SECTION 01351
ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes procedures for achieving a LEED Platinum project. The Contractor shall:
   1. Deliver a finished work product that assists the Owner in achieving a United States Green Building Council (USGBC) green building rating of Platinum.
   2. The Project is using USGBC's Leadership in Energy and Environmental Design (LEED™) Green Building Rating System Version 2.0.
   3. A copy of the LEED™ Green Building Rating System Version 2.0 is available at http://www.usgbc.org
   4. Prepare LEED™ required documentation and submittals as described in this Section.

B. LEED™ Green Building Rating System Overview
   1. The following overview information was developed by the USGBC.
   2. The LEED™ Green Building Rating System is a priority program of the US Green Building Council. It is a voluntary, consensus-based, market-driven building rating system based on existing proven technology. It evaluates environmental performance from a "whole building" perspective over a building's life cycle, providing a definitive standard for what constitutes a "green building."
   3. LEED™ is based on accepted energy and environmental principles and strikes a balance between known effective practices and emerging concepts. Unlike other rating systems currently in existence, the development of LEED™ Green Building Rating System™ was instigated by the US Green Council Membership, representing all segments of the building industry, and has been open to public scrutiny.
   4. LEED™ is a self-assessing system designed for rating new and existing commercial, institutional, and high-rise residential buildings. It is a feature-oriented system where credits are earned for satisfying each criterion. Different levels of green building certification are awarded based on the total credits earned. The system is designed to be comprehensive in scope, yet simple in operation.

1.2 SPECIAL SUBMITTAL REQUIREMENTS

A. Environmental Procedures Compliance Plans: Not more than 10 days after the Preconstruction Meeting, prepare and submit the Environmental Procedures

Compliance Plan(s) detailing methods and procedures for ensuring compliance with all of the Environmental Procedures contained in this Section.

B. Revise and resubmit Environmental Procedures Compliance Plans as required by Owner or Architect.
   1. Approval of the Contractor's Environmental Procedures Compliance Plans will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures required by Federal, State, County or local agencies.

C. In addition to Contractor will submit the following:
   1. All approved Contractor Environmental Procedures Special Substitution Request Forms using the form in Appendix B of this Section.
   2. All LEED™ Green Building Compliance Submittals as specified in Part 3 of this Section.

D. Contractor shall be required to provide documentation required to obtain LEED™ points listed in Part 3 of this Section.

E. "Shared Points" (identified in Part 3) – Require coordination with the Building Contractor. Area development contractor will prepare submittals as required by the Contract Documents to support the Building Contractor's submittals.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.1 LEED™ GREEN BUILDING COMPLIANCE REQUIREMENTS

A. SS – Prerequisite 1 – Erosion & Sedimentation Control
   1. Requirements: The Contractor shall
      a. Comply with the requirements of the existing Storm Water Pollution Prevention Plan (SWPPP) in place for the construction site.
      b. Comply with the Building Contractor's SWPPP compliance addendum.

B. The Contractor shall provide the following submittals on the submittal dates identified:
   1. A certification letter demonstrating compliance with the requirements of SWPPP and Building Contractor's addendum. 2) Detailed report of clean-up measures or modifications to the existing erosion and sedimentation controls due to construction activities or major storm events.

C. SS – Credit 4.2 – Alternative Transportation – Bike Racks (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

D. SS – Credit 4.4 – Alternative Transportation - Parking Reductions (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

E. SS – Credit 5.1 – Reduced Site Disturbance (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

F. SS – Credit 6.1 – Stormwater Management - No Net Increase (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

F. SS – Credit 6.1 – Stormwater Management - TSS and TP (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

G. SS – Credit 7.1 – Landscape to Reduce Heat Island (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

H. SS – Credit 8.0 – Light Pollution Reduction (1 Point)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

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I. WE – Credit 1.1 and 1.2 - Water Efficient Landscaping (2 Points)

1. Requirements: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

J. MR - Prerequisite 1 - Storage & Collection of Recyclables (Shared with Bldg)

1. Requirements: The Contractor shall: Contractor to provide as-built information, receipts, data documentation as required by the commissioning agent to achieve LEED point.

K. MR Credit 2.1 and 2.2 Construction Waste Management (2 Point shared with Bldg)

1. Requirements: The Contractor shall: recycle, savage, reuse, and/or donate a minimum of ninety percent (90%), by weight not volume, of the total construction and demolition waste, less hazardous waste materials, generated during construction of the project. The site contractor shall coordinate his construction waste management plan and recycling efforts with the existing plan developed by the building contractor.
2. The Contractor shall provide the following Submittals on the Submittal Dates identified:
   a) Construction Waste Management Plan prior to any site construction activity. Plan shall be coordinated with the Construction Waste Management Plan developed by the building contractor on site.
   b) Construction Waste Monthly Reports. These shall be presented in electronic spreadsheets detailing each waste and recycle pick-up. Each entry shall include detail of contents and weight. (i.e. General Waste – 1 ton / steel –recycle – 3.5 tons)
   c) Construction Waste Final Report at the end of construction. (Identical in format to monthly reports.) The report shall include:
      1) The Contractor's cost of disposing of all construction waste materials.
      2) A detailed breakdown by weight of each material type disposed of as follows:
         a) Recycling (separated by generic material type)
         b) Salvage, including reuse on site
         c) Hazardous waste disposal
         d) Landfill (general waste)

L. Construction Materials Cost Data –Specification Sections 1 – 14 Only

1. Requirements: The Contractor shall:
   a. Provide a Construction Materials Cost Data Report organized by CSI Specification Division, summarizing the cost for all materials used for the project. Materials shall be listed separately by sub-contractor / supplier.
   b. Provide cost data that separates out the cost of material for materials indicated in the detailed trade contract scope of work provided by the General Contractor**.**

2. The Contractor shall provide the following Submittals on the Submittal Dates identified:
   a. Construction Materials Cost Data Report at the end of construction. (Use an electronic version of the Environmental Materials Usage Summary Sample Project Form in Appendix C).

3. The form will include date, dump ticket number item and number of tons.

M. MR – Credit 4.1 and 4.2 - Recycled Content (2 Points shared with Bldg)

1. The Contractor shall provide product specifications and / or cut sheets indicating the recycled content amount (by percentage) and type (post-industrial or post-consumer)for all materials indicated in the plans and specifications. See Appendix A for format. Appendix A documents the design phase expectations for the points.

2. The recycled content of each material shall be broken down by:
   a. Post-Consumer Recycled Content: This is the percentage of waste material available from consumer use incorporated into a building material.
   b. Post Industrial Recycled Content: This is the percentage of waste material available from industrial use incorporated into a building material.

3. The Contractor shall provide the following Submittals on the Submittal Dates identified:
   a. Recycled Content Summary and Final Cost Report at the end of construction that:
      (1) Lists each material separately (organized by sub-contractor / supplier and the CSI specification division).
      (2) Includes product specification and / or cut sheets highlighting the recycled content amount and type (post-consumer/post-industrial)
      (3) Identifies the name and location of each material manufacturer.
      (4) Identifies the cost of each material.Includes an electronic version of the Environmental Materials Usage Summary Sample Project Form in Appendix A
      (5) Includes an electronic version of the Environmental Materials Usage Summary Sample Project Form in Appendix A

O. MR Credit 5.1 and 5.2 - Local/Regional Materials (2 Points shared with Bldg)

1. The Contractor shall provide material manufacturer location information and distance from the Project site for all materials indicated the plans and specifications. **(**See Appendix C for format. Appendix C documents the design phase expectations for the points.
2. The Contractor shall also include information for all other materials not included in the plans and specifications for manufacturing locations that are within 500 air miles of the Project site.
3. Manufacturing refers to the final assembly of the components into the building product that is furnished and installed by the tradesman. An accounting of manufacturer locations for components used in a final assembly is not required.

4. The Contractor shall provide the following Submittals on the Submittal Dates identified:
    a. Local/Regional Materials Summary and Final Cost Report at the end of construction that:
        (1) Lists each material separately. (Organized by CSI specification division and sub-contractor / supplier.)
        (2) Identifies the name and location of each material manufacturer
        (3) Identifies the distance from the material manufacturer to the site.
        (4) Identifies the cost of each material.
        (5) Includes an electronic version of the Environmental Materials Usage Summary Sample Project Form in Appendix A.

P. MR Credit 6 - Rapidly Renewable Materials (1 Point Shared with Bldg)
1. Rapidly renewable materials are materials that are planted and harvested in less than a 10-year cycle.
2. Rapidly Renewable materials include but are not limited to:
    a. Plywood
    b. Oriented Strand Board
    c. Manufactured Lumber
    d. Medium Density Fiberboard
    e. Bamboo
    f. Cork
    g. Cotton
    h. Straw Fiber
    i. Hemp
4. Provide written documentation form the manufacturer, declaring the rapidly renewable materials contained for the products identified in this Paragraph.
5. Provide product specifications or cut sheets, and contractor submittals highlighting the rapidly renewable materials. indicated in the detailed trade contract scope of work provided by the used in the Project.
6. The Contractor shall provide the following Submittals on the Submittal Dates identified:
    a. Rapidly Renewable Materials Summary and Final Cost Report at the end of construction that:
        (1) Lists each material separately.
        (2) Includes all product specifications and Contractor submittals.
        (3) Identifies the name and location of each material manufacturer.
        (4) Identifies the cost of each material.

(5) Includes an electronic version of the Environmental Materials Usage Summary Sample Project Form in Appendix A.

Q. MR Credit 7 - Certified Wood (1 Point Shared with Bldg)

1. Certified wood products are wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines.
2. The Certified Forest Products Council provides a database of certified wood product suppliers via the Internet at www.certifiedwood.org/CertSuppliers.html, or by phone from Terry Campbell, Marketing Development Coordinator – Western States – (503) 224-2205.
   a. Provide written documentation from the manufacturer, declaring conformance with the Forest Stewardship Council Guidelines.
   b. Provide product specifications or cut sheets, and contractor submittals highlighting the Certified Wood materials used in the Project.
   c. The Contractor shall provide the following Submittals on the Submittal Dates identified:
   d. Certified Wood Materials Summary and Final Cost Report at the end of construction that:
      (1) Lists each material separately.
      (2) Includes all product specifications and Contractor submittals.
      (3) Includes chain of custody documentation for all certified wood materials from the point of harvest to the final installation location.
      (4) Identifies the name and location of each material manufacturer.
      (5) Identifies the cost of each material.

END OF SECTION

APPENDIX A

ENVIRONMENTAL MATERIALS USAGE SUMMARY
SAMPLE PROJECT FORM

The Contractor shall be responsible for submitting the following form in _____.

LEED POINT - MR CREDIT 4

						MR Credit 4		
						Recycled Content		
Description of Material		Total Construction Cost	Labor Cost	Equipment Cost	Material Cost (Less Labor & Equipment)	Post-Consumer	Post-Industrial	Value
		[$]	[$]	[$]	[$]	[%]	[%]	[$]
02	**SITEWORK**							
02500	Base Material - CMB	$140,315	$70,000		$70,315		100%	$175,788
02730	Decomposed granite	$171,808	$85,900		$85,908		99%	$212,622
02750	Concrete - Fly ash component	$31,150	$15,575		$15,575		20%	$7,788
02841	Composite Wheelstop	$33,420	$15,000		$18,420	100%		$92,100
02900	Composite header	$10,924	$5,462		$5,462		100%	$13,655
02900	Rubberized mulch	$68,500	$34,000		$34,500	100%		$172,500
	TOTAL	**$456,117**	**$225,937**	**$0**	**$230,180**			**$674,452**

The above form represents the design calculating for the LEED point.

END OF APPENDIX A

APPENDIX B

CONRTRACTOR ENVIRONMENTAL PROCEDURES SPECIAL SUBSTITUTION
SAMPLE PROJECT REQUEST FORM

To: _____

Project Name: _____

We hereby submit for your consideration the following product instead of the specified item for the above project.

Drawing No.: _____ Drawing Title: _____

Section: _____ Paragraph: _____ Specified Item: _____

Proposed Substitution: _____

_____

Attach complete technical data, including laboratory test, if applicable. Include complete information on changes to Drawings and/or Specifications the proposed substitution will require for its proper installation.

A. Does the substitution affect dimensions shown on Drawings?

Yes _____ No _____ If yes, clearly indicate changes below.

_____

_____

_____

_____

B. Will the undersigned pay for changes to the building design, including engineering and detailing cost caused by the requested substitution?

Yes _____ No _____ If no, fully explain below.

_____

_____

C. What effect does substitution have on other Contracts or trades?

_____

_____

_____

_____

E. Manufacturer's guarantees of the proposed and specified items are:

Same _____ Different _____ (explain on attachment)

E. Itemized comparison of specified item(s) with the proposed substitution; list significant variations:

_____

_____

_____

_____

(Use separate sheet if necessary)

F. Accurate cost data comparing proposed substitution with product specified:

(Use separate sheet if necessary)

G. Reasons for substitution:

(Use separate sheet if necessary)

H. What effect does substitution have on construction schedule?

(Use separate sheet if necessary)

I. Designation of maintenance services and sources:

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE, EQUAL DESIGN, AND COMPATIBILITY WITH ADJACENT MATERIALS.

The undersigned states that the function, appearance, and quality are equal or superior to the specified item.

Signature shall be person having authority to legally bind their firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

For Use by Contractor:

Submitted by: _____

Firm (Contractor): _____

Address: _____

Signature & Title: _____

Date: _____ Telephone: _____

For Use by Architect/Engineer:
( ) Accepted ( )Accepted As Noted ( ) Not Accepted ( ) Received Too Late

By: _____

Date: _____

Remarks: _____

_____

_____

END OF APPENDIX B

APPENDIX C

ENVIRONMENTAL MATERIALS USAGE SUMMARY
SAMPLE PROJECT FORM

The Contractor shall be responsible for submitting the following form in _____.

LEED POINT - MR CREDIT 5

Description of Material		Total Construction Cost [$]	Labor Cost [$]	Equipment Cost [$]	Material Cost (Less Labor & Equipment) [$]	MR Credit 5 Local/Regional Materials Credit 5.1 Manufacture **[$]	MR Credit 5 Local/Regional Materials Credit 5.2 Harvested **[$]
02	**SITEWORK**						
02060	4" Class II Subgrade	$140,315			$140,315	X	X
02630	Junction Structure	$1,800			$1,800		
02630	Inlet Structure	$8,750			$8,750		
02630	ADS Catch Basin w/ Solid Grate	$7,700			$7,700		
02060	River Rock Pad	$400			$400	X	X
02060	Gravel Mulch	$9,375			$9,375	X	X
02630	NDS pipe (various sizes)	$23,639			$23,639		
02730	Decomposed Granite	$171,808			$171,808	X	X
02740	Asphalt	$178,658			$178,658	X	
02518	Precast Concrete ECO-Pavers	$21,060			$21,060		
02518	Precast Concrete Pavers	$56,225			$56,225	X	
02518	Precast Concrete Pavers	$60,923			$60,923	X	
02870	Wheel Stops (Recycled)	$33,410			$33,410		
02870	Composite Header - Recycled	$10,924			$10,924		
02870	3x3 Boulders	$20,736			$20,736		X
02900	Mulch	$68,500			$68,500		X
02900	Planting	$281,000			$281,000	X	X
02810	Irrigation	$274,000			$274,000		
02800	Pedestrian Bridge	$25,000			$25,000	X	
02800	Vehicular Bridge& enhancements	$50,000			$50,000	X	
02800	Fountain feature	$152,000			$152,000	X	
03	**CONCRETE**						
03300	Parking Lot - Natural Grey/Pervious	$31,150			$31,150	X	X
04	**MASONRY**						
04220	CMU Trash enclosures	$36,000			$36,000	X	
05	**METALS**						
05700	Tubular Steel Fencing and gates and elec. gates	$55,550			$55,550	X	
10	**SPECIALTIES**						
10400	Signage	$8,600			$8,600		
10	**ELECTRICAL**						
16520	Site Electrical	$518,175			$518,175		
	TOTAL	**$2,245,698**	**$0**	**$0**	**$2,245,698**	**$0**	**$0**

** NOTE: Checked boxes require contractor to obtain local/regionally manufactured and/or harvested materials within 500 miles of job site. Final costs, material, labor and equipment costs to be inserted following award of contract. Anticipated LEED percentage calculations will be based on final bid pricing.

The above form represents the design calculating for the LEED point.

END OF APPENDIX C

SECTION 02212
FINE GRADING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to fine grade site as indicated on Drawings and as specified herein.

B. Work Included in this Section:
1. Removal of topsoil and subsoil.
2. Cutting, grading, filling, rough contouring, compacting, and shaping the site for landscaping, site structures, parking areas, and roadways.
3. Erosion and Sediment Control
4. Dust control.

C. Work Related in other Sections:
1. Section 02060 - Aggregate Materials.
2. Section 02205 - Soil Materials.
3. Section 02311 - Rough Grading.
4. Section 02315 - Excavating.
5 Section 02316 - Backfilling.
6 Section 02317 - Trenching: Trenching and backfilling for utilities.
7. Section 02900 - Landscape Planting: Amending of topsoil.

1.3 REFERENCES

A. ASTM C136 - Method For Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18-inch Drop.

D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

E. ASTM D2419 - Test Method For Sand Equivalent Value of Soils and Fine Aggregate.

F. ASTM D2434 - Test Method For Permeability of Granular Soils (Constant Head).

G. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

H. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with project specifications and referenced standards.

1.6 SEASONAL LIMITS

A. Do not place fill materials, spread or roll during unfavorable weather conditions. When work is interrupted by heavy rain, do not resume fill operations until field tests by Soil Engineer indicate that moisture content and density of fill is as previously specified.

1.7 TESTS AND INSPECTIONS

A. The Owner will select a testing laboratory and pay for all soil tests.

B. Soil samples will be obtained at excavating areas for Moisture Density Relationship Curves, "Modified Proctor", ASTM D1557.

C. Compaction tests will be made in the fill areas as designated by Owner's Authorized Representative. Schedule Work to allow time and space for tests to be made.

1.8 SAFETY PRECAUTIONS

A. Maintain substantial precautions and other protective measures to safeguard workmen and general public from bodily injury.

1.9 ROUGH GRADING TOLERANCES

A. Rough grading to be set at elevations within plus 0 or minus 0.1-foot of final subgrade elevations.

1.10 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.1 SOIL

A. On-Site Borrow Fill: Utilize on-site borrow fill material from designated stockpile areas as determined by Owner's Authorized Representative for use in landscape berm construction, filling of medians and landscape planter areas. Verify on-site borrow fill material and stockpile locations with Owner's Authorized Representative.

B. Landscape Mound Construction:
1. Process fill material to remove rocks and miscellaneous debris over 12-inches in diameter prior to placement. No rocks or stones larger than 2-inches in diameter will be allowed in top 6-inches of mound.

C. Medians and Landscape Planter Areas:
1. Process fill material to remove rocks and miscellaneous debris over 2-inches in diameter prior to placement. No rocks or stones larger than 2-inches in diameter will be allowed in top 6-inches of landscape planter areas.

D. 3/8-inch Minus Topsoil:
1. Process fill material to a 3/8-inch minus condition for turf areas.

E. Off-Site Borrow Fill for use under Paving and Structures: Utilize off-site fill material or process on-site material to the following specifications. Cohesive fill with liquid limit of less than 35% and plasticity index ranging from 2 to 12. Select fill shall be free of organic material and meet the following gradation:
1. Gradation (ASTM C136), percent passing by weight:
   a. 3-inch Sieve: 100%.
   b. No. 4 Sieve: 25-75%.
   c. No. 200 Sieve: 20% (Max).

F. Off-Site 3/8-inch Minus Topsoil: Provide off-site 3/8-inch minus topsoil for turf areas and groundcover areas. 3/8-inch minus topsoil is to have following specifications:

1.	Organic Matter:	0.1 to 1.0% by dry weight of soil.
2.	Particle Size:	3/8 inch (9.53 centimeters) maximum.
3.	Clay and Silt Content:	20% maximum (by weight).
4.	pH Factor:	6.5 to 8.0.
5.	Electrical Conductivity:	Max. of 3.0 mhos. per centimeter of the saturation paste extract.

2.1 SAND

A. Natural or manufactured sand shall conform to ASTM C33.

2.3 GEOTEXTILE DRAINAGE MATTING

A. Enkadrain 9010 or Miradrain 6200, or approved equal conforming to following standards:
   1. Weight: ASTM D-1777 (4.3 oz/sq yd).
   2. Grab Strength: ASTM D-1682.
   3. Puncture: ASTM D-751.
   4. Flow Rate: Falling Head Test (120 gpm/sq ft)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions prior to beginning Work.

B. Verify that survey bench mark and intended elevations for the Work are as indicated on Drawings.

3.2 EXISTING UTILITIES

A. Before starting rough grading operations, establish location and extent of underground utilities in work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as work progresses.

B. Maintain, protect, relocate, or extend, as required, existing utility lines to remain which pass through work area. Pay costs for this work, except as covered by applicable utility companies.

C. Protect active utility services uncovered by excavation. Notify respective utility companies of damage caused to active utilities immediately.

D. Remove abandoned utility service lines, if any, from areas of excavation. Cap, plug or seal abandoned lines and identify termination points at grade level with markers.

E. Accurately locate and record abandoned and active utility liners rerouted or extended on project Record Documents.

3.3 PROTECTION

A. Protect existing trees, shrubs, rock outcroppings and miscellaneous planting that is to be preserved as indicated on Drawings.

B. Protect survey monuments, existing structures, fences, walls, curb and gutter that are to remain as directed by Owner's Authorized Representative.

C. Protect downstream drainage structures and channels from siltation. This project shall conform to the requirements of Local Permit No. CA8000279 issued by the Santa Ana Regional Water Quality Control Board. This Local Permit, hereafter referred to as the "Permit," regulates storm water discharges associated with construction activities.

D. Control dust by watering as required.

3.4 PREPARATION

A. Establish extent of grading and excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels and elevations.

B. Do not cover or enclose work of this Section before obtaining required inspections, tests, approvals, and location recording.

3.5 GRADING

A. Perform grading within contract limits, including adjacent transition areas, to new elevations, level, profiles and contours as indicated on Drawings. Provide uniform levels and slopes between new elevations and existing grades.

B. Obtain approval of scarified subgrade by Owner's Authorized Representative prior to filling operations. Scarify, dry and compact soft and wet areas, remove and replace unsuitable subgrade materials with an approved fill material. Take corrective measures before placing fill materials.

C. Thoroughly scarify existing soil surface to a depth of 6-inches and verify scarification with the Owner's Authorized Representative prior to placing fill material in landscape planter areas.

D. Spread approved fill materials uniformly in layers not greater than 8-inches of loose thickness over the entire of the planter area to be filled.
   1. Lift thickness requirements may be adjusted by Owner's Authorized Representative to suit equipment, materials or other conditions when required to assure satisfactory compaction.
   2. In landscape areas, place and compact each lift of fill to 85% maximum compaction before placing additional fill material. Repeat lift operations until the proposed grades are achieved as indicated on Drawings. In

building pad areas and areas of structural fill, place and compact each lift of fill to 90% maximum compaction or as indicated in the geotechnical report prepared by RMA Group, 11-27-01or per the Owner's representative before placing additional fill material. Repeat lift operations until the proposed grades are achieved as indicated on Drawings

3. Suspend filling operations when satisfactory results cannot be obtained because of environmental or other unsatisfactory site conditions. Do not use muddy fill materials. Do not place lifts of fill over muddy subgrade surfaces.
4. Grade final fill surfaces to assure positive drainage and to prevent ponding. Install drainage swales as indicated on Drawings.
5. Protect finish grading areas from traffic and erosion. Keep area free of trash and debris. Repair and reestablish grades if area settles or gets damaged or eroded.

E. An independent surveyor may be hired, if in the opinion of Owner's Authorized Representative, completed site conditions do not reflect that as indicated on Drawings. If grades are found to be correct, Owner will pay for services of surveyor, if however, grades are not correct, cost of surveyor will be paid for by Contractor.

3.6 PROTECTION OF COMPLETED WORK

A. Protect finished areas from weather damage by whatever means as required to prevent erosion of graded areas or sloughing off of slopes.

B. Continued use of prepared subgrade for hauling which will cut or deform it from required cross-section of elevations will not be permitted and the Contractor shall repair and recompact any damage to prepared subgrades caused by such operations.

C. Prior to acceptance by Owner, repair damaged areas.

3.7 FIELD QUALITY CONTROL

A. Testing: In accordance with ASTM D1556, ASTM D1557, ASTM D2167, ASTM D2922, and ASTM D3017.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Frequency of Tests: Perform one density test for each 7,500 square feet per 1-foot of vertical lift.

3.8 DISPOSAL OF WASTE MATERIALS

A. If specified on Drawings, transport excess excavated materials, including rocks, to a designated disposal area as directed by Owner's Authorized Representative. Stockpile or spread as directed.

B. Remove from site and legally dispose of trash and debris.

C. Keep disposal route clear, clean and free of debris.

3.9 COMPACTION SCHEDULE

A. All fills to be compacted per geotechnical investigation prepared by RMA Group dated November 27, 2001 (RMA Job No. 00-138-11).

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Payment for fine grading shall include excavating, sloping, rounding tops and ends of excavations, loading, disposing of surplus material, stockpiling, and hauling it to its final location. Measurement and payment for this item is to be per lump sum bid item for fine grading. No additional payment is to be required for this item.

END OF SECTION

SECTION 02510
ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The requirements of the "General Conditions of the Contract" and of Division 1, "General Requirements," shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish all materials, labor, transportation, services, and equipment necessary to furnish and install asphaltic concrete paving as indicated on the Drawings and as specified herein.

B. Work included in this Section:
   1. Asphaltic concrete parking lot.

C. Work related in other Sections:
   1. Landscape Planting - Section 02900.
   2. Irrigation System - Section 02810.
   3. Portland Cement Concrete Paving - Section 02520.
   4. Irrigation System - Section 02810.

1.3 REFERENCES

A. Work shall comply with the rules and regulations of the City of Chino, Riverside County and the State of California.

B. ASTM Standards.

1.4 PROJECT CONDITIONS

A. The Contractor shall keep his work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with the work of other trades.

B. Apply prime and tack coats when ambient temperature is above 50 degrees F and when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

C. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F and when base is dry. Base course may be placed when air temperature is above 30 degrees F.

1.5 COORDINATION

A. The Contractor shall notify the General Contractor and all other contractors related to the installation of his Work in ample time, so as to allow sufficient time for those contractors to perform their portion of the Work.

PART 2 - PRODUCTS

2.1 SOIL STERILANT

A. "Casoron W-50," with colored marker dye, manufactured by Pacific Coast Borax Company or an approved product of another manufacturer of non-flammable type.

2.2 AGGREGATE BASE

A. Type II with 85% meeting fractured faces as specified in the Standard Specification.

2.3 PRIME COAT

A. Medium curing liquid asphalt MC-70 in accordance with applicable provisions of Section 406 of the Standard Specification.

2.4 EMULSIFIED ASPHALT

A. Grade SS-1h.

2.5 ASPHALT BINDER

A. Ar-8000.

2.6 TACK COAT

A. Type SS-1 asphalt emulsion diluted to 50% emulsion and 50% water and in accordance with Section 405 and 703 of the Standard Specification.

2.7 FOG SEAL

A. Grade SS-1h or CCS-1h asphalt emulsion to 50% emulsion and 50% water and in accordance with Section 407 of the Standard Specification.

2.8 MIXES

A. Asphalt concrete for paving shall be in accordance with applicable provisions of the Standard Specifications Section 401 and related sections and with the requirements contained in this Section.

2.9 PAVEMENT STRIPING PAINT

Provide chlorinated rubber or flat alkyd type traffic marking paint as manufactured by J. D. Bauer, Decratrend, Porter, Dunn-Edward, Sinclair or other approved equal. The color to be selected by Owner will be either yellow or white, except handicap which will be blue and white.

2.10 ASPHALT PAVING MACHINES

A. Standard, self-propelled, self-contained units having an activated screed or strike-off assembly capable of spreading and finishing courses of bituminous plant mix material in widths compatible to the specified cross-section and thickness required.

PART 3 - EXECUTION

3.1 PROTECTION

A. The prime coat shall not be applied on a wet surface, when the atmospheric temperature is below 50 degrees F, or when weather conditions are in the opinion of the Owner's Authorized Representative, unsuitable for its application.

3.2 SOIL STERILIZATION

A. After all fine grading, checking, shaping, and compacting of the subgrade has been completed, and just prior to placing aggregate base course, in truck traffic areas or asphaltic concrete in pedestrian areas, all soil in the area to receive bituminous concrete pavement shall be thoroughly treated with soil sterilant and thoroughly sprinkled to distribute the chemical through the first two or three inches of the subgrade.

B. The Contractor shall provide all necessary protection to prevent injury to animal, fish, or plant life and property occasioned by the application of the soil sterilant. The Contractor will be held responsible for all application of soil sterilant or the storage of same.

C. Soil Sterilant shall be applied in accordance with the manufacturer's recommendations.

3.3 BASE COURSE

A. The base material shall be delivered to the site as a uniform mixture.

B. Spreading: Deliver base material to subgrade as uniform mixture. Spread each layer in one operation without segregation to compacted thickness of 6" maximum.

C. Compacting:Water base material as required and compact with steel wheeled power roller, weighing 10 tons minimum with compression on rear wheels of 325 lbs. min. per linear inch of tire width. Continue rolling until relative compaction of 95% minimum as determined by Test Method ASTM D1556, has been obtained for entire thickness of base. Do not vary thickness of finished base more than 1/2" from planned thickness at any point. Rework base which does not conform to above requirements; reshape, water, and thoroughly recompact to conform to specified requirements.

3.4 PRIME COAT

A. Following preparation of the bikepath base, any loose and foreign material shall be removed and the base material shall be sprinkled and rolled with a steel roller until the base is unyielding.

B. At least 24 hours in advance of spreading the asphalt concrete mixture, a prime coat consisting of Type MC-70 liquid asphalt shall be applied beneath areas to be paved at an application rate of 0.10 to 0.25 gallon per square year of surface or as requested by Owner's Representative. The surface of the aggregate base course shall be free from loose material immediately prior to applying the prime coat. The temperature of the liquid asphalt, at the time of application, shall not be less than 120 degrees F nor more than 180 degrees F.

C. The contact surface of curbs, gutters, manholes and structures shall be coated with a thin uniform coating of Grade SS-1h emulsified asphalt immediately prior to placing the asphalt concrete.

D. After execution of prime coat application, vehicular access shall not be permitted on the areas uNtIlAC pavement is being placed. It ShAll be the Contractor's responsibility to properly barricade and inform his subcontractors and the Owner that these areas are off limits to vehicular traffic.

3.5 ASPHALT CONCRETE PAVING COURSES

A. The first asphaltic concrete paving course where more than one course is required shall be one half the thickness of the total finish pavement of three (3) inches whichever is less. This course shall use AR-8000 asphalt cement and Type II aggregate with 85 percent minimum fractured faces.

B. All subsequent asphaltic concrete paving courses where more than one course is required shall be one half the thickness of the remaining pavement or three (3) inches whichever is greater, courses shall be of approximately equal thickness. Each course shall use AR-8000 asphalt cement and Type II aggregate with 85 percent minimum fractured faces.

C. All asphaltic concrete pavement sections requiring one course only, and not more than three (3) inches thick, shall be AR-8000 asphalt cement and Type II Aggregate with 85 percent minimum fractured faces.

3.6 PLACING ASPHALT CONCRETE PAVING

A. All new asphalt concrete paving shall be of the thicknesses shown, as measured after compaction. The maximum thickness of paving placed in a single lift shall be 3-inches. The asphalt concrete mixture shall be placed in accordance with the requirements of the Standard Specifications. Prior to placement of asphalt concrete, the cured prime coat shall be free from raw exposed asphalt and shall be cleaned of all loose material.

B. Use standard self-propelled paving machines for all accessible work. Heat scarred or strike-off assembly as necessary to effectively produce an even finished surface of the required thickness without lengthy shoving or gouging the mixture.

C. Placing the bituminous paving shall be as continuous as possible, and shall be such that a hot joint is maintained between longitudinal passes to the extent possible. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course. A brush coat of asphaltic emulsion shall be applied to the contact surface of transverse joints immediately prior to placing the new mixture against the previously rolled material.

D. Hand raking behind the paving machine shall be held to a minimum. The rake shall generally be used only to remove excess material. Where hand spreading methods must be used, the work shall be accomplished in a competent and careful manner, and the labor force shall be of sufficient number and skill such that operations are rapid and smooth, and the mix does not become chilled before spreading and rolling is complete.

3.7 TACK COAT

A. A tack coat shall be applied between lifts of the asphalt concrete paving where directed by Owner's Representative, and shall be applied at the rate of 0.10 gallon per square year of surface, unless otherwise directed by Owner's Representative.

3.8 FOG SEAL

A. The fog seal coat shall be applied to the surface of the asphalt concrete pavement

immediately after the asphalt concrete has set and cooled, in accordance with Section 407 of the Standard Specifications and as specified herein. Apply at a rate of 0.10 gallon per square yard of surface, unless otherwise requested by Owner's Representative.

3.9 SURFACE REQUIREMENTS

A. The surface of the paving shall be in accordance with the lines, grades and cross-sections shown on the Drawings, and shall be free from ruts, humps, depressions and irregularities.

B. For the purpose of testing the finished surface course, a 12-foot straight edge will be used, except that a 10-foot straight edge may be used on vertical curves. The straight edge shall be held in contact with the surface in successive positions parallel to the road centerline. The entire area will be checked from one side to the other, by advancing along the pavement in successive stages of not more than half the length of the straight edge.

C. Except at intersections or at changes of grade, any irregularities which vary more than 1/4 inch from the lower edge of the straight edge shall be corrected at the Contractor's own expense. The transverse slope of the finished surface shall contain no depressions greater than 1/8 inch below the lower edge of the straight edge when laid transverse to the road centerline.

D. Irregularities which may develop before the completion of rolling shall be remedied by loosening the surface mix and removing or adding materials as may be required. Should any irregularities or defects remain after the final compaction, the material shall be promptly removed and sufficient new material laid to form a true and even surface.

E. All minor surface projections, ridges, indentations and minor honeycombed surfaced shall be corrected smooth to grade by rolling or other means as requested by Owner's Representative, at the Contractor's own expense.

3.10 INSPECTIONS

A. Pavement mixtures shall have a minimum stability of 35 per applicable state specifications. Certified laboratory tests shall be furnished to indicate compliance with these requirements.

B. The Owner reserves the right to have measurements taken of base course and bituminous surfacing as actually installed.

3.11 TESTING FOR DRAINAGE

A. Before final acceptance of the work, the Contractor shall, in the presence of the Owner's representative, test all paved areas for correct water runoff by flooding with water in such quantity as to prove correct shaping of the paving to the satisfaction of the Owner's representative.

B. Pavement in areas where water remains standing after testing shall be removed and reconstructed to the correct grade. Feathered pavement edges resulting from patching will not be permitted. All costs for such work shall be borne by the Contractor.

3.12 QUALITY CONTROL

A. Trucks used for hauling bituminous mixtures shall have tight, clean, smooth beds coated with a minimum amount of paraffin oil, lime solution, or other approved material to prevent the mixture from adhering to the beds.

B. Should the mixture, at the plant or in place, show an excess or deficiency of bitumen,s how injury or damage due to burning or overheating, or show an improper combination of aggregates, as determined by Owner's Representative, the mixture shall be rejected and shall be disposed of by the Contractor at his own expense.

3.13 CLEAN UP

A. Upon completion of the work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner-accepted condition.

END OF SECTION

SECTION 02710
SUBSURFACE DRAINAGE FACILITIES

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

The requirements of the "General Conditions of the Contract" and of Division 1, "General Requirements", shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

Furnish all materials, labor, transportation, services, and equipment necessary to furnish and install the subsurface drainage facilities as shown on the Drawings and as specified herein.

A. Work included in this Section:
   1. Required incidental work, such as staking of bed elevations, slopes for trenches, checking elevations for catch basins.
   2. Plastic Pipes, perforated and non-perforated.
   3. Drainage structures, outlet structures, junction structures, catch basins, in-line drains, area drains, river rock pads, water quality gravel filters, and other items as shown on the drainage plans.
   4. Excavation and backfill, including bedding materials for drainage systems.

1.2 DEFINITIONS

NOT USED

1.3 REQUIREMENTS OF REGULATORY AGENCIES

All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.4 APPLICABLE STANDARDS

Drainage lines and drainage structures shall be provided at locations and as detailed on the drawings and, where so shown or specified, shall be in accordance with "Standard Specifications for Public Works Construction", latest edition.

1.5 QUALITY CONTROL

A. Manufacturer's Directions

Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in the Section furnish directions covering points not shown in the Drawings and Specifications.

B. Permits, Fees, Bonds and Inspections

The Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the work.

C. Subcontractor shall personally, or through an authorized and competent representative, constantly supervise the work and, so far as possible, keep the same foreman and workmen on the job throughout the course of construction.

1.6 SUBMITTALS

A. Product Data

The Contractor shall submit no later than ten days after the award of Contract manufacturer's catalog cuts, or a typed listing of all products used in this Section.

B. Record Drawings

Provide record drawings of as built conditions on sepia mylar. Layout to be approved by Owner.

1.7 SUBSTITUTIONS

Specific reference to manufacturer's names and products specified in this Section are used as standards of quality, this implies no right of the Contractor to substitute other materials without prior written approval.

Any materials installed without written approval may be rejected and the Contractor shall at his own cost remove such materials from the site.

If an approval is granted for a substitution, adjustment in the Contract price will be made in accordance with the Contract Conditions.

1.8 PRODUCT HANDLING

A. Delivery:

Materials shall be delivered in such a way that it does not damage said materials.

B. Storage:

Store materials in a dry and protected location. Protect from rusting, deformation, staining, and moisture damage.

1.9 COORDINATION

A. The Contractor shall notify the General Contractor and all other contractors related to the installation of his Work in ample time, so as to allow sufficient time for those contractors to perform their portion of the Work.

B. Subcontractor shall coordinate all work under this contract with Owner and other subcontractors in order that he does not interfere with or make more difficult the work of others. Subcontractor shall be guided by and shall comply with directives of Owner in any disputes arising out of work coordination. This includes location and placement of work both in time or place. Coordination with others shall be performed at no additional cost to Owner, even though such reasonable coordination may result in a cost for his subcontractor.

C. Subcontractor shall familiarize himself with the schedule drawings and specifications, and plan his work to conform to the conditions shown and specified, so as to provide the best possible assembly of the combined work of all trades.

1.10 GUARANTEE AND REPLACEMENT

The manufacturer's warranty shall not relieve the Contractor of his own liability under the guarantee. Such warranties shall only supplement the guarantee.

PART 2 – CONSTRUCTION ITEMS

2.1 PLASTIC PIPE CONSTRUCTION

MATERIALS

A. The Contractor shall use corrugated High Density Polyethylene Pipe (HDPE), Type S in conformance with Section 64, Plastic Pipe of the State Standard Specifications (current edition) to be manufactured by Advance Drainage Systems, Inc. (ADS) or approved equal with H25 loading. The pipe and fittings shall be a smooth interior, corrugated exterior with a bell and spigot design and resin composition conforming to the most current versions of AASHTO M252, AASHTO M294, and ASTM D3350. Gaskets shall conform to the most current version of ASTM F477.

B. Perforations shall be one inch in diameter with 2.5 inches vertical spacing between rows (center to center). Nine perforations shall be provided per row.

C. Construction of the connection to the new reinforced concrete box shall be in accordance with A.P.W.A. Standard Plan No. 333-1.

PIPE EXCAVATION

A. Pipe excavation shall be in conformance with Section 306 of the Green Book. Access to trenches shall be in conformance with Section 306-1.1.6 of the Green Book and the manner of bracing excavations shall be in conformance with Section 306-1.1.6 of the Green Book. Excavation shall be kept to the minimum widths required for efficient placing of the pipe.

B. The trench bottom shall be graded to provide a smooth, straight, firm and stable foundation for the pipe bedding at every point throughout the length of the pipe. The recess shall be large enough to prevent foreign material from entering the pipe.

C. If in the opinion of the Owner the trench subgrade is wet, contaminated or contains unsuitable material due to no fault of the Contractor, the Contractor shall overexcavate to a depth determined by the Owner and place bedding materials as directed by the Owner.

D. The Contractor shall haul and properly dispose of all surplus excavated materials outside the project limits.

PIPE BEDDING AND TRENCH BACKFILL

A. Pipe bedding and trench backfill shall conform to Section 306-1.3 of the Green Book.

B. Densification of backfill shall be accomplished by either: mechanical compaction or water densification. All relative compaction tests will be made by the Owner in conformance with Test Method No. California 216. Whenever relative compaction is specified to be determined by Test Method No. California 216, the in-place density may be determined by Test Method No. California 231. The wet weight or dry weight basis and English units of measurement may be used at the option of the Owner.

Mechanical Compaction - Backfill shall be mechanically compacted by means of tamping rollers, or other mechanical tampers. Impact type pavement breakers (stompers) will not be permitted unless otherwise approved by the Owner. All backfill material for structures shall be placed in horizontal, uniform layers and shall be brought up uniformly on each side of the structure. The thickness of each layer of

backfill shall not exceed 8 inches before compaction unless otherwise approved by the Owner.

Water Densification – As used in these Specifications, flooding shall mean the inundation of backfill with water puddle with poles or bars to ensure saturation of the backfill material for its full depth. Jetting shall be accomplished by the use of a jet pipe to which a nose is attached carrying a continuous supply of water under pressure. Compaction of backfill by flooding or jetting will be permitted when, as determined by the Owner, the backfill material is of such character that it will be self draining when compacted and that foundation materials will not soften or be otherwise damaged by the applied water and no damage from hydrostatic pressure will result to the structure. The work shall be done in such a manner that water will not be impounded. Backfill shall be brought up uniformly on each side of the structure. Flooding and jetting methods shall be supplemented by the use of vibratory or other compaction equipment when necessary to obtain the required compaction. Maximum lift thickness shall be 4 feet. Flooding or jetting of the top 3 feet of backfill, measured from finished paving surface, will not be permitted in roadway areas.

C. Approval to use a specific method and compaction equipment shall not be construed as guaranteeing or implying that the use of such method and equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract, nor shall it be construed as guaranteeing proper compaction. The contractor shall make his own determination in this regard.

D. All backfill and bedding around pipes shall be compacted to no less than ninety (90) percent relative compaction. Where such material is placed under paved roadways, the top 3 feet, measured from the finished paving, shall be compacted to ninety-five (95) percent and shall be compacted by mechanical compaction method.

E. Trench bottoms of pipe shall be graded to provide firm and uniform bearing throughout the entire length of the pipe and structures.

F. Pipe bedding shall consist of well graded granular material (clean sand, gravel, or crushed miscellaneous base) having a sand equivalent value of not less than 30 and be capable of being readily consolidated by vibrating. Gravel shall have a maximum size of ¾ inch and shall meet the percentage of wear requirement per the Project Soils Report. Pipe bedding shall be placed to one foot above the top of the reinforced concrete pipe. The Contractor may use onsite material for pipe bedding subject to the approval of the Owner and provided it meets the requirements as set forth above. Should onsite material be unsatisfactory, the Contractor will be required to import suitable material.

G. Six inches of bedding material shall be placed beneath the pipe.

H. The Contractor shall obtain all necessary permits from the State Division of Industrial Safety as stated in Section 7-10.1.1 "Safety Orders" of the Green Book and carry out all the requirements as called out in such State permit; it shall be copied and submitted to the Owner prior to any work.

PIPE CONSTRCUTION AND PAYMENT

A. The bid item Pipe Construction covers the complete construction of the various sizes and classes including all materials, pipe excavation, bedding and backfill, testing requirements, temporary resurfacing, bracing, concrete connections, shoring of storm drain trench, bracing support of existing utilities, **river rock pad**, shop drawings, record drawings, protection or reconstruction of existing of all utilities encountered during construction, plating, all tools and equipment including incidentals and all work as required to complete the construction of the plastic pipe complete in place as indicated on the plans and specifications.

B. Payment for all the preceding requirements shall be per the unit price bid per linear foot of pipe of the various sizes and classes measured along the centerline of the pipe in place including curves. Additionally, the price per linear foot of pipe shall include the cost for obtaining all necessary permits from State Division of Industrial Safety, as stated in Section 7-10.4.1, "Safety Orders", carrying out all the requirements as called out in such State permit, which shall be copied to the Owner prior to any work.

2.2 CONCRETE CONSTRUCTION

Construction of junction structures (including junction sleeves) and concrete sleeve to prevent hydrostatic uplift shall include concrete, reinforcing steel, unclassified excavation and structure backfill.

CONCRETE

A. Concrete shall be composed of Portland cement, aggregates, and water of the quantities and qualities herein specified and in the required proportions. The ingredients are to be well mixed and brought to the proper consistency and to have a compressive strength of the age of 28 days of not less than 3,000 p.s.i. or minimum of 6 cement sacks per cubic yard. All concrete materials, methods, forms, and proportioning shall conform to Sections 51 and 90 of the State Standard Specifications. Combined aggregate grading for all concrete shall be in conformance with Section 90-3.04 of the State Standard Specifications or 1-1/2" maximum combined aggregate grading.

B. The consistency of concrete shall be such as to allow it to be worked into place without segregation. Unless otherwise specified, the slump shall be 3 inches plus or minus 1 inch for all concrete. The slump test shall be performed in accordance with

the requirements of ASTM Designation: C-143. Slumps greater than those specified maybe be cause for rejection of the concrete by the Owner.

C. Concrete shall not be placed except in the presence of the Owner or the Owner's representative. The Contractor shall give reasonable notice to the Owner each time he intends to place concrete. Such notice shall be far enough in advance to give the Owner adequate time to inspect the subgrade, forms, steel reinforcement, and other preparations for compliance with the specifications before concrete is delivered for placing.

D. Formed concrete shall be placed in horizontal layers in lifts of not more than 20 inches. Hoppers and chutes, pipes and "elephant trunks" shall be used as necessary to prevent segregation of the concrete.

E. Forms shall be removed only when the Owner has given his approval. Forms shall be removed in a manner that will permit the concrete to take stresses due to its own weight uniformly.

F. Forms shall not be removed sooner than 16 to 24 hours after the concrete is placed. These times represent cumulative umber of days and fractions of days, not necessarily consecutive, during which temperature of the air adjacent to the concrete is above 50 degrees Fahrenheit. If the temperature falls below 50 degrees Fahrenheit at any time after the concrete is placed in the forms, the Owner will advise the Contractor of additional time required before forms can be removed.

G. All concrete shall be prevented from drying for a curing period of at least seven (7) days after it is placed. Surfaces exposed to air during the curing process shall be kept continuously moist for the entire period or until the curing compound is applied.

H. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged. Water for curing shall be clean and free from any substances that will cause discoloration of the concrete.

I. Concrete may be coated with curing compound in lieu of the continued application of moisture. The curing compound shall comply with the requirements of Section 90-7.01B of the State Standard Specifications. The curing compound shall be No. 5 White Pigmented Curing Compound conforming to the requirements of ASTM Designation: C-309, Type 2, Class B for all concrete surfaces.

J. The curing compound shall be spayed on the moist concrete surfaces as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. The curing compound shall be thoroughly mixed immediately before applying, and shall be applied at a uniform

rate of not less than one gallon per 150 square feet of surface. No separate payment will be made for the curing compound.

REINFORCING STEEL

A. Reinforcing steel for reinforced concrete structures shall be Grade 60 Billet-Steel. Cleaning, bending, placing and spacing of reinforcement shall conform to the applicable provisions of Section 52 of the State Standard Specifications and the drawings. The Contractor shall furnish a "Certificate of Compliance" with the specification of ASTM Designation: A-615. All splices shall conform to the requirements of A.C.I. Manual, Standard 318-89. Splices requested by the Contractor for his conveniences shall be subject to approval by the Owner.

UNCLASSIFIED EXCAVATION

A. Unclassified excavation shall conform to all applicable sections of the Standard Specifications.

STRUCTURE BACKFILL

A. Structural backfill shall conform to Section 300-4.1 through 300-4.8 of the State Standard Specifications.

CONCRETE CONSTRUCTION AND PAYMENT

A. The bid item Concrete Construction covers the complete construction of the junction structure per A.P.W.A. Standard Plan 1333-1 and the concrete sleeve for preventing hydrostatic uplift including concrete, reinforcing steel, unclassified excavation, structure backfill, forms, bracing, and protection or reconstruction of existing of all utilities encountered during construction, and other incidentals and all work as required to complete the construction of the junction structure and concrete sleeve complete in place as indicated on the plans and specifications.

B. Payment for the junction structure shall be per the unit price bid. Payment for the concrete sleeve shall be included per the unit price bid per linear foot of the Plastic Pipe Construction. No additional compensation will be allowed therefore.

2.3 DRAINAGE IN-LINE INLETS AND CATCH BASINS

Construction drainage in-line inlets and catch basins shall include all materials, fittings, tubings, grates, extensions, water quality gravel filter, 6-inch perforated riser, excavation, and backfill.

IN-LINE INLETS AND CATCH BASINS

A. In-line inlets and catch basins shall conform to ADS Specifications or approved equal and as shown on the plans.

B. The 6-inch perforated riser shall conform to the requirements and specification under Section 2.1, "Plastic Pipe Construction" and as shown on the plans.

C. The water quality gravel filter shall consist of clean gravel with size ranging from 1.5 inches to 3 inches and shall conform to all applicable sections of the State Standard Specifications and as shown on the plans.

IN-LINE INLETS AND CATCH BASINS AND PAYMENT

A. The bid item In-line Inlets and Catch Basins covers the complete construction of the specified items per ADS standard plans or approved equal including all materials, fittings, tubings, grates, extensions, water qualtiy gravel filter, 6-inch perforated riser, excavation, backfill, and protection or reconstruction of existing utilities encountered during construction, and other incidentals and all work as required to complete the construction of the in-line inlets and catch basins in place as indicated on the plans and specifications.

B. Payment for the In-line Inlets and Catch Basins shall be per the unit price bid. No additional compensation will be allowed therefore.

END OF SECTION

SECTION 02730
DECOMPOSED GRANITE PAVING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install decomposed granite paving as indicated on Drawings and as specified herein.

B. Work included in this Section:
   1. Decomposed granite paving with Stabilizer binder additive.

C. Work related in other Sections:
   1. Section 02311 - Rough Grading: Setting of subgrade to receive soil cement base course.
   2. Section 02811 - Irrigation System: Coordination of irrigation spray heads.
   3. Section 02900 - Landscape Planting: Coordination of planting along edges of decomposed granite paving and composite header.

1.3 REFERENCES

A. ASTM C 136 - Method for Sieve Analysis for Fine and Coarse.

1.4 SYSTEM DESCRIPTION

A. Decomposed granite paving with Stabilizer binder additive and polypropylene fibers for strength.

1.5 SUBMITTALS

A. In accordance with Division 1.

B. Submit specification data Cut Sheets for products specified under this Section.

C. Products: Five pound sample and sieve analysis for grading of decomposed granite.

1.6 TESTS

A. Perform gradation of decomposed granite material in accordance with ASTM C 136.

1.7 MOCK-UPS

A. Install a 4-foot wide x 10-foot long mock-up of decomposed granite paving with Stabilizer additive at location as directed by Owner's Authorized Representative.

B. This mock-up will be the standard from which future work will be judged.

C. Remove Mock-up completely prior to Final Payment.

1.8 ENVIRONMENTAL CONDITIONS

A. Do not install decomposed granite paving during rainy conditions.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. In accordance with Division 1.

B. Cover Stabilizer binder with plastic covering to prevent exposure to rainfall, debris, or removal by wind.

1.10 COORDINATION

A. Notify contractor's related to installation of his work in ample time, so as to allow sufficient time for those contractors to perform their portion of work.

1.11 QUALITY ASSURANCE

A. Installer: Provide evidence to indicate successful experience in providing decomposed granite paving containing Stabilizer binder additive.
   1. Experience: Minimum 5 years.

1.12 INSPECTION OF SITE

A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Owner's Authorized Representative prior to commencing Work.

1.13 EXCESS MATERIALS

A. Provide Owner's Authorized Representative with the following excess materials for use in future decomposed granite paving repair:
   1. Four, 40 lb. bags of decomposed granite screenings with source location provided.
   2. Two, 40 lb. bags of Stabilizer additive.

PART 2 - PRODUCTS

2.1 DECOMPOSED GRANITE SCREENINGS

A. Washed, natural-colored crushed granite stone, free of clay, friable materials and debris and graded in accordance with ASTM C 136 within the following limits:

   1. Gradation: As determined by ASTM C-136 methodolgy

Sieve Size	**Percent Passing**
½"	95 - 100
3/8"	90 - 100
No. 4	50 - 100
No. 30	25 to 55
No. 100	10 to 20
No. 200	5 - 18

   2. Sand Equivalent: As determined by ASTM D-2419 methodology. Shall have a minimum of 30.
   3. R-Value: As determined by ASTM D-2488 methodology. Shall have a minimum of 70

B. Acceptable Local Supplier:
   1. Gail Materials (909) 279-1095, "California Gold".

2.2 STABILIZER BINDER

A. Patented, non-toxic organic binder that is colorless and odorless concentrated powder that binds decomposed granite together to produce a firm surface.

B. Acceptable Manufacturers:
   1. Stabilizer (800) 336-2468; Stabilizer.

C. Acceptable Local Supplier:
   1. Gail Materials (909) 279-1095, "California Gold".

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Verify that gradients and elevations of subgrade are correct. Ensure that a minimum of 1 1/2% cross slope will be provided. Contact Owner's Authorized Representative if this minimum percentage will not be maintained.

B. Verify that subgrade consists of a minimum of 8-inches of compacted soil.

C. Verify that soil cement base course will extend to edge of decomposed granite paving and will achieve a positive outfall for trapped water.

D. Remove loose material from compacted subbase surface immediately before placing decomposed granite screenings.

E. Wet surface of soil cement base course prior to placing decomposed granite screenings.

3.2 BLENDING STABILIZER

A. Blend 14 pounds of Stabilizer powder per ton of decomposed granite screenings. It is critical that Stabilizer be thoroughly and uniformly be mixed throughout decomposed granite screenings.

B. Blending stabilizer shall be incorporated with the DG by use of a pug mill that includes a weight belt feeder to insure the proper ratio of stabilizer to DG. Blending with the use of a bucket loader or belt blending without a weight feeder are not acceptable methods.

3.3 PLACEMENT OF DECOMPOSED GRANITE SCREENINGS

A. Place Stabilized and fiber-added decomposed granite screenings to a depth indicated in Paving Schedule on Drawings.

B. Grade and smooth decomposed granite paving per approved Owner's Authorized Representative mock-up.

C. Apply water until moisture penetrates to full depth of decomposed granite screenings. It is critical that full section of Stabilized decomposed granite screenings receive water at this time.

D. Upon thorough moisture penetration, compact decomposed granite screenings to within 90% relative compaction by using a vibrating plate tamp or similar compaction equipment.

E. Take care in compacting decomposed granite screenings when adjacent planting and irrigation systems.

F. Allow the finished surface enough time to dry completely before allowing traffic.

3.4 REPAIRS AND PROTECTION

A. Remove and replace decomposed granite paving that is damaged, defective, or does not meet requirements of this Section.

B. Protect decomposed granite paving from damage until Final Payment.

3.5 CLEA NUP

A. Upon completion of Work under this Section, remove rubbish, waste and debris resulting from Contractor's operations. Leave work area in a neat and clean condition.

END OF SECTION

SECTION 02750
PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install portland cement concrete paving as indicated on Drawings and as specified herein.

B. Work included in this Section:
   1. Pervious concrete paving.

C. Work related in other Sections:
   1. Section 02310 - Rough Grading.
   2. Section 02811 - Irrigation System: Coordination of irrigation mainline PVC sleeving and lateral pipe.
   3. Section 02900 – Landscape Planting.

1.3 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 304R - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 305R - Hot Weather Concreting.

D. ACI 306R - Cold Weather Concreting.

E. ACI 309R - Guide for Consolidation of Concrete.

F. ASTM A 615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

G. ASTM C 31 - Standard Specification for Making and Curing Concrete Test Specimens in the Field.

H. ASTM C 33 - Standard Specification for Concrete Aggregates.

I. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

J. ASTM C 94 - Standard Specification for Ready Mix Concrete.

K. ASTM C 143 - Standard Specification for Hydraulic Hydrated Cement Concrete.

L. ASTM C 150 - Standard Specification for Portland Cement.

M. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.

N. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

O. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

P. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

Q. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

R. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

1.4 SUBMITTALS

A. In accordance with Section 01340 - Shop Drawings, Samples and Product Data: Procedures for submittals.

B. Concrete Mix Designs: Provide documention for pervious concrete paving.

1. The data shall include unit weights detemined in accordance with ASTM C29 paragraph 11, jiggin procedure. Compacted void content shall be a minimum o f10%. C Cement content shall be a minimum of 580 pounds per cubic yard, with total cementitious content to be a minimum of 630 pounds per cubic yard. Water cement ratio shall be a maximum of 0.30.

2. Laboratory and Cement Test Reports: Submit six (6) copies of laboratory test reports for concrete materials and a certificate with each concrete mixer truck, stating mix design, PSI rating, slump, water and cement quantity, cement/water ratio, fine and coarse aggregate and color additives.

2. Cement:

a) Manufacturer and plant location.

b) Cement type, i.e. Type I, II or V.

3. Admixtures:
   a) Manufacturer and plant location.
4. Sand:
   a) Source and type.
5. Aggregates:
   a) Source and type.
6. Signed certification from a licensed structural engineer.

C. Certification that Agency's mock-up has been reviewed and that materials and processes provided, will achieve intended effects indicated on Agency's mock-up.

D. Submit specification data "Cut Sheets" for agent, plastic dowel sleeves, chemical stain, curing agents, and clear sealers.

E. Products: Submit one pound samples, clearly identified, for each component used to prepare each paving type, including but not limited to, cement, sand, aggregate, coloring pigment, release agents, and chemical stains.

F. Submit process for installing pervious paving for approval prior to installation.

1.5 QUALITY ASSURANCE

A. Pre-Bid Conference: Prior to submitting bid, attend pre-bid conference with Agency to review Agency mock-up and to review requirements and artistic effect desired.

B. Mock-Ups:
   1. Contractor Mock-Ups: For each paving finish indicated on Drawings (asphalt excepted), provide a mock-up directly adjacent Agency's existing mock-up. Required concrete finish is to closely match Agency's mock-up. Contractor's mock-up will provide evidence to Agency that desired paving finish can be achieved by Contractor.
   2. Contractor Damage/Repair Mock-Ups: Provide a 2 x 2-foot "damage/repair" sample directly adjacent to each required 4 x 4-foot mock-up for each paving type specified on Project. Purpose of "damage/repair" samples are to clearly indicate Contractor's ability to repair damaged concrete to match existing, should damage occur during course of construction.

C. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

D. Installer: Provide evidence to indicate successful experience in providing patterned concrete work similar to that specified herein and can demonstrate successful experience through past project documentation and references.

1. Experience: Minimum 5 years experience in the installation of concrete paving.
2. Demonstration of Experience: 10 projects which have been completed within the past 36 months utilizing similar products, scope, and complexity.
3. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
4. Submit qualifications to Agency for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.

E. Slip Resistance: Provide a finish surface slip resistance coefficient of friction equal or greater than 0.6 for flat surfaces and 0.8 for ramps, when tested in accordance with ASTM F 489.

1.6 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Section 01640 - Product Handling and Protection: Transport, handle, store, and protect.

B. Store materials in dry and protected locations and protect from damage.

C. Do not change brand of cement nor source of aggregate during course of Work.

1.7 SITE CONDITIONS

A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.8 COORDINATION

A. In accordance with Section 01041 - Project Coordination.

B. Ensure that irrigation sleeves, electrical conduit, and other utility elements are accomodated and as-built located prior to pouring concrete.

1.9 INSPECTION OF SITE

A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Agency prior to commencing work.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of 200-foot or less radius.

2.2 REINFORCING MATERIAL

A. Synthetic Fiber Reinforcement: 100% pure synthetic polypropylene fibers, engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116 - Type III. Maximum length of fibers to be 3/4-inch.
   1. Acceptable Manufacturers:
      a. Fibermesh: Stealth (800)348-9348.
      b. Forta Fiber: Microfiber (800)245-0306.
      c. W.R. Grace: Monofiliment (800)433-0020.
      d. Bomanite; Monofiliment (800)854-2094.

C. Fiberglass reinforced plastic (FRP) reinforcinb bar shall be used to tie adjacent concrete slabs together. FRP rebar shall be of at least 1-1/2" diameter 18" oc both ways. Steel or epoxy coated steel shall not be used due to exposure to moisture experienced in pervious concrete.

D. Plain, Cold-Drawn Steel Wire: ASTM A 82.

E. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars.

F. Construction Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

G. Epoxy-Coated Construction Joint Dowel Bars: ASTM A 775 over ASTM A 615, Grade 60 plain steel bars.

H. Joint Dowel Alignment Sleeves: Polypropylene plastic sleeve dowel to ensure proper alignment of steel dowels.
   1. Acceptable Manufacturers:
      a. Aztec Concrete Accessories, Inc. (800)531-3355: Speed Dowel sleeves.

I. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type supports.
   1. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150 - Type I.

B. Fly Ash: ASTM C 618 - Type F. The combined weight of fly ash conforming to ASTM C 618 shall not exceed 20% of the total weight of cementatious materials. Ground iron blast-furnace slag conforming to ASTM C989 may be used in amounts not to exceed 50% by weight of total cementitious material.

C. Concrete Aggregate: ASTM C 33 - Class 4, and as follows. Provide aggregates from a single source:
   1. Maximum aggregate size: 1-inch (3/8-inch pea gravel for "concrete dirt" only).

D. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

2.4 ADMIXTURES

A. Provide concrete admixtures that contain not more than 1 percent chloride ions and no calcium chloride.

B. Water-Reducing Admixture: ASTM 4 94, Type A.

C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

D. Water-Reducing and Retarding Admixture: ASTM C 494, Type D or E.

E. Acceptable Manufacturers:
   1. Water-Reducing Admixtures:
      a. ChemMasters Corp; Chemtard.
      b. Cormix Construction Chemicals; Type A Series.
      c. Euclid Chemical Company; Eucon WR-75.
   2. High-Range Water-Reducing Admixtures:
      a. Anti-Hydro Co. Inc.; Super P.
      b. Cormix Construction Chemicals; Cormix 2000, PSI Super.
      c. Eculid Chemical Company; Eucon 37.
   3. Water-Reducing and Acceleration Admixtures:
      a. Conspec Marketing & Manufacturing Company; Q-Set.
      b. Cormix Construction Chemicals; Gilco Accelerator or Lub NCR.
      c. Euclid Chemical Company; Accelguard 80.
   4. Water-Reducing and Retarding Admixtures:
      a. Cormix Construction Chemicals; Type D Series.
      b. Euclid Chemical Company; Eucon Retarder 75.
      c. W.R. Grace Company: Daratard-17.

2.5 CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One of the following complying with ASTM C 171:
   1. Waterproof paper.
   2. Polyethylene film.
   3. White burlap-polyethylene sheeting.

C. Clear, Waterborne Membrane-Forming Curing Compounds:
   1. Provide curing materials that have a maximum volatile organic compound (VOC) rating of 350 g/l.

D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
   1. Clear, Waterborne Membrane-Forming Curing Compounds Acceptable Manufacturers:
      a. Anti-Hydro Company; Clear Cure Water Base.
      b. The Burke Company; Spartan Cote WB.
      c. Cormix Construction Chemicals; Sealco VOC.
   2. Acceptable Evaporation Control Manufacturers:
      a. Conspec Marketing and MFG. Company; Aquafilm.
      b. Euclid Chemical Company; Eucobar.
      c. L&M Construction Chemicals; E-Con.

2.6 RELATED MATERIALS

A. Bonding Agent: Acrylic or styrene butadiene.

G. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

H. Miscellaneous Materials: Miscellaneous specialty materials, acids, or other materials required to achieve the specialized effects indicated by Agency's mock-up or as required by Agency.

I. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated in Work include, but are not limited to, the following:
   1. Clear Penetrating Sealer (water based):
      a. L.M. Scofield; Cementone Clear Sealer.
      b. Superstone; Clear Sealer.
      c. Lambert; Clear Sealer.

2.7 CONCRETE

A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified under ACI 301.
   1. A field quality control testing agency will be provided by Agency.
   2. Limit use of fly ash to 25% percent of cement content by weight.

B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
   1. Compressive Strength at 28 days: 4,000 psi.
   2. Maximum Water-Cement Ratio at Point of Placement: 0.55.
   3. Slump Limit at Point of Placement: 3-inches. Slump limit for concrete containing high-range water-reducing admixture: Not more than 8-inches after adding admixture to site-verified 2 to 3-inch slump concrete.
   4. Air Content: 2 1/2 to 4 1/2 percent.

C. Synthetic Fiber Reinforcement: 1 lb. per cu. yd of mix added only at batch plant.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94.
   1. Reduce mixing and delivery time when air temperature is between 85 degrees F and 90 degrees F and reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
   2. Reduce mixing and delivery time to 60 minutes when air temperature is above 90 degrees F.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Verify that paving subgrade consists of a minimum of 12-inches of compacted sand, passes less than 7% through a #200 sieve, and is compacted to at least 95% of the materials ASTM D 1557 maximum dry density for its full depth.

B. Verify that paving subgrade extends 1-foot beyond the outside edge of paving or curbing and has a positive outfall for trapped water.

C. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

D. Remove loose material from compacted subbase surface immediately before placing concrete.

E. Provide necessary chairs or supports, and maintain position of reinforcing bars.

F. Wet surface of sand subgrade prior to placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations.

B. Install forms to allow continuous progress of Work and so that forms can remain in place at least 24 hours after placing concrete.

C. Check completed formwork and screeds for grade and alignment to following tolerances:
   1. Top of Forms: Not more than 1/8-inch in 10-feet.
   2. Vertical Face on Longitudinal Axis: Not more than 1/4-inch in 10-feet.

D. Clean forms after each use and coat with form release agent to ensure separation from concrete.

3.3 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover over reinforcement.

D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to facilitate installation of their work.

B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes and other utility structures until they are at the required finish elevation and alignment.

C. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.

D. Deposit and spread concrete in a continuous operation between construction joints. Do not push, drag, or use vibrators to move concrete into place.

E. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309 R.

1. Consolidate concrete along face of forms with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Prevent dislocating reinforcing and dowels.

F. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

G. Hot-Weather Placement: Place concrete complying with ACI 305R when hot weather conditions exist.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement 90 degrees F and below. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, or soft or dry areas.

H. Cold Weather Placement: Adhere to ACI 306R - Cold Weather Concreting for installing concrete paving during cold weather.

3.5 CONCRETE FINISHING

A. Medium Broom – Broom evenly and both ways.

3.6 JOINTING

A. Construct contraction, construction, and isolation joints to match irregular edge pattern of stamping tools with faces perpendicular to surface plane of concrete.

B. Contraction Joints: Provide contraction joints as indicated on Drawings (or to not exceed 10-feet in either direction), to minimize random surface cracking and as indicated on approved Paving Jointing and Pour Sequence Plan provided by Contractor. Match irregular pattern of stamping tools, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one fourth of concrete thickness, as follows:
   1. Hand-tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each joint edge with a radiused jointer tool.
   2. Machine-Sawn Joints: Machine-sawn joints are not permitted unless otherwise indicated on Drawings. Provide saw cut joints as soon as concrete has sufficient strength to support sawing equipment.
   3. Do not exceed 1/4-inch in joint width.

C. Doweled Construction Joints: Construct doweled construction joints at end termination's of paving where paving operations are stopped for more than 1/2 hour, unless paving terminates at an isolation joint and at all edges of different paving types. Locations of doweled construction joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
   1. Steel Dowels:
      a. Provide smooth steel dowels across construction joints to reduce differential movement across the joint. Utilize smooth steel dowels based upon the following:
         1) 6-inch Thick Pavement:
            (i) Diameter: 3/4-inch.
            (ii) Length: 24-inches.
            (iii) On-center Spacing: 18-inches.
         2) 4-inch Thick Pavement:
            (i) Diameter: 1/2-inch.
            (ii) Length: 24-inches.
            (iii) On-center Spacing: 18-inches.

b. To assist in correct alignment of steel dowels along construction joints use plastic dowel sleeves:
   1) Insure that wood edge forms are true to line and grade prior to installing plastic dowel sleeves.
   2) Install plastic dowel sleeves on wood forms at the specified on-center dowel spacing, centered between top and bottom of wood form.
   3) Contact plastic dowel sleeve manufacturer for complete installation requirement.

2. Do not continue tie-reinforcement through sides of strip paving.
3. Use a bond breaking agent on cured concrete edges that will be joined with fresh concrete.
4. Immediately before new concrete is placed, wet construction joint and remove standing water.
5. Tool edges of construction joints to match decorative field jointing.

D. Isolation Joints: Provide isolation joints to permit horizontal and vertical movement between slab and fixed vertical edges such as building walls, steps, columns, and other vertical restraints. Locations of isolation joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
1. Provide 1/4-inch thick pre-molded asphalt impregnated fiber board, backup, and caulking along edges of isolation joints.
2. Extend pre-molded asphalt impregnated fiber board to full-width and depth of joint, not less than 1/4-inch or more than 1-inch below finished surface of slab.
3. Furnish pre-molded asphalt impregnated fiber board in one-piece lengths for full width being placed. Where more than one length is required, lace or clip pre-molded asphalt impregnated fiber board sections together.
4. Protect top edge of pre-molded asphalt impregnated fiber board during concrete placement with a metal, plastic, or other temporary cap. Remove protective cap after concrete has been placed on both sides of joint to facilitate installation of caulking backup.
5. Joints for Non-Stamped Special Flooring: Tool to profile and dimensions detailed; fill with specified grout, tool grout to a concave profile.
6. Install isolation joint sealant as specified under Section 07900 - Joint Sealers.

3.7 CONCRETE PROTECTION AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 305R for hot weather and ACI 306R for cold weather protection during curing.

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

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture retaining cover curing, curing compound, or a combination of following:
   1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with following materials:
      a. Water.
      b. Continuous water fog spray.
      c. Absorptive cover, water saturated, kept continuously wet.
   2. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
   3. Curing Compound:
      a. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
      b. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
      c. Maintain continuity of coating and repair damage during curing period.

3.8 FIELD QUALITY CONTROL TESTING

A. Agency will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
   1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
      a. Compression Test Specimens: ASTM C 31. One set of four (4) standard cylinders for each compressive strength test. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
      b. Compressive-Strength Tests: ASTM C 39. One (1) set for each day's pour of each concrete class exceeding 1/2 cu. yd. but less than 25 cu. yd., plus one (1) set for each additional 50 cu. yd. Test

one (1) specimen at 7 days, test two (2) specimens at 28 days, and retain one (1) specimen in reserve for later testing.

c. Slump: ASTM C 143. One (1) test at point of placement for each compressive strength test but not less than one (1) test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

d. Air Contact: ASTM C 231, pressure method. One (1) test for each compressive strength test but no less than one (1) test for each day's pour of each type of air-entrained concrete.

e. Concrete Temperature: ASTM C 1064. One (1) test performed hourly when air temperature is 40 degrees F and below and when 80 degrees F and above. One (1) test for each set of compressive strength specimens.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing concrete.

4. Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

B. Test results will be reported in writing to Agency, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests will contain project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7 day and 28 day tests.

C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but not be used as the sole basis for acceptance or rejection.

D. Additional Tests: The testing agency will make additional tests of concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, defective, or does not meet the requirements of this Section.

B. Protect concrete from damage until Final Payment. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material until Final Payment.

3.10 CLEAN UP

A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of Agency.

END OF SECTION

SECTION 02780
UNIT PAVERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this Section:
   1. Unit pavers on road, plazas and walks.
   2. Sub-grade

B. Related work furnished and installed in other Sections:
   1. Section 02212- Fine Grading
   2. Section 02510-Asphaltic Concrete Paving
   3. Section 02730 – Decomposed Granite
   4. Section 02810 – Irrigation System
   5. Section 02900 Landscape Planting

1.2 APPLICABLE STANDARDS AND SPECIFICATIONS

A. ASTM Standards – Current Editions:
   1. ASTM C-33 Standard Specification for Concrete Aggregates
   2. ASTM C-136 Standard Method for Sieve Analysis for Fine and Course Aggregates.
   3. ASTM C-140 Standard Specification for Sampling and Testing Concrete Masonry Units.
   4. ASTM C 936 – Standard Specifications for Solid Interlocking Concrete Paving Units.
   5. ASTM C-1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

B. Americans with Disabilities Act, Part 36, Appendix A – Standards for accessible design.

1.3 SUBMITTALS

A. Manufacturers' details:
   1. Submit a list of all products and manufacturers of materials and covered in this Section.
   2. Submit manufacturers data for all materials covered in this Section together with the quality/testing procedures to be proposed by the Manufacturers.

B. Samples: Submit two sets of samples to the architect to demonstrate the potential color and texture variation of each color designation of concrete paver used in the works.

C. Environmental data: The joint sand stabilizer manufacturer shall submit documentation to demonstrate that the product complies with relevant local environmental and hazardous materials legislation.

1.4 QUALITY ASSURANCE

A. Manufacturer qualifications: Submit proof of the following:
1. Manufacturer shall have a minimum of 5 years successful experience in the manufacturer pavers.
2. Manufacturer shall have sufficient production capacity and established quality control procedures to produce, transport, and deliver the required pavers of the quality specified, without causing delay to the work.
3. Manufacturer shall have suitably experienced personnel and a management capability sufficient to produce pavers as depicted on the drawings and specified herein.

B. Installer qualifications:
1. Installer shall have ten years in business, specializing in the installation of pavers and interlocking concrete with verifiable job references dating back ten years.
2. Installer must be Interlocking Paver Institute certified and must show proof of certification.
3. The installer's supervisor shall have a minimum of eight years experience in the installation of unit paver systems similar in nature to this project.
4. The installer must be acceptable to the City Representative, Architect and Manufacturer after fulfilling prequalifications in items, 1, 2, and 3 above.

C. Coordination:
1. Coordinate work in this Section with that affecting or affected by other trades to ensure the smooth progression of the work.
2. Attend pre-installation meeting and other weekly progress meetings as required by the General Contractor or Owner.

D. Mock-ups:
1. Mockup: Prior to installing unit pavers, construct mockups for each form, color, finish and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of work, including same base construction, special features for expansion joints and contiguous work as indicated.
    a. Locate mockups on-site in the location of the size indicated or if not indicated, as directed by the Architect.
    b. Notify Architect one week in advance of the dates and times when mockups will be constructed.

c. Demonstrate the proposed range of aesthetics effects and workmanship.
d. Obtain Architect's acceptance of mockups before start of final unit or work.
e. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaging: Concrete pavers shall be packaged on pallets in such a way as to minimize damage during transportation, delivery, storage and handling.

B. Rate of supply: Deliver pavers to the construction site in such quantities and at such times as will assure the continuity of the installation.

C. Storage: Place packaged pavers on firm, level and smooth surfaces, and at least six inches above the ground. Place stored pallets so that the identification marks are visible. Covers should allow air to circulate freely around the pallets.

D. Damaged pavers: No paver or any part thereof, used in the permanent wroks, shall exhibit obvious signs of damage on the surface, including but note limited to chipping, cracking and staining. Such damage shall be grounds for rejection.

E. Bedding sand: Deliver and stockpile bedding sand in such a way as to minimize contamination and segregation. Stockpiles are to be located on firm, level, and smooth surfaces that do not channel water into the sand.

F. Jointing sand: Deliver jointing sand in bags and store in such a way as to minimize contamination.

G. Joint sand stabilizer: Deliver and store in strict accordance with the manufacturers instructions and maintain a temperature range of 50 degrees F to 105 degrees F.

1.6 SAMPLING AND TESTING

A. Sampling:
1. The Owner shall select all paver samples for laboratory testing prior to shipping to the site. Sampling shall be carried out at the time of packaging in the place of manufacture.
2. Full size pavers of each color shall be randomly selected from approximately equal sections of the consignment to suit testing frequency.
3. All paver samples shall be clearly marked at the time of sampling in such a way that the designated section of the works can be identified.
4. Joining and bedding sand shall be sampled from within the stockpiles prior to delivery to the site.

B. Paver manufacturer testing: To be carried out by an independent testing company meeting the approval of the Owner. The following testing shall be carried out a t the specified frequency.

1. Individual dimensions to ASTM C-140 shall be carried out at a rate of 1 set of tests of each size of paver (10 pavers each) per 50,000 pavers of each size and color, or part thereof.
2. Continuous monitoring shall be carried out against approved color boards.
3. Samples for compressive strength testing shall be sawn to 4 in. by 4 in. square on plan where pavers are larger than this size. Compressive testing to ASTM C-1140 shall be carried out at a rate of 1 set of tests (5 samples each)) per 250,000 pavers or part thereof, of each size, with a minimum of two sets of tests per color and size of paver.
4. Water absorption testing to ASTM C-140 shall be carried out at a rate of 1 set of tests (5 pavers each) per 250,000 pavers or part thereof, of each size, with a minimum of one set of tests per color and size of paver.
5. Static coefficient of friction testing to ASTM C-1028 shall be carried out at a rate of 1 set of tests (5 pavers each) per 250,000 pavers or part thereof, of each size, with a minimum of one set of tests per color and size of paver.

C. Sand supplier's testing: To be carried out by an independent testing company meeting the approval of the Owner. The following testing shall be carried out a the specified frequency.

1. Particle size distribution testing of the bedding and jointing sand shall be carried out at a rate of one per 5,000 square feet.
2. Sand degradation testing shall be carried out on the bedding sand at a rate of one test per 25,000 square feet.

D. Owner's testing: To be carried out by an independent testing company meeting the approval of the Owner. The following testing shall be carried out at the specified frequency.

1. The Owner may elect to sample and test materials delivered to the site that they consider to be non-compliant. These tests shall be carried out a the expense of the Owner unless the tests demonstrate that the materials are not acceptable in which case the cost shall be borne by the Contractor.
2. Where any of the individual test results fail to meet the specified requirements, the consignment shall be rejected subject to the following option. The manufacturer/supplier may elect to inspect the consignment, remove any part he considers to be defective and submit the remainder for sampling by the Owner at twice the original test requirement. Should their further tests fails to meet the requirement, the entire consignment shall be rejected and shall be removed from the site at the manufacturer's/supplier's expense.

E. Bedding Sand Degradation Testing:

1. Obtain a representative sample weighing 3 lbs. The samples shall be dried for 24 hours or to a constant weight in a thermostatically controlled oven at a temperature of 240 degrees F. – 250 degrees F.
2. Obtain three sub samples each weighing ½ lb by passing the main sample several ties through a riffle box. Perform a sieve analysis test in accordance with ASTM C-136 on each sample.
3. Remix each sub sample and place in a quart nominal capacity porcelain jar together with two one-inch diameter steel ball bearings.
4. Place ach jar on a bottle roller to rotate at 50 rpm for a period of 6 hours.
5. Repeat the sieve analysis on each sub sample. The individual and average results shall be recorded.
6. The samples shall be deemed to comply if the maximum average increase in the percentages passing each sieve and the maximum individual percentage passing shall be as follows:

Sieve size passing (mm)	Max. Increase	Max %
No. 50 (0.300)	5%	35%
No. 100 (0.150)	5%	15%
No. 200 (0.075)	1%	5%

PART 2 - PRODUCTS

2.1 CONCRETE PAVERS

A. Physical Requirement:
1. The average compressive strength of the test samples shall not be less than 8,000 psi with no individual paver less than 7,200 psi.
2. The average water absorption of the test samples shall not be greater than 5% with no result for an individual paver greater than 7%.
3. The static coefficient of friction shall not be less than 0.6.
4. Pigments shall comply with ASTM C0979 and shall be color Group 1 by L.M. Scofield, or as approved by the Architect.

B. Acceptable Manufacturers: Dependent upon final selection by the Architect, the Manufacturer shall be one of the following or any other manufacturers approved by the Architect.
1. Olsen Pavingstone Inc. PO Box 1554, San Juan Capistrano, CA 92693 (Telephone 714 728.0415)
2. Acker-Stone, 13296 Temescal Canyon Road, Corona, CA 91719 (Telephone 800 258.2353).
3. Basalite 707 836.9360.

C. Dimensions and permissible variations:
1. The pavers shall have spacer bars and chamfers. Spacer bars shall be 1/16 in. to 1/8 in. proud of the side of the paver. The maximum dimension between spacer bars on any side of a paver shall be 6 in.

2. No paver shall depart from the specified size by more than the following limits:
   a. Length +/- 1/16 in.
   b. Width +/- 1/16 in.
   c. Thickness +/- 1/8 in.

D. Visual Inspection:
1. The pavers shall be free of chips that extend more than ¼ inch in from the edge. The cumulative length of chips on a single edge shall not exceed 5% of the length of that edge.
2. All pavers shall be free from defects that would interfere with the proper placing of the pavers or impair the strength or performance thereof.
3. The color range of the pavers shall be submitted and approved by the Architect.

E. Records: The manufacturer shall maintain a production record showing batch numbers and date of manufacture. The product shall be marked with the batch number on the packaging for identification.

2.2 BEDDING SAND

A. Materials: The bedding sand shall conform to the requirements of ASTM C-33 except for the grading requirements. The sand shall be clean, naturally occurring silica sand with sub-angular particles. Manufactured sand shall not be used. The sand shall contain no more than 10% acid soluble materials. It shall be delivered to the site in a moist condition.

B. Graduation: The sand gradation shall conform to the following grading requirements such that it shall not vary from the high limit on one sieve to the low limit on the next sieve or vice versa.

ASTM Sieve Size	(mm)	Percentage Passing by Weight
3/8 in	(9.500)	100
3/16 in	(750)	95-100
No. 8	(360)	80-100
No. 16	(180)	50-85
No. 30	(0.600)	25-60
No. 50	(0.300)	10-30
No. 100	(0.150)	0-10
No. 200	(0.075)	0-0.5

C. Mineralogy: The sand supplier shall provide mineralogical details of the proposed sand by way of petrographic analysis or equal.

2.3 JOINT FILLING SAND

A. Properties: Joint filling sand shall conform to the requirements of Article 2 of this section except that the sand shall be dry and shall conform to the following grading requirements.

ASTM Sieve Size	(mm)	Percentage Passing by Weight
No. 8	(360)	100
No. 16	(180)	60-90
No. 30	(0.600)	30-60
No. 50	(0.300)	0-0.5

2.4 JOINT SAND STABILIZER

A. Manufacturers: The joint sand stabilizing material shall be the following:
   1. Surebond SB-1300 as manufactured by Surebond Inc. (Telephone 847 843.1818) and distributed by Surebond California Inc. (Telephone 949 360.4446).

2.5 FILTER GEOTEXTILE

A. Manufactures: The woven geotextile fabric shall be MIRAFI 700X manufactured by MIRAFI Inc. PO Box 240967, Charlotte, NC, 28224 or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Methodology: The installer shall provide a method statement for approval by the Owner prior to installation. The method statement shall indicate the proposed starting points, direction of operations and progress of works, the dimensional controls to be used and the personnel and equipment to be kept on site at all times. In particular it shall set out the installers control procedures to ensure uniform use of the colors and correct apportionment of the different sizes.

B. Edge conditions: The installer shall inspect the edge restraints to ensure that they met the grade, alignment, vertically and continuity requirements for proper installation prior to commencing paver installation. The installer shall notify the general contractor, in writing of any deficiencies if and when they occur, and shall not continue paving these areas until they are rectified to his satisfaction.

C. Substrate: The installer shall inspect the substrate to ensure that it meets the grade requirements for proper installation and that the area is free from soft or yielding places and debris or obstructions prior to commencing paver installation. The installer shall notify the contractor, in writing, of any deviations in the underlying surface levels greater than +1/8 in. to -1/4 in. or of other deficiencies if and when they occur, and shall not continue paving these areas until they are rectified to his satisfaction.

D. Starting point: Installation commencement location shall be reviewed and approved by the Landscape Architect prior to starting each paving pattern.

E. Examination: Examine surfaces indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit pavers. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Where pavers are to be installed over waterproofing, examine, waterproofing installation, with waterproofing installer present, for protection from paving operations. Examine areas where waterproofing systems is turned up or flashed against vertical surfaces as wee as horizontal waterproofing. Do not proceed with installation until protection is in place.

F. Coordination: The installer shall coordinate with all other trades involved in his scope of work. Irrigation and other sleeving required to pass through the unit paving system is included, but not limited to, this scope of coordination.

3.2 INSTALLATION OF CONCRETE PAVERS

A. Bedding course sand:

1. The bedding sand shall be spread over the areas to be constructed to create an uncompacted loose surface onto which the pavers shall be placed. The laying course shall be such that after compaction it forms a uniform layer nominally one inch thick. Upon completion of the works the final surface of the pavers shall be 1/8 in above adjacent finishes at the low edge and flush with adjacent finishes at the high edge.
2. It shall be laid to a tolerance +/- 3/16 in allowing for the correct surcharge. Where distances between screed rails exceed 12-foot intervals an intermediate rail shall be set to line and level.
3. The screeded bedding sand shall not be subjected to any traffic by either mechanical or pedestrian use.
4. Sufficient sand shall be placed to ensure that no delay occurs to paver laying. The sand should be dept moist as necessary by lightly misting with water so as not to disturb the screeded surface. Bedding sand that has been screeded but not covered with pavers at the end of each days work shall be taken up and rescreeded prior to re-commencement.
5. The voids left after the removal of screed rails shall be filled with loose sand as the laying of pavers proceeds.
6. The bedding sand in areas where the sand depth exceeds 1 and ¼ inch, shall be stabilized with cement by thoroughly mixing 10 parts of bedding sand that has a moisture content of a minimum of 8% with 1 part of Type 2 cement in a dry mix. These areas only shall be pre-compacted with a plate compactor to received the un-compacted bedding sand under the pavers.
7. A 20 ft. X 20 ft. test area shall be laid prior to screeding sand to determine the correct amount of surcharge required to obtain the correct final grade. If this

area complies with the specification it may be incorporated as part of the works.

8. Spreading of the laying course sand shall stop when weather conditions are unsuitable. If Inclement weather causes deterioration of the laying course sand, it shall be lifted and stored to one side to drain before its reuse.

B. Concrete Pavers:

1. The pavers shall be laid away from an edge restraint or the existing laying face in such a manner as to ensure squareness of pattern. The joints shall be parallel and perpendicular to one another.
2. Full pavers shall be laid first, including pre-cut pavers around drains and other utility covers. Cut pavers shall then be laid to fill the edges between the laying pattern and the edge restraint or adjacent paving.
3. All cut pavers shall be cut using a masonry saw and in such a manner that no segment has any side shorter than 2 in. The cut faces shall be vertical. Where necessary to maintain joint width requirements at edge restraints, the cuts shall be curved. Hammer cutting is not acceptable.
4. Before compaction, the alignment of the pavers shall be adjusted to form regular joints. The maximum joint width shall be 3/1.
5. If weather conditions are such that the performance of the pavement may be compromised, laying operations shall be discontinued and all laid pavers shall be aligned and compacted prior to suspension of the works.
6. On recommencement of laying operations the edge two courses of existing paving shall be lifted and the sand rescreeded before further pavers and laid.
7. Pavers over waterproofing: Exercise care in placing pavers and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Carefully replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with paving.
    a. Provide cork joint filler, where indicated, at waterproofing that is turned up on vertical surfaces or if not indicated, provide temporary filler or protection until paver installation is complete.
    b. Refer to drawings for size, color, finish and pattern.

C. Compaction:

1. At the end of each day, after the pavers have been aligned, and cut pavers incorporated at edge restraints, dry bedding sand shall be brushed over the surface so that it penetrates the joints. Surplus sand shall be brushed off.
2. The pavement shall be compacted using a low amplitude plate compactor with a plate areas of not less than 1 ½ sq. ft. transmitting an effective force of not less than 11 psi at a frequency of 80-100 hz. The installer shall take necessary precaution to prevent damage to the pavers. Compaction shall continue until the finished surface is within the specified tolerance. No compaction shall be permitted within 4 ft. of an unrestrained edge.

3. After vibration of the pavers to finished elevations, dry jointing sand shall be brushed over the surface and the pavement shall be re-compacted until all joints are completely filled with sand. Great care shall be taken to ensure that the joints are filled. Sand shall be constantly brushed over the surface and the pavement recompacted as necessary. Surplus jointing sand shall be maintained on the surface until application of the joint sand stabilizer.
4. On completion of vibration, before and after joint filling, surface tolerances shall be within 3/16 in under a 10 ft. straight edge and +1/4 in. to -1/8 in. from finished elevation. The pavers shall be 1/8 in above edge restraints and there shall not be a difference in elevation between adjacent units of greater than 1/8 in. Elevations should be such that no water stands on the surface.

D. Jointing sand stabilizer:
1. On completion of the entire pavement installation the surface shall be further compacted using a pneumatic tired roller having tire pressures of 90 psi. rolling shall be continued for a minimum of 2 days. At the completion of rolling jointing sand shall be brushed off the surface so that the sand level is at the bottom of the chamfers.
2. The surface shall be made clean and free from oil, laitance, dust and any loose material prior to the application of joint sand stabilizer. The surface and joint sand should be dry for it's full depth prior to commencing work.
3. The joint sand stabilizer shall be applied evenly at the appropriate coverage as follows: Surebond shall be applied from a low-pressure regulated backpack sprayer at a coverage rate of 150 sq.ft. / gallon. Work the material into the untreated joints with a floor squeegee ensuring that the all joints are adequately flooded and that no surplus material is left on the surface. This work to be in strict accordance with the manufacturers recommendations.
4. The treated area should be protected from rain or moisture and not be trafficked for 24 hours after completing to the stabilizer. Work shall cease if inclement weather (rain or strong wind) will affect the stabilizing operation and shall not recommence until the joint sand has dried sufficiently to allow penetration of the sealant.

3.3 PROTECTION AND CLEAN UP

A. Proteciton:
1. Protect work from damage, discoloration, deterioration and theft until Substantial Completion.
2. All vehicles and equipment operating on the completed pavers before and after application of the joint sand stabilizer shall be maintained in a clean condition, so that oil, tar, rubber or other matter is not deposited on the surface of the pavers or adjacent paving and features.

B. Clean Up:

1. All material generated by construction work in this section shall be removed at the end of each section of the works and the site shall be left in a clean and safe condition.
2. After completion of any repair work, clean all exposed surfaces with clean water and stiff brushes until all stains and dirt are removed. Use cleaning solutions only that are recommended by the paver and stabilizer manufacturers and do not use wire brushes.

3.4 MAINTENANCE

A. Repairs:
1. Repair or replace any damaged work to original specified condition prior to handover.
2. Where lateral displacement of the pavers has occurred adjacent to edge restrains the cut pavers shall be replaced with new pavers of the correct size to comply with the specified joint widths and the surface be re-stabilized.

B. Maintenance: The installer shall return to the site at least at quarterly intervals to rectify any problems in the works caused by his failure to adequately align the pavers, compact the bedding sand or fill the joints.

END OF SECTION

SECTION 02810
IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The requirements of the "General Conditions of the Contract" and of Division 1, "General Requirements", shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish all materials, labor, transportation, services, and equipment necessary to install landscape irrigation as shown on the Drawings and as specified herein.
   1. Work included in this Section:
      a. Layout.
      b. Trenching.
      c. Backfilling.
      d. Assemblage.
      e. Wiring.
      f. System Flushing.
      g. Sprinkler Head Installation.
      h. Valve Installation.
      i. System Testing and Adjustment.
      j. Maintenance.
   2. Work related in other Sections:
      a. Section 02900 - Landscape Planting.

1.3 DEFINITIONS

A. The Owner's Authorized Representative in this Section will refer to the Landscape Architect.

B. The Owner in this section will refer to Inland Empire Utility Agency.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. All local, municipal and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of this Specification, and its provisions shall be carried out by the Contractor. Anything contained in this Specification shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when the Drawings and Specifications call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the

above rules and regulations, the provisions of the Drawings and Specifications shall take precedence.

1.5 QUALITY CONTROL

A. Manufacturer's Directions

1. The Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification, furnish directions covering points not shown in the Drawings and Specifications.

B. Permits, Fees, Bonds and Inspections

1. The Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the Work.

C. Explanation of the Drawings

1. Due to the scale of the 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 his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. The Drawings are diagrammatic only and are indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.
2. All work called for on the Drawings by notes or details shall be furnished and installed whether or not specifically mentioned in this Specification.
3. 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 Owner's Authorized Representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revisions necessary.

1.6 SUBMITTALS

A. Materials List

1. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the Drawings and Specifications. No substitution will be allowed without prior written approval by the Owner's Authorized Representative.
2. Complete material list shall be submitted prior to performing any work. Material list shall include the manufacturer, model number and description of all materials and equipment to be used. Although manufacturer and other information may be different, the following is a guide to proper submittal format:

Model

Item No.	Description	Manufacturer	No.
1.	Gate Valve	Nibco	T-113
2.	Etc.	Etc.	Etc.

The irrigation submittal list must be specific and complete. All items must be listed and should include solvent/primer, wire, wire connectors, valve boxes, etc. No copies of manufacturer's literature (catalog cuts) are required as submittal information.

3. The Contractor may submit substitutions for equipment and materials listed on the Drawings by following procedures as outlined in Section 1.6 of this Specification.
4. Equipment or materials installed or furnished without prior approval of the Owner's Authorized Representative may be rejected and the Contractor required to remove such materials from the site at no cost to the Owner.
5. Approval of any item, alternate or substitute indicates only that the product or products apparently meet the requirements of the Drawings and Specifications on the basis of the information or samples submitted.
6. Manufacturer's warranties shall not relieve the Contractor of his liability under the Guarantee. Such warranties shall only supplement the Guarantee.

B. Record Drawings or "As-Builts"

1. The Contractor shall provide and keep up to date at all times, a complete record set "as-builts" of blue line ozalid prints which shall be corrected daily and show every change from the original Drawings and Specifications and the exact installed locations, sizes, and kinds of equipment. Prints for this purposes may be obtained from the Owner's Authorized Representative at the Contractor's cost. "As-builts" shall be kept on the site and shall be used only as a record set.
2. "As-builts" shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. "As-builts" shall be available at all times for observation and shall be kept in a location easily accessible to the Owner's Authorized Representative. Should the "as-built" progress sheets not be available for review or not current at the time of any site visit by the Owner's Authorized Representative, it will be assumed no work has been completed and the Contractor will be assessed the cost of that site visit at the current billing rate of the Owner's Authorized Representative. No other site observations shall take place without prior payment of this assessment.
3. The Contractor shall make neat and legible notations on the "as-built" progress sheets daily as the work proceeds, showing the work as actually installed. For example, should a piece of equipment be installed in a location that does not match the Drawings, the Contractor must indicate that equipment has been relocated in a graphic manner so as to match the original symbols as indicated in the irrigation legend. The relocated equipment and dimensions will then be transferred to the original "as-builts" at the proper time.

4. Before the date of the Final Walkthrough, the Contractor shall transfer all information from the "as-built" prints to sepia mylar plans procured from the Owner's Authorized Representative at the Contractor's cost. All drafting shall be done with waterproof technical pen ink and applied to the sepia mylar by technical drafting pens made expressly for use on mylar surfaces. Dimensions shall be made on the sepia mylar so as to be easily readable even on the final irrigation controller chart. The original sepia mylar "as-builts" shall be submitted to the Owner's Authorized Representative for approval prior to the making of the irrigation controller charts.
5. The Contractor shall dimension from two (2) permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
    a. Connection to existing water lines.
    b. Connection to existing electrical power.
    c. Gate valves.
    d. Routing of sprinkler pressure lines.
    e. Sprinkler control valves.
    f. Routing of control wiring.
    g. Quick coupling valves.
    h. Other related equipment.
6. On or before the date of the Final Walkthrough, the Contractor shall deliver the corrected and completed sepia mylar "as-builts" to the Owner's Authorized Representative. Delivery of the sepia "as-builts" will not relieve the Contractor of the responsibility of furnishing required information that may be omitted from the "as-builts".

C. Irrigation Controller Charts
1. "As-built" drawings shall be approved by the Owner's Authorized Representative before irrigation controller charts are prepared.
2. Provide one irrigation controller chart for each irrigation controller supplied.
3. Each irrigation controller chart shall show the area controlled by that irrigation controller and shall be the maximum size of which the irrigation controller door will allow.
4. The irrigation controller chart is to be a reduced drawing of the actual installed irrigation system. In the event that the irrigation controller chart is not legible when the chart is reduced, it may be enlarged to a size that will be readable when reduced.
5. The irrigation controller chart shall be a 11” x 17” Xerox bond reduction with each valve station represented by a different color.
6. When completed, hermetically seal the irrigation controller chart between two pieces of 3 mil plastic with a 1/8” edge overlap.
7. Irrigation controller charts shall be completed and approved by the Owner's Authorized Representative prior to the Final Walk-through.

D. Operation and Maintenance Manuals

1. Prepare and deliver to the Owner's Authorized Representative within 10 calendar days prior to completion of irrigation installation, two (2) - 3 ring hard cover binders each containing the following information:
    a. Index sheets stating the Contractor's address and telephone number and a list of equipment with the name and addresses of local manufacturer's representatives.
    b. Catalog and part sheets on every material and equipment installed under this Contract.
    c. Guarantee statement.
    d. Complete operating and maintenance instruction on all major equipment.
2. In addition to the above mentioned maintenance manual, provide the Owner with on-site instructions for major equipment and show evidence in writing to the Owner's Authorized Representative at the conclusion of the Project that this service was rendered.

E. Equipment to be Furnished
1. Supply as a part of this Contract the following tools:
    a. Two (2) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on the Project.
    b. Two (2) five-foot valve keys for operation of gate valves.
    c. Two (2) keys for each automatic controller and irrigation controller enclosure.
    d. One (1) quick coupler key and matching hose swivel for every five (5), or fraction thereof, of each type of quick coupling valve installed.
2. The above mentioned equipment shall be turned over to the Owner at the conclusion of the Project. Before the Final Walk-through shall be performed, evidence that the Owner has received this material must be shown to the Owner's Authorized Representative.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handling of PVC Pipe and Fittings
1. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing of PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which 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 at no cost to the Owner.

1.8 SUBSTITUTIONS

A. If the Contractor wishes to substitute any equipment or materials for those equipment or materials listed on the Drawings and Specifications, he may do so by providing the following information to the Owner's Authorized Representative for approval:

1. Provide a statement indicating the reason for making the substitution. Use a separate sheet of paper for each item to be substituted.
2. Provide descriptive catalog literature, performance charts and flow charts for each item to be substituted.
3. Provide the amount of cost savings if the substituted item is approved.

B. The Owner's Authorized Representative shall have the sole responsibility in accepting or rejecting any substituted item as an approved equal to those equipment and materials listed on the Drawings and Specifications.

1.9 PRIOR TO START OF THE LANDSCAPE MAINTENANCE PERIOD

A. The Contractor shall submit proof of warranty to the Owner's Authorized Representative prior to the start of the landscape maintenance period. All computerized irrigation control system materials except interconnect conductors shall have a five-year warranty. It is the Contractor's responsibility to obtain the necessary warranty inspections from the equipment supplier. No installations will be accepted without proof of warranty.

1.10 GUARANTEE

A. The Guarantee for the irrigation system shall be made in accordance with the attached form.

B. A copy of the Guarantee form shall be included in the Operations and Maintenance Manual.

C. The Guarantee form shall be re-typed onto the Contractor's letterhead and contain the following information:

1.11 GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

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

PROJECT:

LOCATION:

SIGNED:

ADDRESS:

PHONE:

DATE OF ACCEPTANCE:

1.12 RULES AND REGULATIONS

A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.

1.13 PROTECTION OF WORK AND MATERIALS

A. The Contractor shall protect his work and work of others for the duration of the Contract. He shall protect pipes and fittings from direct sunlight, and avoid undue bending and any concentrated external loading. Pipe or fittings that have been damaged shall not be used.

B. The Contractor shall exercise extreme care in excavating and working near existing utilities. Damage to utilities which are caused by contractor's operation shall be the Contractor's responsibility.

C. The Contractor shall take necessary precautions to protect site conditions and plant material that is to remain. Should damage to incurred, Contractor shall repair damage to its original condition or furnish and install equal replacements.

D. All existing irrigation systems shall be kept in operation at all times. If the existing system is damaged by Contractor, he shall be responsible for immediate repair of such damage. After each repair, all heads of the repaired system shall be removed so that the lines can be cleared of all dirt and foreign matter.

1.14 CORRECTION OF WORK

A. Any and all discrepancies of unsatisfactory work shall be corrected by the Contractor at no additional expense to the Owner. The correction of work shall be finished with a reasonable period mutually agreed upon between the Owner and Contractor.

PART 2 - PRODUCTS

2.1 GENERAL

A. Use only new materials of brands and types noted on the Drawings or Specifications.

2.2 PVC PRESSURE MAIN LINE PIPE AND FITTINGS

A. Pressure main line piping for sizes 2" and larger, shall be PVC Class 315.

B. Class 315 pipe shall be made from an NSF approved Type I, Grade I, PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements as set forth in ASTM D2241 (Solvent-weld Class Pipe), with an appropriate standard dimension (S.D.R.).

C. Pressure main line piping for sizes 1-1/2" and smaller shall be PVC Schedule 40 with solvent welded joints.

D. Schedule 40 pipe shall be made from NSF approved Type I, Grade I PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements as set forth in ASTM D1785 (Solvent-weld Schedule Pipe).

E. PVC solvent-weld fittings shall be Schedule 40, 1-2, II-I NSF approved conforming to ASTM test procedure D2466.

F. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of type and installation methods prescribed by the manufacturer.

G. All PVC pipe must bear the following markings:
   1. Manufacturer's name.
   2. Nominal pipe size.
   3. Schedule or class.
   4. Pressure rating in PSI.
   5. NSF (National Sanitation Foundation) approval.
   6. Date of extrusion.

H. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval.

2.3 PVC NON-PRESSURE LATERAL LINE PIPING

A. Non-pressure buried lateral line piping shall be PVC class 200 with solvent-welded joints.

B. Non-pressure lateral line piping installed under paved areas shall be installed in a PVC Schedule 40 sleeve.

C. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements set forth in ASTM D2241 (Solvent-weld Class Pipe) with an appropriate standard dimension ratio.

D. Except as noted in paragraphs A, B, C and D of Section 2.2, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as set forth in this Specification.

2.4 BRASS PIPE AND FITTINGS

A. Where indicated on the Drawings, use red brass screwed pipe conforming to Federal Specification #WW-P-351.

B. Fittings shall be red brass conforming to Federal Specification #WW-P-460.

2.5 GALVANIZED PIPE FITTINGS

A. Where indicated on the Drawings, use galvanized steel pipe ASA Schedule 40 mild steel screwed pipe.

B. Fittings shall be medium galvanized screwed beaded malleable iron, or Class 150 flanged steel with Corten bolts where required. Galvanized couplings may be merchant coupling.

C. All galvanized pipe and fittings installed below grade shall be painted with two (2) coats of Koppers #50 bitumastic. Or cover pipe with 2 layers of plastic, self-adhesive, pipe wrap, 2 mils thick, as manufactured by 3M Company or equivalent.

D. Use non-hardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on all metal threaded connections.

2.6 GATE VALVES

A. Gate valves 3" and smaller shall be 125 lb. SWP bronze ball gate valve with blow-out proof and full port.

B. Gate valves 3" and smaller shall have threaded ends and shall be equipped with a bronze handle.

C. Gate valves 3" and smaller shall be similar to those manufactured by Hammond or equivalent.

D. All gate valves shall be installed per irrigation installation details.

2.7 QUICK COUPLING VALVES

A. Quick coupling valves shall have a brass two-piece body designed for a working pressure of 150 PSI, operable with quick coupler. Key size and type shall be as indicated on the Drawings.

2.8 CHECK VALVES

A. Swing check valves 2" and smaller shall be 200 pound WOG bronze construction with replaceable composition, neoprene or rubber disc and shall meet or exceed Federal Specification WW-V- 51D, Class A, Type IV.

B. Check valves shall be of heavy duty virgin PVC construction with FIP threaded inlets and outlets. Internal parts shall be stainless steel and neoprene. Check valves shall be field adjustable against draw-out from 5 to 40 feet of head. Check valves shall be similar to the King Bros. Industries "CV" series, or equivalent.

2.9 CONTROL WIRE

A. Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire AWG-U.F. 600 volt. Pilot wires shall be a different color wire for each automatic controller. Common wires shall be #12 gauge and the color white with a different color stripe for each automatic controller. Install wires in accordance with valve manufacturer's specifications and wire charts. In no case shall wire size be less than #14 gauge. Wire color shall be continuous over its entire length.

B. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible.

C. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of 10 feet.

D. An expansion curl shall be provided within three (3) feet of each wire connection. Expansion curl shall be of sufficient length at each splice connection at each electric control, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wires. Control wires shall be laid loosely in the trench without stress or stretching of the control wire conductors.

E. All splices shall be made with either Scotch-Lok #3576 Connector Sealing Packs or Rain Bird Snap-Tite wire connector, or equivalent. Use one splice per connector sealing pack.

F. Field wire splices between the automatic controller and the electrical control valves shall not be allowed without prior approval of the Owner's Authorized Representative.

G. When control wiring is trenched separately from mainline trenches a continuous warning tape shall be installed with the wiring. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored yellow, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."

H. Provide a 36-inch excess length of wire in an 8-inch diameter loop at each 90 degree change of direction, at both ends of sleeves, and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop.

I. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install one common wire for each controller. Multiple controllers with one common wire will not be permitted.

2.10 AUTOMATIC IRRIGATION CONTROLLERS

A. Automatic irrigation controllers shall be of the size and type as that indicated on the Drawings.

B. Final location of automatic irrigation controllers shall be approved by the Owner's Authorized Representative.

C. Unless otherwise noted on the Drawings, the 120 volt electrical power to the automatic irrigation controller shall be furnished by others. The final electrical hook-up shall be the responsibility of the Contractor.

D. The automatic irrigation controller shall be included as a part of the Irrigation Controller Enclosure Assembly.

2.11 ELECTRICAL CONTROL VALVES

A. All electric control valves shall be the same manufacturer as the automatic controllers unless noted otherwise on the Drawings.

B. All electric control valves shall have a manual flow adjustment.

C. Provide and install one (1) control valve box for each electric control valve.

2.12 VALVE BOXES

A. Use a 10" diameter x 10-1/4" round valve box for gate valves, control wire splices and quick coupling valves as manufactured by Carson-Brooks Plastics, model #910-13B with green bolt-down cover or equivalent. Extension sleeves shall be 6" minimum PVC piping material.

B. Use a 11 3/4" wide x 17" long x 12" deep rectangular valve box for electrical control valves, master valves, and control wire pull boxes, as manufactured by Carson-Brooks Plastics, model #1419-12-3B with a green bolt-down cover or equivalent.

C. Valve boxes shall be a minimum of one (1) foot apart when arranged in a group or side by side, or unless noted otherwise in the Drawings.

2.13 SPRINKLER HEADS

A. All sprinkler heads shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw, pressure, and discharge as shown on the Drawings and in this Specification.

B. Spray heads shall have a screw adjustment and a purple NP cover.

C. Riser units shall be fabricated in accordance with the Drawings.

D. Riser nipples for all sprinkler heads shall be the same size as the riser opening in the sprinkler body.

E. All sprinkler heads of the same type shall be from the same manufacturer.

2.14 IDENTIFICATION TAGS

A. Identification tags for electrical control valves, and other equipment assemblies as designated on Drawings, shall be manufactured from Polyurethane Behr Desopan. Use Christy's standard tag hot stamped with black letters on yellow background. The tags shall be numbered to match station identification as indicated on Drawings. Provide one (1) tag for each electric control valve.

B. Special order tags from T. Christy Enterprises, (714)771-4142.

2.15 IRRIGATION CONTROLLER ENCLOSURE ASSEMBLY

A. The irrigation controller shall be as specified on the plan.

B. The stainless steel back board shall be bolted to the housing to provide a base for mounting the irrigation controller and terminal strip.

C. The irrigation controller enclosure assembly shall be equipped with a 120 volt duplex box with an on/off switch, and 120 volt receptacle. Metal conduit shall run from the 120 volt supply to the irrigation controller housing. All power within the housing shall be properly phased.

D. The irrigation controller enclosure assembly shall be equipped with a pre-wired terminal strip clearly indicating the proper points of connection of all appropriate wiring, i.e. station valves, master valve, common and central control.

2.16 SLEEVING

A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.

B. Sleeving material beneath pedestrian pavements - PVC Schedule 40 pipe with solvent welded joints.

C. Sleeving beneath streets and drives - PVC Schedule 40 pipe with solvent welded joints.

D. Sleeving diameter - equal to twice that of the pipe or wiring bundle. Minimum sleeving diameter shall be 2 inches.

E. Marking stakes - 2" x 2" x 24" wood stakes.

2.17 OTHER COMPONENTS

A. Tools and Spare Parts
   1. Provide operating keys, servicing tools, test equipment, other items, and spare parts as indicated in other areas of this Specification.

B. Other Materials
   1. Provide other materials or equipment not indicated on the Drawings or referenced in this Specification, as necessary, to complete the installation of the irrigation system.

PART 3 - EXECUTION

3.1 GENERAL

A. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and receive the Owner's Authorized Representative's approval prior to proceeding with any work under this Specification. Contractor shall locate with 2" x 2" wood stakes with identifying markings for all proposed locations of electrical control valve boxes, gate valve boxes and quick coupler boxes for approval by the Owner's Authorized Representative. After locating all these items contact the Owner's Authorized Representative for review and approval. Minor adjustments to

the stake locations may be requested of the Contractor by the Owner's Authorized Representative at that time.

B. Exercise extreme care in excavating and working near existing utilities. The Contractor shall be responsible for damages to these utilities which are caused by his operations. Check existing utility drawings for existing utility locations.

C. Coordinate installation of sprinkler irrigation materials including pipe, so that there shall be no interference with utilities, construction elements, or the planting of trees, shrubs, and ground covers.

D. The Contractor shall carefully check all finish grades to satisfy himself that he may safely proceed before starting work on the irrigation system.

E. Report irregularities to Owner's Authorized Representative prior to beginning work. Beginning of work implies acceptance of existing conditions.

3.2 SITE PREPARATION

A. Physical Layout
   1. Prior to installation, the Contractor shall stake out all pressure and non-pressure supply lines and the location of all sprinkler heads.
   2. All layout shall be approved by the Owner's Authorized Representative prior to installation.

B. Water Supply Point-of-Connections
   1. Water supply points of connection are as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.
   2. The sprinkler irrigation system shall be connected to water supply points of connection as indicated on the Drawings.

C. Electrical Supply Point-of-Connections
   1. Electrical supply point-of-connections for the automatic irrigation controllers are as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.
   2. Connections shall be made at approximate locations as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.

3.3 INSTALLATION

A. Trenching
   1. Dig trenches straight and support pipe continuously on bottom of trench. Lay pipe to an even grade. Trenching excavation shall follow the layout as indicated on the Drawings.
   2. Provide a minimum soil cover of 18 inches for all pressure supply lines.

3. Provide a minimum soil cover of 12 inches for all non- pressure lines.
4. Provide a minimum soil cover of 18 inches for all control wire.
5. Where piping is indicated under paved areas, but running parallel and adjacent to planting areas, install the piping in the planted areas. Irrigation head spacing as indicated on the Drawings shall not be exceeded.

B. Backfilling
1. The trenches shall not be backfilled 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 landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.
2. A fine granular material backfill shall be initially placed over all lines. No foreign matter larger than one-half inch in size will be permitted in the initial backfill.
3. Flooding of trenches will be permitted only with the approval of the Owner's Authorized Representative.
4. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, planting, or other construction elements are necessary, the Contractor shall make all required adjustments without cost to the Owner.

C. Trenching and Backfilling Under Paving
1. Trenches located under areas where asphaltic concrete or concrete paving occur, shall be backfilled with sand (a layer six (6) inches below the pipe and three (3) inches above the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm unyielding condition. All trenches shall be left flush with adjoining finish grade. The Contractor shall set in place, cap and pressure test all piping under paving prior to the paving work.
2. Generally piping under existing walks is done by jacking, boring or hydraulic driving, but where any cutting or breaking of concrete is necessary, it shall be done and replaced by the Contractor at no cost to the Owner. Permission to cut or break concrete shall be obtained from the Owner's Authorized Representative. No hydraulic driving will be permitted under concrete paving.
3. Provide a minimum soil cover of 18 inches between the top of the pipe and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete paving.

D. Assemblies
1. Routing of irrigation lines as indicated on the Drawings is diagrammatic only. Install lines and various assemblies in such a manner as to conform with the Drawings.

2. Install no multiple assemblies in plastic lines. Provide each assembly with its own outlet.
3. Install all assemblies specified herein in accordance with their respective details. In absence of Drawings or Specifications pertaining to specific items required to complete this work, perform such work in accordance with best standard practice with prior approval of the Owner's Authorized Representative.
4. 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.
5. On PVC to metal connections work the metal connections first. Teflon tape or approved equal, shall be used on all threaded PVC to PVC and threaded PVC to metal joints. Apply a light wrench pressure only. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be solvent welded.

E. Assembling Pipe and Fittings:
1. Inspect all pipe and fittings before installation.
2. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends of loose pipe shavings.
3. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
4. Install pipe with all markings up for visual inspection and verification.
5. All lines shall have a minimum clearance of six (6) inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.
6. Maintain 10 foot minimum horizontal separation from all potable water piping. Where reclaimed and potable water pressure main line piping cross, the reclaimed water piping shall be installed below the potable water piping on a PVC Class 200 pipe sleeve which extends a minimum of five (5) feet on either side of the potable water piping. Provide a minimum vertical clearance of six (6) inches.
7. Use only strap-type friction wrenches for threaded plastic pipe.
8. Snake pipe from side to side within the trench.

F. Line Clearance
1. All lines shall have a minimum clearance of six (6) inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.

G. Irrigation Controller Installation
1. Install the irrigation controller per the manufacturer's instructions. Remote control valves shall be connected to the irrigation controller in numerical sequence as indicated on the Drawings.

H. High Voltage Wiring for the Irrigation Controller

1. 120 volt power connection to the irrigation controller shall be provided by the Contractor.

I. Electric Control Valve Installation
   1. Install electric control valves as indicated on the Drawings. When grouped together, allow at least twelve inches between electric control valves. Install each electric control valve in a separate valve box. Each electric control valve number shall be heat-branded on valve box top with 2" tall letters.
   2. The Owner's Authorized Representative shall approve electric control valve and quick coupling valve box locations prior to final installation.

J. Valve Box Installation
   1. Install valve boxes as indicated on the Drawings. When grouped together, allow at least twelve inches between valve boxes.
   2. Heat brand valve box identification as indicated on Drawings. Heat branding unit available from Hydro-Scape Products, Inc., phone number (714) 639-1850.

K. System Flushing
   1. After all pipe lines and risers are in place and connected and all necessary diversion work has been completed, and prior to installation of sprinkler heads, the control valves shall be opened and a full head of water used to flush out the system. Sprinkler heads shall be installed only after flushing of the system has been performed.

L. Sprinkler Head Installation
   1. Install the sprinkler heads as indicated on the Drawings.
   2. Spacing of sprinkler heads shall not exceed the maximum spacing as indicated on the Drawings. In no case shall the spacing exceed the maximum recommended by the manufacturer.
   3. Install check valves on sprinkler heads that drain water after the control valve is turned off. "Low head" drainage will not be allowed on sprinkler heads.

M. Sleeving
   1. Extend sleeve ends a minimum of 12 inches beyond the edge of the paved surface. Cover pipe ends and mark with stakes. Route wire through and tie at each end to stakes.

3.4 TEMPORARY REPAIRS

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

3.5 INSTALLATION OF OTHER COMPONENTS

A. Tools and Spare Parts
   1. Prior to the Pre-Maintenance Walk-through, supply the Owner operating keys, servicing tools, test equipment, and any other items as indicated on the Drawings.

B. Other Materials
   1. Install other materials or equipment to be part of the irrigation system, as indicated on the Drawings, even though such items may not have been referenced in this Specification.

3.6 EXISTING TREES

A. Where it is necessary to excavate adjacent existing trees, the Contractor shall use all possible care to avoid injury to trees and their roots. Excavation in areas where two (2) inch and larger roots occur shall be done by hand. All roots two (2) inches and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped with burlap, to prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than two (2) inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed. Roots one (1) inch and larger in diameter shall be painted with two coats of an approved tree seal. Trenches adjacent to existing trees should be closed within 24 hours. Where this is not possible, the side of the trench adjacent to the existing tree shall be kept shaded with burlap or canvas.

3.7 FIELD QUALITY CONTROL

A. Adjustment of the Irrigation System
   1. Flush and adjust all sprinkler heads for optimum performance and to reduce overspray onto walks, roadways, and buildings as much as possible.
   2. If it is determined that adjustments to the sprinkler heads will provide proper and more adequate coverage, the Contractor shall make such adjustments prior to any planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.
   3. Lowering raised sprinkler heads by the Contractor shall be accomplished within 10 days after notification by the Owner's Authorized Representative.
   4. All sprinkler heads shall be set perpendicular to finish grades unless otherwise indicated on the Drawings.

B. Irrigation System Testing
   1. The Contractor shall request the presence of the Owner's Authorized Representative at least 48 hours in advance of irrigation system testing.
   2. Test all pressure lines under hydrostatic pressure of 150 PSI for a period of threee (3) hours.

Note: Testing of pressure mainline shall occur prior to installation of any electric control valves.

3. All piping (pressure and non-pressure) under paved areas shall be pressure tested under a hydrostatic pressure of 150 PSI for a period of three (3) hours.
4. If during the pressure test, a pressure drop occurs - indicating a leak, replace the faulty joints and repeat the pressure test until the entire system is proven watertight.
5. All hydrostatic tests shall be made only in the presence of the Owner's Authorized Representative. No pipe shall be backfilled until it has been observed, tested and approved in writing.
6. The Contractor is to furnish the necessary force pump and all other test equipment for the hydrostatic pressure test.
7. When the irrigation system passes the hydrostatic pressure test and is completed, perform a sprinkler coverage test in the presence of the Owner's Authorized Representative. Determine if the water coverage is complete and adequate. Furnish all materials and perform all work necessary to correct any inadequacies of water coverage due to deviations from the Drawings, or where the irrigation system has been willfully installed as indicated on the Drawings when it is obviously inadequate, without bringing this to the attention of the Owner's Authorized Representative. This test shall be accomplished before any groundcover or turf is planted.
8. Upon completion of each phase of work, the entire system shall be coverage tested and adjusted to meet specific site requirements.

3.8 IRRIGATION SYSTEM MAINTENANCE

A. The entire irrigation system shall be under full, automatic operation for a period of seven (7) days prior to beginning any planting. The Owner reserves the right to waive or shorten this operation period.

3.9 CLEAN UP

A. Clean up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broom swept or washed down, and any damage sustained to the work of other contractors shall be repaired to original conditions at no cost to the Owner.

B. Upon completion of the Work, the Contractor shall smooth all ground surfaces. Remove excess materials such as rubbish, debris and sweep adjacent streets, curbs, gutters, walkways and trails. Remove construction equipment from the premises.

3.10 FINAL WALK-THROUGH PRIOR TO ACCEPTANCE

A. The Contractor shall operate the irrigation system in its entirety for the Owner's Authorized Representative at time of the Final Walk through. Any items deemed not

acceptable by the Owner's Authorized Representative shall be reworked to the his complete satisfaction.

B. The Contractor shall show evidence to the Owner's Authorized Representative that the Owner has received all accessories, charts, "As-built drawings", and equipment as required before the Final Walk through will be performed.

3.11 SITE VISIT OBSERVATION SCHEDULE

A. The Contractor shall be responsible for notifying the Owner's Authorized Representative in advance of the following site visits:
   1. Pre-Job or "Kick-Off" meeting - 7 days.
   2. Pressure supply line installation and testing - 2 days.
   3. Automatic controller installation - 2 days.
   4. Control wire installation - 2 days.
   5. Lateral line and sprinkler head installation - 2 days.
   6. Sprinkler coverage test - 2 days.
   7. Final Walkthrough - 7 days.

B. When site visits are conducted by other than the Owner's Authorized Representative, show evidence in writing of when and by whom these site visits were made.

C. No site visits will commence without "As-builts". In the event the Contractor schedules a site visit without "As-builts" or without completing previously noted corrections, or without preparing the system for said visit, the Contractor be responsible for reimbursing the Owner's Authorized Representative at his current billing rate per hour portal to portal (plus transportation costs) for this inconvenience. No further site visits will be performed by the Owner's Authorized Representative until this charge has been paid and received.

END OF SECTION

SECTION 02840
PARKING STRIPING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install parking lot striping as indicated on Drawings and as specified herein.

A. Work included in this Section:
   1. Parking lot striping.

B. Work related in other Sections:
   1. Section 02740 - Asphaltic Concrete Paving.

1.3 SUBMITTALS

A. Submit color sample of striping paint for Owners.

PART 2 - PRODUCTS

2.1 TRAFFIC PAINT

A. Conform to requirements of City of Chino, County of Riverside and State of California.

B. Paint Color: Standard black.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Preparation: Clean surface of asphalt to be striped with compressed air or other effective means, immediately before starting painting operations.

B. Paint Application: Specified dimensions, with clean, true edges and without sharp breaks in alignment. Obtain a uniform coating of paint, containing finished markings with no light spots or paint skips.

C. Minimum rate of application for painted 4-inch wide solid parking stall stripes: 16.5 gallons per mile of striping.

D. Required Film Thickness: 15 mils.

END OF SECTION

SECTION 02900
LANDSCAPE PLANTING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The requirements of the "General Conditions of the Contract" and of Division 1, "General Requirements", shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish all materials, labor, transportation, services, and equipment necessary to install landscape planting as shown on the Drawings and as specified herein.

B. Work included in this Section:
1. Fine grading.
2. Soil preparation.
3. Pre-plant weed control.
4. Tree, shrub and ground cover planting.
5. Tree staking and guying.
6. Turf sodding.
7. Wood mulching.
8. Rubberific Mulch.
9. Gravel aggregate mulching.
10. Headerboard installation.
11. Clean up.

C. Work related in other Sections:
1. Portland Cement Concrete Paving - Section 02520.
2. Irrigation System - Section 02810.
3. Landscape Maintenance - Section 02970.
4. Concrete Unit Masonry - Section 04220.

1.3 DEFINITIONS

A. The Owner's Authorized Representative in this Section will refer to the Landscape Architect.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain

materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.5 REFERENCE STANDARDS

A. All plant material shall be true to botanical and common name as indicated in "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington", (Number 4091)" published by the University of California School of Agriculture - 1979.

B. "American Standard for Nursery Stock" edition 1985 by The American National Standards Institute for plant materials.

C. Hortus Third", 1976; Cornell University for plant nomenclature.

D. All plant material shall conform to the California State Department of Agriculture's regulation for nursery inspections, rules and ratings.

1.6 QUALITY CONTROL

A. Manufacturer's Directions - manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification furnish directions covering points not shown in the Drawings and Specifications.

B. Permits, Fees, Bonds and Inspections - the Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the Work.

C. Plant Source Quality - submit written documentation to the Owner's Authorized Representative within 25 days of Contract award that the plant material listed on the Drawings is available. Any substitutions required due to unavailability must be requested in writing prior to confirmation of ordering.

D. Upon execution of the order, the Owner's Authorized Representative has the option of either inspecting the plant material at the source of growth, requesting representative color photos, or inspecting the material as it is being delivered to the site for conformity to the Drawings and Specifications. Such approvals shall not impair the right of additional inspections during further progress of the Work.

E. Any tagging of plant material by the Owner's Authorized Representative does not constitute his approval of the plant materials' health and vigor. The health and vigor of the plant material is the sole responsibility of the Contractor.

F. Plant Inspection Request

1. Submit written request to the Owner's Authorized Representative for inspection of the specified plant material, either at the place of growth or by color photographs. Requests for inspection shall state the place of growth and the quantity and variety of plant material.
2. The Owner's Authorized Representative reserves the right to refuse inspection if in his judgment, a sufficient quantity of plant material at that time is not available for inspection.

G. Topsoil Inspection
1. Within 25 days of contract award, furnish source of topsoil to the Owner's Authorized Representative for purpose of soil inspection.
2. Take two (2) representative soil samples from the site.
3. Soil samples shall be tested for pH, alkalinity, total soluble salts, porosity, sodium content, organic matter and soil preparation recommendations.

1.7 QUALIFICATIONS

A. Hydroseeding - hydroseeding to be applied by an approved hydromulch company.

B. The applicator of all weed control materials shall be licensed by the State of California as a Pest Control Operator and a Pest Control Advisor in addition to any subcontractor licenses that are required.

1.8 SUBMITTALS

A. The Contractor shall submit no later than 30 days after the award of Contract (2) bound booklets containing the following landscape information:
1. List of all proposed landscape materials indicated by description, manufacturer and model number. Include catalog cuts of all items.
2. List of all trees indicated by botanical name, common name, quantity, size, nursery and location and any specific remarks, i.e. "unable to locate", "photo submitted", etc. The tree list is to be accompanied with color photographs of each tree type and size with specifications, i.e. height, spread and caliper. Include a person in each photograph for scale purposes.
3. List of all shrubs, vines and ground covers indicated by botanical name, common name, size, nursery and location and specific remarks, i.e. "unable to locate", "photo submitted", etc.
4. Soil amendment receipts containing analytical data and physical samples of all specified amendments.
5. Receipts from the soil supplier of all soil mixes specified in this section.

B. The Contractor shall submit no later than 30 days after the award of Contract the following physical samples sent to the Owner's Authorized Representative in plastic bags:
1. Gravel aggregate mulch.
2. Rubberific (TM) mulch.

3. Certificates
4. Turf Grower Certification
5. Turf species and location of field from where the sod will be cut.
6. Compliance with State of California and federal quarantine restrictions.

C. Weed Control
1. Prior to the installation of any weed control materials, the Pest Control Advisor shall submit to the Owner's Authorized Representative, a list of the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site.
2. The Pest Control Advisor shall furnish data to demonstrate the compatibility of the weed control materials and methods with the intended planting and seed varieties.

1.9 SUBSTITUTIONS

A. Substitutions shall be in accordance with Division 1.

B. Specific reference to manufacturer's names and products specified in this Specification are used as standards of quality, this implies no right to the Contractor to substitute other materials without prior written approval by the Owner's Authorized Representative.

C. Any materials installed without written approval by the Owner's Authorized Representative may be rejected.

D. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.

1.10 SAMPLES, TESTS AND MOCK-UPS

A. The Owner's Authorized Representative reserves the right to take and analyze selected samples of plant material for conformity to this Specification at any time. Rejected plant material shall be removed from the site and be replaced by the Contractor at no cost to the Owner.

1.11 PROJECT CONDITIONS

A. Perform planting operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.12 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Deliver all plant material with legible and durable identification labels.
2. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's name, guaranteed chemical analysis, and its conformance to California State Law.
3. Notify the Owner's Authorized Representative within seven (7) days of the delivery of plant material to the site. Indicate the quantity and type of plant material in each delivery.

B. Storage
1. Store plant materials in the shade and protect from the weather.
2. Maintain and protect plant material not planted within four (4) hours of delivery.

C. Protection
1. Protect plant material during delivery and to the site and after, in order to prevent damage to the root ball or desiccation of leaves.

D. Handling
1. Take extreme care in the loading and unloading of plant material. Do not pick up container plants by the stems or trunks.
2. Any plant material that has been damaged due to mishandling shall be removed and replaced with new material.

1.13 REJECTION OF PLANT MATERIAL

A. All plant material not conforming to the requirements herein, shall be considered defective. Such plants, whether in place or not, shall be marked as rejected and immediately removed from the site and replaced with new material at the full expense of the Contractor. Replacement plant material shall be of the same size, specie and condition as that indicated on the Drawings.

1.14 PROTECTION OF THE SITE

A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.

B. The Contractor shall be responsible for any damage resulting from his landscape planting operations. Repair damage and return the area to the previous condition at no additional cost to the Owner.

1.15 COORDINATION

A. The Contractor shall notify the General Contractor and all other trades related to the installation of his work, so as to allow sufficient time for those contractors' to perform their portion of the work.

B. Determine the locations of underground utilities and perform work in a manner which will avoid damage to the utilities.

1.16 GUARANTEE

A. The manufacturer's warranty shall not relieve the Contractor of his own liability under the guarantee. Such warranties shall only supplement the guarantee.

B. All plant material installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of 1 year from the date of Final Acceptance. Any plant material not meeting the satisfaction of the Owner's Authorized Representative shall immediately be removed and replaced at no cost to the Owner. Replaced plant material will also be guaranteed for a period of 1 year upon installation.

C. Replace without cost to the Owner and as soon as weather permits, all dead plants and all plants not found in a vigorous, thriving condition, as determined by the Owner's Authorized Representative during and at the end of the plant warranty period. Replacement of plants shall closely match adjacent specimens of the same specie and shall be subject to all requirements of this section.

D. Repair damage to adjacent plant material caused by the Contractor's work at no cost to the Owner. All repairs shall be made with materials, varieties, sizes "in kind" with adjacent existing materials.

PART 2 - PRODUCTS

2.1 PRE-EMERGENT WEED CONTROL

A. Pre-emergent weed control to be Ronstar-G, Treflan, Eptam, Vegitex, or approved equal.

2.2 PLANTING SOIL

A. Reuse of Stockpiled On-Site Soil

Stockpiled on-site soil may be available from the Owner's stockpile for use. Soils for turf beds are classified as 3/8" minus. Soils for miscellaneous landscape areas are classified as 2-inch minus.

B. Soil Characteristics for Stockpiled Native Soil

1. Composition for 3/8-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 3/8" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
2. Composition for 2-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 2" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
3. Soil Analysis - If soil has not been tested within 30 days of the date of delivery to the project, obtain an agricultural suitability and chemical analysis of the proposed soil from a company as determined by the Owner's Authorized Representative. Cost of the testing will be paid for by the Contractor. The soil report is to include the following information:
4. Elemental Analysis: Nitrate Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulfur, Sodium Zinc, Iron, Copper, Manganese, Boron and free Lime.
5. Other: pH factor, % base saturation, electrical conductivity, mechanical analysis, % of organic content, cation exchange capacity (C.E.C.).
6. Recommendations: Type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring topsoil to a satisfactory level for planting.
7. All stockpiled native soil to be used from 3/8-inch minus topsoil is to be amended at the levels listed in this Section as part of the base bid. Additional amendments, if requested by the Owner's Authorized Representative are not part of the contract and the Contractor will be compensated for this work on a Time and Materials basis. Rates for labor and equipment will be charged according to the Construction Contract.

2.3 SOIL AMENDMENTS

A. Peat Moss - natural product of sphagnum moss, reed, or sedge peat, taken from a fresh water site, free from lumps, woody material, stones and other foreign matter.

B. Soil Sulfur - agricultural grade sulfur containing a minimum of 99% sulfur (expressed as elemental).

C. Iron Oxide - 45% iron (expressed as metallic iron), derived from iron oxide with micronutrients.

D. Calcium Carbonate - 95% lime as derived from oyster shells.

E. Gypsum - agricultural grade product containing 98% minimum calcium sulfate.

F. Iron Sulfate - 20% iron (expressed as metallic iron), derived from ferric and ferrous sulfate, 100% sulfur (expressed as elemental).

G. Ground Limestone - agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass a #1000 sieve and 90% will pass a #20 sieve.

H. Dolomite Lime - agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum carbonate, 100% passing the #65 sieve.

I. Sulfate of Potash - agricultural grade product containing 50% to 53% of water soluble potash.

J. Single Superphosphate - commercial grade product containing 20% to 25% available phosphoric acid.

K. Ammonium Sulfate - commercial grade product containing approximately 21% ammonia.

L. Ammonium Nitrate - commercial grade product containing approximately 34% ammonia nitrogen.

M. Urea Formaldehyde - granular commercial product containing 38% nitrogen.

N. IBDU (Iso Butldiene Diurea) - commercial grade product containing 31% nitrogen.

O. Iron: Gro-Power Premium Green Iron - 45% Fe, non-staining.

2.4 FERTILIZERS

A. General Purpose Soil Conditioner Fertilizer (5-3-1)

1. Consisting of the following minimum percents by weight:
   - 5% Nitrogen
   - 3% Phosphoric Acid
   - 1% Potash
   - 50% Humus
   - 15% Humic Acids
   - 1% Soluble Metallic Iron
2. Soil Conditioner Fertilizer shall be "Gro-Power Plus", as manufactured by Gro-Power (909)393-3744.
3. General Purpose Soil Conditioner Fertilizer with Soil Penetrant (5-3-1)
4. Soil conditioning fertilizer for use in areas of clay, adobe soils or soils high in salt, sodium boron or pH consisting of the following minimum percents by weight:
   - 5% Nitrogen
   - 3% Phosphoric Acid
   - 1% Potash
   - 50% Humus
   - 15% Humic Acids
   - 4% Sulfur
   - 1% Soluble Metallic Iron

5. Soil Conditioner Fertilizer shall be "Gro-Power Plus with 4% Sulfur", as manufactured by Gro-Power (909)393-3744.

B. Pre-Plant Fertilizer (16-20-0)
   1. Ammonium phosphate consisting of the following minimum percentages by weight:
      16% Nitrogen
      20% Phosphoric Acid
      0% Potash
   2. Pre-Plant Fertilizer shall be Best "16-20-0", as manufactured by J.R. Simplot Company (800)992-6066, or approved equal.

C. General Purpose Planting Fertilizer (12-12-12)
   1. Pelleted or granular form shall consist of the following minimum percents by weight:
      12% Nitrogen
      12% Phosphoric Acid
      12% Potash
   2. General Purpose Planting Fertilizer shall be Best "Triple Twelve", as manufactured by J.R. Simplot Company (800)992-6066, or approved equal.

D. General Turf Fertilizer (16-6-8)
   1. Consisting of the following minimum percents by weight:
      16% Nitrogen
      6% Phosphoric Acid
      8% Potash
   2. General Turf Fertilizer shall be Best "Turf Supreme", as manufactured by J.R. Simplot Company (800)992-6066, or approved equal.

E. Hydroseeding Fertilizer - for previously soil prepped areas (14-4-9)
   1. Pelleted or granular form shall be installed initially in the hydroseed slurry mix and consist of the following minimum percents by weight:
      14% Nitrogen
      4% Phosphoric Acid
      9% Potash
      30% Humus
      6% Humic Acid
      3% Sulfur
   2. Hydroseeding Fertilizer shall be "Gro-Power Hi Nitrogen" as manufactured by Gro-Power (909)393-3744.

F. Hydroseeding Fertilizer - for non-prepped slope areas (12-8-8)
   1. Consisting of the following minimum percents by weight:
      12% Nitrogen
      8% Phosphoric Acid
      8% Potash

25% Humus
5% Humic Acids

2. Hydroseeding Fertilizer - for non-prepped slope areas shall be "Gro-Power Controlled Release", as manufactured by Gro-Power (909)393-3744, or approved equal.

G. Hydroseeding Fertilizer - for non-prepped slope areas (5-3-1)

1. Consisting of the following minimum percents by weight:
   5% Nitrogen
   3% Phosphoric Acid
   1% Potash
   50% Humus
   15% Humic Acids
   1% Soluble Metallic Iron
2. Hydroseeding Fertilizer - for non-prepped slope areas shall be "Gro-Power Plus", as manufactured by Gro-Power (909)393-3744, or approved equal.

H. Controlled Release Fertilizer (12-8-8)

1. Consisting of the following minimum percents by weight:
   12% Nitrogen
   8% Phosphoric Acid
   8% Potash
   25% Humus
   5% Humic Acids
2. Acceptable product - "Gro-Power Controlled Release", as manufactured by Gro-Power (909)393-3744, or approved equal.

I. Planting Tablets (12-8-8)

1. Shall be 21 gram, 24 month release, non-burning tablets containing the following percentages of nutrients by weight:
   20% Nitrogen
   10% Phosphoric Acid
   5% Potash
   10% Humus
   2% Humic acids
2. Acceptable product - "Gro-Power Planting Tablets", as manufactured by Gro-Power (909)393-3744, or approved equal.

2.5 HYDROSEEDING MATERIALS

A. Seed

1. All seed used shall be labeled and shall be furnished in sealed standard containers with signed copies of a statement from the seed vendor certifying that each container of seed delivered is fully labeled in accordance with the California State Agricultural Code and is equal to or better than the requirements of these specifications.

2. Seed which has become wet, moldy or otherwise damaged in transit or storage will be rejected.

B. Fiber Mulch

1. Fiber mulch shall be composed of wood cellulose fiber and contain no germination or growth-inhibiting factors. It shall also have a consistent texture which disburses evenly and remains suspended in agitated water. It shall have a temporary green dye with the following property analysis:
   Moisture content - 9.0% + 3% O.D. basis
   Organic matter - 99.2% + 0.8%
   Ash content - 0.8% + 0.2%
   pH - 4.8% + 0.5%
   Water holding capacity - grams of $H2^{O}$ per 1001150 minimum grams of fiber
2. Acceptable manufacturer of fiber mulch - Conwed or equal.

C. Hydroseeding Binder Additive

1. The soil and mulch tackifier shall be a dry, organic powder hydrocolloid formulation. The tackifier shall contain a blend of at least three selected ingredients, two of which shall form at least 65% of the total, which are identified as:
2. Plantago ovata (Psyllium) - Muceloid content of 85% or greater Ecology Control - M Binder by Conwed, or equal.
3. Gyamposis tetragonolobus - 3000 cps or greater.
4. The soil and tackifier shall hydrate and disperse in a mixing tank with circulating water forming a homogeneous slurry, either alone or in combination with other material, and shall be pH stable in the presence of fertilizer.
5. Application of the soil and mulch tackifier shall be made at a minimum rate of:
   a. Flat areas - 80 pounds per acre.
   b. Sloped areas (3:1 or steeper) - 120 pounds per acre.

2.6 PLANT MATERIAL

A. General Plant Condition

1. All plant material delivered to the site shall have a normal habit of growth, well formed and shaped, healthy, vigorous, and free of any insects, diseases, sunscalds, windburn, abrasions of the bark, or other objectionable disfigurements.
2. The size of the plant material shall correspond with that normally expected for species and variety of commercially nursery stock or as specified on the Drawings.
3. Plant material shall be grown under climatic conditions similar to those in the locality of the project unless approved otherwise by the Owner's Authorized Representative.

4. The use of plant material larger than that specified on the Drawings may be used, pending approval from the Owner's Authorized Representative, however, there will be no change in the Contract amount if the larger plant material is approved and used.

B. Trees and Shrubs
   1. Tree and shrub trunks shall be sturdy and well hardened with vigorous and fibrous root systems which are not root-bound.
   2. In the event of a disagreement as to the condition of the root system, the root conditions of the plants furnished by the Contractor will be determined by the removal of soil around the roots of not less than 10 plants or more than 2% of the total number of plants of each specie.
   3. When container grown plants are supplied from several sources, the roots of not less than 10 plants of each specie from each source will be inspected. In case the plants sampled are found to be defective, the Owner's Authorized Representative has the right to reject the entire lot represented by the defective sample. Any plant material rendered unsuitable for use because of this inspection will be considered as samples and will be provided at the full expense of the Contractor.

C. Nursery Grown and Collected Stock
   1. Nursery grown and collected stock shall be grown under climatic conditions similar to that found in the locality of the site.

D. Container Grown Stock
   1. Container grown stock shall be in a vigorous and healthy condition, not root bound or with the root system hardened off.

E. Ground Cover Stock
   1. Ground cover stock shall be well established in removable containers or having formed homogenous soil sections.

F. Dry-Hydroseed Mix Seed (non-irrigated)
   1. All seed used shall be labeled and shall be furnished in sealed standard containers with signed copies of a statement from the seed vendor certifying that each container of seed delivered is fully labeled in accordance with the California State Agricultural Code and is equal to or better than the requirements of this Specification.
   2. Seed which has become wet, moldy or otherwise damaged in transit or storage will be rejected.
   3. Seed Mix Ratio Specifications:
      Refer to plans for mix. Seed mixes are available from S&S Seeds at (805) 684-0436, or approved equal.

2.7 AUXILIARY ACCESSORIES

A. Tree Stakes

1. Wood stakes - 2" diameter by 10 feet Lodgepole Pine stake without splits or bowing. Refer to the Drawings for which trees receive wood stakes.

B. Tree Ties

1. V.I.T. Tree-Brace as distributed by R.C. Einfeldt, Inc. (909) 738-4777, or approved equal.

C. Gravel

1. Refer to plans for gravel type and depth. Submit sample to the Owner's Authorized Representative for review and approval.

D. Boulders

1. Refer to plans for type size and location. Submit sample to the Owner's Authorized Representative for review and approval.

E. Rubberific Mulch

1. General – Rubberific Mulch (314-336-1030) must be manufactured in the United States of America, be comprised 100% from recyclable tires and free of all steel belting and cord. The product must meet the guidelines that are approved as safe for use in landscape areas by the Environmental protection Agency. The product must have been approved for use in playgrounds and other such areas where the public has access by the United States Consumer Product Safety Commission.
2. The rubber mulch shall be of the shredded type. The individual places shall be thin and elongated with a natural wood grain appearance. The pieces shall vary in width, thickness, and length with nor more than 5% of the pieced exceeding 4: in length or 1/8" in thickness. There shall be no chunks or squared off pieces. The mulch shall be colored and the color process shall be such that the color shall not fade, chip, peel, or wash off when handled or installed. The Manufacturer will provide a written document that warrants the color for a minimum of 5 years from the date of installation. The color of the mulch is to be specified by the designer/engineer for the specific project.
3. The mulch shall be non-flammable and be capable of withstanding temperatures between 608 and -25 degrees Fahrenheit without discoloring.
4. The rubber mulch shall be delivered to the project in containers that are adequate to protect the contents from damage in handling and storage. The containers shall be weather resistant and capable of containing the material for extended periods. The outside of the containers shall be marked with the Manufacturer's name, address, and method of contact. The labeling shall also list the material and the color of the mulch contained within.

F. Deep Root Planter

1 Install root control containers 5' from any hardscape i.e.,
."Deep root barrier" #24-2 disdtributed by Deep Root Corp (800-458-7668)
Shawtown ,Industries #ep series by O'Connor Sales (562-403-3848 x-21)

or equivalent.

PART 3 - EXECUTION

3.1 CULTIVATION OF EXISTING SOIL

A. In areas where topsoil will not be applied, rip or cultivate the existing soil that will be receiving planting to a depth of at least 10-inches immediately prior to applying soil amendments.

B. In areas where topsoil will be applied the following procedures are to be followed:

C. Verify that subgrades for installation of topsoil have been established under rough grading, subgrade depth plus specified depth of topsoil should equal finished grade. Do not spread topsoil prior to the Owner's Authorized Representative acceptance of all subgrade work.

D. Rip or cultivate subgrade in all planting areas to a minimum depth of 10-inches immediately prior to spreading topsoil.

E. Remove all rocks, stones, sticks and debris larger than 1-inch in diameter from the surface of the subgrade prior to applying topsoil.

3.2 SOIL SCARIFICATION

A. Planting areas which become compacted in excess of 85% relative compaction due to construction activities, shall be thoroughly cross-ripped to a minimum depth of 9" to alleviate the condition, taking care to avoid existing subsurface utility lines, if present.

3.3 VERIFICATION OF EXISTING CONDITIONS

A. Prior to the work in this Section, examine previously installed work from other trades and verify that such work is complete and as required, to the point where this installation may commence properly.

3.4 ROUGH GRADING CERTIFICATION

A. Obtain the Owner's written certification that indicates that final rough grade have been set by previous contractors to plus or minus 0.10' prior to commencing fine grading operations.

3.5 FINE GRADING OPERATIONS

A. Insure that the top 2-inches of soil is free of stones, roots, stumps, wire, or other deleterious matter 1-inch in diameter and larger. Dispose of debris offsite.

B. All planting areas to be fine graded to within 1-1/2-inches of paved areas, irrigation valve boxes, and headerboards.

C. Upon acceptance of rough grade by the Owner's Authorized Representative and prior to beginning planting operations, finish grade all planting areas, fill as needed and remove surplus soil and float areas to a smooth, uniform grade to elevations as indicated on the Drawings. Obtain the Owner's Authorized Representative approval of the fine grading prior to commencing planting operations.

3.6 SURFACE DRAINAGE OF PLANTING AREAS

A. The Contractor shall bear final responsibility for properly draining all planting areas. Any discrepancy in the Drawings or Specifications, obstructions on the site, or prior work done by another contractor, which the Contractor feels precludes establishing proper drainage, shall be brought to the immediate attention of the Owner's Authorized Representative for correction or relief of said responsibility. The Contractor is to insure proper drainage of all planting areas at a minimum of 2%.

3.7 SOIL PREPARATION (On-grade Planting Areas)

A. After finish grades for all landscaped areas have been established and approved by the Owner's Authorized Representative perform the following operations:

B. Cross-rip all area to a depth of 9".

C. Spread organic amendments uniformly on the surface of the soil and cultivate thoroughly into the top 4-6 inches in a minimum of two directions with a mechanical rototiller.

D. The following soil amendments and fertilizers are to be used for bid purposes only. Specific amendment recommendations will be made after horticultural soil samples are taken and paid for by the Contractor and analyzed. Application rates per 1,000 square feet shall be as follows:
Nitrolized Fir bark - 6 cu. yds.
Planting fertilizer - 200 lbs. of Gro-Power Plus.
Agricultural gypsum - 100 lbs.
Soil sulfur - 20 lbs.

` E . Soil samples shall be taken by the Contractor in (6) different areas as directed by the Owner’s Representative to an approved Soil Laboratory after grading for an Horticulture soil test and recommendation for amending the soil.

F. After applying soil amendments and prior to planting, irrigate with overhead irrigation so that a minimum of 1-3 inches of good quality water passes through the soil profile.

3.8 BACKFILL MIX FOR SHRUBS AND TREES (On-grade Planting Areas)

A. The following backfill mix is for bid price basis only. Final backfill recommendations will be made only after rough and fine grading operations are completed and horticultural soil testing has been performed and paid for by the Contractor and approved by the Owner's Authorized Representative.
7 parts by volume on-site soil.
3 parts by volume nitrolized stabilized Fir bark.
2 lbs. iron sulfate per cubic yard of mix.
18 lbs. of Gro-Power Plus per cubic yard of mix.
Planting tablets - quantity based on size of plant.

B. Thoroughly blend the backfill mix prior to placement.

C. Do not apply iron sulfate over paved materials since severe staining is likely to occur.

D. Amend backfill per Soil Report.

3.9 PRE-PLANT WEED CONTROL

A. Clear and remove existing weeds by mowing or grubbing to at least 1/4-inch below the soil surface.

B. Fertilize areas to receive planting with urea 46-0-0 commercial fertilizer at the rate of 1/2-pound per 1,000 square feet.

C. Water area thoroughly and continuously for a period of 3 consecutive weeks. Employ a specific watering duration and frequency program designed to germinate all residual weeds.

D. After sufficient weed germination is present, apply a post-emergent contact weed killer according to the directions of the manufacturer.

E. Allow for a sufficient period of time to ensure that the weeds are dead and the weed killer has dissipated before applying a second weed kill.

F. Water planting areas thoroughly and continuously for a period of 3 weeks. Discontinue the watering process for 1 day prior to the second application of the

herbicide. Reapply the spraying operation with a straight contact weed killer according to the pest control adviser's recommendations. Avoid any irrigation for a minimum of 4 days for effective weed kill.

G. After the second weed kill, water planting areas thoroughly and continuously for 3 consecutive days to saturate upper layers of soil prior to commencing planting operations.

3.10 TREE PIT PERCOLATION TESTING

A. Due to the potential of standing water in the tree pits, Contractor is to perform a tree pit percolation test (for trees larger than 15 gallon only) in each tree pit prior to planting the tree. Fill the tree pit to the top with water. If the water has not drained by more than 95% within 24 hours, do not plant the tree and bring this to the immediate attention of the Owner's Authorized Representative. The Contractor may be required to either dig a substitute plant pit or to install a drainage sump in the existing plant pit. Substitute plant pits are the responsibility of the Contractor under the Base Bid. Drainage sumps are not part of the Base Bid and compensation will be awarded to the Contractor based on the Construction Agreement.

B. Submit written results of each plant pit peculation test with locations, date and time of test to the Owner's Authorized Representative.

3.11 COMPOSITE HEADERBOARD LAYOUT

A. Headerboards shall be laid true to line and grade. Protect adjacent improvements from damage. Stakes shall be placed on the ground cover side of all headerboard.

B Stakes and splices for headerboards shall be installed per recommendation of Epics Plastics distributed through O'Connor Sales, Inc. (562) 403-3848 Ext. 21 or equivalent.

3.12 PLANTING OPERATIONS

A. Planting Layout

1. It is the Contractor's responsibility to verify with the Owner's site superintendent and local governing agencies the location and depth of all underground utilities. If any underground construction or utility lines are encountered in the excavation of planting holes, alternative planting locations may be selected by the Owner's Authorized Representative.
2. Locations for all shrubs and trees shall be marked on the ground either by flagged grade stakes indicating plant type and size or the actual plants

themselves for the Owner's Authorized Representative's review and approval prior to planting.

B. General Planting Guidelines
   1. Plant only as many plants that can be planted and watered on that same day in a given planting area.
   2. Protect the planting area from excessive vehicle compaction.
   3. Face plant material with fullest growth into the prevailing wind and/or the primary direction of view.
   4. Center plant material in the planting hole.
   5. Set plant material plumb and hold rigidly in place until soil has been tamped firmly around the rootball.
   6. Planting pits shall have vertical sides and roughened surfaces. The size of the plant pit shall be twice the diameter and only as deep as the rootball itself.

C. Container Removal
   1. Plant containers shall be opened and removed in such a manner that the soil surrounding the rootball shall not be broken.
   2. Do not injure the root ball while removing the container. After removing plant, superficially cut edge rots with a knife on three (3) sides.

D. Tree Box Removal
   1. Remove the bottom of the box before planting.
   2. Remove the sides of the box without damaging the rootball after positioning the tree and partially backfilling the plant pit.

E. Shrub and Tree Installation
   1. Apply backfill mix to the plant pit up to 1/2 the height of the rootball. Add water to the top of the remaining plant pit and let soak in before completing the remainder of backfilling.

F. Placement of Plant Tablets
   1. Prior to planting, place the required amount of planting tablets per plant size on top of each root ball while the plants are still in their containers so that the Owner's Authorized Representative can easily verify their existence and quantity.
   2. After obtaining approval by the Owner's Authorized Representative on plant tablet quantity and after water has completely drained from the plant pit, add plant tablets to the planting pits in the following quantities:
      1 gallon - 1 tablet
      3 gallon - 2 tablets
      5 gallon - 3 tablets
      10 gallon - 4 tablets
      15 gallon - 5 tablets
   3. Dig planting pit to the recommended depth.

4. Backfill the plant pit to attain the proper level for the plant.
5. Place the specified amount of plant tablets between the bottom of the rootball but not higher than 1/3 of the way up the rootball. Space the plant tablets equally around the perimeter of the rootball approximately 2" from the rootball.
6. Finish backfilling of the planting pit by tamping the soil firmly around the rootball and watering thoroughly.

G. Final Backfilling
1. Once the water has soaked in thoroughly, place the remaining backfill and tamp firmly.
2. After final backfilling, construct an earthen basin around the base of each plant with backfill mix sufficient to hold water for the following plant sizes:
   1 gallon - 2-inches of water.
   5 gallon through 24" box - 3-inches of water.
3. Remove basins in all turf areas but not before the irrigation system is operational.

H. Plant Settling
1. Any plant material that has settled deeper than the surrounding grade shall be raised to the correct level.

I. Ground Cover Planting
1. Ground cover flats shall contain sufficient moisture to reduce soil separation when lifting out the plants.
2. Plant ground covers in a straight rows, evenly, triangular spaced, and at an on-center spacing as indicated on the Drawings.
3. Each rooted ground cover plant shall be planted with its proportional amount of soil.
4. Apply a 2-inch layer of wood mulch at the completion of planting.

J. Hydroseed Planting
1. Apply pre-plant weed control to the entire area prior to hydroseeding.
2. Plant all trees and shrubs prior to commencing hydroseeding operations.
3. All areas to receive hydroseeding are to be applied by a licensed and approved hydromulch contractor.
4. The hydromulch slurry mixes shall be applied at the following rates per acre:

   Non Soil-Prepped Areas, i.e. slopes:

SLURRY MIX	MIX #A
Fiber Mulch	2,000 lbs./acre
Binder	50 lbs./acre
Fertilizer (5-3-1)	1,000 lbs./acre
Fertilizer (12-8-8)	280 lbs./acre

Seed Mix	15.9 lbs./acre

5. The hydromulch shall be applied in the form of a slurry consisting of cellulose fiber, seed, chemical additives, commercial fertilizers, and water. The slurry shall be hydraulically sprayed to the soil surface to form a blotter-like ground cover.
6. The slurry mix shall be sprayed in a uniformly visible coating by using temporary green dye as a guide. The slurry shall be applied in a sweeping motion so as to fall like rain, allowing the wood fibers to build upon themselves until a thick coating is achieved.
7. All slurry mixes that have not been applied within 30 minutes (45 minutes maximum) after mixing shall be rejected.
8. Areas receiving hydroseeding that fail to exhibit adequate plant growth within 30 days shall be cleared of all previously applied seed materials, prepared and rehydroseeded in conformance with the requirements listed above. The warranty period for seeded areas that have been rehydroseeded shall begin at the time the areas were hydroseeded and exhibit continued growth for the required duration as identified in the warranty of work.
9. The Contractor shall be responsible for the application of sufficient irrigation water to ensure the germination and growth (for the duration of the warranty period) of the seed mix specified herein. At the Contractor's option, water may be applied by a means of temporary irrigation system or water truck. All costs associated with the application of water shall be included in the Contractor's price bid.
10. Upon completion of hydroseeding operations, clean off any slurry overspray from drainage devices, paving surfaces, plant materials and architectural features. Take care in cleaning these areas so as to not wash away previously hydroseeded areas.
11. Prior to hydroseeding, submit a work report to the Owner's Authorized Representative. This report shall be signed by the Contractor and contain the following information:
    a. Seed - type and amount.
    b. Fertilizer - analysis and amount.
    c. Fibermulch - type and amount.
    d. Seeding additive - type and amount.
    e. Number of loads - amount of water.
    f. Area covered in acres.
    g. Equipment used - capacity.
    h. Operator's license number.
12. An even ground cover planting is the desired goal during hydroseed operations. The Contractor shall be responsible for reseeding, if required.

K. Turf Sod Planting
1. General
    a. Tag all sod indicating botanical and common name of each turf species and submit to the Owner's Authorized Representative.

b. Deliver sod on pallets.
c. Protect root system from exposure to the weather.
d. Protect sod against dehydration, contamination and heating during transportation and delivery.
e. Do not deliver more sod than can be installed at the site in one (1) day. Longer periods may be acceptable if the weather is cool and is approved by the Owner's Authorized Representative.
f. Keep stored sod moist and under shade.
g. Do not pile sod more than two (2) feet deep.
h. Do not tear, stretch or drop sod during placement.

L. Soil Preparation
1. Similar to that stated in "Soil Preparation" above.

M. Fine Grading and Rolling
1. Carefully smooth out all surface irregularities that will be receiving sod. Roll the area to expose soil depressions and regrade as necessary.

N. Fertilizing
1. Spread and rake in lightly, fertilizer onto the soil surface evenly at the rate of (1) pound per 100 square feet of sod area.

O. Watering
1. Water soil to a depth of 4-inches, 48 hours before placing sod.

P. Sod Placement
1. Verify that soil preparation and related preparatory work has been completed prior to placing sod. Do not begin work until conditions are satisfactory.
2. Begin sodding at the bottom of slopes. Peg sod on all slopes greater than 3:1 (33%) with a minimum of (2) stakes per square yard.
3. Lay the first sod strip along a straight baseline. Butt joints tightly but do not overlap the joints. On the second strip, stagger in a running bond pattern. Use a sharp knife to cut the sod to fit irregular curved areas and around irrigation spray heads, valve boxes, etc.

Q. Watering
1. Do not lay the entire amount of sod before beginning watering. Water in lightly, when a relatively large area of sod has been placed.

R. Rolling Sod
1. Roll sod, except on pegged areas, with a lawn roller weighing not more than 150 pounds per foot or roller width.

S. Irrigation

1. Water thoroughly once the sod is installed. The soil should be watered to a minimum depth of 4-inches.

T. Protection

1. Erect temporary barricades and warning signs against vehicular traffic after placing sod.

U. Sod Establishment

1. Keep sod moist during the first week after installation. After the first week, supplement rainfall to produce a total of two (2) inches per day. Repeat watering at regular intervals until the sod establishes itself. Once the sod has become established, decrease the watering frequency and increase the amount of water per application.
2. Mow and maintain turf at a height recommended by the turf nursery. Do not cut more than 40% of the total grass leaf length in one (1) single mowing.
3. Replace all dead or dying sod with new sod.
4. Eradicate weeds between the second and third mowing. Apply herbicides uniformly at the manufacturer's recommended rate.
5. Apply fertilizer uniformly at the manufacturer's recommended rate 30 days after sodding.
6. The sod establishment period is to extend 45 days until the second mowing is complete and approved.
7. Dispose of protective barricades and warning signs at the termination of sod establishment.

3.13 WATERING

A. All planting shall be watered immediately after planting. After the first watering, water shall be applied to all plants as conditions may require to keep the plants in a healthy and vigorous growing condition until the completion of the Contract.

3.14 TREE STAKING

A. Staking of trees shall be completed immediately after planting trees. Trees shall stand plumb before stakes are applied.

B. All stakes shall be installed plumb when tied to the tree. Stakes may be located in a specific location to the trunk - refer to the Drawings.

C. When locating a single stake, locate it on the windward side of the tree and as close to the main trunk as possible without damaging the trunk.

D. Stakes shall be driven at least 3)" into the ground.

E. Tie the tree trunk to the stake with the specified tree guy. Cut off stake after installation 4-inches above the upper tie.

3.15 PRUNING

A. At no time shall plant material be pruned, trimmed or topped prior to delivery. Any alteration to their shape shall be conducted only on-site and in the presence of the Owner's Authorized Representative.

B. All planted material requiring pruning shall be done under the observation of the Owner's Authorized Representative. Prune planted material only when necessary and under standard horticultural practices to preserve the natural character of the plant.

3.16 GRAVEL AGGREGATE MULCH INSTALLATION

A. Evenly spread throughout all designated planting areas, gravel aggregate mulch to a depth as indicated on the Drawings. Refer to the Drawings for mulch locations.

B. Protect all plants during the installation of gravel aggregate mulch. Plants damaged during this operation shall be replaced at the Contractor's expense.

C. Avoid contamination of the gravel aggregate mulch with the soil beneath during planting operations. Contaminated gravel aggregate mulch shall be corrected by either removal, and replacement or through washing at the Contractor's expense.

3.17 RUBBERIFIC MULCH INSTALLATION

A. Equipment – The Rubberific Mulch shall be able to be applied mechanically or manually. Mulch blowers may be used at locations designated by the Engineer.

B. Mulching Operations – The mulch shall be installed as directed by the Engineer. The thickness shall be 1.5 inches uniformly throughout the area to be mulched.

C. Care During Construction – Care should be taken to contain the mulch within the areas to be mulched. Daily cleaning of the surrounding areas should be completed prior to leaving the project site. Any mulch not used on the project shall be sealed in the proper containers and returned to the Engineer.

3.18 CLEAN UP

A. Contractor shall remove all trash caused from his Work on a weekly basis throughout the duration of the Project.

B. Upon completion of his Work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner's Authorized Representative.

C. All scars, ruts or other marks in the ground caused by the Contractors work shall be repaired.

D. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner-accepted condition. All sidewalks and other paving areas shall receive a broom-clean treatment.

3.19 SITE VISIT SCHEDULE

A. The Contractor shall be responsible for notifying the Owner's Authorized Representative in advance to schedule the following site visits:
   1. Pre-construction "Kick-Off" meeting - 7 days.
   2. At completion of fine grading - 2 days.
   3. At completion of soil preparation - 2 days.
   4. Delivery of plant material - 2 days.
   5. Plant layout prior to plant pit excavation - 2 days.
   6. At start of tree planting, staking and guying - 2 days.
   7. Final walkthrough prior to going on contracted maintenance period - 7 days.
   8. Final walkthrough for project acceptance - 7 days.

B. The Owner's Authorized Representative may or may not attend all of the above mentioned site visits. He may also elect to attend more than is listed above, and without notice to the Contractor.

C. When site visits are made by other than the Owner's Authorized Representative, the Contractor shall show evidence in writing of when and by whom the site visit was made.

D. No site visit will commence without all previous punch list items being completed, unless compliance has been waived by the Owner's Authorized Representative. Failure to accomplish the timely execution of previous field report punch list items and preparing adequately for the next site visit shall make the Contractor potentially liable for reimbursing the Owner's Authorized Representative's for his labor and reimbursable expenses. No further site visits will be made until outstanding charges have been paid to the Owner's Authorized Representative by the Contractor.

END OF SECTION

SECTION 02935
LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. After landscape planting and irrigation work have been completed, reviewed and accepted by Owner, furnish materials, labor, transportation, services and equipment necessary to provide landscape maintenance as indicated on Drawings and as specified herein.

B. Work included in this Section:
   1. Continuous maintenance of plant material and irrigation system during specified landscape maintenance period.

C. Work related in other Sections:
   1. Section 02810 – Irrigation System.
   2. Section 02900 – Landscape Planting.

1.2 LANDSCAPE MAINTENANCE PERIOD

A. Landscape Maintenance Period: One Year from Final Acceptance by Owner. Contractor may, at discretion of Owner, be allowed to proceed into landscape maintenance period if planting and irrigation is deemed "substantially complete" by Owner.

B. Continuously maintain areas involved in this Contract during progress of Work and during landscape maintenance period until Final Acceptance by Owner has been granted.

C. Improper landscape maintenance or possible poor condition of planting at termination of the scheduled landscape maintenance period may cause landscape maintenance period to be continued at no cost to Owner.

D. In order to carry out plant establishment work, furnish sufficient men and adequate equipment to perform Work during landscape maintenance period.

E. Request an observation of Work by Owner to begin landscape maintenance period after planting and related work has been completed in accordance with Contract Documents. A prime requirement is that groundcover and turf areas be planted and show a consistent and healthy appearance. Mow turf at least two times, no closer than 1 week apart. If such criteria is met to satisfaction of Owner, a field report may be issued to Owner recommending a start date to begin landscape maintenance period.

F. Any day that Contractor fails to adequately perform landscape maintenance, as determined necessary by Owner, that day will not be credited as one of landscape maintenance working days.

G. Prior to being placed on landscape maintenance, submit a schedule of activities planned during landscape maintenance period. This schedule needs to be accepted by Owner prior to start of landscape maintenance. Document scheduled changes and obtain acceptance by Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide materials used during landscape maintenance work in accordance with requirements of Section 02900 - Landscape Planting and following:

1. Shrub and Groundcover Planting Fertilizer:
   a. Consisting of following minimum percents by weight:
      14% Nitrogen
      4% Phosphoric Acid
      9% Potash
      30% Humus
      6% Humic Acid
      3% Sulfur
   b. Acceptable Manufacturers:
      Gro-Power Hi Nitrogen; Gro-Power (909) 393-3744.

B. Submit a list of materials that are to be used during landscape maintenance that are not specified in Section 02900 in written form to Owner for review and approval.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

A. Keep landscape areas free of debris.

B. Keep planted areas weed-free. Cultivate at intervals of not more than 10 days.

C. Maintain adequate protection of Work area. Repair damaged areas.

D. Between 15th day and 20th day of landscape maintenance period, reseed or re-sod spots or areas within turf areas where normal turf growth is not evident. After 20th day, areas that are not acceptably are to be sodded at no cost to Owner.

E. Sweep clean paved areas on once a week intervals or less, if deemed necessary.

3.2 TREE AND SHRUB CARE

A. Watering:
   1. Maintain a large enough water basin around trees and shrubs so that enough water can be applied to establish moisture through major root zone.
   2. When hand watering, use a water wand to break water force.
   3. Replenish wood mulches to reduce evaporation and frequency of watering.
   4. Regulate irrigation watering times to minimize erosion and gullying.

B. Pruning:
   1. Trees:
      a. Prune Trees To:
         1) Select and develop permanent scaffold branches that are smaller in diameter than trunk or branch to which they are attached which have vertical spacing of from 18-inches to 48-inches and radial orientation so as not to overlay one another.
         2) To eliminate diseased or damaged growth.
         3) To eliminate narrow V-shaped branch forks that lack strength.
         4) To reduce toppling and wind damage by thinning out crowns.
         5) To maintain growth within space limitations.
         6) To maintain a natural appearance and to balance crown with root mass.
      b. Under no circumstances, will stripping of lower branches "raising-up" of young trees be permitted.
      c. Retain lower branches in a "tipped-back" or pinched condition with as much foliage as possible to promote caliper trunk growth.
      d. Cut lower branches flush with trunk only after tree is able to stand erect without staking or other support.
      e. Remove sucker growth.
      f. Thin evergreen trees and shape when necessary to prevent wind and storm damage.
   2. Shrubs:
      a. Overall objective of shrub pruning is same as for trees.
      b. Do not clip shrubs into balled or boxed forms unless approved initially by Owner.
      c. Make pruning cuts on lateral branches or buds flush with trunk.
      d. Do not “stub” branches.

C. Tree Staking and Guying:
   1. Restake, tighten and repair damaged ties and guys.
   2. Reset to proper grades or upright position, trees that are not in their proper growing position.

3. Inspect stakes and guys to prevent girdling of trunks or branches and to prevent rubbing that may cause bark wounds.

D. Weed Control:
1. Keep planted and aggregate areas free of weeds.
2. Use recommended legally approved herbicides.
3. Avoid frequent soil cultivation that destroy shallow surface roots.
4. Replenish lost wood mulch to reduce weed growth.

E. Insect and Disease Control:
1. Maintain insect and disease control during landscape maintenance period.

F. Fertilization:
1. Fertilize planting areas with application of Gro-Power Hi-Nitrogen 14-4-9, or equal, commercial fertilizer at the rate of 7 1/2 pounds per 1,000 square feet 30 days after planting.
2. Repeat fertilizer application at 30 day intervals until end of the landscape maintenance period.

G. Replacement of Plants:
1. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed at no cost to Owner.

H. Replacement of Soil
1. Replacement of soil to maintain height of 2" below top of planter.

3.3 GROUND COVER CARE

A. Weed Control:
1. Control weeds with chemical systemic spray or by hand so as to cause minimal damage to planted materials.

B. Watering:
1. Water enough so that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth.

C. Fertilizing:
1. Fertilize as specified under Tree and Shrub care of this Specification.

D. Edge groundcover to keep in bounds and trim top growth as necessary to achieve an overall even appearance.

E. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed.

3. 4 TURF CARE

A. Mowing and Edging:
   1. Commence mowing of turf when turf has reached a recommended height for specified species.
   2. Mow weekly after first cut.
   3. Turf must be well established and free of bare spots and weeds prior to Final Acceptance.
   4. Remove excess grass clippings.
   5. Trim paved edges at least twice monthly or as needed for a neat appearance.
   6. Blow or vacuum grass clippings off paved areas.

B. Watering:
   1. Water turf at such frequency as weather conditions require to replenish soil moisture below root zone and maintain healthy turf growth.

C. Fertilizing:
   1. Fertilize turf areas with applications of turf fertilizer on 30 day intervals until end of landscape maintenance period.

D. Weed Control:
   1. If needed, control broadleaf weeds with selective herbicides.

3.5 IRRIGATION SYSTEM

A. Provide maintenance of irrigation system consisting of cleaning and adjusting sprinkler nozzles, repairing damaged equipment, servicing valves, programming controllers and other activities required during landscape maintenance period.

3.6 FINAL WALKTHROUGH

A. At completion of landscape maintenance period, schedule a Final Walkthrough with Owner.

B. Owner, General Contractor and others deemed necessary by Owner may be present at Final Walkthrough.

C. If, during Final Walkthrough Owner is of opinion that landscape maintenance has been substantially completed in accordance with this Section, written notice of recommendation to allow Contractor to be released from Project will be submitted to Owner for approval. This report will note any incomplete punch list items from Final Walkthrough and a date on which these items must be completed. Complete remaining punch list items within 5 working days after Final Walkthrough was performed by Owner.

3.7 CLEAN UP

A. Upon completion landscape maintenance, remove rubbish, waste and debris resulting from Contractor's operations.

B. Repair scars, ruts or other marks in landscaped areas caused by Contractor.

C. Remove equipment, implements of service, and leave Work area in a neat and clean condition. Sweep clean paved areas.

END OF SECTION

SECTION 04220
CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1. 2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to install concrete masonry units as indicated on Drawings and as specified herein.

B. Work included in this Section:
1. Reinforcement.
2. Concrete masonry unit retaining walls.
3. Mortar and masonry grouting.

C. Work related in other Sections:
1. Section 02810 – Irrigation System
2. Section 02900 – Landscape Planting

1.3 REFERENCES

A. ASTM C 5 - Quicklime for Structural Purposes.

B. ASTM A 82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

C. ASTM C 91 - Masonry Cement.

D. ASTM C 94 - Ready-Mixed Concrete.

E. ASTM A 123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.

F. ASTM C 129 - Non-Load Bearing Concrete Masonry Units.

G. ASTM C 144 - Aggregate for Masonry Mortar.

H. ASTM A 153 - Specifications for Zinc Coating (Hot Dip) or Iron and Steel Hardware.

I. ASTM C 150 - Portland Cement.

J. ASTM C 199 - Test Method for Pier Test for Refractory Mortar.

K. ASTM C 207 - Hydrated Lime for Masonry Purposes.

L. ASTM C 270 - Mortar for Unit Masonry.

M. ASTM C 387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.

N. ASTM C 404 - Aggregates for Masonry Grout.

O. ASTM E 447 - Test Methods for Compressive Strength of Masonry Prisms.

P. ASTM C 476 - Grout for Masonry.

Q. ASTM E 518 - Test Method for Flexural Bond Strength of Masonry.

R. ASTM C 595 - Blended Hydraulic Cement.

S. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

T. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

U. ASTM C 780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

V. ASTM C 1019 - Method of Sampling and Testing Grout.

W. ASTM C 1072 - Method for Measurement of Masonry Flexural Bond Strength.

X. ASTM C 1142 - Ready-Mixed Mortar for Unit Masonry.

Y. ACI 530 - Building Code Requirements for Masonry Structures.

Z. ACI 530.1 - Specifications For Masonry Structures.

AA. IMIAC (International Masonry Industry All-Weather Council) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.4 SUBMITTALS

A. Shop Drawings: Indicate bars sizes, spacings, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement, accessories.

B. Product Data: Provide data for masonry units and fabricated wire reinforcement.

C. Manufacturer's Certificates: Certify that products meet or exceed specified requirements.

E. Quality Assurance Certifications: Submit current certificates indicating compliance with requirements specified under Quality Assurance Article for Certified Structural Masonry Contractor and Certified Structural Masons.
   1. Maintain one copy on file on site while masonry construction is in progress.

F. Submit three block for approval prior to purchasing.

1.5 QUALITY ASSURANCE

A. Conform Work to provision of ACI 530.1/ASCE 6 - Specifications for Masonry Structures.

B. Construct unit masonry by a certified Masonry Contractor who engages only certified Masons to perform masonry work.

C. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, from one source and by a single manufacturer.

D. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for aggregate.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of 5 years experience.

B. Provide unit masonry that develops minimum installed compressive strength of 2,000 psi at 28 days.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry accessories, including metal items to prevent deterioration from corrosion and accumulation of foreign matter.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F and a maximum of maximum 90 degrees F prior to, during, and 48 hours after completion of Work.

B. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.10 PROTECTION

A. Adequately protect work from damage by subsequent construction operations. Damaged work shall be refinished or replaced at no additional cost to Owner.

1.11 COORDINATION

A. Notify General Contractor and other contractors related to installation of Work in ample time, so as to allow time for those contractors to perform their portion of work.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Hollow Block Units (CMU): ASTM C90, Type II - Non-moisture controlled, normal weight.

B. Provide units with minimum average net-area compressive strength 1,900 psi.

2.2 CEMENT

A. Portland Cement, ASTM C150, Type II.

2.3 WATER

A. From domestic sources, clean and free from deleterious quantities of acids, alkalis, and organic materials.

2.4 GROUT AND MASONRY SAND

A. Washed concrete sand conforming to ASTM C 33.

2.5 AGGREGATES

A. Pea Gravel: Washed and graded natural hardrock aggregate, with not more than 5% passing the No. 8 sieve, and with 95 to 100% passing 3/8-in. sieve.

B. Mortar Aggregate: Natural or manufactured sand of natural color.
   1. For joints less than 1/4-inch use aggregate graded with 100 percent passing a No. 16 sieve.
   2. For joints greater than 1/4-inch wide, comply with following limits:

Sieve Size:	Percent Passing:
No. 4	100
No. 8	95 to 100
No. 16	60 to 100
No. 30	35 to 70
No. 50	15 to 35
No. 100	2 to 15
No. 200	0 to 2

2.6 HYDRATED LIME

A. Dolomite hydrated lime conforming to ASTM C 207, Type "S". Lime may be substituted.
   1. Acceptable Manufacturers:
      a. Gibco MRF; Gibco Industries, Inc.
      b. Easy Spread; Penisula Products, Inc.

2.7 ADMIXTURES

A. Water-reducing Admixture for Grout:
   1. Acceptable Manufacturers: Sika Grout Aid by Sika Corp.

B. Waterproofing Admixture for Mortar:
   1. Acceptable Manufacturers: Sika Red Label by Sika Corp.

2.8 REINFORCEMENT

A. Clean, without rust conforming to ASTM A 615, Grade 40.

2.9 MIXES

A. Following proportions are arbitrary by loose, dry volumes:
   1. Mortar:
      a. ASTM Rating: C 270, Type S.
      b. Portland Cement: 1 part.
      c. Mortar Sand: 3-1/2 parts maximum.
      d. Hydrated Lime: 1/4 part.
      e. Water: Sufficient to provide weird end.
      f. Pea Gravel Grout:

1) Cement: 1 part.
2) Grout Sand: 3 parts.
3) Pea Gravel: 1-1/2 to 2 parts.
4) Water: Sufficient to provide weird end.

B. Tests: Minimum compressive strength of 1,200 psi at 7 days and 2,000 psi at 28 days. Deliver test reports to Owner's Authorized Representative.

C. Mixing Mortar and Grout: Accurately make measurements for mortar and grout, by volume - shovel measurements will not be accepted:
1. Mix by placing one-half the water and sand in operating mixer, add cement, lime and remainder of sand and water.
2. After ingredients are in mixer, mechanically mix for not less than 3 minutes.
3. Retemper mortar within 1 hour after leaving mixer with water to maintain high plasticity on mortar board by adding water within a basin formed within mortar and mortar reworked into water. Discard mortar which is not used within 1 hour.
4. Mortar Slump: 2-3/4-inches, natural color.
5. Grout Slump: Approximately 7 to 9-inches, to permit pouring without segregation.
6. Grout Strength: Obtain 3,000 psi strength at 28 days.
7. Do not use anti-freeze compounds to lower freezing point of mortar or grout.

2.10 ACCESSORIES

A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
1. Acceptable Manufacturers:
a. ProSoCo Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify items provided by other sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into Work.

3.2 PREPARATION

A. Set or embed in masonry work anchors, bolts, reglets, sleeves, conduits, and other items as required by other trades. Work out details and be responsible for size, position, arrangement of embedded items and other necessary openings.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 REINFORCEMENT

A. Ensure that reinforcing bars are set straight except for bends around corners and where bends or hooks are detailed on Drawings. Do not use "hickey" dowels or reinforcements.

B. Lap reinforcing steel at 40 bar diameters minimum where spliced. Separated by one bar diameter or wire together.

C. Hold vertical bars in position at top and bottom and at intervals not exceeding 192 diameters of reinforcement. Ensure that vertical reinforcing steel has a minimum clearance of at least one-half inch from masonry, and not less than one bar diameter between bars.

D. Lay horizontal reinforcing bars on webs of units in continuous masonry courses, consisting of bond-beam units. Grout bars solid in place.

3.4 LAYOUT

A. Establish lines, levels, and coursing as indicated on Drawings. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Type: Precision Block.
   2. Size: 8”x12”x16”-inches.
   3. Color: Natural gray.
   4. Bond: Running.
   5. Mortar Joint Type: Concave.

3. 5 BONDING

A. Ensure that when bonding masonry to concrete foundation, top surface of concrete foundation is clean with residue removed.

B. Bond intersecting masonry walls and partitions by using steel ties at 2-foot on center maximum.

C. Provide at corners, standard masonry bond by overlapping units and solid grouted.

D. Anchor columns, beams, joists, and similar structural members to walls with anchor bolts or their equivalent. Fully grout anchors in place. Ensure that embedment is not less than two-thirds of wall thickness.

E. Solid grout first base course. Lay hollow masonry units with face shell bedding on head and bed joints.

F. Solid grout all cells as noted on the drawings.

3.6 PLACEMENT

A. Make every effort to minimize cutting of blocks and odd joint sizes or bonds.

B. Cut masonry units by machine.

C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

D. Remove excess mortar as work progresses.

E. At corners and wall intersections, provide prefabricated “L” and “T” sections. Cut and bend reinforcement units for continuity at returns, offsets, pipe enclosures, and other special conditions.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.7 JOINTING

A. Lay starting joint on foundations with full mortar coverage on bed joint except that area where grout occurs free from mortar so that grout will contact foundation.

B. Install mortar joints that are straight, clean, and uniform in thickness.

C. Perform tooling when mortar is partially set but still sufficiently plastic to bond. All tooling shall be done with a tool which compacts the mortar, pressing the excess mortar out of the joint rather than dragging it out. Joints which are not tight at the time of tooling shall be raked out, pointed and then tooled.

D. Horizontal and Vertical Mortar Joints: 3/8-inch thick with full mortar coverage on face shells and on webs surrounding cells to be filled.

E. Butter vertical head joints for a thickness equal to face of shell of unit. Shove units tightly so that mortar bonds well to both units. Set joints to depth of face shell.

F. Set lintels, capping units, and bearing plates that are set by mason in a full bed of mortar.

3.8 GROUTING

A. Reinforcing steel shall be secured in place and inspected before grouting starts.

B. Grout cells in structure in heights of less than 4-feet or unless otherwise noted. Keep mortar from dropping into grout space.

C. Fill vertical cells and ensure that vertical alignment is maintained in a continuous unobstructed cell area not less than 2-inches by 3-inches.

D. Solidly fill cells with grout . Consolidate grout by rodding.

E. Stop grout within 1-1/2 inches below top of a course to form a key at pour joints.

F. Solidly grout in-place bolts, anchors, and other items inserted in wall.

3.9 ENGINEERED MASONRY

A. Lay masonry units with core cells vertically aligned clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4-inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.

C. Reinforce masonry unit cores with reinforcement bars and grout as indicated on Drawings.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200 - Concrete Reinforcement.

E. Wet masonry unit surfaces immediately prior to grout placement.

F. Grout spaces less than 2-inches with fine grout using low lift grouting techniques. Grout spaces 2-inches or greater in width with course grout using low-lift grouting techniques.

G. When grouting is stopped for more than 1 hour, terminate grout 1-1/2-inch below top of upper masonry unit to form a positive key for subsequent grout placement.

H. Low Lift Grouting: Place each lift of grout to a height of 2-feet and rod for grout consolidation.

3.10 CONTROL JOINTS

A. Do not continue horizontal joint reinforcement through control joints.

3.11 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16-inch.

B. Maximum Variation from Plane of Wall: 1/4-inch in 10-feet and 1/2-inch in 20-feet or more.

C. Maximum Variation from Plumb: 1/4-inch per story non-cumulative; 1/2-inch in two (2) stories or more.

D. Maximum Variation from Level Coursing: 1/8-inch in 3-feet and 1/4-inch in 10-feet; 1/2-inch in 30-feet.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4-inch.

3.12 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and locations.

B. Obtain Owner's Authorized Representative approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.13 FIELD QUALITY CONTROL

A. Test and evaluate mortar in accordance with ASTM C 780.

B. Test and evaluate grout in accordance with ASTM C 1019.

3.14 PROTECTION OF FINISHED WORK

A. Without damaging completed Work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.15 CLEAN UP

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work, where applicable.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools during cleaning operations.

E. Upon completion of Work, remove scaffolding and equipment used in Work, debris, refuse, and surplus masonry materials. Leave entire Work area in a neat, clean and Owner's Authorized Representative-accepted condition.

END OF SECTION

SECTION 05700
ORNAMENTAL METAL

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The requirements of the "General Conditions of the Contract" and of Division 1, "General Requirements," shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish all materials, labor, transportation, services, and equipment necessary to furnish and install ornamental metal as shown on the Drawings and as specified herein.

B. Work included in this Section:
1. Metal fencing.
2. Metal gates.
3. Metal railing
5. Painting.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

A. All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.4 APPLICABLE STANDARDS

A. Reference Standards
1. "AISC Steel Construction Manual."
2. "Metal Finishes Manual" of the National Association of Architectural Metal Manufacturers (NAAMM).
3. "Code for Arch and Gas welding in Building Construction" of the American Welding Society.
4. "Metal Bar Grating Manual" of the National Association of Architectural Metal Manufacturers (NAAMM).
5. "Surface Preparation Specification, Volume 2" of the Steel Structures Painting Council (SSPC).

1.5 QUALITY CONTROL

A. Manufacturer's Directions
   1. Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in the Section furnish directions covering points not shown in the Drawings and Specifications.

B. Permits, Fees, Bonds and Inspections
   1. The Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the work.

1.6 QUALIFICATIONS

A. All welding shall be performed by welders approved and certified in accordance with ASTM A233.

B. Workmen shall be competent and skilled in their respective responsibilities.

1.7 INSPECTION OF THE SITE

A. Contractor is responsible for inspection of all surfaces to receive miscellaneous metal work.

B. All defects shall be reported which would interfere with proper installation of this work.

C. Failure to report such defects would imply acceptance of surfaces and will obligate the Contractor to pay for all repair and corrections needed to properly perform this and related work.

1.8 SUBMITTALS

A. Product Data
   1. The Contractor shall submit no later than 10 days after the award of Contract manufacturer's catalog cuts, or a typed listing of all products used in this Section.

B. Shop Drawings
   1. Complete shop drawings shall be submitted for approval by the Owner in advance of fabrication.
   2. Shop drawings shall show dimensions, sizes, thickness gauges, finishes, joining, attachments, fabrication and erection details and relationship to adjacent work.
   3. Where welded connections or other items are required receive other work, shop drawings shall show exact locations required.

1.9 SUBSTITUTIONS

A. Specific reference to manufacturer's names and products specified in this Section are used as standards of quality, this implies no right of the Contractor to substitute other materials without prior written approval.

B. Any materials installed without written approval may be rejected and the Contractor shall at his own cost remove such materials from the site.

C. If an approval is granted for a substitution, adjustment in the Contract price will be made in accordance with the Contract Conditions.

1.10 PROJECT CONDITIONS

A. The Contractor shall keep his work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with the work of other trades.

1.11 COORDINATION

A. The Contractor shall notify the General Contractor and all other contractors related to the installation of his Work in ample time, so as to allow sufficient time for those contractors to perform their portion of the Work.

B. Examine drawings and specifications, and include all miscellaneous metal which is not distinctly specified in other sections.

C. Provide all connections, anchors, bolts, welding, punching, drilling, tapping or other connecting required to fit miscellaneous metal with other work.

PART 2 - PRODUCTS

2.1 ORNAMENTAL METAL WORK ITEMS

A. The following list is included as an aid to take-off and is not necessarily a complete list of work items:

1. Fences and gates shall be in accordance with locations and heights as indicated on Drawings.
    a. Service gate shall be a pedestrian single gate with padlockable slide bolt.

2. Sliding Vehicular Gates – automatic and manual.

2.2 STEEL TUBING

A. ASTM A500 Grade A, or ASTM A501 seamless.

2.3 STEEL PIPE

A. ASTM A53, Type E or S, Grade A, black or galvanized.

2.4 STEEL BOLTS

A. ASTM A307, Grade A.

2.5 STEEL SHAPES AND PLATES

A. Shall be hot-rolled carbon steel ASTM A36.

2.6 THREADED FASTENERS

A. Shall be ASTM A307, Grade A. Provide hexagonal heads at all exposed locations.

2.7 FILLER MATERIAL FOR WELDING

A. ASTM A233, E60XX or E70XX as required for manual shielded metal-arc welding.

2.8 NON-SHRINK GROUT

A. Shall be Hallemite Mfg. Co.'s "Por-Rok," Master Builder's "Embecco - Mix A" or equal.
   1. Color shall match color of adjacent surface.

2.9 GATE HARDWARE

A. Hinges – heavy weight stainless steel concealed ball bearing type. Manufactured and supplied by Stanley, (860) 827-5828.

B. Locks – extra heavy duty satin stainless steel cylindrical keyed lever set. Manufactured and supplied by Schlage, San Francisco, CA, (415) 330-5600.

C. Closer – heavy duty satin stainless spring powered barrier free. Manufactured and supplied by Stanley, (860) 827-5828.

2.10 MATERIALS

A. Architectural brass/bronze: Copper, zinc, and/or lead alloy conforming to respective ASTM and CDA standards for specific types and manufactured shapes as required by design and finish. Except as otherwise indicated or selected by Owner, provide Alloy 280 Muntz Metal and/or Alloy 385 Architectural Bronze with the following approximate alloy composition:

1. Copper: 58%.
2. Zinc: 38.75%.
3. Lead: 3.25%.

B. Stainless steel:
   1. Tubing and pipe: ASTM A269 and ASTM A312, seamless, and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Type 304 with minimum wall thickness equilvalent to Schedule 40.
   2. Plate, sheet, and strip: ASTM A167 and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Type 304.
   3. Castings: ASTM A743 and unless indicated otherwise on Drawings, required by design, or directed by Owner, provide Grade CF-8.

C. Iron:
   1. Wrought: ASTM A186 with carbon content not to exceed 0.05%. Low carbon or mild steel with carbon content not to exceed 0.20% is also acceptable.
   2. Castings: ASTM A48.

D. Fasteners: ANSI B18.6.3, ASTM A307, F467, F468, F593 and F594. Provide fasteners of same basic material and alloy as parts being joined except provide stainless steel fasteners at aluminum connections and at stainless steel connections. Unless otherwise indicated, provide Phillips (cross recessed), flathead, countersunk screws for all exposed locations.

E. Anchors and inserts: Provide non-ferrous anchors and inserts required to support work specified in accord with approved shop drawings.

F. Welding electrodes and filler material: Provide type and alloy as recommended by producer of metal to be welded, and as required for color match, strength, and compatibility of components.
   1. Comply with AWS D1.1 and D1.2.

G. Isolation tape: Polymer alloy film with elastomeric coating specifically designed for corrosion and electrolytic protection of embedded metals, Tapecoat H30 as manufactured by The Tapecoat Company, Evanston IL, tel: (708) 866-8500.

H. Shop coating for ferrous metal:
   1. Lead- and chromate-free, high solids (minimum 50% by volume), low VOC, rust inhibitive prime. Water-based/latex primers are not acceptable. Provide one of the following, or equivalent as approved by Owner.
      a. Tnemec No. 10-99 (Red) or 10-1009 (Gray) Tnemec Primer, by Tnemec Co., Inc.
      b. Rust-Oleum 769 Damp Proof Red Primer or No. X-60 Red Bare Metal Primer, by Rust-Oleum Corp.

c. Sherwin-Williams E41N1 Kromik Metal Primer by The Sherwin-Williams Company.
d. Enviro-Guard Heavy Duty Primer No. 1-2900 (Red) or No. 1-2969 (Gray), by Southern Coatings, Inc.

I. Provide sufficient, additional primer for field touch-up.

2.11 FABRICATION

A. Workmanship: The best architectural quality workmanship and fit-up is required and expected.

B. Field measurements: Take measurements as required to supplement and verify Drawing dimensions, and be responsible for accuracy thereof.

C. Aesthetics: Fabricate all work to accurately express the character and detail indicated on the Drawings and approved shop drawings.

D. Formed work: Form metal work to the required dimensions, shapes and sizes, with true curves, lines and angles. Provide necessary rebates, lugs, flanges, covers and brackets for assembly of units. Use concealed fasteners wherever possible.

E. Welding: Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of the exposed side. Clean exposed welded joints.
1. Unless specified, detailed, or approved otherwise on shop drawings, weld all shop connections and all field connections.
2. Unless otherwise approved, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

F. Fit-up: Construct joints to a tight, hairline fit. Cope or miter corner joints.

G. Castings: Provide castings that are sound and free of warp, pinholes, voids, or other defects which could impair strength and appearance. Finish exposed surfaces to smooth, sharp, well-defined lines and arises.

H. Anchorage: Provide brackets and anchors for joining and securing ornamental metal fabrications. Furnish inserts and sleeves as required for anchorage to concrete and structural supports.

I. Railings: Design and fabricate railing assemblies capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.
1. Ensure quality by completely prefabricating railings in shop, before shipping to job site for installation. Prefabricate in as large sections as practicable to minimize field work.

2.12 METAL FINISHES

A. Iron: Shop primer as specified hereinafter.

B. Stainless steel: Provide with finish in accord with NAAMM AMP503 to match approved samples.

C. As applicable, provide sufficient, additional coating materials for field touch-up.

2.13 SHOP PAINTING - FERROUS metal

A. Surface preparation: SSPC-SP6 or equivalent.

B. Primer:
   1. Apply one coat of primer, dry film thickness 2.0 mils minimum after cleaning and shop assembly.
   2. Apply primer by spray or brush. Thoroughly work into joints and corners and apply evenly over surfaces. Do not apply to wet or damp surfaces. Film shall be dry when material is handled or loaded for delivery to site.

2.14 SPECIALLY FABRICATED PRODUCTS

A. Ferrous Railings:
   1. Bar Railings: Mild steel with all connections welded.
   2. Pipe Railings: I.P.S. unless otherwise noted. Fabricate in largest sections practicable. Weld all shop joints. Conceal all field joints with sleeves and pins.

2.15 FINISHES:

A. Paints: Two coats. Color on plan. All paint shall be smooth and cover fencing completely. Paint sample fence for approval prior to finishing.

2.16 GROUT

A. Non-shrinking Master Builder's "Embeco", Conrad Sovig's "Metal-Mxs Grout", Sonneborn's "Ferrolith G Redi-Mixed Grout", Upco's "Upcon", or equal.

PART 3 - EXECUTION

3.1 VERIFICATION OF SURFACES

A. The Contractor shall be responsible for inspection of all surfaces to receive fencing, gates or other decorative metal fabrications.

3.2 COORDINATION WITH OTHER WORK

A. Examine the Drawings and Specifications of other related trades in terms of how they may effect the work effort of this work.

B. Provide all connections, anchors, bolts, welding, cutting, punching, drilling, tapping or other connections required to fit miscellaneous metal with other work.

3.3 SHOP FABRICATION

A. General
   1. For all metals which are exposed to view, use materials which are smooth and free of surface blemishes, patina, seam marks, roller marks, rolled trade names and roughness.
   2. Remove blemishes by grinding and filling prior to applying shop finishes.
   3. Bring all metal pieces together without distortion, shimming or hairline cracks.
   4. Grind all exposed welds smooth.
   5. Form bends, where required, with uniform cross-sections, without buckling or flattening.

B. Welding
   1. Weld all metal connections except where indicated otherwise.
   2. Weld corners and connections continuous.
   3. Use care and procedures that minimize locked in stresses and distortion.

C. Painting
   1. Preparation
      a. Remove all loose mill scale, rust oil film and dirt.
      b. Clean all surfaces equivalent to SS PC-SP-6.
      c. Recoat all damaged and marred galvanized surfaces. Apply rich compound in accordance with manufacturer's instructions.
   2. Painting
      a. Do not paint surfaces which will be embedded in concrete. Steel surfaces to be embedded in or bonded to concrete shall be primed only.
      b. Shop coat with specified paint, all ferrous items, to 1 mil dry coat thickness after fabrication, deburring and grinding smooth welds and rough spots. Touch up after installation. Leave in proper condition to receive finish.

3.4 INSTALLATION

A. General
   1. Install all work in accordance with the approved shop drawings.
   2. Erection shall be plumb, straight, true and accurately fitted.
   3. Work shall be adequately braced, reinforced, and anchored in place.
   4. All connections shall be concealed in the finished work where possible. Use Allen-head screws for all metal slip-fitted joints.

B. Fencing
   1. Erect fence as indicated on the Drawings.
   2. Set fencing true to line and grade.
   3. Footing Excavation
      a. Excavate footings to the depth indicated on the Drawings.
      b. Trim sides of excavation sharp and vertical. Bottom of the footing should be level and on firm native material.
   4. Concrete Footings
      a. Proportion and mix concrete to a minimum 2,000 PSI at 28 days.
      b. Slope top of footings to allow for drainage and apply a smooth trowel finish.

3.5 REPAIR OF DEFECTS

A. All defective or damaged work shall be replaced, removed and/or repaired as per the direction of the Owner.

B. Restore adjacent finish grades which have been disturbed during work of this Section to their original condition.

3.6 CLEAN UP

A. Upon completion of the work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner-accepted condition.

END OF SECTION