pipe with factory- or field-cut threaded ends.

D. Grooved-End, Schedule 10 Steel Pipe: ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M
   1. Wet system- black pipe with factory- or field-formed, square cut or roll-grooved ends.
   2. Dry system- hot-dip galvanized pipe with factory- or field-formed, square cut or roll-grooved ends.

E. Copper Pipe: ASTM B88, copper tubing, hard drawn, type M.

F. Fittings: ASME B16.22, wrought copper solder joint.
   1. Joints: ASTM B32, solder metal, 95-5 tin-antimony, allow grade Sb5. Flux shall be ASTM ASTM B813, liquid or paste type.

G. Plastic Pipe: ASTM F442/F442M, chlorinated polyvinyl chloride (CPVC) UL listed for a working pressure of 175 PSI (1200 kPa). Pipe shall be specifically listed for use in fire sprinkler systems.
   1. Plastic Pipe Fittings: CPVC fittings, UL listed for fire sprinkler systems. ASTM F437 B-96, threaded fittings, schedule 80. ASTM F439, socket type fittings, schedule 80.
   2. Solvent Cement: Primer and solvent cement manufactured by pipe and fitting manufacturer for joining sprinkler piping.

2.02 CHECK VALVE:

A. Check Valve: 250 pound non-shock WOG, bronze body, stainless steel spring and disc holder, rubber disc, inline lift type. Model KT-480 by Nibco, Inc., Elkhart, IN 46515 or approved equal.

2.03 RISER MANIFOLD:

A. Integral assembly specifically manufactured for NFPA 13R and 13D systems that consists of water flow indicator, pressure gauge, and drain valve. Model 13 and 13D Riser manifold.

2.04 SPRINKLERS

A. UL 199, residential automatic sprinklers for "ordinary" temperature classification, except where higher temperature heads are required and indicated. Provide higher temperature heads in mechanical rooms.

B. Mechanical rooms, storage rooms, and garages shall have guards and a brass finish, all other areas shall be chrome plated.

C. PIPE SLEEVES: Sleeves in Partitions, Walls, and Floors: Zinc-coated steel sheet having nominal weight of not less than 0.90 pound per square foot.

D. ESCUTCHEON PLATES: Two-piece or split hinge metal plates for piping passing through floors, walls, and ceilings in exposed areas. Provide chromium-plated finish on plates in finished areas and paint finish on plates in unfinished areas.

E. PRESSURE GAUGES: 2-1/2 inch dial type with maximum limit not less than twice the normal working pressure.

F. INSPECTOR'S TEST CONNECTION: Accessible test connection connected to the most remote part of the sprinkler system with the discharge routed to the outside.

G. ELECTRICAL WORK: Provide control wiring, including connections to fire alarm system in accordance with NFPA 70 and NFPA 72.

PART 3 -EXECUTION

3.01 SURFACE CONDITIONS

A. Coordination- Coordinate with all other trades as required to ensure proper and adequate installation of cabinets and brackets in the locations shown.

B. Inspection:
   1. Prior to installation, inspect all areas to verify that all necessary provisions have been made and installed.

C. In the event of discrepancy immediately notify the architect.
   1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been resolved.

End of Section 21 1300

Section 31 1000

Site Clearing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. General Conditions - Article 64: Protection of Work and Property

B. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

E. Section 02 4100 - Demolition: Removal of built elements and utilities.

F. Section 31 2200 - Grading: Topsoil removal.

G. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

H. Section 31 2323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. City of Thousand Oaks - Oak Tree Ordinance No. 1610-NS: protection of existing oak trees.

B. City of Thousand Oaks - Landmark Tree Ordinance No. 1217-NS: protection of existing landmark trees.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 7000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

C. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:

1. At vegetation removal limits.

D. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

E. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.

F. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to District.

3.03 BOULDERS

A. If native boulders greater than 2 cubic-feet are unearthed during site clearing activities, they shall be stockpiled on site for re-use on the project at the direction of the District or Landscape Architect. These boulders may be used in lieu of, or to supplement the boulders indicated in the Drawings. Contractor's bid shall not assume the presense of said boulders.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

End of Section 31 1000

Section 31 2200

Grading

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal and storage of topsoil.

B. Rough grading the site for site structures and site improvements.

C. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing.

B. Section 31 2316 - Excavation.

C. Section 31 2316.13 - Trenching: Trenching and backfilling for utilities.

D. Section 31 2323 - Fill: Filling and compaction.

E. Section 32 9300 - Plants: Topsoil in beds and pits.

F. Initial Study/Mitigated Negative Declaration, Envicom Corporation, March 2019.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Topsoil, on-site. Applies to Unit Price _____.
   1. Measurement Method: By the cubic yard.
   2. Includes: Excavating existing topsoil, stockpiling, scarifying substrate surface, placing where required, compacting, and dewatering.

C. Topsoil, imported:
   1. Measurement Method: By the cubic yard.
   2. Includes: Importing topsoil, stockpiling, scarifying substrate surface, placing where required, and compacting.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: See Section 31 2323.

B. Other Fill Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. See Section 31 2323 for filling procedures.

G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

E. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.05 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.06 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.07 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

3.08 CLEANING

A. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

End of Section 31 2200

Section 31 2316.13

Trenching

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trenching, backfilling, and compacting.

B. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Document Conejo Creek Southwest Park Initial Study/Mitigated Negative Declaration, Evicom Corporation, March 2019.: Geotechnical report; bore hole locations and findings of subsurface materials.

B. General Conditions - Article 17: Trenches.

C. Section 31 2200 - Grading: Site grading.

D. Section 31 2316 - Excavation: Building and foundation excavating.

E. Section 31 2323 - Fill: Backfilling at building and foundations.

F. Section 32 8423 - Irrigation System.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 17: Trenches.

B. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

C. Unit Price trenches: Excavating Soil Materials:
   1. Measurement method: By the linear foot to depth required on Drawings.
   2. Includes: Excavating to required elevations, loading and placing materials in stockpile, and dewatering.
   3. Does Not Include Over-Excavation: Payment will not be made for over-excavated work nor for replacement materials.

D. General Fill: Applies to Unit Price _____.
   1. Measurement Method: By the cubic yard.
   2. Includes: Supplying fill, scarifying substrate surface, placing where required, compacting, and dewatering.

1.04 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

1.05 SUBMITTALS

A. See Section 9 of the General Conditions for submittal procedures.

B. See Section 01 3300 - Submittals, for submittal procedures.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

PART 2 PRODUCTS

2.01 FILL MATERIALS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

H. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

I. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.03 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.04 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

F. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

G. Compaction Density Unless Otherwise Specified or Indicated:

H. Reshape and re-compact fills subjected to vehicular traffic.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: _____.

End of Section 31 2316.13

Section 31 2316

Excavation

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 02 4100 - Demolition: Shoring and underpinning existing structures.

B. Section 31 2200 - Grading: Grading.

C. Section 31 2316.13 - Trenching: Excavating for utility trenches to utility main connections.

D. Section 31 2323 - Fill: Fill materials, backfilling, and compacting.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for excavation.

C. Unit Price ____: Excavating Soil Materials.
   1. Measurement Method: By the cubic foot.
   2. Includes: Excavating to required elevations, loading and placing materials in stockpile, and dewatering.
   3. Does Not Include Over-Excavation: Payment will not be made for over-excavated work nor for replacement materials.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for topsoil removal.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Protect plants, lawns, rock outcroppings, and other features to remain.

F. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Cut utility trenches wide enough to allow inspection of installed utilities.

C. Hand trim excavations. Remove loose matter.

D. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

H. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

I. If native boulders greater than 2 cubic-feet are unearthed during excavation activities, they shall be stockpiled on site for re-use on the project at the direction of the District or Landscape Architect. These boulders may be used in lieu of, or to supplement the boulders indicated in the Drawings. Contractor's bid shall not assume the presence of said boulders.

End of Section 31 2316

Section 31 2323

Fill

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, slabs-on-grade, paving, and site structures.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Removal and handling of soil to be re-used.

B. Section 31 2200 - Grading: Site grading.

C. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

D. Section 31 2316.13 - Trenching: Excavating for utility trenches to utility main connections.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

C. General Fill: Applies to Unit Price _____.
   1. Measurement Method: By the cubic yard.
   2. Includes: Supplying fill, stockpiling, scarifying substrate surface, placing where required, compacting, and dewatering.

1.04 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

F. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. See Section 01 3300 - Submittals, for submittal procedures.

C. Materials Sources: Submit name of imported materials source.

D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where designated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type Imported borrow: Subsoil excavated on-site.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Sand - Fill Type ____: Complying with State of _____ Highway Department standard.

C. Topsoil: See Section 31 2200.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 8 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

G. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 90 percent of maximum dry density.

I. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
   2. At other locations: 90 percent of maximum dry density.

J. Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: _____.

3.07 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

End of Section 31 2323

Section 32 1123

Aggregate Base Courses

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Permeable base course.

C. Geotextile Fabric.

D. Paving aggregates.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for base course.

1.03 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2015.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

I. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.04 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Type Permeable Class 2: Course aggregate, conforming to State of California Highway Department standard.

B. Coarse Aggregate Type 3/4" crushed washed aggregate. _____
   1. Graded in accordance with ASTM D2487 Group Symbol GW.
   2. Graded in accordance with ASTM C136/C136M, within the following limits:
      a. 1 inch sieve: 95 percent passing.
      b. 3/4 inch sieve: 95 to 100 percent passing.

c. No. 4 sieve: 35 to 60 percent passing.
d. 30: 10 to 30 percent passing.
e. No. 200: 2 to 9 percent passing.

C. Coarse Aggregate Type 1/2" crushed washed aggregate. _____
1. Graded in accordance with ASTM D2487 Group Symbol GW.
2. Graded in accordance with ASTM C136/C136M, within the following limits:
a. 3/4 inch sieve: ____ 100 percent passing.
b. 1/2 inch sieve: 90 to 100 percent passing.
c. 3/8 inch sieve: 20 to 60 percent passing.
d. No. 4 sieve: 0 to 15 percent passing.
e. No. 8 sieve: 0 to 5 percent passing.

D. Medium Aggregate Type 57: Natural stone; washed, free of clay, shale, organic matter.

E. Medium Aggregate Type [2]: Natural stone; washed, free of clay, shale, organic matter.

F. Fine Aggregate Type ____: Sand; complying with State of _____ Highway Department standard.

G. Geotextile Fabric: Non-biodegradable, non-woven, Mirafi 140 N or approved equal.;.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Place aggregate in maximum 4 inch layers and roller compact to specified density.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

End of Section 32 1123

Section 32 1216

Asphalt Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Single course bituminous concrete paving.

C. Double course bituminous concrete paving.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving and base.

B. Section 32 1123 - Aggregate Base Courses: Aggregate base course.

C. Section 32 1313 - Concrete Paving: Concrete curbs.

D. Section 32 1723.13 - Painted Pavement Markings: Concrete bumpers, roadway striping, parking stalls, ADA markings, and miscellaneous markings.

E. Section 33 0561 - Concrete Manholes: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Measurement and payment shall be as follows:

C. See Section 01 2200 - Unit Prices for requirements applicable to this section. Measurement and payment will be as follows:

1. Asphalt Pavement Mix (Base Course): By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.
2. Asphalt Pavement Mix (Binder Course): By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.
3. Asphalt Pavement Mix (Wearing Course): By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.
4. Seal Coat: By the square yard. Includes preparing surfaces and applying.

1.04 REFERENCE STANDARDS

A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.

B. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of California Highways standard.

B. Mixing Plant: Complying with State of _____ Highways standard.

C. Obtain materials from same source throughout.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: ASTM D946.

1. All AC surfacing 3" or greater in thickness shall be constructed in two courses, one base course and one surface course. The surface course shall be a minimum thickness of 1" and a maximum of 1-1/2". Core drillled samples of the finished AC section shall be provided by the Developer's Engineer as directed by the Public Works Inspector.
2. AC pavement base course shall be Type III-B2-PF 64-10 and surface course shall be Type III-C2-PG 64-10, per SSPWC 400-4. For private parking lots, AC pavement surface course may be Type III-C3-PG or Type III-D-PG 64-10.
3. AC pavement shall be placed in accordance with SSPWC 302-5, and shall be compacted to 95% relative compaction.

B. Aggregate for Base Course: In accordance with State of California Highways standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

A. Place and compact base course.

3.03 PREPARATION - PRIMER

A. Apply primer in accordance with manufacturer's instructions.

B. Apply primer on aggregate base or subbase at uniform rate of 1/3 gal/sq yd.

C. Use clean sand to blot excess primer.

3.04 PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions.

B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.

3.05 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with State of California Highways standards.

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.06 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place wearing course within two hours of placing and compacting binder course.

C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.07 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Variation from True Elevation: Within 1/2 inch.

3.08 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.

B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.09 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for ____ days or until surface temperature is less than 140 degrees F.

End of Section 32 1216

Section 32 1220

Porous Asphalt Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single course open graded bituminous concrete paving.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving and base.

B. Section 32 1123 - Aggregate Base Courses: Aggregate base course.

1.03 PRICE AND PAYMENT PROCEDURES

A. See General Conditions - Article 41, for payment procedures.

B. Measurement and payment will be as follows:

1. Porous Asphalt Pavement Mix: By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.

1.04 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).

B. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

D. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of California Highways standard.

B. Mixing Plant: Conform to State of California Highways standard.

C. Obtain materials from same source throughout.

1.06 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: PG 64-10 Binder.

B. Aggregate for Wearing Course : Angular crushed washed stone; free of shale, clay, friable material and debris.

1. Graded in accordance with ASTM C136/C136M, within the following limits:
   a. 3/4 inch sieve: 95 to 100 percent passing.
   b. 3/4 inch sieve: 100 percent passing.
   c. 1/2 inch sieve: 85 to 100 percent passing.
   d. 3/8 inch sieve: 55 to 75 percent passing.
   e. No. 4 sieve: 10 to 25 percent passing.
   f. No. 8 sieve: 5 to 10 percent passing.

g. No. 200: 2 to 4 percent passing.

C. Pigment: Integral color by Davis Colors, www.daviscolors.com, or approved equal.
1. Color: Omaha Tan, verify with District.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

A. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with AI MS-2.

B. Submit proposed mix design of each class of mix for review prior to beginning of work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

A. Place and compact base course.

3.03 PLACING OPEN GRADED ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with State of California Highways standards.

B. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

C. All compation shall be by the Ordinary Cmpaction Method. Compactio nof the hot-mix asphalt shall take place when the surface is cool enought ot resist a 10-ton steel-wheeled roller (vibratory mode not allowed). One or two passes is all that is required for proper compation. Vibratory rollers and/or pneumatic-tired rollers are not allowed.

3.04 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for 7 days or until surface temperature is less than 140 degrees F.

End of Section 32 1220

Section 32 1313

Concrete Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete driveway apron, accessible parking, stair steps and integral curbs, and headers.

B. Joint fillers, accessories and sealants.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 31 2200 - Grading: Preparation of site for paving and base.

D. Section 31 2323 - Fill: Compacted subbase for paving.

E. Section 32 1123 - Aggregate Base Courses: base course.

F. Section 32 1216 - Asphalt Paving: Asphalt wearing course.

G. Section 32 1726 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

H. Section 33 0561 - Concrete Manholes: Structures, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for payment procedures.

B. Provide concrete paving by the unit price method.

C. See Section 01 2200 - Unit Prices, for additional unit price requirements.

D. Concrete Placed: Measurement by the square yard per inch thickness. Includes preparing base, placing, floating and finishing, testing.

1.04 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

D. ACI 305R - Hot Weather Concreting; 2010.

E. ACI 306R - Cold Weather Concreting; 2010.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.

I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

K. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

O. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

P. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

Q. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

R. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751).
   1. Thickness: 3/8 inch.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Concrete Sidewalks and Curbs: minimum 4 inches thick, natural color and per project soils report.

2.02 FORM MATERIALS

A. Wood form material, profiled to suit conditions.
   1. Materials shall be free from defects which would impair the appearance of structural quality of the completed work
   2. Provide stakes and bracing materials as required to hold forms securely in place.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 3/8 inch.

2.03 REINFORCEMENT

A. Reinforcing Steel and Welded Wire Reinforcement: Types specified in Section 03 2000.

B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.

C. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

D. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: As specified in Section 03 3000.

2.05 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1, Class A.

B. Joint sealant: Dow Corning "888 Silicone Joint Sealant" or equal, color to match concrete.

C. Tactile Warning Surfaces: See Section 32 1726.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

C. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 3000 psi.
      a. Concrete sidewalks: 3,000 psi.
      b. Parking areas: 4,000 psi.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Water-Cement Ratio: Maximum 50 percent by weight.
   4. Maximum Slump: 3 inches.
   5. Maximum Aggregate Size: 1/2 inch.

2.07 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. See Section 32 1123 for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement as indicated.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Do not place concrete when base surface is wet.

C. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

E. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.08 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place expansion joints at intervals indicated in the Improvement Plans, Specifications and Landscape's Construction Plan.

C. Provide keyed joints as indicated.

D. Seal expansion and cold joints in accordance with manufacturer's instructions.

3.09 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

3.10 FIELD QUALITY CONTROL

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian or vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

End of Section 32 1313

Section 32 1320

Porous Concrete Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pourous Concrete sidewalks and parking areas.

B. Joint fillers, accessories and sealants.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving.

B. Section 31 2323 - Fill: Compacted subbase for paving.

C. Section 32 1123 - Aggregate Base Courses: Compacted base for paving.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for payment procedures.

B. Concrete paving is to be provided by the unit price method.

C. Concrete Placed: Measurement by the square yard per inch thickness. Includes preparing base, formwork, reinforcing, joints, concrete placing, floating, finishing, and testing.

1.04 REFERENCE STANDARDS

A. ACI 305R - Hot Weather Concreting; 2010.

B. ACI 306R - Cold Weather Concreting; 2010.

C. American Concrete Institute
   1. Concrete Field Testing Technician Grade I

D. American Society for Testing and Materials
   1. ASTM C 29 "Test for Bulk Density (Unit Weight) and Voids in Aggregate ASTM C33 "Specification for Concrete Aggregates"
   2. ASTM C 33 "Specification for Concrete Aggregates"
   3. ASTM C 94 "Specification for Ready-Mixed Concrete"
   4. ASTM C 150 "Specification for Portland Cement"
   5. ASTM C 260 "Specification for Air-Entraining Admixtures for Concrete"
   6. ASTM C 494 "Specification for Chemical Admixtures for Concrete"
   7. ASTM C 595 "Specification for Blended Hydraulic Cements"
   8. ASTM C 618 "Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
   9. ASTM C 685 "Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing"
   10. ASTM C 989 "Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."
   11. ASTM C 1438 "Standard Specification for Latex and Powder Modifiers for Hydraulic Cement Concrete and Mortar."
   12. ASTM C 1602 "Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete"
   13. ASTM C 1688 "Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete"
   14. ASTM C 1701/C1701M "Standard Test Method for Infiltration Rate of In Place Pervious Concrete"

15. ASTM C 1751 "Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
16. ASTM D 994 "Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)"
17. ASTM E 329 "Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction."
    a. National Ready Mixed Concrete Association
        1) Text Reference for Pervious Concrete Contractor Certification
        2) 1.03 Quality Assurance:

1.05 SUBMITTALS

A. See Section 9 of the General Conditions for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

C. The pervious concrete subcontractor shall submit:
    1. Evidence of two successful pervious concrete pavement projects including: the project name and address, owner's name, contact information and size of each project.
    2. Verification of current NRMCA Certification requirements described below:
    3. Shall meet, at the time of bidding: one of the following criteria for the minimum certification for each placement crew and submit verification of NRMCA Pervious Concrete Certification with the bid. (http://www.nrmca.org/Education/Certifications/Pervious_Contractor.htm)
        a. The pervious concrete subcontractor shall employ no less than one (1) NRMCA Certified Pervious Concrete Craftsman who must be onsite, actively guiding and working with each placement crew during all pervious concrete placement.
        b. The pervious concrete subcontractor shall employ no less than three (3) NRMCA Certified Pervious Concrete Installers who must be onsite, actively guiding and working with pervious concrete for projects.
        c. The pervious concrete subcontractor shall employ no less than three (3) NRMCA Pervious Concrete technicians and one (1) Pervious Installer who shall be onsite, actively guiding and working with each placement crew during all pervious concrete placement.
    4. Performance:
        a. Upon completion of the initial curing, the pervious concrete shall be tested for initial baseline infiltration in accordance with ASTM C1701. The rate shall be a minimum of 100 inches per hour.
        b. Plastic void content shall be 15% to 25%.

D. Concrete materials:
    1. Proposed concrete mixture proportions including all material weights, volumes, density (unit weight), water / cementitious ratio, and void content. The mix design shall be adequate to achieve 3000 psi compressive strength at 28 days.
    2. Aggregate type, source and gradation.
    3. Cement, fly ash, ground granulated blast-furnace slag and admixture manufacturer certifications

E. Qualifications: Evidence of qualifications listed under Quality Assurance.

F. Project details: Specific plans, details, schedule, construction procedures and quality control plan.

G. Test Panel:

1. Construct Test panel(s) to meet requirements of contract documents. Place a minimum one 225 sq. ft panel. Provide joints and curing using materials, equipment, and personnel proposed for the project as described in Section 1.02.B. Coordinate location of test panels with engineer.
2. The test panel shall be tested for acceptance in accordance with the Quality Control Section below.
3. An approved test panel will be used as quality control for the project and may be incorporated into the project if of acceptable quality.
4. Remove and legally dispose of all materials used for test panels not approved and all excess materials.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. PAVING ASSEMBLIES
1. Cement: Portland cement Type II or V conforming to ASTM C150 or Portland cement Type IP or IS conforming to ASTM C595.
2. Supplementary Cementitious Materials:
   a. Class F Fly Ash: ASTM C618
   b. Ground Granulated Blast-Furnace Slag: ASTM C989
3. Chemical Admixtures:
   a. Air entraining agents shall comply with ASTM C260.
   b. Chemical Admixtures shall comply with ASTM C494.
   c. Latex bonding agents shall comply with ASTM C1438.
4. Aggregates: Use a maximum 3/8" coarse aggregate that meets ASTM C33 Size 8 (3/8" to No. 16). Naturally rounded aggregates are recommended.
5. Water: ASTM C 1602.
6. Isolation Joint Material: Shall comply with ASTM D994, D1751, or D1752.
7. Pigment: Integral Color by Davis Colors (www.daviscolors.com), or approved equal.
   a. Color: Omaha Tan, verify with District.

B. FORM MATERIALS
1. Wood form material, profiled to suit conditions.
   a. Materials shall be 2-inch dressed dimension lumber or of metal of equal strenght when approved by the engineer.
   b. Material shall be free from defects which would impair the appearance or structural quality of the completed work.
   c. Short radius forms may be 1 inch dressed lumber or plywood.
   d. Provide stakes and bracing materials as required to hold forms securely in place.
2. Joint Filler: Preformed: non-extruding bitumous type (ASTM D 1751).
   a. Thickness: 1/2 inch.
   b. Premolded joint filler shall be one of the following:
      1) Preformed Expansion Joint Filler (Bituminous) conforming to ASTM D 994.
      2) Nonextruding and Resilient Filler (Bituminous) conforming to ASTM D 1751.
      3) Approved equal.

C. MIXTURE PROPORTIONS
1. The composition of the proposed concrete mixtures shall be submitted to the owner's representative for review and shall comply with the following provisions unless an alternative composition is demonstrated to comply with the project requirements.

Conform with all requirements of the City of Thousand Oaks for pavements and walkways.

2. Cementitious Content: Comply with the approved mix design.
    a. Supplementary cementitious content:
        1) Fly ash: 25% maximum of the total cementitious material or in accordance with approved mix design.
            (a) b. Slag: 40% maximum of the total cementitious material or in accordance with approved mix design.
3. Water / Cementitious Ratio Shall range between 0.27 lb/lb and 0.31 lb/lb. or in accordance with approved mix design.
4. Aggregate Content: As appropriate for approved mix design.
5. Admixtures: Use in accordance with approved mix design.
6. Mix Water: as appropriate for approved mix design.
7. Color: Pigments to be selected by the engineer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. Verify subgrade preparation, grade, and conduct permeability and density tests for conformance to project requirements and is acceptable for installation of pervious concrete.

B. See Section 321123 for construction of base course for work of this Section.

3.03 FORMWORK

A. Form materials: any material of sufficient strength and stability to support mechanical equipment without deformation of plan profiles following spreading, strike-off and compaction operations.

3.04 MIXING AND HAULING

A. Production: Pervious concrete shall be manufactured and delivered in accordance with applicable sections of ASTM C 94 or ASTM C 685.

B. Mixing: Pervious concrete shall be produced in central mixers, transit mixers or in volumetric mixers.

C. Delivery: Deliver pervious concrete directly from the mixer by means of conveyer as close as possible to final position.

D. Discharge: Each truckload will be visually inspected for consistency of concrete mixture. Job site water additions are permitted to obtain and maintain the required mix consistency throughout the discharge. Discharge shall be a continuous operation. Concrete shall be deposited as close to its final position as practical and such that discharged concrete is incorporated into previously placed plastic concrete.

3.05 PLACING AND FINISHING

A. Comply with the content of the National Ready Mixed Concrete Association's 'Text Reference for Pervious Concrete Contractor Certification' with the following provisions

B. Internal vibration shall not be permitted. Use mechanical screed equipment. Do not use hand screeds except in confined and small areas. Cross roll compacted concrete to remove any screeding and compaction marks on the concrete surface.

C. Compact to the required cross-section and shall not deviate more than + 3/8 inch in 10 feet from profile grade.

3.06 JOINTING

A. Joints shall be installed at locations and to depths shown on the project plans.

B. Control (contraction) joints shall be installed at regular intervals not to exceed 1.5 times the width of the placement or 20 feet, or in accordance with approved joint placement plan. The control joints shall be installed at ¼ the thickness of the pavement but not to exceed 1-1/2". These joints can be installed in the plastic concrete or saw cut after the concrete has hardened. New joints in plastic concrete or recently hardened concrete shall align with joints in older concrete. Joints abutting curbs and other fixed concrete shall be installed within 10 degrees of perpendicular to the older concrete as possible.

C. Install joints to match approved sample.

D. Transverse construction joints: Install whenever placing is suspended for 20 minutes or whenever concrete is no longer workable.

E. Do not dowel longitudinal joints between successive placements.

F. Isolation joints: Use when abutting fixed vertical structures. Place isolation material before concrete is placed and to the depth of the pavement section.

3.07 CURING

A. Final curing procedures shall begin no later than 20 minutes after the concrete has been discharged from the mixer. The pavement surface shall be covered with a minimum of six (6) mil thick white or clear polyethylene sheet or other approved covering material. In cold weather black plastic may be used to aid in heat retention. The cover shall prevent air infiltration to the fresh concrete and shall overlap all exposed edges and shall be secured to prevent dislocation due to winds or adjacent traffic conditions.

B. The curing cover shall remain securely in place for a minimum of 7 days. No vehicular traffic shall be permitted on the pavement until curing is complete and no truck traffic shall be permitted for at least 14 days.

3.08 QUALITY CONTROL

A. The owner shall employ a testing laboratory that conforms to the requirements of ASTM E329 and ASTM C1077. All personnel engaged in testing shall be certified by the American Concrete Institute as ACI Concrete Field Technicians or equivalent and shall be certified by NRMCA as a Pervious Concrete Technician.

B. Prior to each placement, the formed thickness shall be at least the design thickness testing within -0" to +3/4".

C. Plastic concrete shall be sampled in accordance with ASTM C 172 and density (unit weight) measured in accordance with ASTM C 1688. The density (unit weight) of the delivered concrete shall be +/- 5 pcf of the design density (unit weight).

D. Plastic void content shall be calculated as per ASTM C1688 Gravimetric Air Determination and compared to the void percentage required by the hydraulic design.

E. Upon completion of initial curing, the pervious concrete shall be tested for a baseline infiltration rate using ASTM C1701.

3.09 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

End of Section 32 1320

Section 32 1713

Parking Bumpers

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete parking bumpers and anchorage.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for Payment Procedures.

B. See Section 01 2200 - Unit Prices, for additional unit price requirements.

C. Parking Bumpers:
   1. Basis of Measurement: By the unit.
   2. Basis of Payment: Includes bumper unit, installed.

1.03 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

PART 2 PRODUCTS

2.01 MATERIALS

A. Parking Bumpers: Precast concrete, complying with the following:
   1. Nominal Size: 5 inches high, 9 inches wide, 6 feet long.
   2. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
   3. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
   4. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
   5. Air Entrainment Admixture: ASTM C260/C260M.
   6. Concrete Mix: Minimum 5,000 psi compressive strength after 28 days, air entrained to 5 to 7 percent.
   7. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
   8. Embed reinforcing steel, and drill or sleeve for two dowels.
   9. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
   10. Minor patching in plant is acceptable, providing appearance of units is not impaired.
   11. Color: (Brown or Green)

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work.

C. Fasten units in place with 2 dowels per unit.

End of Section 32 1713

Section 32 1723.13

Painted Pavement Markings

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including arrows and handicapped symbols.

B. "No Parking" curb painting.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

B. Section 32 1313 - Concrete Paving.

C. Section 32 1726 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for Payment Procedures.

B. See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.04 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; Rev. D, 2007.

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

C. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Roadway Markings: As required by authorities having jurisdiction.

2. Parking Lots: Yellow.
3. Handicapped Symbols: Blue.

B. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

C. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.
1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.

D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

F. Temporary Pavement Markings: When required or directed by Architect, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
2. At Contractor's option, temporary marking tape may be used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to District.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch, minimum.
   3. Width Tolerance: Plus or minus 1/8 inch.

G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to District.

End of Section 32 1723.13

Section 32 1726

Tactile Warning Surfacing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.02 RELATED REQUIREMENTS

A. Section 32 1723.13 - Painted Pavement Markings: Crosswalk and curb markings.

1.03 REFERENCE STANDARDS

A. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

D. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

1.04 SUBMITTALS

A. See Article 9 of the General Conditions for Submittal Procedures.

B. See Section 01 3300 - Submittals, for submittal procedures.

C. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.

D. Warranty: Submit manufacturer warranty; complete forms in District's name and register with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.

B. Installer Qualifications: Company certified in writing by product manufacturer as having successfully completed work substantially similar to the work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.

B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Tactile and Detectable Warning Surface Tiles:

1. Access Tile, a brand of Access Products, Inc; _____: www.accesstile.com/#sle.

2.02 TACTILE AND DETECTABLE WARNING DEVICES

A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory-applied removable protective sheeting.
   1. Pattern: In-line pattern of truncated domes complying with ADA Standards.
   2. Color: As selected by Architect from manufacturer's standard range.

2.03 ACCESSORIES

A. Fasteners: ASTM A666, Type 304 stainless steel
   1. Type: Countersunk, color matched composite sleeve anchors
   2. Size: 1/4 inch diameter and 1-1/2 inches long.

PART 3 EXECUTION

3.01 EXAMINATION

A. When installation location is near site boundary or property line, verify required location using property survey.

B. Verify that work area is ready to receive work:
   1. Examine work area with installer present.
   2. If existing conditions are not as required to properly complete the work of this section, notify Architect.
   3. Do not proceed with installation until deficiencies in existing conditions have been corrected.

C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's written instructions.
   1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
   2. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.

B. Field Adjustment:
   1. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
   2. Orient so dome pattern is aligned with the direction of ramp.
   3. Align truncated dome pattern between adjacent units.

C. Install units fully seated to substrate, square to straight edges and flat to required slope.

3.03 INSTALLATION, SURFACE APPLIED PLASTIC TILES

A. Cure concrete surfaces for a minimum of 4 days before installing units.

B. Verify substrate is clean and dry; free of voids, projections and loose material. Remove dust, oil, grease, curing compounds, sealers and other substances that may interfere with adhesive bond or sealant adhesion.

C. Mechanically roughen surface as required to remove contaminants and prepare surface for adhesive and sealant application.

D. When installing multiple adjacent units, leave a 1/8 inch gap between tiles to allow for expansion.

E. Drill fastener holes straight, true and to depth recommended by manufacturer.

F. Apply adhesive to back of unit as recommended by manufacturer.

G. Mechanically fasten to substrate. Avoid striking or damaging the unit itself during installation.

H. Apply sealant to edges in cove profile.

3.04 CLEANING PLASTIC UNITS

A. Remove protective plastic sheeting within 24 hours of installation.

B. Remove excess sealant or adhesive from joints and edges.

C. Clean four days prior to date of scheduled inspection.

3.05 PROTECTION

A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.

B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

End of Section 32 1726

Section 32 1816.13

Playground Protective Surfacing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Protective surfacing for playground area.

B. Subbase under resilient surfacing.

C. Containment curbs.

D. Engineered Wood Fiber (EWF).

E. Subbase under protective surfacing.

F. Geotextile Fabric.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 11 6813 - Playground Equipment: Playground layout (staking).

C. Section 32 1123 - Aggregate Base Courses: Subbase for resilient surfacing.

D. Section 32 1313 - Concrete Paving: Subbase for resilient surfacing.

1.03 REFERENCE STANDARDS

A. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

B. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine; 2011.

C. ASTM F1292 - Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment; 2009.

D. ASTM F1487 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2011.

E. CPSC Pub. No. 325 - Public Playground Safety Handbook; 2010.

1.04 DEFINITIONS

A. Use Zone: The area beneath and immediately adjacent to a play structure or equipment (play event) that is designated for unrestricted circulation around equipment, and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

B. Critical Fall Height: The maximum fall height at which the protective surfacing meets the requirements of ASTM F1292.

C. Fall Height: The vertical distance between the finished elevation of the designated play surface and the finished elevation of the protective surfacing beneath it as defined by ASTM F1487.

D. Protective Surfacing: Resilient ground surfacing. The characteristics of the protective surfacing are based on the fall height of the playground equipment. Changes in either the surfacing or the fall height, particularly reducing the resilience of the protective surfacing or increasing the fall height, will reduce safety-related performance.

E. Subbase: A layer under the resilient layer of the protective surfacing but over the subgrade; may be rigid, as in concrete or bituminous, or aggregate.

F. Subgrade: The surface of the ground on which the protective surfacing is installed.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Product Data: For all manufactured surfacing products, provide manufacturer's product data showing materials of construction, compliance with specified standards, installation procedures, and safety limitations.
   1. Include IPEMA certifications where required.

C. Samples: For each product for which color must be selected provide color chart showing full range of colors.

D. Samples: Provide actual material samples for Engineered Wood Fiber.

1.06 QUALITY ASSURANCE

A. Maintain one copy of the latest edition of ASTM F1487 and CPSC Pub. No. 325 at project site.

B. Manufacturer Qualifications: Company regularly engaged in manufacturing products specified in this section, with not less than 10 years of documented experience.
   1. Surfacing installed in minimum 20 sites and been in successful service minimum 7 years.

C. Installer Qualifications: Company certified by manufacturer for training and experience installing the protective surfacing; provide installer's company name and address, and training and experience certificate.

1.07 PRE-INSTALLATION MEETING

A. Convene a meeting one week before starting earthwork for playground to discuss coordination between various installers.
   1. Require attendance by personnel responsible for grading and installers of playground equipment, protective surfacing, footings, and adjacent work.
   2. Include representatives of Contractor.
   3. Notify Architect at least 2 weeks prior to meeting.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store protective surfacing to project site in accordance with manufacturer's recommendations.

B. Store materials in a dry, covered area, elevated above grade.

1.09 WARRANTY

A. Provide minimum 5 year warranty for playground surfacing.

PART 2 PRODUCTS

2.01 Performance CRITERIA

A. Because the safety of the playground depends on strict compliance with the performance criteria, this information is provided for Contractor's information.
   1. The protective surfacing constitutes a resilient layer installed over a non-resilient layer, which is installed over the subgrade, with the top of playground equipment footings and anchorage devices covered by full depth of the resilient portion of the protective surfacing.
   2. The top elevation of the protective surfacing is intended to be flush with adjacent grades.
   3. Use Zone: The protective surfacing has been designed to provide acceptable impact attenuation as defined in ASTM F1292 for Critical Height of ____ feet.

B. If deviation from specified depth is required, it is the Contractor's responsibility to make all changes required to maintain specified top elevation and required impact attenuation at no

extra cost to District; obtain approval prior to proceeding; follow approval request procedure as specified for substitutions.

2.02 MATERIALS

A. Poured-In-Place Membrane Surfacing: Weather-resistant wear layer over impact attenuating substrate over rigid subbase.
   1. Wear Layer: Ethylene propylene diene monomer (EPDM) particles adhered with a ultraviolet-stabilized polyurethane binder to produce an even, uniformly colored surface.
   2. Wear Layer Thickness:.5 inch, minimum.
   3. Coefficient of Friction, when wet: 0.8, minimum, when tested in accordance with ASTM D2047.
   4. Wear Layer Color(s): As indicated on drawings. Submit samples.
   5. Impact Attenuating Substrate: 100 percent recycled shredded styrene butadiene rubber (SBR) shreds or granules with 100 percent solids polyurethane binder to form a resilient material; do not use foam rubber.

B. Engineered Wood Fiber Fill: Manufactured for the purpose of protective surfacing; complying with ASTM F2075; do not use mulch manufactured from recycled pallets, or lumber containing nails or metal fasteners.
   1. Depth: As required to achieve specified Critical Fall Height as defined in ASTM F1292 but not more than depth indicated; maintain top elevation flush with adjacent grades.
   2. Manufacturers:
      a. Crossroads Mulch: California Play Fiber: www.crossroadsmulch.com
         1) 14253 Whittram Ave., Fontana, CA 92335
         2) T: 888-975-2934
      b. Substitutions: See Article 7 of the General Conditions

C. Geotextile: Nonwoven polypropylene sheet, Mirafi 40N or approved equal.

D. Aggregate Subbase: See Section 32 1123.

PART 3 EXECUTION

3.01 EXAMINATION

A. Playground equipment installer will perform playground layout prior to installation of footings; verify correctness of layout before starting this work.

B. Verify that playground equipment and site furnishings and irrigation system located within playground area are complete.

C. Verify location of underground utilities and facilities in the playground area. Damage to underground utilities and facilities will be repaired at Contractor's expense.

D. Verify that subgrades are at proper elevations and that smooth grading is complete.

E. Verify that proper depth of surfacing is marked on base supports of playground equipment.

3.02 PREPARATION

A. Correct subgrade irregularities to ensure that required depth of protective surfacing can be installed, and subgrade elevation is in accordance with manufacturer's requirements.

B. Inside Use Zones remove all obstructions that would extend into the resilient protective surfacing.

C. Remove rocks, debris, and other similar items.

3.03 SUBBASE

A. Install aggregate subbase as indicated on drawings and in Section 32 1123. Compact aggregate to maximum 95 percent, in accordance with ASTM D1557.

B. Install with top surface of subbase no higher than grades and levels indicated and not more than 1/4 inch lower than grades and levels indicated.

C. Install in true, even plane, sloped to provide positive drainage.

D. Flatness Tolerance: 1/4 inch in 10 feet, maximum.

3.04 RESILIENT SURFACING LAYER

A. Install in accordance with CPSC Pub. No. 325, ASTM F1487, manufacturer's instructions, and requirements of authorities having jurisdiction (AHJ).

B. Install proper thickness throughout Use Zone(s).

C. Clean and dry surface of subbase.

D. Cover aggregate subbase with geotextile:
   1. Verify that aggregate is free of ruts or protruding objects.
   2. Lap minimum 4 inches width at seams. Adhere seams in accordance with manufacturer's recommendations.
   3. Install smooth, and free of tensile stresses, folds, or wrinkles.
   4. Protect from clogging, tears, or other damage during surfacing installation.
   5. Repair or replace damaged geotextile in accordance with manufacturer's recommendations.

E. Poured In Place Surfacing:
   1. Mix components mechanically on-site in accordance with manufacturer's directions; do not mix by hand.
   2. Install seamlessly; ensure complete bond to subbase.
   3. Cover footings and foundations and adhere tightly around penetrating elements.
   4. Maintain full thickness of resilient layers within Use Zone; cover or abut containment curbs as indicated on drawings; completely cover tapered transition edges.
   5. Hand trowel exposed surface to smooth, even finish.
   6. Impact Attenuation Layer: Install entire layer in one continuous pour on the same day.
   7. Wear Surface: Bond wear surface to substrate with adhesive. Apply adhesive in small quantities so that wear surface can be applied before adhesive dries.
      a. Install surfacing seamlessly. When wear surface is composed of different color patterns, pour surface continuously and seamlessly.
      b. When seams are required due to color change or field conditions, place adjacent wear surface as soon as possible, before initial pour has cured. Coat edge of initial pour with adhesive and apply wear surface mixture immediately.
      c. Add a minimum of 1/16 inch depth to specified surfacing depth to ensure required impact attenuation performance is met.
      d. Install wear surface to cover foundations and adhere tightly around elements penetrating the surface.

3.05 LOOSE FILL SURFACING

A. Install in accordance with CPSC Pub. No. 325, ASTM F1487, and requirements of authorities having jurisdiction (AHJ).

B. Cover Subgrade with Geotextile:

1. Lap minimum 4 inches width at seams. Adhere seams in accordance with manufacturer's recommendations.
2. Install smooth, and free of tensile stresses, folds, or wrinkles.
3. Protect from clogging, tears, or other damage during surfacing installation.
4. Repair or replace damaged geotextile in accordance with manufacturer's recommendations.

C. Install loose fill to depths indicated, with smooth even surface flush with tops of containment curbs.

3.06 FIELD QUALITY CONTROL

A. District or District's representative will inspect playground surfacing after installation to verify that surfacing is of proper type and depth and that playground meets specified design safety and accessibility requirements.

B. Repair or replace rejected work until compliance is achieved.

3.07 CLEANING AND PROTECTION

A. Restore adjacent existing areas that have been damaged from the construction.

B. Clean playground equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation. Clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.

C. Clean playground area of excess construction materials, debris, and waste.

D. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

E. Protect installed products until Date of Substantial Completion.

F. Replace damaged products before Date of Substantial Completion.

End of Section 32 1816.13

Section 32 3225

Gabion Columns

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gabion columns.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for Payment Procedures.

B. Payment will be based on the Unit Method: Measurement by the linear foot x full height of wall shown on Drawings. Includes excavating and preparing base, aggregate for leveling pad, placing mesh cage units, installing stone fill and drainage devices, installing geotextile, installing sleeves for other items work, and miscellaneous tie wire and accessories necessary for a complete gabion wall installation.

1.03 RELATED REQUIREMENTS

A. Section 05,5000 - Metal Fabrications: metal trellises in gabion walls.

B. Section 06,2000 - Finish Carpentry: wood bench seats on gabion walls.

C. Section 31 2200 - Grading: Rough and finish grading.

D. Section 31 2316 - Excavation.

E. Section 31 2323 - Fill.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

B. ASTM C1372 - Standard Specification for Dry-Cast Segmental Retaining Wall Units; 2011.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for Submittal Procedures.

B. Shop Drawings: Drawings for installation, including elevations, large-scale details of elevations, typical sections, details, and connections, soil reinforcement, and drainage provisions.
   1. Include marked up contract drawings showing exact dimensions for blocks, required coping, and other minor revisions.
   2. Installer Qualification Statement.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Firm specializing in design and installation of segmental retaining walls and:
   1. With not less than 5 years documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wire Mesh Baskets
   1. The flexible wire mesh shall be hexagonal woven mesh with the joints formed by triple twist which does not unravel if cut.
   2. All wires used in the manufacturing of the gabion units shall conform to BS 1052:1980 (1999) in mild steel wire, annealed, having a tensile strength of 38-50 kgf/mm2

3. All wires shall be heavily galvanized to BS 443:1982 (1990) and conforming to its minimum weight zinc coating weight and zinc coating adhesion reqirement which is checked by the rigoruous wrapping test.
4. All edges of the gabion units shall be mechanically selvedged to prevent raveling of the mesh and to develop the full strength of the woven mesh.

B. Stone
1. Stone fill for gabion units shall be clean rough quarry stone or put or river cobbles or a mixture of any of these materials, and shall be essentionally free from dust, clay, vegetative matter, and other deleterious materials.
   a. Contractor shall not collect or excavate on-site stone beyond the limits of construction as shown on the drawings.
   b. Stone harvested on-site may be used for stone fill for gabion units provided it meets the requirements of this section, and it is harvested in the normal course of construction earthwork?
2. Stone fill that will be visible in finished work should of similar size, color, and type.
3. Individual pieces of stone shall have least dimensions not less than 1-inch larger than the gabion mesh openings and greatest dimension not more than 2/3 of the thickness for gabion.
4. The stone shall be hard, tough, durable, and dense, resistant to the action of air and water, and suitable in all aspected for the purpose intended.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of existing structures and utilities prior to excavation.

B. Protect adjacent structures from the effects of excavation.

C. Verify that layout dimensions are correct and substrate is in proper condition for installation.

D. Notify Architect of unsatisfactory conditions.

E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Leveling Pad:
1. Depth: 6 inches, minimum.
2. In lieu of pad made solely of aggregate or concrete, pad may be 3 inches, minimum, of thick compacted sand or crushed rock, covered with 2 inches to 3 inches of unreinforced concrete.
3. Location: Top of pad at 1 inch below grade for each 8 inches that wall extends above grade.
4. Compact aggregate to lines and grades on drawings, in lifts 6 inches thick, maximum.

B. Verify level grade before proceeding.

3.03 INSTALLATION

A. Install in accordance with drawings, manufacturer instructions, and applicable codes and regulations.

3.04 PROTECTION

A. Prevent damage to wall and earthwork by subsequent construction and uncontrolled runoff until substantial completion; repair damage due to failure to protect wall or earthwork.

B. Do not operate heavy paving or grading equipment within 36 inches from the back of the wall face.

C. Do not operate equipment with wheel loads in excess of 150 psf live load within 10 feet from the wall face.

D. Do not place temporary soil or fill stockpiles adjacent to wall.

E. Replace damaged units prior to Date of Substantial Completion.

End of Section 32 3225

Section 32 3300

Site Furnishings

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tables

B. Benches

C. Bike Racks

D. Grills

E. Hydration Station

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Bollard infill and underground encasement.

B. Section 05 5000 - Metal Fabrications: Anchors to attach site furnishings to mounting surfaces.

C. Section 32,8423 - Irrigation: potable water connection for hydration stations.

1.03 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. See Section 01 3300 - Submittals, for submittal procedures.

C. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.

D. Shop Drawings: Indicate plans for each unit or group of units, elevations with model number, overall dimensions, construction, and anchorage details.

1.04 SUBSTITUTIONS

A. Comply with Article 7 of the General Conditions.

PART 2 PRODUCTS

2.01 Tables

A. Manufacturer: County of Sonoma Probation Camp (http://sonomacounty.ca.gov/Probation/Camp/Products/Tables/).

B. Description: 8-foot long, 3-inch thick redwood picnic table, ADA compliant on ends.

C. Length: 8 ft.

D. Model: Item 2

E. Finish: Natural

F. Mounting:Freestanding

2.02 Benches

A. Manufacturer: County of Sonoma Probation Camp (http://sonomacounty.ca.gov/Probation/Camp/Products/Benches/)

B. Description: 6-foot 3" Redwood Bench with Back (ADA) with Redwood Bench Armrest

C. Model: Item 8a with Item 38

D. Finish: Natural

E. Mounting: Freestanding.

2.03 Bike Racks

A. Manufacturer: Madrax (www.madrax.com)

B. Description: Inverted "U" bike rack, 2.375-inch O.D. metal pipe.

C. Model: U238-SF-P

D. Finish: "Bronze" powdercoat

E. Mounting: Embed mount per manufacturer's instructions

2.04 Grills

A. Manufacturer: Pilot Rock (pilotrock.com).

B. Description: 300 square-inch, multi-level, 360-degree swiveling charcoal grill with pedestal mount.

C. Model: J-20-B3.

D. Finish: Hot-dip galvanized.

E. Mounting: Embed mount per manufacturer's instructions. Provide ANC1-4 Concrete Anchor Kit.

2.05 Hydration Stations

A. Manufacturer: Elkay (www.elkay.com)

B. Description: DRINKING OUTDOOR BOTTLE FILLING STATION AND DUAL DRINKING FOUNTAINS.

C. Model: LK4430BF1UGRY EZH20

D. Finish: Grey

E. Mounting: Floor mount per manufacturer's specifications.

F. Install with shut off valve and install new drain line in adjacent area. Refer to Construction Detail I/LC501.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify proper installation of mounting surfaces, preinstalled anchor bolts, and other mounting devices; and ready to receive site furnishing items.

B. See Section 05 5000 for anchors to attach site furnishings to mounting surfaces.

C. Do not begin installation until unacceptable conditions are corrected.

D. Verify surfaces and footings to receive furnishings are level.

3.02 INSTALLATION

A. Install site furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.

B. See Section 03 3000 for bollard infill and underground encasement.

C. Provide level mounting surfaces for site furnishing items.

End of Section 32 3300

Section 32 4000

Landscape Boulders and Stone

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ornamental Boulders.

B. Landscape Cobble.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for Payment Procedures.

B. Payment will be based on the Unit Method: Measurement by the ton. Includes excavating, placing boulders, installing geotextile, placing cobble.

1.03 SUBMITTALS

A. See Article 9, General Conditions, for submittal procedures.

B. Samples - submit the following:
   1. Boulders
      a. Photographs taken at supplier or quarry that are representative of the size range, color, shape, and rock type. Boulders shown should be individually depicted so as to be clearly seen, and not on a palette or in a pile with other rock or rubble.
      b. Owner and Landscape Architect reserve the right to visit supplier's yard or quarry to make final selections.
   2. Cobble - provide 5 cobbles, representative of size, color, shape, smoothness, and rock type.

1.04 QUALITY ASSURANCE

A. Provide all rock in this section from the same source.

PART 2 PRODUCTS

2.01 LANDSCAPE BOULDERS

A. Supplier: Santa Paula Materials, Inc. 805-525-6858

B. Description: Landscape Boulders, quantity and sizes per plans. Boulders should be free of evidence of significant cracks,fissures, and fragmentation, and generally cubical or spherical in shape. Any one dimension of a boulder (height, width, depth) should not be more than 2-times any other dimension.

C. Color: "Malibu" earth tone.

2.02 LANDSCAPE COBBLE

A. Supplier: Santa Paula Materials, Inc. 805-525-6858

B. Description: Landscape cobble, smooth, 6" to 8" as indicated on Drawings.

C. Color: "Malibu" earth tone.

2.03 GEOTEXTILE

A. Non-woven polypropylene: Mirafi 40N or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that boulders are of good quality without cracks or fissures.

B. Verify subgrades are ready to recieve work.

3.02 INSTALLATION AND PLACEMENT

A. Install in accordance with drawings.

B. Cobble:
   1. Install geotextile fabric.
   2. Place boulders as shown on Drawings.
   3. Place cobble. Geotextile should not be exposed or visible.

End of Section 32 4000

Section 32 8423

Irrigation System

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings, and accessories.

B. Automatic valves

C. Manual valves

D. Control system.

E. Drip Irrigation

F. Pop-up rotor systems

1.02 DESCRIPTION

A. Provide all material, labor, equipment transportation, and services necessary for the furnishing and installation of the complete automatic sprinkler irrigation system as shown on the drawings and as specified herein. The work includes, but is not limited to:

1. Trenching, stockpiling excavation materials and refilling trenches.
2. Providing a complete system including piping, valves, fittings, backflow prevention device(s), rotors, sprinklers, automatic controls, dripline, and emitters and final adjustment of heads to ensure complete coverage.
3. Line voltage connections to all irrigation controllers; low voltage control wiring from controller to remote control valves.
4. Solar service and hookup to automatic controller
5. Automatic controller assembly and installation.
6. Thrust Blocking
7. Submittals, tests, as-built and record drawings.
8. Erosion control and repair of damage due to over watering and erosion.
9. Warranty replacement.
10. Cleanup, inspection and approval.

1.03 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 31 2316 - Excavation: Excavating for irrigation piping.

C. Section 31 2316.13 - Trenching: Excavating and backfilling for irrigation piping.

D. Section 31 2323 - Fill: Backfilling for irrigation piping.

E. Section - Exterior Plants.

1.04 PRICE AND PAYMENT PROCEDURES

A. See Article 41 of the General Conditions for payment procedures.

B. Piping:

1. Basis of Measurement: By the linear foot.
2. Basis of Payment: Includes trenching, placing pipe and fittings, valves, control box, conduit and wiring, and accessories.

C. Sprinkler Heads:

1. Basis of Measurement: By the unit.
2. Basis of Payment: Includes sprinkler head and fittings.

1.05 REFERENCE STANDARDS

A. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.

B. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

1.06 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Product Data: Provide component and control system and wiring diagrams.

C. As-Built Record Documents: Record actual locations of all concealed components piping system.

D. Dimension from two permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
   1. Connection to existing water lines.
   2. Connection to existing electrical power.
   3. Gate valves.
   4. Routing and/or directional turns of sprinkler pressure lines (dimension max. 100’ along routing).
   5. Sprinkler control valves.
   6. Routing of control wiring.
   7. Quick coupling valves.
   8. Other related equipment as directed by the Architect.

E. Detail Drawings: Submit detailed drawings for Owner approval, for all assemblies not detailed on the drawings.

F. Controller Charts:
   1. The Architect shall accept Record drawings before controller charts are prepared. Provide one controller chart for each controller supplied. The chart shall show the area controlled by the automatic controller and shall be the maximum size that the controller door will allow.
   2. The chart is to be a reduced drawing of the actual “as-built” system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced. The chart shall be a black line or blue line ozalid print and a different color shall be used to indicate the area of coverage for each station. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum of 10 mils. These charts shall be completed by the Contractor and approved by the Architect prior to final observation of the irrigation system.

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

H. Maintenance Materials: Provide the following for District's use in maintenance of project.
   1. Extra Sprinkler/Rotor Heads: One of each type and size.
   2. Extra Valve Keys for Manual Valves: One.

3. Extra Valve Box Keys: One.
4. Extra Quick Coupler Keys: One.
5. Prepare and deliver to the Architect, within 10 calendar days prior to completion of construction, two hardcover binders with three rings containing the following information:
    a. Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local manufacturer's representative.
    b. Catalog and part sheets on every material and equipment installed under this contract.
    c. Contractor's Guarantee statement that all equipment has been installed per plans and specifications.
    d. Complete operating and maintenance instruction on all major equipment.

I. Irrigation Schedule:
1. Watering schedule shall include watering times and start times for each valve. Schedule shall indicate watering times for each day of the week as applicable. The schedule shall be broken out to include seasonal adjustments.
2. Submit the Watering Schedule to the Architect for approval. The amount of water used per the irrigation schedule shall not exceed the projected water usage shown on the irrigation calculations and plans.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

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

1.08 JOB CONDITIONS

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

1.09 SUBSTITUTIONS

A. Procedure: Submit information in conformance with the substitution requirements of Division 01, General Provisions.

B. Provide descriptive catalog literature, performance charts and flow charts for each item to be substituted.

1.10 REGULATORY REQUIREMENTS

A. Requirements of Regulatory Agencies: All work and materials shall be in full conformance with the latest rules and regulations of the California Plumbing and Electric codes.

B. Manufacturer's Directions: Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers of articles used in this contract furnish directions covering points not shown in the drawings and specifications.

C. Underwriters Laboratories: Electrical wiring, controls, motors, and devices shall be UL listed, and so labeled.

1.11 INSTALLATION MEETINGS

A. Contractor shall be responsible for notifying the Architect or Designated Representative in advance for the following observation meetings, according to the time indicated: (Certain meetings may be grouped if prior approval is granted).
   1. Coordinate one week prior to commencing work of this Section.
   2. Pressure supply line installation and testing: 48 hours.
   3. Automatic controller location: 48 hours.
   4. Coverage test: 48 hours.
   5. Final site review: 7 days.

B. When observations have been conducted by other than the Architect or Designated Representative, show evidence in writing of when and by whom these observations were made.
   1. Final Observation:
      a. The Contractor shall operate each system in its entirety for the Architect or Designated Representative at time of final observation. Any items deemed not acceptable by the Architect or Designated Representative, or not in compliance with these specifications and drawings, shall be reworked to the complete satisfaction of the Architect or Designated Representative.
      b. The Contractor shall show evidence to the Architect or Designated Representative that the District has received all accessories, charts, record drawings, and equipment as required before final observation can occur.

1.12 COORDINATION

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

1.13 WARRANTY

A. The warranty for the sprinkler irrigation system shall be made in accordance with the following form.

B. A copy of the warranty form shall be included in the operations and maintenance manual.

C. The warranty form shall be retyped onto the Contractor's letterhead and contain the following information

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

6. DATE OF ACCEPTANCE:_____BY:_____

PART 2 PRODUCTS

2.01 IRRIGATION SYSTEM

A. Manufacturers:
   1. As shown on plans.

2.02 PIPE MATERIALS

A. Laterial PVC Pipe (Sizes up through 2 1/2"): ASTM D 2241; 200 psi pressure rated upstream from controls, 160 psi downstream; solvent welded sockets.

B. Mainline PVC Pipe (3" - 6" sizes): ASTM D 2241; 200 psi (1.38 MPa) pressure rated upstream from controls, 160 psi (1.10 MPa) downstream; gasketed joints.

C. Non-pressure lines (buried): Shall be PVC Schedule 40.

D. Fittings: Type and style of connection to match pipe and shall meet the requirements for service at an operating pressure of 150 pounds per square inch, unless otherwise specified.

E. Pipe Risers at Valves: 160 psi PVC pipe.

F. Solvent Cement: ASTM D2564 for PVC pipe and fittings.

G. Sleeve Material: Schedule 80 PVC.

H. PVC nipples: Schedule 80 with molded threads.

I. All PVC pipe must bear the following markings:
   1. Manufacturer's name.
   2. Nominal pipe size.
   3. Schedule or class.
   4. Pressure rating in AST (not required on drip tubing).
   5. NSF (National Sanitation Foundation) approval (not required on drip tubing).
   6. Date of extrusion.

2.03 OUTLETS

A. Manufacturer:
   1. As indicated on the drawings.
   2. Substitutions: See Article 7 of the General Conditions.

B. Emitter: Non-clogging, self-cleaning per the model numbers shown on the drawings.

C. Tree Bubbler: Fixed outlet capable of watering deep root systems directly.

D. Quick Coupler: _____.

2.04 VALVES

A. Manufacturers:
   1. As indicated on the drawings

B. Ball Valves: Brass construction with locking lever..

C. Backflow Preventers: Bronze body construction, reduced pressure zone type.

D. Backflow Enclosure: Vandal and weather resistant nature manufactured entirely of marine grade aluminum alloy 5052-H32. The mounting base shall be manufactured entirely of stainless steel. The length of the enclosure shall be expandable to allow for site adjustment. The enclosure shall have a mounting lip on one end and a locking mechanism on the other end. The handle controlling the locking mechanism shall be concealed within the surface of the enclosure and provide for a padlock.

E. Quick Coupling Valves: Two-piece brass body construction, 150-pound class, with 1-inch female threads opening at base permitting operation with a special connecting device (coupler) designed for this purpose.
   1. Coupler threads: Lug type.
   2. Hinge cover: Provide with rubber-like locking N/A vinyl cover.

F. Master Valves
   1. Valve Type: Spring loaded, packless diaphragm activated, normally closed type with brass body, equipped with flow control and pressure regulation capabilities where noted.
   2. Valve Solenoid: 24 volt AC, 4.5 watt maximum, 500 milli-amp maximum surge, corrosion-proof, stainless steel construction, epoxy encapsulated to form a single integral unit unless otherwise noted on plans.
   3. Provide bleeder valve to permit operation in the field without power at the controller.

G. Remote Control Valves
   1. Valve Type: Spring loaded, packless diaphragm activated, normally closed type with brass body, equipped with flow control and pressure regulation capabilities where noted.
   2. Valve Solenoid: 24 volt AC, 4.5 watt maximum, 500 milli-amp maximum surge, corrosion-proof, stainless steel construction, epoxy encapsulated to form a single integral unit unless otherwise noted on plans.
   3. Provide bleeder valve to permit operation in the field without power at the controller.
   4. Valves shall be spaced Min. 5 ft. apart.

H. Valve Boxes
   1. Remote control Valves: 14” x 19” of concrete material with locking cover.
   2. Gate valves, ball valves and quick couplers: 10" round of concrete material with locking cover.
   3. Valve box extensions shall be by the same manufacturer as the valve box.
   4. Emboss, letters on valve boxes to indicate contents of valve box. (ie. GV = Gate Valve, QC = Quick Coupler, RC = Remote Control Valve, MV = Master Valve, BV = Ball Valve)

I. Station Decoders
   1. Shall match manufacturer of controller.
   2. Provide minimum one (1) decoder per valve. The station decoder shall be a 2-station decoder and shall be able to operate up to 2-solenoids using unique colored wires for each. Utilizing decorder to support multiple valves is acceptable in accordance with manufacturer's instructions.
   3. Include POC decoders for master valve and flow sensor per manufacturer's instructions.
   4. Provide grounding rods or plates per manufacturer's instructions.

2.05 CONTROLS

A. Manufacturers:
   1. Rainmaster or approved equal. City maintenance approval required for substitutions.
   2. Substitutions: See Article 7 of the General Conditions.

B. Controller:
   1. Automatic controller shall support up to 128-stations when using 2-Wire.
   2. A single controller shall be able to operate up to 70, 2-station decoders and it shall be intended that all wire runs between valves and 2-Wire decoders shall be direct pulls and have no splices except at the decoder location.

C. Controller Enclosure: The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304-grade stainless steel, and the top shall be 12 gauge and the body 14 gauge with lockable hinged door. The main housing shall be louvered upper and lower body to allow for cross flow ventilation.
   1. Controller(s) shall be labeled inside and outside, warning that the system is utilizing recycled water. The labels shall also alert the system's maintenance personnel of any important constraints on the operation of the system.

D. Flow Sensor
   1. Shall match manufacturer of controller.
   2. The flow sensor shall be wired back to the irrigation controller using two #14 AWG wires, one red, and one black in 1" PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller shall be 2000 ft. The flow meter shall send low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and be resistant to any moisture entry.
   3. Housing to be a Sch 80 polyvinyl chloride tee or bronze tee.

2.06 ELECTRICAL (LOW VOLTAGE)

A. The 2-Wire cable shall either be Paige P7354D or Regency's Hunter® Decoder cable with a maximum length of 7,000 ft.

B. All electrical connections must be waterproof and moisture-resistant and shall be done with 3M™ Scotchcast™ 3570G Connector Sealing Packs.

C. Control wire shall be in conduit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of existing utilities.

B. Verify that required utilities are available, in proper location, and ready for use.

3.02 PREPARATION

A. A pre-construction meeting with the General Contractor and Landscape Architect is required for discussion and clarification of the following:
   1. Site and job conditions
   2. Safety
   3. Scope of work
   4. Trenching and backfill operations
   5. Pipe laying, inspection, and testing requirements
   6. Certification, submittals and acceptance requirements
   7. Protection of existing improvements and utilities
   8. Repair of existing improvements not scheduled for removal
   9. Disposal of surplus earth materials to approved disposal site(s)
   10. Coordination with water main Contractor
   11. Coordination of temporary interruption of utility service.

B. Drawings are generally diagrammatic and indicative of the work to be installed. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan accordingly, furnishing such fittings, etc., as may be required.

C. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and receive Architect or Designated Representative's approval prior to proceeding with work under this section.

D. Coordinate installation of irrigation system, including pipe, so there will be NO interference with utilities or other construction or difficulty in planting trees, shrubs, and ground covers. The Contractor shall carefully check all grades to satisfy him/her that he may safely proceed before starting work on the irrigation system.

E. All piping or equipment shown diagrammatically on drawings outside planting areas shall be installed inside planting areas whenever possible.

F. Layout and stake locations of system components.

G. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.03 TRENCHING

A. Trench and backfill in accordance with Section 31 2316 and Section 31 2323.

B. Excavate trenches to required depths. Follow approved layout for each system.

C. Trench bottom shall be flat to ensure piping is supported continuously on an even grade.

D. Where lines occur under paved areas, consider dimension to be below the subgrade.

E. Trench Size:
   1. As indicated on the drawings.

F. Trench to accommodate grade changes and slope to drains.

G. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 INSTALLATION

A. Assemblies:
   1. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions.
   2. Line Clearance: All lines shall have a minimum clearance of 6 inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.
   3. Connect to utilities.
   4. Install all assemblies specified herein in accordance with respective detail. In absence of detail drawings or specification pertaining to specific items required to complete work, perform such work in accordance with best standard practice, with prior approval from Architect or Designated Representative.
   5. PVC pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.
   6. On PVC to metal connections, the Contractor shall work the metal connections first. Teflon tape or approved equal shall be used on all threaded PVC to PVC, and on all threaded PVC to metal joints. Light wrench pressure is all that is required. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be welded.
   7. Quick Coupling Valves: Unless otherwise indicated, locate valves within 12 inches of hardscape.
   8. Set outlets and box covers 1 inch above finish grade in turf areas and 2 inches above finish grade in shrub planters.

9. Provide for thermal movement of components in system.
10. Use threaded nipples for risers to each outlet.

B. Mechanical Joints:
1. Use for pipe sizes 4" and larger.

C. Thrust Blocks:
1. For 4" pipe and larger install thrust blocks at fittings per plans.

D. Electrical Supply:
1. Low voltage wiring shall be placed in the same ditch and taped on bottom side of main lines unless otherwise approved.
2. Wire is to be taped a maximum 12 feet on center.
3. Provide a minimum 12-inch expansion loop at each connection and directional change.
4. Use a continuous wire between controller and remote control valves. Except as otherwise approved, do not splice wire at any point. All approved splices shall be enclosed in an acceptable box.
5. Each controller shall be provided with separate 2-wire path.

E. Automatic Controller:
1. Install as per manufacturer's instructions. Remote control valves shall be connected to controller in numerical sequence as shown on the drawings.
2. Controller shall be mounted inside lockable electrical cabinet.
3. Controller shall be programmed to read flows from valve stations.
4. Manufacturer's representative shall be on site for initial programming and startup of controller.
5. Contractor shall coordinate controller communication service plan, connectivity and startup with manufacturer and District.

F. Flow Sensor:
1. Flow sensor tee assembly shall be installed with minimum required length of unobstructed straight pipe run per manufacturer's instructions.
2. Install flow sensor wiring from flow sensor to controller. Connect wiring to flow sensor terminal at controller.

G. Mark valves with neoprene valve markers containing locking device. Set valve markers in pipe risers extending from top of valve to finish grade.

H. System Flush: After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

I. Sprinkler Heads:
1. Install the sprinkler heads as designated on the drawings and in accordance with their respective detail.
2. Spacing of heads shall not exceed the maximum indicated on the drawings. In no case shall the spacing exceed the maximum recommended by the manufacturer.

J. Valve Boxes:
1. All buried valves and equipment shall be installed with a proper box as specified in part 2 - products.

3.05 FIELD QUALITY CONTROL

A. Prior to backfilling, test system for leakage at main piping to maintain 100 psi pressure for two hours.

B. System is acceptable if no leakage or loss of pressure occurs and system self drains during test period.

C. Testing of pressure main lines shall occur prior to installation of electrical control valves, quick couplers or any other equipment that might prevent a proper test from being performed.

D. All piping under paved areas shall be tested under hydrostatic pressure of 150 pounds per square inch, and proved watertight, prior to paving.

E. If leaks develop, replace joints and repeat test until entire system is proven watertight.

F. All hydrostatic tests shall be made only in the presence of the Architect or Designated Representative of the District. No pipe shall be completely backfilled until it has been inspected, tested and approved in writing.

G. Furnish necessary force pump and all other test equipment.

H. Upon completion of each phase of work, entire system shall be tested and adjusted to meet site requirements.

I. Low voltage wire under paving shall be tested for continuity, prior to paving.

3.06 BACKFILLING

A. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.

B. Buried pipe in trenches shall be center loaded only until all required tests are performed. Trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand or other approved materials, free from large clods of earth or stones. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill will conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.

C. A fine granular material backfill will be initially placed on all lines. No foreign matter larger than 1/2 inch in size will be permitted in the initial backfill.

D. Flooding of trenches will be permitted only with approval of the Architect or Designated Representative.

E. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to the District.

3.07 TEMPORARY REPAIRS

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

3.08 SYSTEM STARTUP

A. Prepare and start system in accordance with manufacturer's instructions.

B. Adjust control system to achieve time cycles required.

3.09 GUARANTEE

A. The main line system shall be guaranteed by the Contractor as to material and workmanship, including settline of excavations for a period of one (1) year from the date of final acceptance of work.

B. Warranties, either implied or written, by the manufacturer, do not relieve the Contractor of his/her responsibility for the guarantee period.

3.10 AS-BUILT DRAWINGS

A. The Contractor shall be responsible for making a set of construction prints and recording work accomplished for that day on the prints in red ink. Prior to completion of the entire project, a final set of as-built drawings on bond paper shall be completed, (2) hardcopy sets and a scanned digital copy in PDF format of all drawings shall be provided to the District. These drawings shall indicate the following:
   1. Dimension from two (2) permanent points of reference (building corners, fixed hardscape corners, road intersections, permanent existing utilities) the location of the following items: Connection to existing water lines, routing of pressure supply lines at 100 ft. intervals or closer as necessary to provide accurate routing, gate valves, quick coupling valves, control wire routing (if separate from main lines), back flow prevention devices, water meters, controllers, and other equipment as directed by the Architect.
   2. Final As-Built plans shall be submitted to the District's approved representative and the Architect for review and approval.
   3. The Contractor shall be responsible for making a set of construction prints.

3.11 MAINTENANCE PERIOD

A. The entire sprinkler irrigation system shall be under full automatic operation for a period of seven days prior to any planting.

B. The Maintenance Period for the main line system shall extend to one year from the date of acceptance of work by the District's authorized representative and the Architect. The Contractor shall warrant materials against defects and guarantee workmanship for the Maintenance Period as specified and for coordinating warranty items with the manufacturer/distributor and District, Settlement of trenches, which may occur during the maintenance period, shall be repaired by the Contractor at no cost to the District.

C. Maintenance Walk-Through: Prior to a release of responsibility at the end of the maintenance period, the Contractor shall schedule a walk-through with the District and Landscape Architect.

3.12 CLEANUP

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

3.13 OPERATING INSTRUCTIONS

A. The Contractor shall be required to train District’s maintenance personnel in proper operation of all major equipment. Provide written evidence of the person or persons so trained to the Architect or Designated Representative.

3.14 CLOSEOUT ACTIVITIES

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

B. Irrigation Schedule: See Submittal Requirements above.

C. Irrigation Audit: Shall be performed by a third party representative hired by the District. Contractor shall coordinate keys to controllers and valve boxes for use by the auditor.

End of Section 32 8423

Section 32 9300

Plants

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil and topsoil.

B. Topsoil bedding.

C. New trees, plants, and ground cover.

D. Mulch and Fertilizer.

E. Plants in pots/containers

F. Warranty Replacement

G. Tree Pruning.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

B. Section 32 8200 - Irrigation

1.03 DEFINITIONS

A. Weeds: Any plant life not specified or scheduled.

B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.04 REFERENCE STANDARDS

A. ANSI/ANLA Z60.1 - American National Standard for Nursery Stock; 2004.

B. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2008.

1.05 SUBMITTALS

A. See Article 9 of the General Conditions for submittal procedures.

B. Submit list of plant life sources.

C. Submit purchase invoices from nurseries for review.

D. Samples: Submit the following to the District for acceptance:
   1. Soil Separator: One square foot minimum, accompanied by product data.
   2. Drain Rock: One-half cubic foot.
   3. Wood Bark Mulch: One-half cubic foot.
   4. Root Control Barrier: One square foot sample panel, accompanied by product data.

E. Product Data: Submit the following product information to the District for acceptance:
   1. Tree Staking Materials: Manufacturer's literature.
   2. Herbicides: Schedule for application of herbicides must be approved by the District.

F. Test Reports: Soil tests shall be performed by a certified soils analyst by the state of California. Provide the following tests and submit the results to the District:
   1. Existing Site Soil: Provide two separate tests at distinctly separate on-site locations, for agricultural suitability, fertility, particle size analysis; including recommendations for soil amendment, and fertilization during the maintenance period.

2. Import Soil: Submit test reports of representative sample(s) for approval prior to delivery and for every 100 yards delivered to the site. Test for agricultural suitability, fertility, particle size analysis; including recommendations for soil amendment, and fertilization during the maintenance period.
3. Organic Amendments, Fir Bark: Test for partial organic amendment evaluation.
4. All Other Fertilizers and Amendments: For standard products, submit manufacturer's analysis. For all other products, submit analysis by testing laboratory.

G. Soil Mix: Submit cut-sheets of each accepted planter soil mix component and one-ounce samples of the fertilizers to the Inspector.

1.06 QUALITY ASSURANCE

A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.

B. Installer Qualifications: Company specializing in installing and planting the plants with five years experience.

C. Testing Laboratory: Recognized laboratory for soil and plant disease analysis for ornamental horticulture, approved by the Inspector. Testing laboratory is to perform all work in accordance with the current methods of the Association of Official Agricultural Chemists.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Store fertilizers and amendments, bark mulch, soil mixes, and other materials which could stain concrete and similar surfaces in such a manner that staining does not occur.

B. Plants: Maintain all plant material in a healthy growing condition prior to and during planting operations. Protect plants at all times from sun and drying winds. Plants that cannot be planted immediately upon delivery shall be kept in the shade, well protected and watered. Plant material delivered to the site must be planted within 3 days of site delivery. Plants that cannot be installed on this work schedule shall be returned to the grower until installation requirements can be met.

1.08 SUBSTITUTIONS, ADDITIONS, DELETIONS

A. General: Submit proposals for substitutions in accordance with the requirements of Division 1 Specification Sections. Acceptance by the Inspector is required prior to proceeding with the work under this Section.

B. The Architect reserves the right to substitute plant material of sizes equal to material specified, as the work progresses, at no additional cost to the District.

C. When requesting substitutions for plant material, the Contractor shall provide the Architect with the following:
1. Contact information for nurseries Contractor was unable to obtain plant material. Minimum of three are required.
2. Three (3) alternate plant suggestions as part of the initial request. Provide foliage/flower color, growth habit, and sunset zone of each.
3. Substitution requests which do not include the above requirements will be denied until requirements have been met.

1.09 FIELD CONDITIONS

A. General: Become familiar with the anticipated growing conditions prior to commencement of work. Notify the Inspector immediately in writing of any conditions, which will prevent the

proper execution of the warranty responsibilities specified. Failure to so notify the Inspector constitutes acceptance of the growing conditions. Any removal, repair or replacement of plant material required by unsuitable conditions found after work has begun shall be done at no additional cost to the District.

B. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

C. Do not install plant life when wind velocity exceeds 30 mph.

1.10 WARRANTY

A. Plant Material: Warrant that all trees under this Contract will be vigorous, healthy, free of dead or dying branches and branch tips, bearing foliage of normal density and color, and will otherwise comply with the requirements of this Section, for a period of one year from date of Final Acceptance. Warrant that all shrubs and plants under this Contract for a period of 90 days. Any delay in completion of planting operations which extends the planting into more than one growing season shall extend the warranty period correspondingly.

B. Replacements: Without cost to the District, in a timely manner and as directed by the Inspector, replace all plants not meeting the requirements above throughout the course of the warranty period. Replacements shall closely match adjacent specimens of the same species in size and shall comply with all requirements of this specification.

C. Species: Replace all plant material determined by the District within two years following the final acceptance of the project, to be untrue to the species, clone and/or variety specified, to the equal condition of adjacent plants at the time of replacement, at no additional cost to the District.

PART 2 PRODUCTS

2.01 PLANTS

A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

1. Size:
    a. Plants shall conform to measurements specified. Measure plants when branches are in their normal position. Height and spread dimensions specified refer to the main body of plant and not branch tip to tip. Take caliper measurements at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper, and at a point 12 inches above the natural ground line for trees over 4 inches in caliper.
    b. The measurements specified are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height, spread, and caliper, shall be rejected.
    c. Plants larger than specified may be used if approved by the District, and if provided at no additional cost to the District. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant; irrigation system shall also be adjusted as required to accommodate larger plants.

B. Acclimatization: The General Contractor is responsible for supplying plant material that has been properly acclimated and conditioned, in accordance with good horticultural practices, for the exposure, wind and humidity levels, soil conditions, etc., encountered at the project site and in the proposed plant location.

C. Coordination: The Contractor shall coordinate his acclimatization schedule with the District as to allow an adequate conditioning period for the plant material prior to the approved date of planting commencement. Notify the District in writing prior to proceeding with any

acclimatization work if approved work schedule allows insufficient time to acclimate the material.

D. Quality: Plants shall be superior in form, compactness and symmetry; sound, healthy and vigorous, well branched and densely foliated when in leaf; free of disease, insect pests, eggs or larvae, and free from physical damage or adverse conditions that would prevent thriving growth.

E. Species: Tag one of each plant prior to delivery to the site; label with genus, species and variety. Any plants not so identified will be subject to rejection by the District. Plants may be cross referenced with nurseries invoice at the discretion of the Architect.

F. Root Ball:
   1. Do not supply any bare root or ball and burlapped stock unless approved by the District.
   2. Sizes: As specified on the plans. Where no root ball dimensions have been specified, supply material in container sizes specified.
   3. Material: Root ball shall consist of a soil or soil mix that is compatible with the soil or soil mix into which the plant will be planted, and that provides for thorough drainage, aeration, and adequate moisture and nutrient retention. Having sufficient density and firmness that when planted, the plant will stand upright and stable without need for additional support.
   4. Containers: All plant material shall have been grown in the containers in which delivered for at least six months, but not over two years. Stock appearing to not have been in their containers for this term shall be rejected.
   5. Root Pruning: Where root pruning is required to provide material of the specified size, or for planting in the sloped containers, the pruning is to be done under the direction of a Certified Arborist. No root pruning is to be done within one year of installation unless approved by the District.

G. Trunks and Branches: Do not prune plants before delivery. All trunks are to be straight and of uniform taper, larger at the bottom unless otherwise specified. Plants with damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Plants with abrasions of the bark, sun scalds, disfiguring knots, or fresh cuts of limbs over 3/4 inch, which have not completely callused, will be rejected. Any plant unable to stand upright without support will be rejected.

2.02 SOIL MATERIALS

A. General: All soils to be used in areas to be planted on the project shall be free of rocks over one inch in diameter, and free of foreign debris. Soil shall be free from sub-base/aggregate, refuse, plants or roots, clods, weeds, viable weed seeds, sticks, solvents, petroleum products, concrete, base rock, or other deleterious or extraneous material. Soil shall be free of soil-borne diseases, and capable of sustaining healthy plant life.

B. Imported Topsoil:
   1. Topsoil shall be fertile, friable soil of loamy character, containing an amount of organic matter normal to the region. All imported topsoil used on the job shall be from the same source.
      a. Make all arrangements for obtaining and testing imported topsoil. Submit test reports of a representative sample of the proposed supply for approval by the District well in advance of its scheduled delivery to the site. The approved sample will establish the standards to which all imported topsoil used on the job must conform.
      b. Transport imported topsoil directly from source to final position. If stockpiling is required, locations and amounts of stockpiles will be designated by the District.

c. The District reserves the right to take additional samples of imported topsoil at the site. If subsequent testing proves material to be at variance with the approved sample, remove rejected soil from the site and replace immediately at no additional cost to the District.

C. Imported Planter Pot Soil Mix: For use in planters and planter pots. The following ingredients, thoroughly blended into a homogeneous mix:

Amount	Ingredient
0.5 cubic yards	1/8 inch Fine Fir Bark as Specified
0.5 cubic yards	Fine Sand as Specified
3 pounds	Single Superphosphate 0-20-0
1 pound	Calcium Nitrate 15.5-0-0
1 pound	Iron Sulfate
8 pounds	Kaiser 65 Dolomite Lime

D. Existing On-Site Soils: Existing site soils shall be amended per the recommendations of the approved soils testing laboratory. The following soil amendments and fertilizers are to be used FOR BIDDING PURPOSES ONLY.

1. Site Soil: Top 6 inches of site soil shall be amended with following blend of amendments per 1000 square feet.

Amount	Ingredient
6 cubic yards	Nitrogen Stabilized 0” - 1/4” Fir Bark
15 lbs	12-12-12 Commercial Fertilizer as approved
15 lbs	Soil Sulfur
100 lbs	Agricultural Gypsum

2. Backfill Mix (on-grade locations): Amend site soil as follows per cubic yard.

Amount	Ingredient
3/5 cubic yard	Surface Soil
2/5 cubic yard	Nitrogen Stabilized 0” to 1/4” Fir Bark
1 lb	12-12-12 Commercial Fertilizer as Specified
2 lbs	Iron Sulfate as Specified
10 lbs	Agricultural Gypsum

3. Additional Amendments: Soil amendment recommendations will vary for planting areas if imported topsoil is required to establish finish grade. Provide all additional amendments as may be required by subsequent soil testing of approved imported topsoil and as directed by the Inspector.

2.03 SOIL AMENDMENT MATERIALS

A. Nitrogen Stabilized Fir Bark On-Grade: Meeting the following specifications:

1. Particle Size (dry weight basis):

Sieve Size	Percent Passing
6.35 mm (1/4 inch)	95 - 100
2.38 mm (No. 8, 8 mesh)	50 - 80
500 micron (No. 35, 32 mesh)	0 - 25

2. Organic Content: Determined by ash analysis. Minimum 92% based on dry weight.

3. Nitrogen: Minimum 0.8% nitrogen based on dry weight.
4. Salinity: Maximum saturation extract conductivity 3.5 millimhos per cm at 25 degrees centigrade.
5. Iron: Minimum 0.08% dilute acid soluble Fe based dry weight, if iron treated.
6. Bulk Density: 400 pounds per cubic yard.

B. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis.
1. Fertilizers shall be approved by the Organic Materials Review Institute (OMRI).
2. Contractor shall obtain District's written approval of proposed fertilizer(s) prior to use.

C. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.

D. Pre-Emergent Herbicide: For all on-grade ground cover and shrub areas, provide "Surflan A.S." as manufactured by Elanco Products Co., Indianapolis, IN, with no acceptable substitutions. Apply per manufacturer's instructions.

2.04 MULCH MATERIALS

A. Mulching Material: Cedar species wood shavings, free of growth or germination inhibiting ingredients. Mulch shall have been baked to remove unwanted seed growth.

2.05 ACCESSORIES

A. Drain Rock: 3/4" diameter river rock or approved equal.

B. Soil Separator: Soil Separator: "Mirafi 140N", as manufactured by Mirafi, Charlotte, NC, "Trevira Spunbond 1120", as manufactured by Hoechst Fibers Industries, Spartanburg, SC, or approved equal.

C. Stakes: Softwood lumber, pointed end.
1. Lodgepole stakes. Length as required to meet dimensions required per plans.

D. Root Control Barrier: "Deep Root Control Barrier", stock number UB24-2 as manufactured by Deep Root Corp., 15040 Golden West Circle, Westminister, CA 92683 (714) 898-0563, or approved equal.

2.06 SOURCE QUALITY CONTROL

A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt and organic matter; pH value and any deficincies.

B. Submit minimum 10 oz sample of topsoil proposed. Forward sample to testing laboratory in sealed containers to prevent contamination.

C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.01 ORDERING, REVIEW AND ACCEPTANCE OF PLANT MATERIAL

A. Ordering:
1. Within 30 days after award of contract, submit written certification to the District of the quantity and species of plant material ordered, and the nursery(s) supplying the material.
2. The Contractor is responsible for providing all plant material in the quantities and sizes specified on the drawings, and for making all arrangements in advance that may be

required to obtain these materials. If any material specified will be unavailable at the time of planting, submit written verification to the District along with the bid.

B. Review of Plant Material: Before planting operations begin, all plant materials shall be reviewed for conformance to the design intent of the Contract Documents by the District. Submit written request for review of plant material at least 10 days prior to commencement of planting operations. Review by the District does not waive the right of rejection during planting or any time thereafter.

C. Rejection of Material: The District reserves the right to review and reject plant material at any time, and at the place of growth, for nonconformance to the Specifications. Do not install plant material, which has not been reviewed at the project site by the District.

3.02 EXAMINATION

A. Verify that prepared subsoil and planters are ready to receive work.

B. Saturate soil with water to test drainage.

C. Verify that required underground utilities are available, in proper location, and ready for use.

3.03 GRADING

A. General: All areas to be planted on the project shall be free of rocks over one inch in diameter to a depth of 8" minimum below finish grade, and free of foreign debris, subsoil, refuse, plants or roots, clods, weeds, sticks, solvents, petroleum products, concrete, base rock, or other deleterious or extraneous material. Areas to be planted shall be free of soil-borne diseases and capable of sustaining healthy plant life. Do all work necessary to bring site soil, import soil and planter backfill to compliance with these requirements. Remove from the project site and dispose of in a legal manner any soils and material not meeting these requirements. Subject to acceptance of the District, all soil and material not meeting these requirements shall be the property of the Contractor.

1. Surface Drainage: Contractor is responsible for proper surface drainage of planted areas. Report in writing to the District any discrepancies in the Contract Documents, obstructions on the site, or any other conditions, which the Contractor feels prevent establishing proper drainage, and obtain the Inspector's instructions prior to proceeding with the work affected.
2. Final Contouring:
   a. Handle and place the soil to depths required. Remove all rocks and clods over one inch in diameter. Provide for surface drainage and cut all necessary drain swales.
   b. Work soil sufficiently so that after rolling and after full settlement has occurred, the site will be graded to within ±0.10 of a foot from the lines, grades and elevations shown, and as may be directed by the Inspector. Finished surface shall be smooth and uniform and shall be free of depressions that retain standing water or any surface irregularities that would impede proper drainage. Unless otherwise noted, all soil finish grades shall be 1-1/2 inches below finish grade of adjacent walks, pavements and curbs, and top of wall elevations.
3. Erosion Repair: Repair all erosion damage that occurs until Final Acceptance. Take all measures necessary to prevent erosion occurring during work under this Section. Provide and amend replacement soil in accordance with this Section.

3.04 PREPARATION OF SUBSOIL

A. Amend subsoil as indicated in analysis.

B. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

C. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

D. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

E. Dig plant pits and beds twice the size of the rootball as directed per the drawings.

3.05 PLACING TOPSOIL

A. Spread topsoil to a minimum depth of 6 inches over area to be planted. Rake smooth.

B. Place topsoil during dry weather and on dry unfrozen subgrade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

F. Place topsoil mix to the depths specified to obtain finish grades shown on the drawings. Soil mix shall be handled in a manner so as to prevent segregation of ingredients. Thoroughly water planter backfill mix after placement to compact and settle mix.

3.06 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches of topsoil.

D. Lightly water to aid the dissipation of fertilizer.

3.07 EXCAVATION OF PLANTING PITS ON-GRADE

A. General: Excavate plant pits by hand or with a backhoe; use of augers will not be permitted. Prior to planting and backfill, scarify the sides and bottom of the pit as required to eliminate any glazed surfaces. Excavate container-grown tree, shrub, and vine holes to the following dimensions:

1. 1, 5, and 15 gallon containers: Two times the size of the root ball in width and depth.
2. 24-inch boxes and larger: Large enough to allow one foot of space around the ball in all directions.
3. Holes on mounds: Dig plant holes on mounds deeper than normal.
4. Excess Soil: Transport and dispose of off-site in a legal manner any excess excavated soil.
5. Obstructions: If rocks, underground construction work, tree roots or other unknown obstructions are encountered in the excavation of plant holes, alternate locations may be selected by District. Report all such conditions in writing to the District. If a change in the location of the planting pit is unacceptable to the District, the original planting pit shall be over-excavated to remove the obstructions to a minimum dimension of 12” beyond the sides and bottom of the tree pit as typically specified. Obtain the District's instructions prior to proceeding with the work affected.

3.08 DETRIMENTAL SOILS AND DRAINAGE

A. General: Prior to planting, test drain all planting areas as follows:

1. On-Grade Plant Pits: Fill with 12 inches of water. Water should drain completely in 48 hours.
2. Plant Beds: Irrigate until soil is saturated. Saturated condition should not remain after 24 hours.

B. Drainage Chimneys:
1. General: For plant pits failing the initial drainage test, provide drainage chimneys as shown on the drawings and as directed by the District.
2. Neatly auger drainage chimneys to a depth directed by the District. Remove loose soil from hole and plant pit. Locate chimneys at perimeter of plant pit. Repeat test for proper drainage.
3. Once required drainage test has been passed, backfill chimneys with drain rock, flush with bottom of pit. Cover chimneys with soil separator.

C. Failure of Drainage Test: report in writing to the District all areas not passing these tests and all soil conditions that the Contractor considers detrimental to growth of plant material. State condition and proposal and cost estimate for correcting the condition. Obtain the District's instructions prior to proceeding with the work affected. Repeat drainage testing and correction of conditions in this manner as necessary until tests are passed. Failure to perform drainage tests and/or to notify the District in writing of the conditions specified above renders the Contractor responsible for all plant failure that occurs as a result of inadequate drainage or detrimental soil conditions, as determined by the District.

3.09 PLANTING

A. General: Do not plant any material that has not been reviewed by the Inspector upon delivery to the project site or that has been rejected for any reason. Do not plant under unfavorable weather conditions.

B. Place plants for best appearance.

C. Set plants vertical.

D. Remove non-biodegradable root containers. After removing plants from their containers, disentangle any small roots that encircle the container. Do not cut or otherwise disturb the root ball. Inspect all plants for rootbound condition; do not install rootbound plants or plants found to have cracked or broken root balls when taken from the container.

E. Care should be exercised to prevent damage or breakage to limbs, and ropes or other lines should not be allowed to damage bark.
1. Container Stock:
a. General: Do not lift or handle container plants by tops, stems, or trunks at any time.
b. Boxed Stock: Remove bottom of box prior to placement of plant in planting pit. Cut bands and remove box sides just prior to backfilling.
c. Canned Stock: Remove canned stock carefully after cans have been cut on two sides with acceptable cutter. Do not use spade to cut cans.
d. Ball and Burlap Stock: Dig ball and burlap (B & B) plants with firm balls of earth of diameter not less than that recommended by the American Standard for Nursery Stock, and of sufficient depth to include the fibrous and feeder roots. Plants moved with ball will not be accepted if the ball is cracked or broken before or during planting operations.

F. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.

G. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.

H. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

I. Top-dress Fertilizing On-Grade: When plant installation is complete, fertilize all planting areas (excluding lawn areas) with top-dress fertilizer at the rate of 4 lbs. per 100 square feet.

J. Anti-Desiccant: At Contractor's option, spray all evergreen and deciduous plant material in full leaf with anti-desiccant, in accordance with manufacturer's instructions. Apply an adequate film over trunks, branches, twigs and foliage. Take precautions as necessary to prevent damage, particularly from sun scald.

K. Mulching: Mulch all planting areas (excluding lawn areas) with 3 inch layer of wood bark mulch unless otherwise shown. Spread mulch uniformly to form a smooth cover free of bare spots and mounds.
   1. Settlement: As shown on the drawings, the crowns of all plants shall be at least 1/2 inch above the surrounding grade after all settlement has occurred.
   2. Watering Basins On-Grade: Form a watering basin, an excavated ring around the root ball of the plant for each tree and shrub. Do not form watering basins in lawn areas.

3.10 GROUND COVER PLANTING

A. Pre-emergent herbicide Application On-Grade Only: Apply pre-emergent herbicide, Surflan A.S. at the rate of 5-1/3 pounds per acre applied in 25 gallons of water to all on-grade locations. Apply before wood bark mulch application.

B. Planting: Plant ground cover plants through wood bark mulch at the specified triangular spacings. Make planting hole with a hand mattock avoiding mixing surface applied herbicide into planting hole.
   1. Activation of Herbicide On-Grade Only: After planting, irrigate with at least one inch of water to activate the herbicide. Water areas carefully taking care to avoid erosion. Repair erosion occurring from careless watering immediately. Remove, repair and replace adjacent planting and soil damaged by careless watering and translocation of herbicide.

3.11 LAYOUT OF PLANT MATERIAL

A. General: The District will review for conformance to the design intent of the Contract Documents locations of all plants in the field prior to planting. Notify the District and schedule layout review sufficiently in advance of planting to allow for review and adjustment without disrupting construction schedule.

B. Adjustments: The District reserves the right to make minor adjustments in the layout of all plant material; adjust irrigation system as necessary.

3.12 INSTALLATION OF ACCESSORIES

A. Install trunk protectors on all new trees located in turf areas.

3.13 PLANT SUPPORT

A. General: Complete staking and guying immediately after planting. Perform in accordance with reference standards, unless otherwise shown on the drawings or directed by the District. Securely stake or guy all trees planted on the site using staking or guying type shown on the drawings. The District reserves the right to make modifications to staking and guying procedures as required to accommodate field conditions at no additional cost to the District.
   1. Staking: Stake trees with one as shown on the drawings.

3.14 PRUNING

A. Prune plants only at the direction of the District and according to reference standards to preserve the natural character of the plant. Remove all dead wood, suckers and broken or badly bruised branches. Remove sucker basal and lateral growth to prevent resprouting; retain normal side branching. Use only disinfected, sharp tools. Improperly pruned trees will be subject to rejection by the District. Apply tree seal to cuts over one inch diameter in accordance with manufacturer's instructions.

B. Prune trees as recommended in ANSI A300 Part 1.

C. Prune newly planted trees as required to remove dead, broken, and split branches.

3.15 FIELD QUALITY CONTROL

A. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

B. Deficient Soils: Remove all soils determined by the District to be deficient and provide all additional amendments as directed to modify deficient soils at no additional cost to the District.

3.16 MAINTENANCE

A. Maintain plant life for three months after Date of Substantial Completion.(Turf will be handled by the District).

3.17 CLEANUP

A. Sweep site clean of all excess materials used in these operations. Excess soils shall be swept up and removed off site. Do not wash excess materials into adjacent drainage facilities.

End of Section 32 9300

Section 33 0110.58

Disinfection of Water Utility Piping Systems

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1416.

1.02 RELATED REQUIREMENTS

A. Section 33 1416 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; 2011.

B. AWWA B301 - Liquid Chlorine; 2010.

C. AWWA B302 - Ammonium Sulfate; 2010.

D. AWWA B303 - Sodium Chlorite; 2010.

E. AWWA C651 - Disinfecting Water Mains; 2005.

1.04 SUBMITTALS

A. Test Reports: Indicate results comparative to specified requirements.

B. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

C. Disinfection report:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
   5. Date and time of flushing start and completion.
   6. Disinfectant residual after flushing in ppm for each outlet tested.

D. Bacteriological report:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.
   4. Test locations.
   5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
   6. Coliform bacteria test results for each outlet tested.
   7. Certification that water complies, or fails to comply, with bacterial standards of _____.

1.05 QUALITY ASSURANCE

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of California.

C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Inject treatment disinfectant into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Test samples in accordance with AWWA C651.

End of Section 33 0110.58

Section 33 1416

Site Water Utility Distribution Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water pipe for site conveyance lines.

B. Pipe valves.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete for thrust restraints.

B. Section 21 1100 - Facility Fire-Suppression Water-Service Piping.

C. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

B. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

C. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.

D. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2015.

E. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

F. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 1998 (Reapproved 2011).

G. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; 2009.

H. AWWA C504 - Rubber-Seated Butterfly Valves 3 In. (75 mm) Through 72 In. (1,800 mm); 2010.

I. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2009.

J. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2007.

K. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Names and addresses of the nearest service and maintenance organization that readily stocks repair parts.

D. Manufacturer's recommended installation procedures.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with utility company requirements.

B. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

A. Copper Tubing: ASTM B88, Type K, Annealed:
   1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
   2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.

B. PVC Pipe: ASTM D1785, Schedule 40.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: ASTM D2855, solvent weld.

C. PVC Pipe: AWWA C900 Class 100:
   1. Fittings: AWWA C111/A21.11, Schedule 40 per ASTM D2466 or schedule 80 per ASTM D2467.
   2. Joints: ASTM D3139 compression gasket ring.

D. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.02 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:
   1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.

C. Gate Valves 3 Inches and Over:
   1. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.

2.03 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

2.04 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03 3000.

B. Backflow Preventer: _____.

C. Meter: _____.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

A. See the sections on excavation and fill for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Slope water pipe and position drains at low points.

D. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.05 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing soil.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway in accordance with Section 21 1100.

D. Set hydrants to grade, with nozzles at least 20 inches above ground in accordance with Section 21 1100.

3.06 SERVICE CONNECTIONS

A. Provide water service to utility company requirements with reduced pressure backflow preventer and water meter with bypass valves and sand strainer.

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform field inspection and testing in accordance with Section 01 4000.

C. Closing un-inspected work:
   1. Do not allow or cause any of the work of this Section to be covered up or enclosed until after it has been completely inspected and tested, and has been approved by the Engineer.

D. Hydrostatic tests:
   1. Where any section of a water line is provided with concrete thrust blocking for fittings, do not make hydrostatic tests until at least five days after installation of the concrete thrust blocking, unless otherwise directed by the Engineer.
   2. Devise a method for disposal of wastewater from hydrostatic tests, and for disinfection, as approved in advance by the Engineer.
   3. Backfill and compaction shall be completed prior to the final 2-hour pressure test.
   4. Each section of the pipe to be tested shall be slowly filled with water, and all air shall be expelled from the pipe.
      a. The release of the air can be accomplished by opening hydrants and service cocks at the high points of the system and the blowoffs at all dead ends.
      b. The valve controlling the admission of water into the section of pipe to be tested shall be opened wide before shutting the hydrants or blowoffs.
      c. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested shall be closed.
      d. The line shall be allowed to set for a period of not less than 24 hours.
      e. The pipe shall then be refilled, if necessary, prior to the pressure tests.

E. Pressure tests:
   1. Bring newly laid piping and valved sections of water distribution and service piping to a hydrostatic pressure of 200 psi for two hours.
   2. Open and close each valve several times during the test.
   3. Carefully examine exposed pipe, joints, fittings, and valves.
   4. Replace or remake joints showing visible leakage.
      a. Remove cracked pipe, defective pipe, and cracked or defective joints, fittings, and valves. Replace with sound material and repeat the test until results are satisfactory.
      b. Make repair and replacement without additional cost to the Owner.

F. Leakage test:
   1. Conduct leakage test after the pressure test has been completed satisfactorily.
   2. Duration of each leakage test: Minimum two (2) hours.
   3. During the test, subject water lines to a pressure of 200 psi.
   4. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
      a. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:
         1) L = 0.00304 ND x sq. root of P
         2) (L = 0.00054 ND x sq root of P); where
         3) L = allowable leakage in gallons per hour;
         4) N = number of joints in length of pipe under test;
         5) D = nominal diameter of pipe in inches; and
         6) P = average test pressure in lbs per sq inch.
         7) The allowable leakage in gallons per hour, per joint, at 200 psi average test pressure shall be in accordance with Table II.
         8) Should any test of pipe disclose leakage greater than that specified in Table II, locate and repair the defective joint or joints until the leakage is within the specified allowance, and at no additional cost to the Owner.
      b. Table II:
   5. Diameter:Leakage in gal:Diameter: Leakage in gal:
      a. 0.015312”0.0915
      b. 0.023114”0.1070
      c. 0.030616”0.1225
      d. 0.045818”0.1375
      e. 0.061020”0.1530
      f. 0.076524”0.1830

G. Time for making test:
   1. Except for joint material setting, or where concrete reaction backing necessitates a five day delay, pipelines jointed with rubber gaskets, mechanical, or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill.

H. Disinfection:
   1. Disinfect per Section 33 0110.58 - Disinfection of Water Utility Piping Systems.

End of Section 33 1416

Section 33 3113

Site Sanitary Sewerage Gravity Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

1.02 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation: Excavating of trenches.

B. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.

C. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

D. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.

1.04 SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. Project Record Documents:
   1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with applicable code(s).

B. Plastic Pipe: ASTM D3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.

C. Use extra strength, minimum of SDR 35.

D. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

2.03 CLEANOUT MANHOLE

2.04 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 31 2316.13.

B. Pipe Cover Material: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 31 2316.13 for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
   1. Plastic Pipe: Also comply with ASTM D2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Connect to building sanitary sewer outlet .

E. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.03 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to District.

3.05 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

End of Section 33 3113

Section 33 4211

Stormwater Gravity Piping

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stormwater drainage piping.

1.02 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation: Excavating of trenches.

B. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM F-405/f-667 - Corrugated polyethylene tubing and fittings.

B. AASHTO M252 - Specification for Corrugated Polyethylene Drainage Tubing, 3- to 10- inch Diameter.

C. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 12- to 36- Inch Diameter.

D. ASTM D1056 - Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

E. ASTM D1248 - Specification for Polyethylene Plastics Molding and Extrusion Material.

F. ASTM D3350 - Specification for Polyethylene Plastics Pipe and Fittings Materials.

G. ASTM D2321 - Standard practice for underground installation.

1.04 SUBMITTALS

A. Comply with pertinent provisions of Division 01 - General Requirements – Administrative Requirements.

B. Product data: Within 35 calendar days after the Contractor has received the City's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.05 PRODUCT HANDLING

A. Comply with pertinent provisions of Division 01 - General Requirements - Product Requirements

PART 2 PRODUCTS

2.01 STORM WATER DRAINAGE PIPE MATERIALS

A. Provide pipe and associated materials of the size indicated on the Drawings and meeting the following requirements.
   1. High Density Polyethylene Pipe (HDPE):
      a. Acceptable products:
         1) "Hi-Q" High Density Polyethylene storm drain and fittings, manufactured by Hancor, Inc., P.O. Box 1047, Findlay, OH 45839. Phone: (800)892-3351

2) "N-12" High Density Polyethylene storm drain and fittings, manufactured by Advanced Drainage Systems, 4640 Trueman Boulevard, Hillard, OH 43026. Phone: (800) 821-6710, Fax: (614) 658-0204.
3) Approved equivalent.

2. High Density Polyethylene material shall comply with:
   a. AASHTO M252 for material from 3" – 10" in size.
   b. AASHTO M294 for material 12" – 36" in size.
   c. STM D1248 for standard specifications for Polyethylene Plastics Molding and Extrusion Materials.
   d. ASTM D3350 for pipe and fitting.
   e. ASTM D2321 standard practice for underground installation.
3. High Density Polyethylene Pipe:
   a. The material supplied under this specification shall be high density polyethylene corrugated exterior/smooth interior pipe. The 12" – 36" diameter shall conform to AASHTO M294 Type S; the 3" – 10" diameter material shall meet the strength requirement of AASHTO M252 with the addition that the pipe shall have a smooth interior liner. Material shall conform to ASTM D3350.
4. Joints and Fittings:
   a. Pipe joints and fitting shall conform to AASHTO M252 and AASHTO M294, or be approved by the engineer.
   b. Coupling bands shall cover at least one full corrugation on each section of pipe. When gasketed couple bands are required, the gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Grade RE42. All coupling bands shall meet or exceed the soils-tightness requirements of the AASHTO Standard Specifications for Highway Bridges, Section 23, paragraph 23.3.2.5.4.(e).
   c. All fittings shall conform to AASHTO M294.

2.02 CATCH BASIN, TRENCH DRAIN, CLEANOUT, AND AREA DRAIN COMPONENTS

A. General:
   1. Construct manholes, inlets, and junction structures of reinforced concrete or precast reinforce concrete, complete with metal frames and covers or gratings, and with fixed ladder rungs where indicated on the Drawings or required by codes. Prefabricated structures may be used when shown on the plans and approved by the engineer.
   2. Rungs shall be individual wall-mounted aluminum, plastic-covered steel, or galvanized steel rungs are acceptable.

B. Materials:
   1. Concrete: Comply with provisions for 3,250 psi concrete specified in Section 02750 Concrete Pavement.
   2. Mortar for pipe joints and connections to other drainage structures, and manhole construction.
      a. Comply with requirements of ASTM C270, type M, except the maximum placement time shall be one hour.
      b. Hydrated lime complying with ASTM C141, type B, may be added to the mixture of sand and cement in an amount equal to 25% of the volume of cement used.
      c. Provide a quantity of water in the mixture sufficient to produce a stiff workable mortar, which shall be clean and free from harmful acids, alkalis, and organic impurities. Use the mortar within 30 minutes after water is added to the mix.

3. Precast reinforced concrete manholes:
   a. Comply with ASTM C478, precast rings and cone sections.
   b. Fully bed the joints between precast concrete risers and tops in mortar, and smooth both interior and exterior surfaces uniformly.
   c. Acceptable products:
      1) Manufactured by Ameron Pipe Products Group, El Monte, California.
      2) Manufactured by Santa Rosa Cast Products Company, 471 West College Avenue, Santa Rosa, CA 95401. Phone: (707) 546-5016, Fax: (707) 571-7768.
      3) Manufactured by Associated Concrete Products, Inc., 4301 W. Mac Arthur Boulevard, Santa Ana, CA 92704. Phone: (800) 862-6465, Fax: (714)540-0538.
      4) Approved equivalent.
4. Reinforcement: Provide intermediate grade billet steel complying with ASTM A 615, grade 40.
5. Frames and covers or gratings:
   a. Provide all gratings or covers from the same manufacturer.
   b. Provide standard black finish, supplied as a total unit, sized as shown on the Drawings or larger sizes except where in a pavement area, and with the wording "STORM DRAIN" cast into the cover.
   c. Acceptable products:
      1) Manufactured by Alhambra Foundry, Alhambra, California.
      2) Approved equivalent.
6. Precast concrete catch basins:
   a. Provide reinforced and bottom open for field pouring to ensure slope through the structure.
   b. Contractor may select this option in lieu of cast-in-place concrete catch basins.
      1) Acceptable products:
      2) Manufactured by Christy, 44100 Christy Street, Fremont, CA 94538. Phone: (800) 486-7070, Fax: (510) 490-6804.
      3) Manufactured by Central Precast Concrete Inc., 471 West College Avenue, Santa Rosa, CA 95401. Phone: (707) 546-5016, Fax: (707) 571-7768.
      4) Manufactured by Brooks Products, 1850 Parco Avenue, Ontario, CA 91761. Phone: (888) 307-7470, Fax: (909) 947-7741.
      5) Approved equivalent.

2.03 IN-LINE DRAINS

A. The inline drain shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals. The pipe bell spigot shall be joined to the inline drain body by use of a swage mechanical joint. The pipe stock used to manufacture the inline drain body and pipe bell spigot of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings.

B. The grates furnished for all surface drainage inlets shall be ductile iron grates for sizes 8", 10", 18", 24" and 30" (12" and 15" frames are cast iron) shall be made specifically for each fitting so as to provide a round bottom flange that closely matches the diameter of the surface

drainage inlet. Inline drain grates for traffic loading areas and turf areas shall be flat and capable of supporting H-20 wheel loading for heavy-duty traffic. Grates in shrub and planter areas shall be domed and capable of a minim H-10 loading for pedestrian traffic. Grates in 12" and 15" will be hinged to the frame using pins. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron and ASTM A-48-83 Class 30B for 12" and 15" cast iron frames. Grates shall be provided painted black.

C. Acceptable Product:
   1. Model ADS 27XXAG N, manufactured by Advanced Drainage Systems, 4640 Trueman Boulevard, Hilliard, OH 43026. Phone: (800) 821-6710, Fax: (614) 658-0204.
   2. Drain-Rite, manufactured by Hancor, 6106 North Prospect, Fresno, CA 93711. Phone: (559) 435-6680, Fax: (559) 435-6667.
   3. Approved equal.

2.04 STORM WATER TREATMENT SYSTEM

A. Filtration Requirements:
   1. Storm water filtration shall meet the requirements for LEED for New Construction Version 2.2, SS Credit 6.2: Stormwater Design: Quality Control.
   2. Capture and treat the stormwater runoff from 90 percent of the average annual precipitation.
      a. The City of _____ has a mean annual rainfall of 14.4 inches and is considered an Arid Watershed.
      b. For Arid Watersheds (less than 20 inches annual precipitation), treat 0.5 inch of precipitation.
   3. Treatment flow = 0.11 cfs.
   4. The system must be capable of removing 80 percent of the average annual post development total suspended solids (TSS) load.
   5. The system shall address the removal of hydrocarbons.
   6. Acceptable Products:
      a. Precast 72 inch manhole StormFilter with 4 cartridges.
         1) Manufactured by Contech Stormwater Solutions. 12021-B NE Airport Way, Portland OR 97220. Phone: (800) 548-4667. Fax: (503) 240-9553. Email: stormwaterinc.com.
         2) Model PMSU20_15 storm water treatment unit.
         3) Manufactured by CDS Technologies. 16360 South Monterey Road, Suite 250, Morgan Hill, CA 95037. Phone: (888) 535-7559. Fax: (408) 782-0721. Email: cds@cdstech.com.
      b. Approved equal.

B. Bypass Requirements:
   1. The filtration system only treats first flush requirements. A bypass system is required to pass larger flows of up to 10 cfs.
      a. The system shall allow for first flush drainage to pass through the filtration system.
      b. The bypass shall be capable of passing 10 cfs through to the existing storm drain system.
   2. Acceptable Products:
      a. StormGate Manhole High Flow Bypass.
         1) Manufactured by Contech Stormwater Solutions. 12021-B NE Airport Way, Portland OR 97220. Phone: 800-548-4667. Fax: 800-561-1271.
         2) Approved equal.

2.05 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the work.

C. Do not proceed until unsatisfactory conditions are corrected.

3.02 TRENCHING

A. See Section 31 2316.13 for additional requirements.

B. Excavate, trench, and bed for site drains as follows:

C. Movement of construction machinery:
   1. Use means necessary to avoid displacement of, and injury to, pipe and structure while compacting by rolling or operating equipment parallel to the pipe.
   2. Movement of construction machinery over a culvert or storm drain at any stage of construction is solely at the Contractor's risk.

D. Bedding:
   1. Provide a bedding surface for the pipe with a firm foundation of uniform density throughout the entire length of the pipe.
   2. Bed the pipe carefully in a soil foundation accurately shaped and rounded to conform to the lower ¼ of the outside perimeter of circular pipe, or set the pipe in a bed of sand.
   3. Tamp bedding where necessary.
   4. Provide bell holes and depressions for pipe joints of only the length, depth, and width required for making the particular pipe joint properly.
   5. Where plastic pipe is used, provide a minimum of 4" of sand bedding over the top and under the pipe.

3.03 INSTALLATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. General:
   1. Carefully examine each pipe prior to placing.
      a. Promptly set aside defective pipe and damaged pipe.
      b. Clearly identify defects.
      c. Do not install defective pipe or damaged pipe.
   2. Place pipe to the grades and alignment indicated, with a tolerance of one in 1000 vertical and one in 500 horizontal, unless otherwise directed by the Architect.
   3. Provide adequate facilities for lowering pipe safely into the trenches.
   4. Do not place pipe in water, nor place pipe when trench or weather is unsuitable for such work.

C. Polyvinyl chloride pipe joints: Install with the specified materials and in accordance with the manufacturer's recommendations as approved by the Engineer, applying solvent cement to pipe and fitting as recommended in ASTM D285.

D. High Density Polyethylene: Installation shall be in accordance with ASTM D2321 and as recommended by the pipe manufacturer. Backfill shall be ASTM D2321 Class I, II, or III soils, or USCS material corresponding to these ASTM designations. Backfill material shall be placed in 6-inch lifts and compacted to 90 percent minimum density per AASHTO T99.

E. Joining pipes of different materials: Provide fittings or couplings made for the pipe material jointing, or provide a concrete collar as approved by the Engineer.

F. Joining pipe of different sizes:
   1. Provide reducer fittings to the larger pipe.
   2. Where pipes are different materials as well as different sizes, use the same material for reducer fittings as in the larger pipe.
   3. Use saddle connection when branch lines join a main or collector main.
   4. Use eccentric collar joint when the slope of the pipe is less than 1%.

G. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

H. Connect to building storm drainage system, foundation drainage system, and utility/municipal system.

3.04 INSTALLATION - CATCH BASINS, TRENCH DRAINS AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Division 01 - General Requirements.

B. Visually inspect the pipe for deflection.
   1. Deflection is limited to 7.5% of the base diameter.
   2. If the visual inspection determines the pipe may have deflection problems, the engineer can direct a mandrel test be performed.
   3. Such test will be performed at the contractor's expense.
   4. If required, the procedure can be conducted within the first 30 days after installation. Recommended madrel settings reflectin 7.5% of the base diameter for piper are shown in the table below:

	PIPE MEETING ASTM AND AASHTO STANDARDS		PIPE MEETING CSA STANDARDS	
NOMINAL DIAMETER INCHES	BASE DIAMETER INCHES	MANDREL SETTING INCHES	BASE DIAMETER MM	MANDREL SETTING MM
4	3.87	3.58	96.92	89.7
6	5.80	5.36	145.42	134.5
8	7.73	7.15	193.84	179.3
10	9.66	8.94	242.34	224.2
12	11.60	10.73	290.83	269.0

15	14.50	13.41	363.65	336.4
18	17.40	16.09	436.18	403.5
21	20.30	18.78	508.86	470.7
24	23.20	21.46	581.67	538.0
Pipe size greater than 24" is tested by visual inspection				

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to District.

3.06 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

End of Section 33 4211