EROSION CONTROL (TYPE D):

Erosion control (Type D) includes applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities including the water quality basin. Erosion control (Type D) must comply with Section 20-3, "Erosion Control" of the Standard Specifications and these Special Provisions.

Before applying erosion control materials, prepare soil surface under Section 19-2.05, "Slopes" of the Standard Specifications, except that rills and gullies exceeding 2 inches in depth or width must be leveled. Remove vegetative growth, temporary erosion control materials, and other debris from areas to receive erosion control.

Before applying erosion control materials, the Engineer designates the ground location of erosion control (Type D) in increments of one acre or smaller for smaller areas. Place stakes or other suitable markers at the locations designated by the Engineer. Furnish all tools, labor and materials required to adequately indicate the various locations.

MATERIALS

Materials must comply with Section 20-2, "Materials" of the Standard Specifications and these Special Provisions.

Seed

Seed must comply with Section 20-2.10, "Seed" of the Standard Specifications. Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts or by a seed technologist certified by the Society of Commercial Seed Technologists. Measure and mix individual seed species in the presence of the Engineer.

Seed must contain at most 1.0 percent total weed seed by weight.

Deliver seed to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag attached are not accepted. The Engineer takes a sample of approximately 1 ounce or 0.25 cup of seed for each seed lot greater than 2 pounds.

Seed must comply with the following:

Non-Irrigated Seed Mix

Botanical Name (Common Name)	Percent Germination (Minimum)	Pounds Pure Live Seed Per Acre (Slope Measurement)
Bromus Carinatus (Cucamonga Brome)	85	20.0
Trifolium Tridentatum (Tomcat Clover)	85	4.0
Vulpia Microstachys (Small Fescue)	85	8.0

Seed Sampling Supplies

At the time of seed sampling, provide the Engineer a glassine lined bag and custody seal tag for each seed lot sample.

Commercial Fertilizer

Commercial fertilizer must comply with Section 20-2.02, "Commercial Fertilizer" of the Standard Specifications and have a guaranteed chemical analysis within 2 percent of 16-21 percent nitrogen, 6-8 percent phosphoric acid and 4-12 percent water soluble potash.

Stabilizing Emulsion

Stabilizing emulsion must comply with Section 20-2.11, "Stabilizing Emulsion" of the Standard Specifications and these Special Provisions.

Stabilizing emulsion:

1. Must be in a dry powder form.
2. Must be a processed organic adhesive used as a soil tackifier.
3. May be reemulsifiable.

APPLICATION

Apply erosion control materials in separate applications in the following sequence:

1. Apply the following mixture with hydroseeding equipment at the rates indicated within 60 minutes after the seed has been added to the mixture:

Non-Irrigated Seed Mix

Material	Pounds Per Acre (Slope Measurement)
Seed	35
Fiber	714
Commercial Fertilizer	10

2. Apply the following mixture with hydro-seeding equipment at the corresponding rates:

Non-Irrigated Seed Mix

Material	Pounds Per Acre (Slope Measurement)
Fiber	714
Commercial Fertilizer	10
Stabilizing Emulsion (Solids)	225

The ratio of total water to total stabilizing emulsion in the mixture must be as recommended by the manufacturer.

Once work is started in an area, complete stabilizing emulsion applications in that area on the same working day.
The Engineer may change the rates of erosion control materials to meet field conditions.

METHOD OF PAYMENT

The payment for Erosion Control (Type D) shall be included under the lump sum contract price paid for Water Pollution Control and shall included full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the specified in the Standard Specifications and these Special Provisions and no additional compensation will be allowed therefor.

TEMPORARY GRAVEL BAG BERM:

GENERAL

Summary

This work includes constructing, maintaining, and removing temporary gravel bag berm.
The SWPPP must describe and include the use of temporary gravel bag berm as a water pollution control practice for sediment control.

Submittals

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for gravel-filled bag fabric.

MATERIALS

Gravel-filled Bag Fabric

Geosynthetic fabric for temporary gravel bag berm must consist of one of the following:

A. Polyester
B. Polypropylene
C. Combined polyester and polypropylene

Sample under ASTM D 4354, Procedure C.

Test under ASTM D 4759. All properties must be based on Minimum Average Roll Value (MARV).

Identify, store, and handle under ASTM D 4873.

Protect geosynthetics from moisture, sunlight, and damage during shipping and storage.

Label each unit with the manufacturer's name, identifying information, and product identification.

Gravel-filled bag fabric must comply with:

Specification	Requirements
Grab breaking load 1-inch grip, lb, min. in each direction	205
Apparent elongation percent, min., in each direction	50
Water Flow Rate max. average roll value, gallons per minute/square foot	80-150
Permittivity 1/sec., min	1.2
Apparent opening size max. average roll value, U.S. Standard sieve size	40-80
Ultraviolet Degradation percent of original unexposed grab breaking load 500 hr, minimum	70

Gravel

Gravel for gravel-filled bags must be:

A. From 3/8 to 3/4 inch in diameter
B. Clean and free from clay balls, organic matter, and other deleterious materials

Gravel-filled Bags

Gravel-filled bags must:

A. Be made from gravel-filled bag fabric.
B. Have inside dimensions from 24 to 32 inches in length, and from 16 to 20 inches in width.
C. Have the opening bound to retain the gravel. The opening must be sewn with yarn, bound with wire, or secured with a closure device.
D. Weigh from 30 to 50 pounds when filled with gravel.

CONSTRUCTION

Before constructing temporary gravel bag berm, remove obstructions including rocks, clods, and debris greater than 1 inch in diameter from the ground.

Temporary gravel bag berm must:

A. Be placed as a single layer of gravel bags to create a linear sediment barrier
B. Be placed end-to-end to eliminate gaps
C. Be placed approximately parallel to the slope contour
D. Have the last 6 feet of the gravel bag berm angled up-slope

If you need to increase the height of the temporary gravel bag berm:

A. Increase height by adding rows of gravel-filled bags
B. Stack bags in a way that the bags in the top row overlap the joints in the lower row
C. Stabilize berm by adding rows at the bottom

If used within shoulder area, gravel-filled bags must be placed behind temporary railing (Type K).

MAINTENANCE

Maintain temporary gravel bag berm to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary gravel bag berm as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary gravel bag berm by:

A. Removing sediment from behind the gravel bag berm when sediment is 1/3 the height of the gravel bag berm above ground
B. Repairing or adjusting the gravel-filled bags when rills and other evidence of concentrated runoff occur beneath the gravel-filled bags
C. Repairing or replacing the gravel-filled bags when they become split, torn, or unraveled

Repair temporary gravel bag berm within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary gravel bag berm, repair temporary gravel bag berm at your expense.

The County of Riverside does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

REMOVAL

When the Engineer determines that temporary gravel bag berm is not required, they must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary gravel bag berm must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT

The contract price for Temporary Gravel Bag Berm shall be included in the lump sum price for Water Pollution Control and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary gravel bag berm, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

TEMPORARY FIBER ROLL/STRAW WADDLE :

GENERAL

Summary

This work includes constructing, maintaining, and removing temporary fiber roll.

Replace "SWPPP" with "WPCP" if SSP 07-340 is used. The SWPPP must describe and include the use of temporary fiber roll as a water pollution control practice for sediment control.

Submittals

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for fiber roll.

MATERIALS

Fiber Roll

Fiber roll must:

A. Last for at least one year after installation.
B. Be Type 1 or Type 2.

If specified, Type 1 fiber roll must be:

A. Made from an erosion control blanket:

1. Classified by the Erosion Control Technology Council (ECTC) as ECTC 2D.
2. With a Universal Soil Loss Equation (USLE) C-Factor of not more than 0.20 at a 2:1 (horizontal:vertical) slope.
3. Capable to withstand a maximum shear stress of 1.75 pounds per square foot under ASTM D 6460.
4. With a minimum tensile strength of 75 pounds per foot under ASTM D 5035.
5. With top and bottom surfaces covered with extruded photodegradable plastic netting or lightweight non-synthetic netting.
6. That complies with one of the following:

    6.1. Double net straw and coconut blanket with 70 percent straw and 30 percent coconut fiber.
    6.2. Double net excelsior blanket with 80 percent of the wood excelsior fibers being 6 inches or longer.

B. Rolled along the width.
C. Secured with natural fiber twine every 6 feet and 6 inches from each end.
D. Finished to be either:

1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 0.5 pounds per linear foot.
2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 2 pounds per linear foot.

If specified, Type 2 fiber roll must:

A. Be filled with rice or wheat straw, wood excelsior, or coconut fiber.
B. Be covered with a biodegradable jute, sisal, or coir fiber netting.
C. Have the netting secured tightly at each end.
D. Be finished to be either:

1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 1.1 pounds per linear foot.
2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 3 pounds per linear foot.

Wood Stakes

Wood stakes must be:

A. Untreated fir, redwood, cedar, or pine and cut from sound timber.
B. Straight and free of loose or unsound knots and other defects which would render the stakes unfit for use.
C. Pointed on the end to be driven into the ground.

For fiber roll, wood stakes must be at least:

A. 1" x 1" x 24" in size for Type 1 installation.
B. 1" x 2" x 24" in size for Type 2 installation.

Rope

For Type 2 installation, rope must:

A. Be biodegradable, such as sisal or manila.
B. Have a minimum diameter of 1/4 inch.

CONSTRUCTION

Before placing fiber roll, remove obstructions including rocks, clods, and debris greater than one inch in diameter from the ground.

If fiber roll is to be placed in the same area as erosion control blanket, install the blanket before placing the fiber roll. For other soil stabilization practices such as hydraulic mulch or compost, place the fiber roll and then apply the soil stabilization practice.

Place fiber roll on slopes at the following spacing unless the plans show a different spacing:

A. 10 feet apart for slopes steeper than 2:1 (horizontal:vertical)
B. 15 feet apart for slopes from 2:1 to 4:1 (horizontal:vertical)
C. 20 feet apart for slopes from 4:1 to 10:1 (horizontal:vertical)
D. 50 feet apart for slopes flatter than 10:1 (horizontal:vertical)

Place fiber roll approximately parallel to the slope contour. For any 20 foot section of fiber roll, do not allow the fiber roll to vary more then 5 percent from level.

Type 1 and Type 2 fiber roll may be installed using installation method Type 1, Type 2, or a combination:

For installation method Type 1, install fiber roll by:

A. Placing in a furrow that is from 2 to 4 inches deep
B. Securing with wood stakes every 4 feet along the length of the fiber roll
C. Securing the ends of the fiber roll by placing a stake 6 inches from the end of the roll
D. Driving the stakes into the soil so that the top of the stake is less then 2 inches above the top of the fiber roll

For installation method Type 2, install fiber roll by:

A. Securing with rope and notched wood stakes.

B. Driving stakes into the soil until the notch is even with the top of the fiber roll.
C. Lacing the rope between stakes and over the fiber roll. Knot the rope at each stake.
D. Tightening the fiber roll to the surface of the slope by driving the stakes further into the soil.

MAINTENANCE

Maintain temporary fiber roll to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary fiber roll as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary fiber roll by:

A. Removing sediment from behind the fiber roll when sediment is 1/3 the height of the fiber roll above ground
B. Repairing or adjusting the fiber roll when rills and other evidence of concentrated runoff occur beneath the fiber roll.
C. Repairing or replacing the fiber roll when they become split, torn, or unraveled
D. Adding stakes when the fiber roll slump or sag
E. Replacing broken or split wood stakes

Repair temporary fiber roll within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary fiber roll, repair temporary fiber roll at your expense.

The County of Riverside does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

REMOVAL

When the Engineer determines that temporary fiber roll is not required, they must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary fiber roll must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

METHOD OF PAYMENT

The contract price paid for temporary fiber roll shall be included in the lump sum prices for Water Pollution Control and includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary fiber roll, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer

DEVELOP WATER SUPPLY:

Develop water supply shall conform to the provisions of Section 17 of the Standard Specifications and these Special Provisions.

Attention is directed to the requirements of Section 10, "Dust Control".

METHOD OF PAYMENT

Full compensation for developing water supply and furnishing watering equipment shall be considered as included in the contract lump sum bid price paid for Develop Water Supply, and no additional compensation will be allowed therefor.

CLEARING AND GRUBBING:

Clearing and grubbing including but not limited to removal of vegetation (trees, shrubs, bushes, and groundcover) within the proposed slopes, trails and water quality basin, removal and replacement of vegetation (trees, shrubs, brushes, and groundcover) not in the slopes and the trails, modification of existing irrigation, removal of CMP and PVC culvert, removal and salvaging of road sign, removal and salvaging of post with flashing beacon, removal of guard post, removal of winery monument with foundation, removal of a portion of the retaining wall including foundation and excess soil material, removal of rip rap, and removal and replacement of rip rap shall conform to the provisions in Section 16 of the Standard Specifications.

Contractor shall remove vegetation (trees, shrubs, bushes and groundcover) within the proposed slopes and trail as shown on the plans and/or as directed by the Resident Engineer. Removed vegetation shall be the property of the Contractor and shall be disposed of by the Contractor, as provided in Section 7-1.13 of the Standard Specification.

Contractor shall remove and replace vegetation (trees, shrubs, bushes and groundcover) not in the proposed slopes and the trails as necessary for the construction of this project. Remove and replace vegetation (trees, shrubs, bushes and groundcover) shall include but not limited to the vegetation removed as part of the construction staging of this project. Vegetation shall be replaced with the same size and species removed. Prior to removal of existing vegetation (trees, shrubs,

bushes, and groundcover), the Contractor shall inventory all the existing vegetation (trees, shrubs, bushes, and ground cover) to be replaced. The inventory shall be conducted with the Resident Engineer. Contractor will be responsible for the reestablishment and maintenance of the replaced vegetation (trees, shrubs, bushes, and ground cover) for ninety (90) days. Attention is directed to 'Landscape Maintenance' of these Special Provisions for the ninety (90) days maintenance requirements for the replaced vegetation.

Replacement of vegetation (trees, shrubs, and bushes) should be at the locations where existing vegetation was removed from and/or as directed by Resident Engineer, the County Service Area (CSA) 143 maintenance district, and the details and standards in the landscaping plans.

Contractor shall relocate, modify and repair all the existing irrigation lines affected by the construction of this project. Included in the relocation, modification and repair of the existing irrigation is the furnishing of materials and accessories needed to make the existing irrigation system work properly with the replaced vegetation (trees, shrubs, bushes, and ground cover). Existing irrigation system may need to be relocated and modified more than once depending on the staging of this project and will be paid under Clearing and Grubbing. The modifications in the existing irrigation line shall be performed to the satisfaction of the County Resident Engineer, the County Services Area (CSA) 143 maintenance district, and per the detail and standards in the irrigation plans.

If any of the irrigation hand holes are damaged, Contractor shall replace the damage hand holes. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved for replacing damaged hand holes shall be paid under the lump sum price of Clearing and Grubbing.

Contractor shall remove, salvage, deliver and off-load the roadside sign post and flashing beacon to the address listed below or as directed by the Engineer:

Riverside County Transportation Department
Road Maintenance Yard
25315 Jefferson Avenue
Murrieta, CA 92562
Telephone (951) 677-5889

Contractor shall remove and dispose of existing CMP and PVC culverts, rip rap, guard posts, winery monument including footing, and retaining wall including footing and excess soil material as provided in Section 7-1.13 of the Standard Specifications.

Plates, plaques and concrete caps on winery monument shall be carefully removed and delivered to the County address listed above or as directed by the Resident Engineer. If any of the plate, plaque, and concrete caps is damaged, Contractor shall replace the damage plates, plaque, and concrete caps. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved for removing and delivering the plates, plaques and concrete caps on winery monument shall be paid under the lump sum price of Clearing and Grubbing and no additional compensation will be allowed therefor.

Contractor shall remove and replace existing rip rap within the project limits as shown on the plans and as directed by Resident Engineer.

Contractor shall relocate roadside sign and post as many times as necessary to conform to the traffic control plans during construction.

Regulatory Requirements

Attention is directed to the Federal Migratory Bird Treaty Act (15 USC 703-711) 50 CFR Part 21 and 50 CFR Part 10, and the California Department of Fish and Game Code Sections 3503, 3513 and 3800, that protect migratory birds, their occupied nests, and their eggs from disturbance or destruction.

Construction

Ground disturbance, tree, shrub and/or vegetation removal that occurs between March 1st and September 15th will not commence until a preconstruction survey for nesting birds has verified that no active nests have been located or the Engineer has approved the beginning of work. If an active nest is located, construction within 500 feet of the nest must be avoided until the nest has been vacated and the young are independent of their parents.

Between March 1st and September 15th, the Contractor shall notify the Engineer 15 working days prior to beginning work disturbing structures, the ground or vegetation. The Engineer will approve the beginning of work disturbing the ground or vegetation between March 1st and September 15th.

The Contractor shall use exclusion techniques directed by the Engineer to prevent migratory birds from nesting in trees within the project limits.

If evidence of bird nesting is discovered, the Contractor shall not disturb the nesting birds or nests until the birds have naturally left the nests. If evidence of migratory bird nesting is discovered after beginning work, the Contractor shall immediately stop work within 500 feet of the nests and notify the Engineer. Work shall not resume until the Engineer provides a written notification that work may begin at or adjacent areas of the discovered bird nest locations.

Attention is directed to Section 8-1.05, "Temporary Suspension of Work" of the Standard Specifications.

Nothing in this section shall relieve the Contractor from providing for public safety in conformance with the provisions in Section 7-1.09, "Public Safety" of the Standard Specifications.

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments" of the Standard Specifications, the amount set forth for the contract item of work hereinafter listed shall be deemed to be maximum total value of said contract item of work which will be recognized for progress payment purposes:

Clearing and Grubbing - $25,000 (Option 1 and Option 2)

After acceptance of the contract pursuant to Section 7-1.17, "Acceptance of Contract" of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes herein above listed for said item, will be included for payment in the first estimate made after acceptance of the contract.

Abandoned Water Pipeline

In the event that an existing abandoned water pipeline is found to be in conflict with the project improvements, the Contractor shall:

1. Obtain verification from the Rancho California Water District that the pipeline is abandoned, and coordinate his work with the Water District's representative.
2. Remove and haul off the conflicting sections of pipeline. Removals shall be made to the nearest joint, or as directed by the Engineer.
3. Install 3 sack concrete slurry five (5) feet into the undisturbed pipe section and provide a bulkhead on the exposed pipe end.
4. All work shall be as described herein, and as directed by the Engineer.
5. Full compensation shall be considered as included in the lump sum price paid for Clearing and Grubbing, including all labor, equipment, personnel and incidentals, and no additional compensation will be allowed therefor.

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article including but not limited to:
- removing vegetation (trees, shrubs, bushes, and groundcover) within the proposed slopes and trail,
- removal and replacement of vegetation (trees, shrubs, bushes, and groundcover) necessary for construction staging and detour,
- the reestablishment and maintenance of the replaced vegetation (trees, shrubs, bushes, and ground cover) for ninety (90) days,
- modification repairs of the existing irrigation system, replacement of damaged hand hole,
- removal of existing Corrugated Metal Pipe and, PVC culvert,
- removal, salvaging, and delivery of road sign, post with flashing beacon,
- removal of guard post, winery monument with footing, rip rap,
- removal and replacement of rip rap,
- removal of CP station,
- partial removal of retaining wall, and
- relocation of roadside sign and post, shall be paid for on a lump sum basis including furnishing of all labor, materials, tools, equipment, furnishing replacement vegetation (trees, shrubs, bushes, and groundcover), incidentals and for doing all the work involved including coordination with the County Services Area (CSA) 143 Maintenance District for placement of the landscape and the modification and placement of the irrigation includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in and no additional compensation will be allowed therefor.

ROADSIDE SIGN (RELOCATE/ SALVAGE):

Existing roadside signs, shall be removed, relocated and/or salvaged as shown on the plans.

Roadside Signs to be removed and relocated shall be installed per the Roadside signs (install) special provisions.

Existing roadside signs at locations shown on the plans to be removed shall not be removed until replacement signs have been installed or until the existing signs are no longer required for direction of public traffic, unless otherwise directed by the Engineer.

County owned removed and salvaged signs shall be delivered to the nearest County Maintenance Yard or as directed by the Engineer. The County Maintenance Yard is located at the following address:

Riverside County Transportation Department
Road Maintenance Yard
25315 Jefferson Avenue
Murrieta, CA 92562
Telephone (951) 677-5889

METHOD OF PAYMENT

Full compensation for Relocate and Salvage roadside signs including furnishing all labor, materials, tools, equipment, incidentals and for doing all the work including sign removal, sign storage, sign protection, excavation and backfill, and installation as specified in the Standard Specifications and these Special Provisions shall be considered as included in the lump sum contract price paid for Clearing and Grubbing and no additional compensation will be allowed therefor.

CLASS 2 CONCRETE (MINOR CONCRETE STRUCTURES):

Class 2 Concrete (Minor Concrete Structures) shall conform to the applicable portions of Section 51, 52, 75 and 90 of the Standard Specifications.

Class 2 Concrete (Minor Concrete Structures) for this project shall consist of: Catch Basins (Curb Inlet), Manholes, Junction Structure, Warped Wingwalls, Wingwall, Wingwall Type D, Catch Basin (Combination Inlet), Concrete Drop Inlet, Transition Structure No. 3, PCC Forebay, and Concrete Collar.

Concrete to be used in the construction of Class 2 Concrete (Minor Concrete Structures) shall be Class "2" concrete.

All exposed metal shall be galvanized in conformance with Section 75-1.05 of the Standard Specifications.

At the Junction Structure, the HDPE pipe and Reinforced Concrete Box joint needs to be watertight. The inside of the junction structure shall be smooth and free of obstructions. Full compensation of all labor, materials, tools, and incidentals for making the HDPE pipe and Reinforced Concrete Box joint watertight shall be included in the payment for Class 2 Concrete (Minor Structure) Junction Structure.

The floor slab for all the catch basins and manholes shall have a slope of ½" per 1' towards the direction of flow and or in the direction of the outlet of the structure. Full compensation for complying with this provision including all labor, materials, tools, and incidentals shall be included in the payment for the various applicable items of work.

METHOD OF PAYMENT

The contract unit price for Class 2 Concrete (Minor Structures) will be paid by each and shall include full compensation for furnishing all labor, materials, tools and equipment, and doing all work involved in the complete structure, including the construction of gutter local depression for the Catch Basin (Curb Inlet) and Catch Basins (Combination Inlet) , structure excavation and backfill, furnishing and placing reinforcement, and metal frames, covers and grates and no further allowances shall be allowed.

The contract unit price for each Class 2 Concrete (Minor Concrete Structures) will not be adjusted if the constructed height of said minor structure, including revisions by Engineer, is within + 0.5 foot of the vertical dimension shown on the plans.

ROCK SLOPE PROTECTION:

Rock slope protection shall conform to the provisions of Section 72 of the Standard Specifications and these Special Provisions.

Rock Slope Protection shall be placed in conformance with Method "B" as designated in the Engingeer's Estimate.

METHOD OF PAYMENT

The unit price paid per cubic yard for Rock Slope Protection (1/4 Ton - rock method "B" placement) shall include full compensations for furnishing all labor, materials (including concrete rock), tools, equipment and incidentals, and for doing all work involved in constructing the rock slope protection, complete in place, including any excavation and backfill necessary for placing rock slope protection.

ROCK SLOPE PROTECTION FABRIC:

Rock slope protection fabric shall conform to the applicable portions of Section 72 and 88 of the Standard Specifications.

METHOD OF PAYMENT

Payment for all work involved in the installation of Rock Slope Protection Fabric shall be paid per square foot and shall include full compensation for furnishing all labor, materials, tools and equipment, incidentals, and doing all work involved in the complete placement of the rock slope protection fabric.

IMPORTED ROCKY MATERIAL:

All aggregate materials to conform to ASTM D 448-08. 3" crushed rock shall meet the gradation requirements for number 1 stone per ASTM D 448-08. This material shall be crusher run and washed.

METHOD OF PAYMENT

The contract unit prices paid per cubic yard for Imported Rocky Material shall include full compensation for furnishing all labor and materials, and doing all work involved in the import and placement of the material and no further allowances shall be allowed.

PLACE ASPHALT CONCRETE – MISCELLANEOUS AREAS:

Asphalt concrete miscellaneous areas shall conform to the County Road Improvement Standards and Specifications, Caltrans Standard Plans, the plans, and as directed by the Engineer.

The paid quantity of Asphalt Concrete (Miscellaneous Areas) shall include placement, and shall be paid for as a separate item of work in addition to the price paid for the asphalt concrete material.

Payment for the asphalt concrete material used in miscellaneous areas shall be included in the contract unit price paid per ton for Hot Mix Asphalt (Type A), and the material shall meet the requirements provided in the special provisions for Hot Asphalt Mix (Type A).

The asphalt binder shall be PG 70-10.

METHOD OF PAYMENT

The contract unit prices paid per square foot for Place Hot Mix Asphalt (Miscellaneous Area) shall include full compensation for furnishing all labor, materials other than asphalt concrete, tools, and equipment and for doing all the work involved in placing and compacting the miscellaneous areas and no additional compensation will be allowed therefore.

CHAIN LINK FENCE AND DOUBLE GATE:

Chain link fence shall conform to the provisions of Section 80-4 of the Standard Specifications, RCFCWCD Standard Plan No. M801, these Special Provisions and as directed by the Engineer.

Chain link fencing material shall conform to the provisions of Section 80-4 of the Standard Specification.

METHOD OF PAYMENT

The contract unit bid price paid per linear foot for Chain Link Fence shall include full compensation for furnishing all labor, equipment, materials and tools, and incidentals, and for doing all the work involved including the furnishing and installation of the 14' Double Drive Gate, any excavation and backfill with concrete and no additional compensation will be allowed therefor.

HIGH DENSITY POLYETHYLENE (HDPE) PIPE:

Plastic Pipe shall conform to the provisions in Section 64, "Plastic Pipe", of the Standard Specifications, except as otherwise specified in these specifications.

Plastic Pipe shall be Type S corrugated polyethylene pipe with smooth interior wall manufactured from high density polyethylene (HDPE) virgin compounds.

Installation shall be in accordance with the plans, Standard Specifications, these specifications, and as recommended by the pipe manufacturer.

Pavement shall be cut to a depth of 3" with an abrasive type saw or with a rock cutting excavator specifically designed for this purpose. Cuts shall be neat and true with no shatter outside the removal area.

The HDPE pipe shall be encased in 3 sack slurry per the detail shown on the plans. The Slurry cement backfill shall conform to Section 19-3.062 of the Standard Specifications

No HDPE pipe joints will be allowed 10-feet in each direction of any crossing water line facility.

All the joints of the HDPE pipes need to be watertight. The watertight joints shall conform to section 64 of the Standard specifications. Full compensation of all labor, materials, tools, and incidentals for making the HDPE pipes watertight shall be included in the payment for the different sizes of the HDPE Pipe.

At all pipe joint locations, the inside of the pipe shall be smooth and free of obstructions.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

Metallic core or metallic-faced polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines shall be installed on the top of the concrete encasement continuously and unbroken. The metallic warning tape shall be at a minimum of 3 inch in width, color coded for the intended use with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

METHOD OF PAYMENT

The contract price paid per linear foot for the different sizes of HDPE Pipe includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all of the work involved in installing HDPE Pipe, complete in place, including structure excavation and backfill, 3 sack slurry encasement, and connecting HDPE Pipe to new or existing facilities, including concrete collars, reinforcement, or other connecting devices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

EXCAVATE BASIN TO GRADE AND CONSTRUCT BERM INCLUDING EMBANKMENT:

Basin Excavation and Embankment shall conform to the provisions of Section 19 of the Standard Specifications and these Special Provisions, and the plans. This item includes all excavation and embankment required to construct the water quality basin to the lines and grades per plans.

No mass diagram or overhaul computations will be provided for this project. The Contractor will be required to haul and transport excess material, and provide his/her own disposal area for any surplus material as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

Full compensation for the construction of earthen berm including embankment shall be included in the unit bid price paid under "Excavate Basin To Grade and Construction of Berm Including Embankment."

Excess material will become the property of the Contractor and will be disposed of as provided in Section 7-1.13 of the Standard Specifications."

Compaction of the water quality basin side slopes shall be to 90% relative compaction. No compaction of the water quality basin bottom shall be permitted. The contractor shall not drive within the water quality basin with rubber tires at any time within 2 feet of the finished grade elevation of the basin bottom.

Whenever relative compaction is specified to be determined by Test Method No. Calif. 216, the in-place density may be determined by Test Method No. Calif. 231. The in-place density required by Test Method No. Calif. 312 may be determined by Test Method No. 231. The wet weight or dry weight basis and English Units of Measurement may be used as an option of the Materials Engineer.

METHOD OF PAYMENT

The unit bid price paid per cubic yard for "Excavate Basin To Grade and Construct Berm Including Embankment" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the excavation, hauling and transporting excess material, embankment and compaction work involved for construction of the water quality basin side slopes, bottom, and access road subgrade grading and 95% relative compaction as directed by the Engineer and no additional compensation will be allowed therefor.

ROADWAY EXCAVATION:

Roadway excavation shall conform to the provisions of Section 19 of the Standard Specifications and these Special Provisions. All large rocks and boulders larger than 1 foot in greatest dimension encountered during roadway excavation shall be considered unsuitable material and shall conform to Section 19-2.02 of the Standard Specifications.

At road connections and at limits of asphalt paving, existing pavement shall be grind 2" as shown on the plans or as directed by the Engineer. Full compensation for furnishing all labor, tools and doing all the work necessary including grinding, and sawcutting shall be considered as included in the contract prices paid per cubic yard for Roadway Excavation and no additional compensation will be allowed therefor.

Existing pavement including dikes and overside drains, any base material shall be cut back to neat lines and removed as shown on the plans or as directed by the Engineer. Excess material will become the property of the Contractor and will be disposed of as provided in Section 7-1.13 of the Standard Specifications.

Reconstruction of dirt driveway with class 3 aggregate base shall be performed as shown on the plans and payment shall be included in the contract bid price paid per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

Grading existing shoulders to drain as directed by Resident Engineer will be included in the unit bid price per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

METHOD OF PAYMENT

The contract unit bid price paid per cubic yard for Roadway Excavation shall include full compensation for furnishing all labor, materials, tools, equipment, including grinding 2 inches where the project matches the exiting asphalt, and incidentals, and for doing all work involved including the compaction of the subgrade, the grading of the shoulder to drain to an existing drainage facility as directed by the Engineer and per plan, reconstruction of exiting dirt driveway, and no additional compensation will be allowed therefor.

RELATIVE COMPACTION

Whenever relative compaction is specified to be determined by Test Method No. Calif. 216, the in-place density may be determined by Test Method No. Calif. 231. The in-place density required by Test Method No. Calif. 312 may be determined by Test Method No. 231. The wet weight or dry weight basis and English Units of Measurement may be used at the option of the Materials Engineer.

PRECAST REINFORCED CONCRETE BOX (RCB):

The Precast reinforced concrete box (RCB) shall conform to the section and detail specified in the Standard Plans for Public Works Construction No. 390-0, as attached herewith. The RCB shall be manufactured based on earth cover less than 24 inches and shall meet all structural requirements including concrete strength, reinforcing steel, concrete cover over steel, and other associated material properties. No welded wire reinforcement will be allowed. Prior to use and acceptance of the RCB, a certificate of compliance for each material used and structural requirements shall be furnished in conformance with Section 6-1.07 of the Standard Specifications. At any time, sampling and testing of any materials used may be required from the manufacturer or contractor at the discretion of the Engineer.

The excavation and backfill of the RCB shall conform to the detail specified in the Standard Plans for Public Works Construction No. 390-0 for fill height 24 inches or less, Method 2. The specified leveling bed material shall meet the requirements of Section 19-3.025 of the Standard Specifications. The 3 sack Slurry cement backfill shall conform to Section 19-3.062 of the Standard Specifications and full compensation shall be paid for by the contract unit bid paid per linear foot for Precast Reinforced Concrete Box and no additional compensation will be allowed therefor.

In areas where utility vertical clearances are less than 12" between the bottom (or side wall) face of the RCB and the crossing utility, 3-sack slurry cement shall be used for backfill.

The slurry cement shall be allowed to cure for a minimum of two days prior to backfilling over or placing any material over the slurry cement.

Contractor shall accommodate an opening and the reinforcing steel in Precast Reinforce Concrete Box for the construction of a Junction Structure per the details shown on the plans.

METHOD OF PAYMENT

The contract unit bid price paid per linear foot for the different sizes of Precast Reinforced Concrete Box shall include full compensation for all labor, materials, tools, equipment, and incidentals, and for doing all the work involved including structural excavation and backfill, 3 sack slurry cement backfill, placement of an opening and reinforcement steel for a Junction Structure, as specified in the Standard Specifications and these Special Provisions, as directed by the Engineer and as shown on the plans an no additional compensation will be allowed therefor.

MISCELLANEOUS FACILITIES-FLARED END SECTIONS:

Flared end sections shall conform to the provisions in Section 70, "Miscellaneous Facilities" of the Standard Specifications and these Special Provisions.

METHOD OF PAYMENT

The contract unit bid prices paid per each for 18" Flared End Section shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved including structures excavation and backing as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

ASPHALT CONCRETE DIKES AND OVERSIDE DRAIN:

Asphalt concrete dikes and overside drains shall conform to the County Road Improvement Standards and Specifications, as specified and as directed by the Engineer.

The pay quantity of asphalt concrete dikes and overside drains shall be for placement, and shall be paid for as a separate item of work in addition to the price paid for the asphalt concrete material.

Asphalt binder to be mixed with the aggregate shall be PG 70-10 in accordance with the Special Provision for Asphalt, or as directed by the Engineer.

METHOD OF PAYMENT

The contract unit prices paid per linear foot for Asphalt Concrete Dike and per each for Asphalt Concrete Overside Drain shall include full compensation for furnishing all labor, materials other than asphalt concrete, tools, and equipment and for doing all the work involved in placing and compacting the dikes and overside drains and no additional compensation will be allowed therefore.

AGGREGATE BASE:

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases" of the Standard Specifications and these Special Provisions and shall meet the gradation requirements for ¾ inch maximum.

The first paragraph of Section 26-1.02A, "Class 2 Aggregate Base" shall be modified to read:

> Aggregate for Class 2 aggregate base shall be free from organic matter and other deleterious matter, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm and stable base. Aggregate may consist of broken and crushed asphalt concrete or Portland cement concrete and may contain crushed aggregate base or other rock materials. The material may contain no more than 3 percent brick by weight as determined by California Test Method 202 as modified: Brick material retained on a No.4 sieve shall be identified visually and

separated manually. Brick quantification shall be based on total weight of dry sample. Also, material retained on the 4.75 mm (No.4) sieve shall contain no more than 15 percent of particles (gravel) that have no more than one fractured face.

The Quality Requirements contained in Section 26-1.02A shall be modified to read:

QUALITY REQUIREMENTS

Test	Contract Compliance
Resistance (R-Value) Virgin Rock Crushed Miscellaneous	 78 Minimum 80 Minimum
Sand Equivalent	35 Minimum
Durability Index	35 Minimum
Percentage Wear 100 Revolutions 500 Revolutions	 15 Maximum 52 Maximum

METHOD OF PAYMENT

Quantities of Aggregate Base will be paid for at the contract unit price per cubic yard and in accordance with the provisions of Sections 26-1.06 and 26-1.07 of the Standard Specifications.

HOT MIX ASPHALT:

Asphalt concrete shall be Type "A" and shall conform to the requirements of Section 39 of the Standard Specifications and the following:

Aggregate grading shall be three-quarter inch (3/4") maximum, medium.

The asphalt lift thickness table, as shown in Section 39-6.01, "General Requirements" of the Standard Specifications, is revised as follows:

Total Thickness Shown on Plans	Minimum No. of Layers	Top Layer Thickness (foot)		Next Lower Layer Thickness (foot)		All Other Lower Layer Thickness (foot)	
		Min.	Max.	Min.	Max.	Min.	Max.
0.24-foot or less[a]	1	-	-	-	-	-	-
0.25-foot	2[b]	0.12	0.13	0.12	0.13	-	-
0.26 - 0.46 foot	2	0.12	0.21	0.14	0.25	-	-
0.47-foot or more	3 or more	0.15	0.21	0.15	0.25	0.17	0.25

Footnotes to asphalt thickness table are revised as follows:

a. No Change.
b. One layer of 0.25 foot thick may be placed as approved by the Engineer. When the Traffic Index specified is 5.5 or below, two layers shall be placed.

ASPHALTS

Asphalt shall conform to the provisions in this Section, "Asphalts". Section 92, "Asphalts" of the Standard Specifications shall not apply.

Asphalt shall consist of refined petroleum or a mixture of refined liquid asphalt and refined solid asphalt, prepared from crude petroleum. Asphalt shall be:

1. Free from residues caused by the artificial distillation of coal, coal tar, or paraffin;
2. Free from water;
3. Homogeneous.

GENERAL

The Contractor shall furnish asphalt in conformance with the State of California Department of Transportation's "Certification Program for Suppliers of Asphalt". The Department maintains the program requirements, procedures, and a list of approved suppliers at http://www.dot.ca.gov/hq/esc/Translab/fpmcoc.htm.

The Contractor shall ensure the safe transportation, storage, use, and disposal of asphalt.

The Contractor shall prevent the formation of carbonized particles caused by overheating asphalt during manufacturing or construction.

GRADE

Performance graded (PG) asphalt binder shall conform to the following:

Property	AASHTO Test Method	Specification Grade		
		PG 64-10	PG 64-16	PG 70-10
Original Binder				
Flash Point, Minimum °C	T48	230	230	230
Solubility, Minimum %[b]	T44	99	99	99
Viscosity at 135 °C, Maximum, Pa·s	T316	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T315	64 1.00	64 1.00	70 1.00
RTFO Test[e], Mass Loss, Maximum, %	T240	1.00	1.00	1.00
RTFO Test Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T315	64 2.20	64 2.20	70 2.20
Ductility at 25 °C Minimum, cm	T51	75	75	75
PAV[f] Aging, Temperature, °C	R28	100	100	110
RTFO Test and PAV Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*/sin(delta), kPa	T315	31[d] 5000	28[d] 5000	34[d] 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, Mpa Minimum M-value	T313	0 300 0.300	-6 300 0.300	0 300 0.300

Notes:

a. Note used.

b. The Engineer will waive this specification if the supplier is a Quality Supplier as defined by Department's "Certification Program for Suppliers of Asphalt".

c. The Engineer will waive this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

d. Test the sample at 3 °C higher if it fails at the specified test temperature. G*sin(delta) shall remain 5000 kPa maximum.

e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T240 or ASTM Designation: D2827.

f. "PAV" means Pressurized Aging Vessel.

Performance graded polymer modified asphalt binder (PG Polymer Modified) is:

Performance Graded Polymer Modified Asphalt Binder [a]

Property	AASHTO Test Method	Specification Grade		
		PG 58-34 PM	PG 64-28 PM	PG 76-22 PM
Original Binder				
Flash Point, Minimum °C	T 48	230	230	230
Solubility, Minimum % [b]	T 44[c]	98.5	98.5	98.5
Viscosity at 135°C, [d] Maximum, Pa·s	T 316	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C	T 315	58	64	76
Minimum G*/sin(delta), kPa		1.00	1.00	1.00
RTFO Test , Mass Loss, Maximum, %	T 240	1.00	1.00	1.00
RTFO Test Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C	T 315	58	64	76
Minimum G*/sin(delta), kPa		2.20	2.20	2.20
Dynamic Shear, Test Temp. at 10 rad/s, °C	T 315	Note e	Note e	Note e
Maximum (delta), %		80	80	80
Elastic Recovery[f], Test Temp., °C	T 301	25	25	25
Minimum recovery, %		75	75	65
PAV[g] Aging, Temperature, °C	R 28	100	100	110
RTFO Test and PAV Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C	T 315	16	22	31
Maximum G*sin(delta), kPa		5000	5000	5000
Creep Stiffness, Test Temperature, °C	T 313	-24	-18	-12
Maximum S-value, MPa		300	300	300
Minimum M-value		0.300	0.300	0.300

Notes:

a. Do not modify PG Polymer Modifier using acid modification.

b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt".

c. The Department allows ASTM D5546 instead of AASHTO T44.

d. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

e. Test temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 Kpa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.

f. Test without a force ductility clamp may be performed.

g. "PAV" means Pressurized Aging Vessel.

SAMPLING

Provide a sampling device in the asphalt feed line connecting the plant storage tanks to the asphalt weighing system or spray bar. Make the sampling device accessible between 24 and 30 inches above the platform. Provide a receptacle for flushing the sampling device.

Include with the sampling device a valve:

1. Between 1/2 and 3/4 inch in diameter;

2. Manufactured in a manner that a one-quart sample may be taken slowly at any time during plant operations;

3. Maintained in good condition.

The Contractor shall replace failed valves.

In the Engineer's presence, take 2 one-quart samples per operating day. Provide round, friction top, one-quart containers for storing samples.

APPLYING ASPHALT

Unless otherwise specified, the Contractor shall heat and apply asphalt in conformance with the provisions in Section 93, "Liquid Asphalts" of the Standard Specifications.

Section 39-2.01, "Asphalts" is replaced in its entirety with the following:

> Asphalt binder to be mixed with aggregate shall conform to the provisions in "Asphalts" of these Special Provisions.
>
> The grade of asphalt binder shall be 70-10.
>
> Liquid asphalt for prime coat shall conform to the provisions in Section 93, "Liquid Asphalts" of the Standard Specifications and shall be Grade 64-10 unless otherwise designated by the contract item or otherwise specified in the Special Provisions.
>
> Asphaltic emulsion for paint binder (tack coat) shall conform to the provisions in Section 94, "Asphaltic Emulsion" of the Standard Specifications for the rapid-setting or slow-setting type and grade approved by the Engineer. Grade 64-10 shall be used if not otherwise specified.

Section 39-3.01B (1) shall be amended to include:

> Aggregate of the 3/4 inch or 1/2 inch maximum size and aggregate for asphalt concrete base shall be separated into 3 or more sizes and each size shall be stored in separate bins. If 3 sizes are used, one bin shall contain that portion of the material which will pass the maximum size specified and be retained on a 3/8 inch sieve; one bin shall contain that

portion of the material which will pass a 3/8 inch sieve and be retained on a No. 8 sieve; and one bin shall contain that portion of the material which will pass a No. 8 sieve.

Aggregate of 3/8 inch maximum size shall be separated into 2 sizes and each size shall be stored in separate bins. One bin shall contain that portion of the material which will pass the maximum size specified and be retained on a No. 8 sieve and one bin shall contain that portion of the material which will pass a No. 8 sieve.

The bin containing the fine material shall not contain more than 15 percent of material retained on the No. 8 sieve. The material in any of the other bins shall not contain more than 15 percent of material passing a No. 8 sieve. Failure to comply with this requirement shall be corrected immediately, and the material in the bins not meeting these requirements shall be re-screened or wasted.

All asphalt concrete for this project shall be supplied from one source unless approved by the Engineer. Said source shall be listed on the Contractors Source of Materials List as required in Section 6 of the Standard Specifications.

Asphalt concrete placed on driveway shall be paid for at the same unit price as for material placed on the roadbed in addition to the price paid per square foot for Place Asphalt Concrete (Miscellaneous Area).

The thickness for the asphalt concrete driveway shall be 0.25' in thickness.

Asphaltic emulsion shall be furnished and applied as provided in Section 39-4.02.

In addition to the provisions in Section 39-5.01, "Spreading Equipment" of the Standard Specifications, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.

When placing asphalt concrete to the lines and grades established by the Engineer, the automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 30 feet. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 30 feet. The end of the screed farthest from centerline shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer, by a sensor activated by a similar ski device or as directed by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.12 inch tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same way it was controlled when placing the initial mat.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the provisions, including straightedge tolerance, of Section 39-6.03, "Compacting" of the Standard Specifications or elsewhere in these Special Provisions, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

Should the automatic screed controls fail to operate properly during a day's work, the Contractor may manually control the spreading equipment for the remainder of that day. However, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the provisions in this section before starting another day's work.

GENERAL CRITERIA FOR PROFILING

In addition to the straightedge provisions in Section 39-6.03, "Compacting" of the Standard Specifications, asphalt concrete pavement shall conform to the surface tolerances specified herein.

The uppermost layer of asphalt concrete surfacing shall be profiled in the presence of the Engineer using a California Profilograph or equivalent in conformance with California Test 526 and as specified in these Special Provisions.

The California Profilograph or equivalent will not be required for the following areas of the pavement surface but shall conform to the straightedge requirements in Section 39-6.03, "Compacting" of the Standard Specifications:

1. Pavement with a total thickness less than 0.24 foot;

2. Pavement on horizontal curves with a centerline curve radius of less than 1,000 feet and the pavement within the superelevation transition on those curves;

3. Pavement placed in a single lift when required by the Special Provisions;

4. Pavement with extensive grade or cross slope correction which does not receive advance leveling operations in conformance with the provisions in Section 39-6.02, "Spreading" of the Standard Specifications;

5. Pavement for ramps and connectors with steep grades and high rates of superelevation, as determined by the Engineer;

6. Shoulders and miscellaneous areas.

The Contractor shall conform to California Test 526, except a zero (null) blanking band shall be used for determining the Profile Index. Prior to beginning profiles, the profilograph shall be calibrated in the presence of the Engineer. Two profiles shall be obtained within each traffic lane, 3 feet from and parallel with the edges of the lane.

Pavements profiled shall conform to the following Profile Index requirements:

1. Pavement on tangent alignment and pavement on horizontal curves having a centerline curve radius of 2,000 feet or more shall have a Profile Index of 0.16 foot or less for each 330 feet section profiled;

2. Pavement on horizontal curves having a centerline curve radius of 1,000 feet or more but less than 2,000 feet, including the pavement within the superelevation transition of these curves, shall have a Profile Index of 0.32 foot or less for each 330 feet section profile;

3. Pavement within any 330 feet section, containing high point areas with deviations in excess of 0.025 foot in a length of 25 feet or less, when tested in conformance with the requirements in California Test 526, shall be corrected by the Contractor regardless of the Profile Index.

The Contractor shall complete initial runs of the profilograph prior to opening the pavement to public traffic. If initial profiles can not made prior to opening the pavement to public traffic, the initial runs of the profilograph shall be made the next day that traffic control is permitted for the area to be profiled.

Areas of the top surface of the uppermost layer of asphalt concrete pavement that do not meet the specified surface tolerances shall be brought within tolerance by abrasive grinding.

Abrasive grinding shall be performed to reduce individual deviations in excess of 0.025 foot, and to reduce the Profile Index of the pavement to be within the specified tolerance. Areas which have been subjected to abrasive grinding shall receive a seal coat. Deviations in excess of 0.025 foot which cannot be brought into specified tolerance by abrasive grinding shall be corrected by either (1) removal and replacement or (2) placing an overlay of asphalt concrete. The corrective method for each area shall be selected by the Contractor and shall be approved by the Engineer prior to beginning the corrective work. Replacement or overlay pavement not meeting the specified tolerances shall be corrected by the methods specified above. Corrective work shall be at the Contractor's expense. The Contractor shall run profilograms on the areas that have received abrasive grinding or corrective work until the final profilograms indicate the Profile Index of the area is within the specifed tolerance.

When abrasive grinding is used to bring the top surface of the uppermost layer of asphalt concrete surfacing within the specified surface tolerances, additional abrasive grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel with, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within a ground area. Ground areas shall be neat rectangular areas of uniform surface appearance.

The original of the final profilograms that indicate the pavement surface is within the Profile Index specified shall become the property of the County and shall be delivered to the Engineer prior to acceptance of the contract.

METHOD OF PAYMENT

Asphalt concrete will be paid for at a unit price per ton as a combined item, including mineral aggregate and asphalt binder in place on the roadbed.

Full compensation for furnishing and applying asphaltic emulsion (paint binder) shall be considered as included in the contract price paid for Asphalt Concrete.

COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS:

The provisions of this section shall apply only to the following contract items:

ITEM CODE	ITEM
390102	Hot Mix Asphalt (Type A)

The compensation payable for asphalt binder used in hot mix asphalt and tack coat will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 10 percent (Iu/Ib is greater than 1.10 or less than 0.90) which occur during performance of the work.

The quantity of asphalt binder used in tack coat will be determined by multiplying the item quantity for tack coat included in a monthly estimate by the minimum percent residue specified in Section 94, "Asphaltic Emulsions" of the Standard Specifications. The asphaltic emulsion minimum percent residue will be based on the type of emulsion used by the Contractor.

At the Contractor's option, the Contractor may provide actual daily test results for asphalt binder residue for the tack coat used. Test results provided by the Contractor shall be from an independent testing laboratory that participates in the AASHTO Proficiency Sample Program. The Contractor shall take samples of asphaltic emulsion from the distributor truck at mid-load from a sampling tap or thief. Two separate one-half (½) gallon samples shall be taken in the presence of the Engineer. The Contractor shall provide one sample to the Contractor's independent testing laboratory within 24 hours of sampling. The second sample shall be given to the Engineer. The test results from the Contractor independent testing laboratory shall be delivered to the Engineer within 10 days from sample date.

The adjustment in compensation will be determined in conformance with the following formulae when the item of hot mix asphalt or tack coat or both are included in a monthly estimate:

A. Total monthly adjustment = AQ

B. For an increase in paving asphalt price index exceeding 10 percent:

$$A = 0.90 (Iu/Ib - 1.10) Ib$$

C. For a decrease in paving asphalt price index exceeding 10 percent:

$A = 0.90 (Iu/Ib - 0.90) Ib$

D. Where:

A = Adjustment in dollars per ton of paving asphalt used to produce hot mix asphalt and asphaltic emulsion residue used as tack coat rounded to the nearest $0.01.

Iu = The California Statewide Paving Asphalt Price Index which is in effect on the first business day of the month within the pay period in which the quantity subject to adjustment was included in the estimate.

Ib = The California Statewide Paving Asphalt Price Index for the month in which the bid opening for the project occurred.

Q = Quantity in tons of asphalt binder that was used in producing the quantity of hot mix asphalt shown under "This Estimate" on the monthly estimate using the amount of asphalt binder determined by the Engineer plus the quantity in tons of asphalt binder that would have been used as residue in the tack coat shown under "This Estimate" on the monthly estimate.

The adjustment in compensation will also be subject to the following:

A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the County for decreased compensation adjustments and the Department may deduct the amount thereof from moneys due or that may become due the Contractor.

B. Compensation adjustments made under this section will be taken into account in making adjustments in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities" of the Standard Specifications.

C. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

The California Statewide Paving Asphalt Price Index is determined each month on the first business day of the month by the Department using the median of posted prices in effect as posted by Chevron, Mobil, and Unocal for the Buena Vista, Huntington Beach, Kern River, Long Beach, Midway Sunset, and Wilmington fields.

In the event that the companies discontinue posting their prices for a field, the Department will determine an index from the remaining posted prices. The Department reserves the right to include in the index determination the posted prices of additional fields.

The California Statewide Paving Asphalt Price Index is available on the Division of Engineering Services website at: http://www.dot.ca.gov/hq/esc/oe/asphalt_index/astable.html.

REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING:

Where blast cleaning/grinding is used for the removal of painted/thermoplastic traffic stripes and pavement markings or for removal of objectionable material, and such removal operation is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by wet abrasive blasting, hydro-blasting or vacuum blasting, and shall comply with AQMD regulations.

Blast cleaning/grinding for removal of traffic stripes shall be feathered out to irregular and varying widths.

Pavement markings shall be removed by blast cleaning/grinding a rectangular area, rather than just lettering or markings, so the old message cannot be identified.

After removal of traffic stripes and pavement markings, a fog seal coat shall be applied in conformance with the provisions in Section 37, "Bituminous Seals" of the Standard Specifications and the following:

If removal of existing striping is performed more than 24 hours prior to final striping, the Contractor shall place reflective temporary striping tape throughout the limits of sandblasting, to provide channelization of traffic, for all lanes of travel.

Temporary striping tape shall be removed subsequent to final striping.

Nothing in these Special Provisions shall relieve the Contractor from his responsibilities as provided in Section 7-1.09, "Public Safety" of the Standard Specifications.

METHOD OF PAYMENT

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in removing traffic stripes and pavement markings as shown on the plans, as specified herein, and as directed by the Engineer shall be considered as included in the contract prices paid for the various items of work and no additional compensation will be allowed therefor.

COLOR STAMPED PORTLAND CEMENT COLOR STAMPED PORTLAND CEMENT CONCRETE PAVEMENT FOR TRUCK APRON (HIGH EARLY STRENGTH CONCRETE)

Concrete pavement for truck apron shall consist of constructing high early strength (HES) colored concrete pavement as shown on the plans and in conformance with Section 40, "Portland Cement Concrete Pavement," and Section 90, "Portland Cement Concrete" of the Standard Specifications and these Special Provisions.

DEFINITIONS

The following definitions shall apply to this section:

1. EARLY AGE – A time less than 10 times the final set time of the concrete.
2. FINAL SET TIME – The elapsed time after initial contact of cement and water, or accelerator, if used, at which a specific penetration resistance of 4,000 pounds per square inch is achieved in conformance with the requirements in ASTM Designation: C 403.
3. OPENING AGE – The age at which the concrete will achieve the specified strength for opening to public or Contractor traffic.

JUST-IN-TIME TRAINING

Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on high early strength colored concrete. Construction operations for high early strength concrete shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT.

The JITT session will be conducted for not less than 4 hours on high early strength concrete. The training class shall be conducted at the project field location convenient for both the Contractor's and the Engineer's project staffs. Scheduling and completion of the JITT session shall be completed at least 5 business days prior to the start of construction of high early strength concrete. The class shall be held during normal working hours.

The JITT instructor shall be experienced in the construction methods, materials, and test methods associated with high early strength colored concrete and decorative concrete including colored and stamped concrete. The instructor shall not be an employee of the Contractor or a member of the Engineer's field staff. A copy of the syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. Selection of the course instructor, the course content and training site shall be as mutually agreed to by the Contractor and the Engineer. The instructor shall issue a certificate of completion to the participants upon the completion of the class. The certificate shall include the course title, date and location of the class, the name of the participant, instructor's name, location and phone number.

The Contractor's or Engineer's personnel involved with high early strength concrete operations will not be required to attend JITT if they have completed similar training within the previous 12 months of the date of the JITT for this project. The Contractor shall provide a certificate of class completion as described above for each staff member to be excluded from the JITT session. The final determination for exclusion of any staff member's participation will be as determined by the Engineer. All attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The course evaluation form will be provided by the Engineer.

It is expressly understood that Just-In-Time Training shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications.

TRIAL SLAB

Prior to construction of HES colored concrete pavement, the Contractor shall construct one or more trial slabs under conditions similar to those that will exist during concrete pavement placement, for each mix design, to show that personnel, equipment, and mixing, placing, texturing/imprinting, curing, and sawing techniques will produce a concrete pavement conforming to these Special Provisions in the anticipated time period under similar atmospheric and temperature conditions as pavement construction and to establish the correlation described below. During production and placement, the Contractor shall conform to the requirements of these Special Provisions and to the procedure outlined in the Quality Control Plan (QCP) herein to ensure that mixing, transporting, placing, finishing, curing and sawing techniques and that personnel and equipment to be used will produce HES colored concrete pavement conforming to these Special Provisions.

A trial slab shall be constructed using the approved mix design, admixtures and conditions for batching. During construction of trial slab, the Contractor shall demonstrate placement at the minimum and maximum times allowed from batching to placement. HES colored concrete pavement within the roadway shall not proceed until a trial slab meeting the requirements of these Special Provisions has been constructed.

The minimum trial slab dimensions shall be 10' x 20' and shall be 9 inches thick where planned HES colored concrete pavement nominal thickness is less than 9 inches. The trial slab thickness shall be 10 inches where planned HES colored concrete pavement nominal thickness is 10 inches or greater. Where there are planned HES colored concrete pavement with greater and less than 10 inches thickness then two trial slabs shall be required one at 9 inches thick and one at 10 inches thick. Trial slabs shall be placed near the project site at a location mutually acceptable to the Engineer and the Contractor except slabs shall not be placed on the roadway or within the project limits.

During trial slab construction, the Contractor shall sample and split the aggregate for gradings, cleanness value, and sand equivalent testing with the Engineer, at the Contractor's cost. Both sets of test results of these samples shall conform to the provisions in Section 90-2.02, "Aggregates" of the Standard Specifications. If test results do not conform to the requirements, the trial slab will be rejected.

During trial slab construction and within 20 minutes of HES colored concrete delivery, beams shall be fabricated in conformance with the requirements in California Test 524. Beams shall be used to determine early age and 7-day modulus of rupture values. Beams fabricated for early age testing shall be cured so that the monitored temperature in the beams and the trial slab are within 5° F at all times. Internal temperatures of the trial slab and early age beams shall be monitored and recorded at minimum time intervals of 5 minutes by installing thermocouples and or thermistors connected to strip-chart recorders or digital data loggers. Temperature recording devices shall be accurate to within ±2° F. Internal temperature readings shall be measured at one inch from the top and one inch from the bottom, no closer than 3 inches from any edge of the concrete elements, until the early age testing is completed. Beams fabricated for 7-day testing shall be cured in conformance with the requirements in California Test 524, except beams shall be placed into sand at between 5 and 10 times the final set time or 24 hours, whichever is earlier. Testing shall be performed by the Contractor and witnessed by the Engineer. At the Engineer's request, the

Contractor shall produce samples for the Engineer to test. Strength results from beams shall be the basis for determining whether HES concrete pavement operations may proceed. Trial slabs 9 inches thick shall have an early age modulus of rupture of not less than 400 pounds per square inch and a 7-day modulus of rupture of not less than 600 pounds per square inch. Trial slabs 10 inches thick shall have an early age modulus of rupture of not less than 333 pounds per square inch and a 7-day modulus of rupture of not less than 600 pounds per square inch. Beams failing early age or 7-day modulus of rupture requirements shall be cause for the rejection of the trial slab.

When proposed by the Contractor, in writing, and approved by the Engineer, ASTM Designation: C 805 or C 900 shall be used to estimate the modulus of rupture of the pavement at early ages. The selected test method shall be used to determine modulus of rupture until 7 days after the Contractor notifies the Engineer of withdrawal of the proposal or 7 days after the Engineer notifies the Contractor of withdrawal of approval, in writing. During trial slab curing, correlation testing shall be performed to determine the relation between the modulus of rupture and ASTM Designation: C 805 or C 900 performed on the trial slab. The correlation shall be established by testing at 4 or more time intervals. At a minimum, tests shall be performed one hour before and one hour after the opening age and two others within 15 minutes of the opening age. Modulus of rupture estimates shall be calculated with either a linear, exponential or logarithmic, least squares best-fit equation, whichever provides the best correlation coefficient.

The Contractor shall state in detail the intended location and time; procedure for production, placement and finishing of HES colored concrete pavement; sampling, sample imprinting, curing and sample transportation; testing and reporting of test results for the trial slab in the QCP.

Materials resulting from construction of trial slabs and test specimens shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

HIGH EARLY STRENGTH CONCRETE

High Early Strength (HES) Colored Concrete shall be a concrete made with hydraulic cement that develops opening age and 7-day specified modulus of rupture strengths.

Requirements of Sections 40-1.05, "Proportioning" and 90-1.01, "Description" of the Standard Specifications shall not apply.

Primary aggregate gradings shall conform to the gradation requirements of Section 90-3, "Aggregate Gradings" of the Standard Specifications. Combined aggregate grading used in HES colored concrete shall be one-inch maximum grading. When combined in the proportions determined by the Contractor, the percent passing the 3/8-inch sieve and retained on the No. 8 sieve shall not be less than 16 percent of the total aggregate.

The cementitious material content shall not be less than 675 pounds per cubic yard and no fly ash will be allowed.

Cement for HES colored concrete shall be hydraulic cement as defined in ASTM Designation: C 219 and shall conform to the following requirements:

Test Description	Test Method	Requirement
Contraction in Air	California Test 527,W/C Ratio = 0.39 ±0.010	0.053 %, max.
Mortar Expansion in Water	ASTM Designation: C 1038	0.04 %, max.
Soluble Chloride*	California Test 422	0.05 %, max.
Soluble Sulfates*	California Test 417	0.30 %, max.
Thermal Stability	California Test 553	60 %, min.
Compressive Strength @ 3 days	ASTM Designation: C 109	2,500 psi

* Test is to be done on a cube specimen, fabricated in conformance with the requirements in ASTM Designation: C 109, cured at least 14 days and then pulverized to 100% passing the No. 50 sieve.

The Contractor shall submit uniformity reports for cement used in HES colored concrete to the Transportation Materials Laboratory. Uniformity reports shall conform to the requirements in ASTM Designation: C 917, except that testing age and water content may be modified to suit the particular material.

Type C accelerating chemical admixtures conforming to the provisions in Section 90-4, "Admixtures" of the Standard Specifications may be used. In addition to the admixtures listed on the Department's current list of approved admixtures, citric acid or borax may be used if requested in writing by the cement manufacturer and a sample is submitted to the Engineer. Chemical or liquid admixtures including coloring agent shall be included in the testing for requirements listed in the table above. When preparing concrete mixes that will contain integral coloring agent admixtures, the type of water-reducing and accelerating admixtures to be added shall be as recommended by the color agent manufacturer.

Integral color shall be **"C-21 Adobe Tan"** by L.M. Schofield Co" or close approximation as approved by the Engineer. The listed product is intended as a guideline, and products from alternate manufacturers will be accepted provided that the product and color are close approximations as determined by the Engineer.

The decorative concrete pattern shall be **"Old Granite",** or close approximation as approved by the Engineer. The listed product is intended as a guideline, and products from alternate manufacturers will be accepted provided that the product provides a pattern of the size and texture that is a close approximation to the guideline product. The pattern shall be implanted, indented, imprinted into the surface by means of forms, molds, or other approved devices.

At least 10 days prior to use in the trial slab, the Contractor shall submit a mix design for HES concrete that shall include the following:

1. Opening age.
2. Aggregate gradings.
3. Mix proportions of hydraulic cement and aggregate.
4. Types and amounts of chemical admixtures including coloring agent.
5. Maximum time allowed between batching HES colored concrete and placing roadway pavement.
6. Range of ambient temperatures over which the mix design is effective (18° F maximum range).
7. Final set time of the concrete.

8. Any special instructions or conditions, including but not limited to, water temperature requirements when appropriate.

The Contractor shall submit more than one mix design to plan for ambient temperature variations anticipated during placement of the roadway pavement. Each mix shall be designed for a maximum ambient temperature range of 18° F. The Contractor shall develop and furnish modulus of rupture development data for each proposed mix design. Modulus of rupture development data for up to 7 days shall be provided to the Engineer prior to beginning paving operations. Modulus of rupture development data may be developed from laboratory prepared samples. The testing ages for modulus of rupture development data shall include one hour before opening age, opening age, one hour after opening age, 24 hours, 7 days and 28 days. The Contractor shall also provide the Engineer with Certificates of Compliance for all materials used in the imprinting, texturing, coloring, curing, and sealing of HES colored concrete including: Product Name, Supplier, and Product Type.

Concrete pavement penetration requirements in Section 90-6.06, "Amount of Water and Penetration" of the Standard Specifications shall not apply to HES colored concrete.

HES colored concrete pavement shall develop a minimum modulus of rupture of as specified in "Pay Factor Adjustment for Low Modulus of Rupture" of these Special Provisions before opening to public or Contractor traffic. In addition, HES colored concrete pavement shall develop a minimum modulus of rupture of 600 pounds per square inch in 7 days after placement. HES colored concrete pavement that attains a modulus of rupture of less than specified may be accepted in conformance with "Pay Factor Adjustment for Low Modulus of Rupture" specified herein. Modulus of rupture shall be determined by averaging results from 3 beam specimens tested in conformance with the requirements in California Test 524. Beam specimens may be fabricated using an internal vibrator in conformance with the requirements in ASTM Designation: C 31. No single test shall represent more than the production of that day or 100 cubic yards, whichever is less.

Modulus of rupture at early age may be estimated using the correlation established during trial slab placement. When modulus of rupture at early age is determined using beam specimens, beam specimens shall be cured under atmospheric conditions and at a temperature within 5° F of the pavement. Modulus of rupture at other ages will be determined using beams cured and tested in conformance with California Test 524 except beams will be placed into sand between 5 times and 10 times final set time or 24 hours, whichever is earlier. The Engineer will perform the testing to determine modulus of rupture values of the HES colored concrete pavement. The modulus of rupture, as determined above, will be the basis for accepting or rejecting the HES colored concrete pavement for modulus of rupture requirements.

PAY FACTOR ADJUSTMENT FOR LOW MODULUS OF RUPTURE

Where planned concrete pavement nominal thickness is less than 10 inches, payment for HES colored concrete pavement will be adjusted for low modulus of rupture tests as follows:

1. HES Colored Concrete Pavement with modulus of rupture of 400 pounds per square inch or greater before the lane is opened to the traffic and 7-day modulus of

rupture of 600 pounds per square inch or greater will be paid for at the contract price per cubic yard for HES Colored Concrete Pavement.

2. HES Colored Concrete Pavement with a 7-day modulus of rupture of less than 500 pounds per square inch will not be paid for, and shall be removed and replaced, at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions.

3. HES Colored Concrete Pavement with modulus of rupture of 300 pounds per square inch or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 500 pounds per square inch will be paid for at a percentage of the contract price per cubic yard for HES Colored Concrete Pavement in conformance with the percentages in the pay table below.

4. HES Colored Concrete Pavement with modulus of rupture of less than 300 pounds per square inch when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions.

Percentage Pay Table

Modulus of Rupture (psi) at opening to traffic	7-Day Modulus of Rupture (psi)		
	Greater than or equal to 600	Less than 600 and greater than or equal to 550	Less than 550 and greater than or equal to 500
Greater than or equal to 400	100%	95%	90%
Less than 400 and greater than or equal to 350	95%	95%	90%
Less than 350 and greater than or equal to 300	80%*	80%*	80%*

* Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

Where planned concrete pavement nominal thickness is 10 inches or greater, payment for HES Colored Concrete Pavement will be adjusted for low modulus of rupture tests as follows:

1. HES Colored Concrete Pavement with modulus of rupture of 333 pounds per square inch or greater before the lane is opened to the traffic and 7-day modulus of rupture of 600 pounds per square inch or greater will be paid for at the contract price per cubic yard for HES Colored Concrete Pavement.

2. HES Colored Concrete Pavement with a 7-day modulus of rupture of less than 500 pounds per square inch will not be paid for, and shall be removed and replaced, at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions.

3. Replace HES Colored Concrete Pavement with modulus of rupture of 260 pounds per square inch or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 500 pounds per square inch will be paid for at

a percentage of the contract price per cubic yard for HES Colored Concrete Pavement in conformance with the percentages in the pay table below.

4. HES Colored Concrete Pavement with modulus of rupture of less than 260 pounds per square inch when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions.

Percentage Pay Table

Modulus of Rupture (psi) at opening to traffic	7-Day Modulus of Rupture (psi)		
	Greater than or equal to 600	Less than 600 and greater than or equal to 550	Less than 550 and greater than or equal to 500
Greater than or equal to 333	100%	95%	90%
Less than 333 and greater than or equal to 290	95%	95%	90%
Less than 290 and greater than or equal to 260	80%*	80%*	80%*

* Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with HES Colored Concrete Pavement conforming to the requirements of these Special Provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

The Contractor shall pay to the County adjustments in payment for low modulus of rupture tests in conformance with the requirements specified in the tables in this section. The County will deduct the amount of the adjustments from moneys due or that may become due, the Contractor under the contract.

PROPORTIONING

Weighing, measuring and metering devices used for proportioning materials shall conform to the provisions in Section 9-1.01, "Measurement of Quantities" of the Standard Specifications and these Special Provisions.

Over and under dials, and other indicators for weighing and measuring systems used in proportioning materials shall be grouped so that the smallest increment for each indicator can be accurately read from the point at which the proportioning operation is controlled for ingredients batched at a central batch plant. In addition, indicators for weighing and measuring cement batched from a remote weighing system shall also be placed so that each indicator can be accurately read from the point at which the proportioning operation is controlled.

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates" of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures" of the Standard Specifications.

Weighing equipment shall be insulated against vibration or movement of other operating equipment. When the plant is in operation, the weight of each draft of material shall not vary from the designated weight by more than the tolerances specified herein. Each scale graduation shall be 0.001 of the usable scale capacity.

Aggregate shall be weighed cumulatively and equipment for the weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch weight of the aggregate. Equipment for the separate weighing of the cement shall have a zero tolerance of ±0.5 percent of its designated individual batch draft. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated weight or volume.

The weight indicated for any individual batch of material shall not vary from the preselected scale setting by more than the following:

Material	Tolerance
Aggregate	±1.0 percent of designated batch weight
Cement	±0.5 percent of designated batch weight
Water	±1.5 percent of designated batch weight or volume

Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement and water as provided in these Special Provisions. Dry ingredients shall be proportioned by weight. Liquid ingredients shall be proportioned by weight or volume.

At the time of batching, aggregates shall have been dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate will take place during the proportioning process. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry weight.

If separate supplies of aggregate material of the same size group with different moisture content or specific gravity or surface characteristics affecting workability are available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another supply.

Cement shall be kept separate from the aggregates until released for discharge into the mixer. Cement shall be free of lumps and clods when discharged into the mixer. Fabric containers used for transportation or proportioning of cement shall be clean and free of residue before reuse.

Weigh systems for proportioning aggregate and cement shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and distinct material-weighing device.

For batches with a volume of one cubic yard or more, proportioning equipment shall conform to one of the following methods:

1. All ingredients shall be batched at a central batch plant and charged into a mixer truck for transportation to the pour site. Ingredient proportioning shall meet the requirements of Section 90-5, "Proportioning" of the Standard Specifications.

2. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote located silo and weigh system for the

proportioning of the cement. The remote system shall proportion cement for charging the mixer truck.

3. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote location where pre-weighed, containerized cement shall be added to the mixer truck. The cement pre-weighing operation shall utilize a platform scale. The platform scale shall have a maximum capacity of 2.75 tons with a maximum graduation size of one pound. Cement shall be pre-weighed into a fabric container. The minimum amount of cement to be proportioned into any single container shall be one half of the total amount required for the load of HES Colored Concrete being produced.

4. Cement, water, and aggregate shall be proportioned volumetrically in conformance with these Special Provisions.

In order to check the accuracy of batch weights, the gross weight and tare weight of truck mixers shall be determined when ordered by the Engineer. The equipment shall be weighed on scales designated by the Engineer.

The Contractor shall install and maintain in operating condition an electrically actuated moisture meter. The meter shall indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched. The meter shall have a sensitivity of 0.5 percent by weight of the fine aggregate.

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced. Water added to the truck mixer at the job site shall be measured through a meter that conforms to the provisions in Section 9-1.01, "Measurement of Quantities" of the Standard Specifications.

Aggregate discharged from several bins shall be controlled by gates or by mechanical conveyors. The means of discharge from the bins and from the weigh hopper shall be interlocked so that no more than one bin can discharge at a time, and so that the weigh hopper cannot be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

WEIGHMASTER CERTIFICATES

Weighmaster certificates for HES Colored Concrete, regardless of the proportioning method used, shall include all information necessary to trace the manufacturer, and manufacturer's lot number for the cement being used. When proportioned into fabric containers the weighmaster certificates for the cement shall contain date of proportioning, location of proportioning and actual net draft weight of the cement. When proportioned at the pour site from a storage silo the weighmaster certificates shall contain date of proportioning, location of proportioning and the net draft weight of the cement used in the load.

VOLUMETRIC PROPORTIONING

When HES Colored Concrete is proportioned by volume, the method shall conform to requirements specified herein.

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates" of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures" of the Standard Specifications.

Batch-mixer trucks shall be equipped to proportion cement, water, aggregate and additives by volume. Aggregate feeders shall be connected directly to the drive on the cement vane feeder. The cement feed rate shall be tied directly to the feed rate for the aggregate and other ingredients. Any change in the ratio of cement to aggregate shall be accomplished by changing the gate opening for the aggregate feed. The drive shaft of the aggregate feeder shall be equipped with a revolution counter reading to the nearest full or partial revolution of the aggregate delivery belt.

Aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate delineated to the nearest quarter increment. Height of the gate opening shall be readily determinable. Cement shall be proportioned by a method that conforms to the accuracy requirements of these special provisions. Water shall be proportioned by a meter conforming to the provisions in Section 9-1.01, "Measurement and Payment" of the Standard Specifications and these Special Provisions.

Delivery rate of aggregate and cement per revolution of the aggregate feeder shall be calibrated at appropriate gate settings for each batch-mixer truck used on the project and for each aggregate source. Batch-mixer trucks shall be calibrated at 3 different aggregate gate settings that are commensurate with production needs. Two or more calibration runs shall be required at each of the different aggregate gate openings. The actual weight of material delivered for aggregate proportioning device calibrations shall be determined by a platform scale as specified in these Special Provisions.

Aggregate belt feeder shall deliver aggregate to the mixer with volumetric consistency so that deviation for any individual aggregate delivery rate check-run shall not exceed 1.0 percent of the mathematical average of all runs for the same gate opening and aggregate type. Each test run shall be at least 1,000 pounds. Fine aggregate used for calibration shall not be reused for device calibration.

At the time of batching, aggregates shall be dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate takes place during the proportioning process. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry weight.

If separate supplies of aggregate material of the same size group with different moisture content or specific gravity or surface characteristics affecting workability are available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting another supply.

Rotating and reciprocating equipment on batch-mixer trucks shall be covered with metal guards.

The cement proportioning system shall deliver cement to the mixer with a volumetric consistency so that the deviation for any individual delivery rate check-run shall not exceed 1.0 percent of the mathematical average of 3 runs of at least 1,000 pounds each. Cement used for calibration shall not be reused for device calibration.

Water meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated weight of water delivered and the actual weight delivered shall not exceed 1.5 percent of the actual weight for each of two individual runs of 300 gallons. The water meter shall be calibrated in conformance with the requirements of California Test 109 and shall be equipped with a resettable totalizer and display the operating rate.

Calibration tests for aggregate, cement and water proportioning devices shall be conducted with a platform scale located at the calibration site. Weighing of test run calibration material shall be performed on a platform scale having a maximum capacity not exceeding 2.75 tons with maximum graduations of one pound. The platform scale shall be error tested within 8 hours of calibration of batch-mixer truck proportioning devices. Error testing shall be performed with test weights conforming to California Test 109 and shall produce a witness scale that is within 2 graduations of the test weight load. The scale shall be available for use at the production site throughout the production period. Equipment needed for the calibration of proportioning systems shall remain available at the production site throughout the production period. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance" shall be furnished with each delivery of aggregate, cement, and admixtures used for calibration tests and shall be submitted to the Engineer with certified copies of the weight of each delivery. The Certificate of Compliance shall state that the source of materials used for the calibration tests is from the same source as to be used for the planned work. The Certificate of Compliance shall state that the material supplied conforms to the Standard Specifications and these Special Provisions and shall be signed by an authorized representative who shall have the authority to represent and act for the Contractor.

The batch-mixer truck shall be equipped so that an accuracy check can be made prior to the first operation for the project and at any other time as directed by the Engineer. Further calibration of proportioning devices shall be required every 30 days after production begins or when the source or type of any ingredient is changed. A spot calibration shall consist of calibration of the cement proportioning system only. A two run spot re-calibration of the cement proportioning system shall be performed each time 55 tons of cement has passed through the batch-mixer truck. Should the spot re-calibration of the cement proportioning system fall outside the limitations specified herein, a full calibration of the cement proportioning system shall be completed before the resumption of production.

Liquid admixtures shall be proportioned by a meter.

Cement storage shall be located immediately before the cement feeder and shall be equipped with a device that will automatically shut down the power to the cement feeder and aggregate belt feeder when the cement storage level is lowered to a point where less than 20 percent of the total volume is left in storage.

The Contractor shall furnish aggregate moisture determinations, made in conformance with the requirements of California Test 223, at least every 2 hours during proportioning and mixing operations. Moisture determinations shall be recorded and presented to the Engineer at the end of the production shift.

Each aggregate bin shall be equipped with a device that will automatically shut down the power to the cement feeder and the aggregate belt feeder when the aggregate discharge rate is less than 95 percent of the scheduled discharge rate of any bin.

Indicators specified herein shall be in working order prior to commencing proportioning and mixing operations and shall be visible when standing near the batch-mixer truck.

Identifying numbers of batch-mixer trucks shall be at least 3 inches in height, and be located on the front and rear of the vehicles.

Volumetric proportioned HES Colored Concrete shall be mixed in a mechanically operated mixer of adequate size and power for the type of HES Colored Concrete to be placed. Mixers may be of the auger type and shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers that have an accumulation of hard concrete or mortar shall be removed from service until cleaned. Other types of mixers may be used provided mixing quality will meet the requirements of these Special Provisions.

Charge or rate of feed to the mixer shall not exceed that which will permit complete mixing of the materials. Dead areas in the mixer, where material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. The mixer shall be designed to provide sufficient mixing action and movement to produce properly mixed HES Colored Concrete. Mixing shall continue until a homogeneous mixture is produced at discharge from the mixer. There shall be no lumps or evidence of non-dispersed cement at discharge from the mixer. No water shall be added to the HES Colored Concrete after discharge from the mixer.

Equipment having components made of aluminum or magnesium alloys, which may have contact with plastic concrete during mixing or transporting of HES Colored Concrete, shall not be used.

Uniformity of concrete mixtures will be determined by differences in penetration measurement made in conformance with the requirements in California Test 533. Difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 5/8 inch. The Contractor shall furnish samples of freshly mixed concrete and provide facilities for obtaining the samples. Sampling facilities shall be safe, accessible, clean and produce a sample which is representative of production. Sample devices and sampling methods shall also conform to the requirements of California Test 125.

Ice shall not be used to cool HES Colored Concrete directly. When ice is used to cool water used in the mix, all of the ice shall be melted before entering the mixer.

Cement shall be proportioned and charged into the mixer by means that will result in no losses of cement due to wind, or due to accumulation on equipment, or other conditions which will vary the required quantity of cement.

Each mixer shall have a metal plate or plates, prominently attached, on which the following information is provided:

1. Uses for which the equipment is designed.
2. Manufacturer's guaranteed capacity of the mixer in terms of the volume of mixed concrete.
3. Speed of rotation of the mixer.

Consistency and workability of mixed concrete when discharged at the delivery point shall be suitable for placement and consolidation.

Information generated by volumetric devices will not be used for payment calculations.

The device that controls the proportioning of cement, aggregate and water shall produce a log of production data. The log of production data shall consist of a series of snapshots captured at 15-minute intervals throughout the period of daily production. Each snapshot of production data shall be a register of production activity at that time and not a summation of the data over the preceding 15 minutes. The amount of material represented by each snapshot shall be the amount produced in the period of time from 7.5 minutes before to 7.5 minutes after the capture time. The daily log shall be submitted to the Engineer, in electronic or printed media, at the end of each production shift or as requested by the Engineer, and shall include the following:

1. Weight of cement per revolution count.
2. Weight of each aggregate size per revolution count.
3. Gate openings for each aggregate size being used.
4. Weight of water added to the concrete per revolution count.
5. Moisture content of each aggregate size being used.
6. Individual volume of all other admixtures per revolution count.
7. Time of day.
8. Day of week.
9. Production start and stop times.
10. Batch-mixer truck identification.
11. Name of supplier.
12. Specific type, size, or designation of concrete being produced.
13. Source of the individual aggregate sizes being used.
14. Source, brand and type of cement being used.
15. Source, brand and type of individual admixtures being used.
16. Name and signature of operator.

Required report items may be input by hand into a pre-printed form or captured and printed by the proportioning device. Electronic media containing recorded production data shall be presented in a tab delimited format on a CD-ROM or a USB flash drive. Each snapshot of the continuous production shall be followed by a line-feed carriage-return with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

BOND BREAKER

Bond breaker shall be placed between HES Colored Concrete pavement and the new base concrete layer. Bond breaker shall be one of the following:

1. Curing paper conforming to the requirements in ASTM Designation: C 171, white.
2. Polyethylene film conforming to the requirements in ASTM Designation: C 171, except that the minimum thickness shall be 6 mils, white opaque.
3. Paving asphalt, Grade PG 64-10, conforming to the provisions in Section 92, "Asphalts" of the Standard Specifications.
4. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A, containing a minimum of 22 percent nonvolatile vehicles consisting of at least 50 percent paraffin wax.

When curing paper or polyethylene film is used, material shall be placed in a wrinkle free manner. Adjacent sheets shall be overlapped a minimum of 6 inches.

When curing compound or paving asphalt is used, all foreign and loose materials remaining from slab removal shall be removed prior to application.

When paving asphalt is used, no water shall be added before applying asphalt to the surface of the base. The paving asphalt shall be applied in one even application at a rate of 0.02-gallon to 0.10-gallon per square yard over the entire base surface area. HES Colored Concrete pavement shall not be placed until the paving asphalt has cured.

When curing compound is used, the curing compound shall be applied in two separate applications. Each application shall be applied evenly at a rate of 0.07-gallon to 0.11-gallon per square yard over the entire base surface area.

SPREADING, COMPACTING AND SHAPING

Metal or wood side forms may be used. Wood side forms shall not be less than 1-1/2 inches thick. Side forms shall be of sufficient rigidity, both in the form and in the connection with adjoining forms, that movement will not occur under the force from subgrading and paving equipment or from the pressure of concrete.

Side forms shall remain in place until the pavement edge no longer requires the protection of forms. Side forms shall be thoroughly cleaned and oiled prior to each use.

Consolidation of HES Colored Concrete shall be by means of high-frequency internal vibrators after the HES Colored Concrete is deposited on the subgrade. Vibrating shall be done in a manner to assure uniform consolidation adjacent to forms and across the full paving width. HES Colored Concrete shall be placed as nearly as possible in its final position and use of vibrators for extensive shifting of the weight of HES Colored Concrete will not be permitted.

HES Colored Concrete shall be spread and shaped by suitable powered finishing machines and supplemented by hand finishing as necessary. Methods of spreading, shaping and consolidating

that result in segregation, voids or rock pockets shall be discontinued. The Contractor shall use methods that will produce dense homogeneous pavement conforming to the required cross section.

After the HES Colored Concrete has been mixed and placed, no additional water shall be added to the surface to facilitate finishing. Surface finishing additives, when used, shall be as recommended by the manufacturer of the cement and shall be approved by the Engineer prior to use.

JOINTS

Contractor shall prepare and submit a "Joint Layout" plan depicting the proposed transverse joint locations for Engineer's review and approval. The proposed joints shall be placed from center curb to edge of concrete pavement at a minimum of 6 feet and maximum 10 feet measured at inner circle and as shown on the plans. The transverse joints shall be placed at equal spacing radially with 1-foot plus or minus tolerance. Contractor shall allow Engineer at least 7 working days to review the Joint Layout plan and to provide comments or approve plans.

A transverse contact (construction) joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next transverse weakened plane joint location. If sufficient concrete has not been mixed to form a slab to match the next transverse weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

Transverse weakened plane joints shall be constructed by the sawing method as described in Section 40-1.8B(1) of the Standard Specifications. Sawing of weakened plane joints shall be completed within 2 hours of completion of final surface or when cutting action will not tear, ravel, abrade, or otherwise damage surface and before developing random cracks. Strictly follow manufacturer's instructions for saw-cutting joints when working with integral color concrete to prevent discoloration or unwanted staining effects. Joints that develop random cracking shall be removed to the nearest controlled joint and replaced with colored concrete pavement containing dowel bars in conformance with these Special Provisions and as shown on the plans. The removal and replacement work shall be at the Contractor's expense.

Sawed grooves shall be cut to a maximum of 0.12-inch in width and the minimum depth of cut shall be calculated utilizing the formula in Section 40-1.08B(1), "Sawing Method" of the Standard Specifications.

Isolation joints, when required by the Engineer, shall conform to this provision for materials and installation as specified herein. Final alignment of perpendicular transverse weakened plane joints in pavement shall not be made to match the spacing or skew of the weakened plane joints in the existing parallel concrete pavement. Tie bars shall not be placed across longitudinal isolation joints. The edge of the existing pavement shall be saw cut a width 1/8 inch and to the full depth of the existing concrete pavement to produce a flat vertical face. Prior to placing concrete, joint filler material shall be placed as shown on the joint layout plans. The joint filler shall be secured to the

face of the existing pavement joint face by a method that will hold the joint filler in place and prevent the new concrete from adhering to the existing concrete, during placement of concrete.

Sealant for longitudinal isolation joints shall be silicone and placed in conformance with the requirements for liquid joint sealant installation as specified herein, except references to backer rods shall not apply.

DOWEL BAR AND PLACEMENT

Epoxy (Drill and Bond)

Epoxy for bonding dowel bars to Portland cement concrete or HES concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class A, B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class A shall be used when the internal temperature is below 40°F, but not lower than recommended by the manufacturer. Class B shall be used when the internal temperature is from 40°F to 60°F. Class C shall be used when the internal temperature is above 60°F, but not higher than recommended by the manufacturer. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications shall be furnished with the epoxy. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Epoxy shall be applied in conformance with the manufacturer's recommendations.

Dowel Bars

Dowel bars shall be plain round smooth, epoxy-coated steel conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 or 60, the details shown on the plans and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement" of the Standard Specifications, except that the two samples required in ASTM Designation: D 3963/D 3963M shall be 18 inches long. Epoxy coating of dowel bars shall conform to the provisions in ASTM Designation: A 884/A 884M, Class A, Type 1 or Type 2, except that the bend test shall not apply.

Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete.

Bond Breaker

Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one gallon per 15 square yards.

Dowel Bar Baskets

Dowel bar baskets shall be manufactured with a minimum welded wire gage number of MW 65. Baskets shall be either U-frame or A-frame shape. J-frame shapes shall not be used. Baskets shall be fabricated in conformance with the requirements in ASTM Designation: A 82. Welding of baskets shall conform to the requirements in AASHTO Designation: M 254. A broken weld will be a cause for rejection of the basket. Baskets shall be Class A, Type 1 or Type 2 epoxy-coated in conformance with the requirements in ASTM Designation: A 884/A 884M. Fabrication and job-site handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement" of the Standard Specifications, except that sampling of epoxy-coated wire reinforcement will not be required. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance" shall be furnished for each shipment of epoxy-coated wire reinforcement certifying that the coated bars conform to the requirements in ASTM Designation: A 884/A 884M and the provisions in Section 52-1.02B, "Epoxy-coated Bar Reinforcement" of the Standard Specifications. The Certificate of Compliance shall include the certifications specified in ASTM Designation: A 884/A 884M and a statement that the coating material has been pre-qualified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Dowel Placement

Dowel bars shall be centered on the joint within a tolerance of ±2 inches in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.

Dowel bars shall be placed at transverse weakened plane joints within shoulder areas except at drainage inlets.

Dowel bars shall be placed as shown on the plans by using dowel bar baskets.

When dowel bar baskets are used, they shall be anchored to the base to hold the dowel bars at the specified depth and alignment during concrete placement without displacement. A minimum of 8 alternating, equally spaced, concrete fasteners with clips shall be used to anchor each 12-foot dowel bar basket (4 per lower runner wire). At least 10 concrete fasteners shall be used for basket sections greater than 12 feet and less than or equal to 16 feet. Temporary spacer wires connecting dowel bar baskets shall be cut or removed after the dowel bar baskets are anchored into position prior to concrete placement. Paving shall be suspended when dowel bar baskets are not in place at least 200 feet in advance of the concrete placement operation. The Engineer may waive this requirement upon written request by the Contractor, in areas, where access is restricted, or other construction limitations are encountered. The Contractor shall demonstrate to the Engineer's satisfaction that dowel bar baskets are adequately anchored and not shift during concrete placement. The Contractor shall provide longer concrete nails than the minimum lengths for the varying bases beneath the Portland cement concrete when anchored dowel bar baskets demonstrate movement.

Full compensation for providing longer concrete nails shall be considered as included in the contract unit price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and no additional compensation will be allowed therefor.

Dowel bar placement at transverse and longitudinal weakened plane joints	
Horizontal offset	±1 inch
Longitudinal translation	±2 inches
Horizontal skew	3/8 inch
Vertical skew	3/8 inch
Vertical depth	(d/3 +1/2 inch) from pavement surface to top of dowel bar or 5/8 inch below planned placement

Note: d = pavement thickness in inches

JOINT SEALANT MATERIAL

Silicone Joint Sealant

Low modulus silicone joint sealant shall be furnished in a one-part silicone formulation. Acid cure sealant shall not be used. The compound shall be compatible with the surface to which it is applied and shall conform to the following requirements:

Property	Test Method	Requirement
Tensile stress, 150% elongation, 7-day cure at 77° F°±2° F and 45% to 55% R.H.[e]	ASTM D 412 (Die C)	45 psi max.
Flow at 77° F°±2° F	ASTM C 639[a]	Shall not flow from channel
Extrusion Rate at 77° F°±2° F	ASTM C 603[b]	3 to 9 ounces/minute
Specific Gravity	ASTM D 792 Method A	1.01 to 1.51
Durometer Hardness, at 0° F, Shore A, cured 7 days at 77° F°±2° F	ASTM C 661	10 to 25
Ozone and Ultraviolet Resistance, after 5,000 hours	ASTM C 793	No chalking, cracking or bond loss
Tack free at 77° F°±2° F and 45% to 55% R.H.[e]	ASTM C 679	Less than 75 minutes
Elongation, 7 day cure at 77° F°±2° F and 45% to 55% R.H.[e]	ASTM D 412 (Die C)	500 percent min.
Set to Touch, at 77° F°±2° F and 45% to 55% R.H.[e]	ASTM D 1640	Less than 75 minutes
Shelf Life, from date of shipment	—	6 months min.
Bond, to concrete mortar-concrete briquettes, air cured 7 days at 77° F°±2° F	AASHTO T 132[c]	50 psi min.
Movement Capability and Adhesion, 100% extension at 0° F after, air cured 7 days at 77° F°±2° F, and followed by 7 days in water at 77° F°±2° F	ASTM C 719[d]	No adhesive or cohesive failure after 5 cycles

Notes:

a. ASTM Designation: C 639 Modified (15 percent slope channel A).
b. ASTM Designation: C 603, through 1/8 inch opening at 50 psi.
c. Mold briquettes in conformance with AASHTO Designation: T 132, sawed in half and bonded with a 1/16 inch maximum thickness of sealant and tested in conformance with AASHTO Designation: T 132. Briquettes shall be dried to constant mass at 212 ±10° F.
d. Movement Capability and Adhesion: Prepare 12" x 1" x 3" concrete blocks in conformance with ASTM Designation: C 719. A sawed face shall be used for bond surface. Seal 2 inches of block leaving 1/2 inch on each end of specimen unsealed. The depth of sealant shall be 3/8 inch and the width 1/2 inch.
e. R.H. equals relative humidity.

The silicone joint sealant shall be formulated to cure rapidly enough to prevent flow after application on grades of up to 15 percent.

A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.

Preformed Compression Joint Sealant

Preformed compression seals shall conform to the requirements of ASTM Designation: D 2628. Preformed compression seals shall have 5 or 6 cells. Preformed compression seals for Types A2 and B joints shall have 4 or more cells. Lubricant adhesive used with preformed compression seals shall conform to the requirements of ASTM Designation: D 2835. Compression seals and lubricant adhesive shall be installed in conformance with the manufacturer's recommendations and these Special Provisions. The manufacturer's recommendations shall be submitted to the Engineer at the pre-paving conference.

Each lot of compression seal and lubricant adhesive shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications, and shall be accompanied with storage instructions and precautionary instructions for use. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the preformed compression joint sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of joint seal prior to use on the project. The Contractor shall submit the manufacturer's data sheet with installation instructions and recommended type of preformed compression seal for the joint size and depth as shown on the plans. The manufacturer's selected compression seal shall show evidence that the seal is being compressed at level between 40 percent and 50 percent for the joint width and depth shown on the plans.

Foam Backer Rods

Foam backer rods shall be Type 1, conforming to the requirements of ASTM Designation: D 5249. Foam backer rods shall have a diameter prior to placement at least 25 percent greater than the width of the sawcut and shall be expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Hot applied sealant that will melt the foam backer rod shall not be used. The Contractor shall submit a manufacturer's data sheet verifying that the foam backer rod is compatible with the sealant to be used.

Joint Filler Material

Joint filler material shall be preformed expansion joint filler for concrete (bituminous type), conforming to the requirements of ASTM Designation: D 994.
Joint filler material shall be Type 1 preformed expansion joint filler for concrete conforming to the requirements of ASTM Designation: D 1752.

Joint filler material shall be Type 2 preformed expansion joint filler for concrete conforming to the requirements of ASTM Designation: D 1752.

A Certificate of Compliance for the joint filler material shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications. The certificate shall be accompanied with a certified test report of the results of the required tests performed on the joint filler material within the previous 12 months prior to proposed use. The certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.

Hydraulic Cement Grout (Non-Shrink)

Hydraulic cement grout (non-shrink) shall conform to the requirements in ASTM Designation: C 1107. At the Contractor's option, clean, uniformly rounded aggregate filler may be used to extend the grout. The extension of grout shall not exceed 60 percent of the weight of the grout or the maximum amount of grout extension recommended by the manufacturer, whichever is less. The moisture content of the aggregate filler shall not exceed 0.5-percent. Grading of the aggregate filler shall conform to the following:

Sieve Size	Percentage Passing
1/2 inch	100
3/8 inch	85 - 100
No. 4	10 - 30
No. 8	0 - 10
No. 16	0 - 5

JOINT SEALANT INSTALLATION

Liquid Joint Sealant

The joint sealant detail for transverse joints, as shown on the plans, shall apply only to weakened plane joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to joints after sealant has been placed, the joint materials shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications, and replaced at the Contractor's expense. Immediately after sawing, a water wash using less than 100 pounds per square inch of pressure shall be used to remove the slurry from the sawing operation.

Transverse weakened plane joints shall be Type A1 or B as shown on the plans.

After the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, the joint walls shall be cleaned by the dry sand blast method and other means as necessary to remove from the joint objectionable material such as soil, asphalt, curing compound, paint and rust. Sand blasting shall be performed in at least 2 passes, one for each side of the joint, with the nozzle held at an angle to the joint within one inch to 2 inches of the pavement. After cleaning the joint, traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 2 inches on each side of the joint by the use of a vacuum device. Surface moisture or dampness shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 1/4 inch ± 1/32 inch and a minimum pressure of 90 pounds per square inch.

Backer rods shall be installed when the temperature of the Portland cement concrete pavement is above the dew point of the air and when the air temperature is 40°F or above. Backer rod shall be installed when the joints to be sealed have been properly patched, cleaned and dried, as determined by the Engineer. Methods of placing backer rod that leave a residue or film on joint walls shall not be used.

Immediately after placement of the backer rod, joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be applied using a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant, the surface of the sealant shall be recessed as shown on the plans.

Failure of the joint material in either adhesion or cohesion will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

After each joint is sealed, surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

Preformed Compression Joint Seal

The compression seal alternative joint detail for transverse joints, as shown on the plans, shall apply only to weakened plane joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to any joint after the compression seal has been placed, the joint materials shall be removed and disposed of, and replaced at the Contractor's expense. Compression seals shall be recessed below the final finished surface as shown on the plans.

Transverse weakened plane joints shall be Type A1 or B as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing preformed compression joint seals, the joint walls shall be cleaned by the dry sand blast method and other means as necessary to remove from the joint objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 2 inches on each side of the joint by the use of a vacuum device. Surface moisture or dampness shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 1/4 inch ± 1/32 inch and a minimum pressure of 90 pounds per square inch.

Longitudinal seals shall be installed before installing transverse seals. Longitudinal seals shall be continuous except at intersections with transverse seals. Transverse seals shall be installed in one continuous piece throughout each transverse joint. After the longitudinal seal is completed and the transverse seal is ready to be installed, a single cut with a sharp instrument or saw shall be made across the longitudinal seal at the middle of the intersection with the transverse seal. After the initial cut of the longitudinal seal, if the longitudinal joint material does not relax enough to allow proper installation of the transverse seal, the longitudinal joint material shall be trimmed precisely to accommodate the transverse seal and form a tight seal between the 2 joints.

An installation machine specifically designed for the installation of preformed compression joint seals shall be used to install the seal at the specified depth without cutting, nicking, or twisting the seal. The installation machine shall install the seal with no more than 4 percent stretch in the installed seal. Hand installation methods of installing seals will not be permitted.

The percentage of stretch shall be determined by laying a length of the preformed compression joint seal material cut to the exact length of the pavement joint to be sealed. The length shall then be measured. The cut length of preformed compression joint seal material shall then be installed in the joint. Excess amount of seal material remaining at the end of the joint shall be measured as the amount of stretch. The measured amount of stretch shall be divided by the original measured length to determine the percentage of stretch.

The completed seal shall not be twisted or have deformities that prevent the seal from making complete continuous contact with the joint walls. Seals installed that are twisted or deformed, or do not make continuous contact with joint walls or with greater than 4 percent stretch of the joint material will be rejected and removed.

CONCRETE BASE LAYER

Concrete base layer shall be considered as the first layer of HES Concrete (0.3 ft) poured over the aggregate base.

Concrete base layer does not require dowels, joint seal, etc. The surface shall not be textured nor colored and shall be finished to a smooth surface, free of mortar ridges and other projections. The finished surface shall be free from voids and porous areas.

FINAL SURFACE

The final textured surface of the HES colored concrete pavement shall be of the pattern specified herein. The pattern shall be implanted, indented, imprinted or stamped into the surface by means of forms, molds, or other approved devices.

PROTECTION AND CURING

The HES concrete shall be cured as described in Section 90-7, Curing Concrete, and protected with the provisions of Section 90-8.03, Protecting Concrete Pavement, and these Special Provisions. Protection and curing of the HES colored concrete pavement shall be in accordance with the manufacturer's specific instructions to prevent mottling, discoloration, unwanted staining effects of the concrete surface.

CONCRETE SEALER

A clear concrete sealer shall be applied between 14 days and 28 days after concrete placement, per manufacturer's written instructions and specifications. The sealed surface shall be finished using a fine brush, which removes residual dust from the surface.

QUALITY CONTROL PROGRAM

General

The Contractor shall establish, provide and maintain a quality control program that will provide assurance to the Engineer that all materials and completed construction conform to the contract requirements specified herein.

At least 20 days prior to the placement of the trial slab the Contractor shall submit to the Engineer for approval a written Quality Control Plan (QCP) that shall be used to ensure the quality of the product and the work. At the request of the Engineer or Contractor, the Contractor and Quality Control Managers (QCMs) shall meet with the Engineer to discuss the QCP. The Engineer will have 15 days to approve the QCP. Should the Engineer fail to complete the review of the QCP within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the QCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays" of the Standard Specifications.

If in the judgement of the Engineer, the Contractor has not implemented or is not complying with the approved QCP, production and placement shall be suspended. Production and placement shall not resume until approved by the Engineer.

Quality Control Plan

The Contractor shall provide a QCP that describes the procedures that the Contractor will use to control the production process, to determine when changes to the production process are needed, and to propose procedures for implementing changes for replacement pavement operations. The QCP shall also include an outline for the placement and testing of the trial slab.

Placement shall not begin until the QCP has been approved by the Engineer. Approval of the QCP will be based on the inclusion of all required information. Approval of the QCP does not imply any warranty by the Engineer that adherence to the QCP will result in replacement pavement that complies with these specifications. It shall remain the responsibility of the Contractor to demonstrate this compliance.

The QCP shall include the names and qualifications of the lead QCM and the assistant QCM. The lead QCM shall be responsible for the administration of the QCP. The lead QCM shall have current American Concrete Institute (ACI) certification as "Concrete Field Testing Technician-Grade I" and "Concrete Laboratory Testing Technician-Grade II". The assistant QCM shall have current ACI certification as "Concrete Field Testing Technician-Grade I" and either "Concrete Laboratory Testing Technician-Grade I" or "Concrete Laboratory Testing Technician-Grade II". All sampling, inspection and test reports shall be reviewed and signed by the QCM responsible for the production period involved prior to submittal to the Engineer. At least one QCM shall be present for each stage of mix design, trial slab construction, during production and construction of replacement pavement and for all meetings between the Contractor and Engineer relating to production, placement or testing of replacement pavement. The QCMs shall not be members of production or paving crews, inspectors or testers on the project during production or placement of replacement pavement. QCMs shall have no duties other than those referenced in these Special Provisions during the production and placement of replacement pavement.

All decorative colored concrete construction shall be performed by qualified personnel. The Contractor shall provide written evidence demonstrating to the satisfaction of the Engineer that the

installer has successfully performed concrete placement and finishing work similar to that specified herein. Such evidence shall include past project documentation and references and shall be included in the QCP.

The QCP shall include an outline of the production, transportation and placement of the HES colored concrete pavement. The QCP shall include a contingency plan for correcting situations if there is a problem in production, transportation or placement. The Contractor shall have equipment and personnel present to meet the requirements of the contingency plan. The QCP shall contain provisions for determining when placement of the HES concrete pavement will be suspended and temporary roadway will be substituted.

The QCP shall include the names of quality control personnel to be used and an outline of sampling, testing to be performed during and after construction of replacement pavement. At the time of submission of the QCP, quality control samplers and testers must be Caltrans qualified by the Department through the Independent Assurance Program (IAP) for the sampling and testing for which they will be responsible.

Before production and placement begins, the Contractor, QCMs and Engineer shall have a meeting with all production, transportation, placement, inspection, sampling and testing personnel to familiarize them with the requirements of the project. Items to be discussed include the production, transportation and placement processes for HES concrete pavement; contingency plan; and sampling and testing. The Contractor shall provide the facility for this meeting. The meeting date and location will be approved by the Engineer. Attendance at this meeting is mandatory for key personnel including the project manager, QCMs, production plant manager, plant inspector, all concrete delivery truck drivers, paving superintendent, paving foreman, paving machine operator, and all inspectors, samplers and testers. All meeting attendees shall sign in at the meeting. Production and placement operations shall not begin unless the above key personnel have attended the mandatory meeting.

Quality Control Inspection, Sampling and Testing

The Contractor shall perform quality control inspection, sampling and testing to ensure that replacement pavement production and placement conform to the provisions specified herein.

The Contractor shall be responsible for the Quality Control Program as described in these Special Provisions and the costs associated with the Quality Control Program.

The Contractor shall provide the required sampling, testing and inspection during all phases of HES concrete pavement production and placement. The Contractor shall provide a minimum of two business days notice to the Engineer, so the Engineer can witness all sampling and testing. The Engineer shall be given unrestricted access to the Contractor's quality control inspectors, samplers, testers and laboratories. During the production and placement period, the Contractor shall provide results of all testing to the Engineer within 15 minutes of completion of testing. The Contractor shall record all inspection, sampling and testing on forms approved by the Engineer. The Contractor shall provide written results of all inspection and testing to the Engineer within 48 hours of completion of each shift of paving and within 24 hours for all 7-day strength tests.

The Contractor shall provide a testing laboratory with adequate equipment and personnel for the performance of the quality control tests. This laboratory shall be located at a location approved by the Engineer and so that prompt testing requirements will be achieved. All sampling and testing equipment shall be maintained in proper working condition. Sampling shall be performed in conformance with the requirements of California Test 125. The QCP shall include a list of the equipment to be used including date of last calibration, the names and certifications of sampling and testing personnel, and the location of the laboratory and testing equipment during and after paving operations.

Testing laboratories, testing equipment, and sampling and testing personnel shall conform to the requirements of the Department's IAP.

Process Control and Quality Control Testing

The Contractor shall provide continuous process control and quality control sampling and testing throughout production and placement of colored concrete pavement.

During production of HES concrete, the Contractor shall sample and test aggregates at least once per placement shift. Aggregates shall be tested for conformance with gradations, cleanness value and sand equivalent requirements.

During placement of HES concrete, the Contractor shall fabricate specimens and test for modulus of rupture within the first 30 cubic yards, within the final truckload and at least twice during a production shift.

During placement of HES concrete, the Contractor shall sample and test for yield, penetration, air content and unit weight at least twice per placement shift.

At the Engineer's request, the Contractor shall provide split samples and fabricate beams for the Engineer to test. The cost of sampling, fabricating and transporting extra samples will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work" of the Standard Specifications. When, in the opinion of the Engineer, HES concrete fails to conform to the mix design requirements or the requirements of these Special Provisions, the Contractor shall provide samples and testing at the direction of the Engineer. If the material fails to meet requirements of these Special Provisions, cost of sampling and testing shall be at the Contractor's expense. If the material meets the requirements of these Special Provisions, the cost of sampling and testing will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work" of the Standard Specifications.

Beams used for determining early age modulus of rupture shall be cured under the same conditions as the pavement until one hour prior to testing. Beams fabricated for the 7-day test shall be cured in conformance with California Test 524 as modified in these Special Provisions. Modulus of rupture test results will be used for accepting or rejecting the HES concrete pavement and pay factor adjustment for low modulus of rupture.

Materials resulting from the construction of the trial slab, test specimens, temporary roadway structural section, and all rejected replacement pavement shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in

Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

MEASUREMENT AND PAYMENT

Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) payments will be subject to the pay factor values listed in "Pay Factor Adjustment for Low Modulus of Rupture" of these Special Provisions.

Costs for providing JITT shall be considered as included in the contract prices paid for the item involving HES concrete and no additional compensation will be made therefor. Costs for providing JITT shall include training materials, class site, and the JITT instructor including the JITT instructor's travel, lodging, meals and presentation materials. All costs incurred by the Contractor or Engineer for attending JITT shall be borne by the party incurring the costs.

The provisions in Section 40-1.135, "Pavement Thickness" of the Standard Specifications shall not apply.

Full compensation for constructing trial slabs, furnishing and placing bond breaker, and quality control program, shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete), and no additional compensation will be allowed therefor.

If calibration of volumetric batch-trucks is performed more than 100 miles from the project limits, additional inspection expenses will be sustained by the County. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) will be reduced $1,000.

Sealing transverse weakened plane joints, and longitudinal isolation joints (when required) in Portland cement concrete pavement shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and no additional compensation will be allowed therefor. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface.

Full compensation for seal pavement joint shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing pavement joints complete in place, including sawing, cleaning and preparing the joints in the concrete pavement, furnishing and installing backer rod, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Full compensation for seal longitudinal isolation joint shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and shall include full compensation for furnishing all

labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing longitudinal isolation joints complete in place, including sawing, cleaning and preparing the joints in the concrete pavement, furnishing and installing joint filler material, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Concrete pavement will be measured by the cubic yard in conformance with the provisions in Section 40-1.13, "Measurement" of the Standard Specifications. No deduction will be made for the volume of epoxy-coated dowel bars, and dowel bar baskets with fasteners, in the concrete pavement. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface, the concrete will be measured and paid for as concrete pavement.

The contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) shall include full compensation for furnishing all labor, materials (including cementitious material in the amount determined by the Contractor), tools, equipment, and incidentals, and for doing all the work involved in constructing the Portland cement concrete pavement complete in place, including color integration and decorative (stamped) surface, furnishing and placing epoxy-coated dowel bars, and dowel bar baskets with fasteners, submittal to the Engineer all test data for determination of mix proportions of concrete for concrete pavement and for providing the facility, Contractor personnel and all the work involved for constructing and repairing all joints; for grooving and grinding required for final finishing; and for removing, and replacing pavement for deficient thickness, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Full compensation for coring test strips for evaluation by the Engineer and for backfilling core holes with hydraulic cement grout when the test strip remains in place as part of the concrete pavement; and for constructing, coring and removing and disposing of test strips that are rejected shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and no additional compensation will be allowed therefor.

Full compensation for furnishing and placing paint binder (tack coat) for transition end panel shall be considered as included in the contract price paid per cubic yard for Color Stamped Portland Cement Concrete Pavement For Truck Apron (High Early Strength Concrete) and no additional compensation will be allowed therefor.

FINISHING ROADWAY:

Finishing roadway shall conform to Section 22 of the Standard Specifications.

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article shall be considered as included in the various items of work involved and no additional compensation will be allowed therefor.

MINOR CONCRETE COLORED STAMPED CONCRETE SPLITTER ISLANDS:

Colored stamped concrete splitter island shall be constructed in accordance with the plans and these specifications, or as directed by the Engineer and in conformance with Section 51, 52, 73 and 90 of Standard Specifications.

Class 3 concrete shall be used for the colored stamped concrete splitter island. Preparation of subgrade for the concrete structures shall be done in conformance with the requirements of Section 73-1.02 of the Standard Specifications.

The maximum size aggregate for the colored stamped splitter island shall be 3/8 inch. Stamped concrete shall be imprinted with special tools while in the plastic stage to provide the pattern specific herein.

Pattern and Finish for the Colored Stamped Concrete Splitter Island:

The color and pattern of colored stamped concrete shall be:

Color:

Integral color shall be **"3292 Navajo Red" by L.M. Schofield Co.**, or close approximation as approved by the Engineer. The listed product is intended as a guideline, and products from alternate manufacturers will be accepted provided that the product and color are close approximations as determined by the Engineer.

Pattern:

The stamped concrete pattern shall be **Colico Construction "CS350 Cobble Stone",** or close approximation as approved by the Engineer. The listed product is intended as a guideline, and products from alternate manufacturers will be accepted provided that the product provides a pattern of the size and texture that is a close approximation to the guideline product.

The pattern shall be implanted, indented, imprinted or stamped into the surface by means of forms, molds, or other approved devices. The impressions shall be approximately 3/8 inch in width, and shall be ungrouted unless otherwise specified.

The Contractor shall install at least one test panel, in an area not to be incorporated into the work, for the specified color and pattern. The sample shall be a minimum of 16 square feet and 4 inches thick, which shall be subject to inspection and approval by the Engineer. If ordered by the Engineer, additional test panels shall be constructed and finished until a satisfactory representation is obtained. The approved test panel shall then be the standard of comparison for enhanced concrete paving. The Contractor shall dispose of the test panel when work is completed, unless otherwise directed by the Engineer.

The Contractor shall provide the Engineer with Certificates of Compliance for all materials used in the imprinting, texturing, coloring, curing, and sealing of decorative colored stamped concrete crossing paving installation, including: Product Name, Supplier, Product Type, and Date of Delivery.

All concrete slabs shall slope to drain. Depressions in the slab surface that hold water will not be accepted.

Expansion joints, joints fillers and joint sealants shall conform to Section 51-1.12 of the Standard Specifications. Joint filler shall be ½ inch wide, premolded, polyethylene expansion foam with a perforated removable top. Remove top of perforated foam filled expansion joint and apply uniform bead of sealant into the joint assuring complete wetting of the bonding surfaces. Thoroughly clean all joint surfaces and apply masking tape to all surfaces adjacent to joints to protect them from primer and sealant residue. Prime all expansion joints carefully. Do not apply primer to any adjacent surfaces.

The colored stamped concrete shall be protected against rapid drying and damage by rain. Keep moist for at least 7 days after placing and protect by wet burlap, canvas covering or liquid-curing compound. If weather is hot or surface has dried out, spray surface with fine mist of water, starting no later than 2 hours after final troweling. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.

A clear concrete sealer shall be applied between 14 days and 28 days after concrete placement, per manufacturer's written instructions and specifications. The sealed surface shall be finished using a fine brush, which removes residual dust from the surface.

No cutting removal or patching of work will be permitted to correct damaged or defective work; defective sections shall be removed and replaced. Repair of damaged facilities shall be performed by the Contractor within a reasonable amount of time. No extensions of time will be allowed for correcting defective work.

All colored stamped concrete construction shall be performed by qualified personnel. The Contractor shall provide written evidence demonstrating to the satisfaction of the Engineer that the installer has successfully performed concrete placement and finishing work similar to that specified herein. Such evidence shall include past project documentation and references.

Construction of colored stamped splitter island shall include, but not be limited to, the following:

1) Removal and disposal of existing soil, asphalt and aggregate as required;
2) Furnishing and installing and compacting any fill material required under the stamped concrete;
3) Establishing grades, and assuring that all grades are met;
4) Performing all grading and compaction
5) Construction of new stamped colored splitter island;
6) All scoring/grooving and required saw cutting;
7) Installing 1/2" wide expansion joints;
8) Reinforcing steel
9) Construction of the colored stamped splitter island, including furnishing and incorporating color admixtures, furnishing and applying color hardeners, furnishing and placement of clear seal and other work as required herein,

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article and plans, including furnishing all labor, tools, equipments, incidentals, furnishing and disposing 4-foot x 4-foot x 4-inch thick colored stamp concrete samples for the splitter island for the approval of the Resident Engineer and doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per square foot Minor Concrete (Colored Stamped Concrete Splitter Islands)

MINOR CONCRETE CURB, CURB AND GUTTER, CURB RAMPS WITH SIDEWALK APPROACH, BIKE RAMPS, CONCRETE RAMPS, SPLITTER ISLAND RAMP, AND CURB TRANSITIONS:

Concrete curb, curb transitions, curb and gutter, and curb ramps with sidewalk approach, bike ramps, concrete ramps and splitter island ramps shall be constructed in accordance with Caltrans Standard plans, County of Riverside Road Improvement Standard plans, these special provision and in conformance with Sections 51, 52, 73 and 90 of the Standard Specifications.

Class 3 concrete shall be used for curb, curb and gutter, curb transitions, and curb ramps with sidewalk approach, bike ramps, concrete ramps and splitter island ramps.

Preparation of subgrade for the concrete structures shall be done in conformance with the requirements of Section 73-1.02 of the Standard Specifications.

Excess material resulting from the excavation of the subgrade shall be disposed of elsewhere provided in these Special Specifications.

The Contractor is responsible for meeting the requirements of the American with Disability Act (ADA).

Construction of curb, curb and gutter, curb transitions, and curb ramps with sidewalk approach, bike ramps with spill gutter, concrete ramps with spill gutter and splitter island ramps shall be included but not limited to the following:

1) Establishing grades, and assuring that all grades are met;
2) Performing all grading and compaction – including all required aggregate import, as directed by the Engineer and in accordance with the details in the plans;
3) Construction of new curb, curb and gutter, and curb ramps (including the curbs in the ramps) with sidewalk approach(including the curbs in the ramps) , bike ramps and concrete ramps, splitter island ramps;
4) All scoring/grooving and required saw cutting;
5) Repair of existing asphalt and PCC surfacing;
6) Installing 1/2" wide expansion joints;
7) Furnishing and installing detectable warning surface in the curb ramps and splitter island ramps.

METHOD OF PAYMENT

The contract unit bid prices paid per linear foot for Minor Concrete (Curbs), Minor Concrete (Curb and Gutter), Minor Concrete (Curb Transitions) per each for Minor Concrete (Curb Ramps Including Sidewalk approach and curbs in the ramps), Minor Concrete (Bike Ramps Including Spill Gutter), Minor Concrete (Concrete Ramps Including Spill Gutter), and Minor Concrete (Splitter Island Ramp) shall include full compensation for furnishing all labor, equipment, materials and tools, and incidentals, and for doing all the work involved in the construction and complete in place including the furnishing and placing of expansion joints, any reinforcement steel and detectable warning surface.

THERMOPLASTIC STRIPE, CROSSWALK AND PAVEMENT MARKING:

Thermoplastic crosswalks and pavement markings shall conform to the provisions in Sections 84-1, "General," and 84-2, "Thermoplastic Traffic Stripes and Pavement Markings," of the Standard Specifications and these Special Provisions.

Newly painted pavement markings shall be protected from damage by public traffic or other causes until the thermoplastic is thoroughly dry. Any newly installed traffic markings which are damaged as a result of the construction, including wheel markings by public traffic and the construction equipment, shall be replaced by the Contractor and any associated removals shall be performed as called for in these Special Provisions.

METHOD OF PAYMENT

The contract unit bid prices paid per linear foot for the different kinds of Thermoplastic Stripe and per square foot for Thermoplastic Crosswalk and Pavement Marking shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work necessary and no additional compensation will be allowed.

Full compensation for furnishing and installing thermoplastic crosswalk and pavement markings as shown on Exhibit "A", Equestrian Crossing attached to these Special Provisions, shall conform to these provisions and payment shall be considered as included in the contract unit price paid per square foot for Thermoplastic Crosswalk and Pavement Marking.

PAVEMENT MARKER:

Pavement markers shall conform to the provisions in Section 85, "Pavement Markers" of the Standard Specifications and these Special Provisions.

Pavement markers shall be placed to the line established by the Engineer. All additional work necessary to establish satisfactory lines for markers shall be performed by the Contractor.

Pavement markers shall be installed where indicated on the plans in accordance with the indicated striping detail. Refer to Standard Plans A20-A through A20-D for striping and markings details.

Markers and adhesive removal shall be performed by a method approved by the Engineer. Any pavement scarring resulting from the markers removal shall be repaired to the satisfaction of the Engineer.

METHOD OF PAYMENT

The contract price paid per each for Pavement Markers (Reflective) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing pavement markers, including the removal and disposal of existing markers, complete in place, including adhesives, and establishing alignment for pavement markers, as shown on the plans, as specified in these special provisions, and as directed by the Engineer and no additional compensation will be allowed therefor.

TEMPORARY ASPHALT CONCRETE:

Contractor shall construct a temporary asphalt road on the southwest and southeast sides of Rancho California Road. The temporary asphalt road shall be composed of 0.30' hot mix asphalt (Type A) over 95% re-compacted native materials. The asphalt material shall conform to the "Hot Mix Asphalt (Type A) article on these special provisions. Contractor is advised to use as much as possible the existing road for the construction of the temporary road.

The maximum cross slope allowed for the temporary road will be 3% or as directed by Resident Engineer. Any fill material needed to construct the temporary road shall be incorporated in the price of temporary asphalt concrete.

Contractor shall remove the temporary asphalt concrete when it is not needed. Removal and disposal of the temporary asphalt concrete will be included in the payment per ton for the temporary asphalt concrete.

METHOD OF PAYMENT

The contract price paid per ton for Temporary Asphalt Concrete shall be for furnishing all labor, materials, tools, equipment, and incidentals and doing all the work necessary including the furnishing and placing of fill material to accommodate a maximum cross slope of 3% or as directed by Resident Engineer.

ROADSIDE SIGN- ONE POST:

The Contractor shall furnish and install roadside signs at the locations shown on the plans or as directed by the Engineer, in conformance to the provisions in Section 56-2 "Roadside Signs," of the State Standard Specification, these Special Provisions, the plans, and as directed by the Resident Engineer.

All roadway signs shall have retroreflective sheeting. Except as stated below, the retro-reflectivity for all roadway signs, both temporary and permanent installations, shall meet or exceed ASTM Standard D 4956 Type III (3M Co. High Intensity Grade or approved equal). The retroreflectivity

for R1-1 ("STOP") signs and W3-1 (Stop Ahead) signs shall meet ASTM Standard D 4956 Type IX (3M Co. Diamond Grade or approved equal).

METHOD OF PAYMENT

The contract unit price paid per each for Roadside Sign-One Post shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work including all necessary concrete excavation and backfill as specified in the Standard Specifications, these Special Provisions, the plans, and as directed by the Resident Engineer, and no additional compensation will be allowed therefor.

Full compensation for furnishing and installing roadside signs as shown on Exhibit "A", Equestrian Crossing attached to these Special Provisions, shall conform to these provisions and payment shall be considered as included in the contract unit price paid per each for Roadside Sign-One Post.

LANDSCAPING LIGHTING SYSTEM:

The landscaping lighting system shall be constructed as shown on the plans and specified in these special provisions.

The Contractor shall install the landscaping lighting system as to protect all existing utilities in-place. Horizontal and vertical alignment of conduit shall be adjusted to protect all existing utility, road and private facilities in-place. Additionally, conduit sweeps for the landscaping lighting locations shall be place so as to protect all existing utility, road and privately owned facilities in-place.

The contractor shall provide necessary coordination with County for all work associated with the landscaping lighting system.

1. The Contractor shall furnish and install
   - All conduits including the sweeps and risers to service tree uplights, trenching, trench backfilling and compaction. Conduit in trench shall be 1" PVC.
   - 120 V Lighting Relay
   - Tree Uplights installed in concrete footings,
   - Electrical wire #10
   - Traffic bearing pull boxes

2. The landscaping lighting plans should be carefully reviewed prior to bidding to ensure that the bidding contractor and specialty sub-contractor, if utilized, understands the Contractor's responsibilities.

The landscaping lighting conduit shall be installed so as to provide the following clearances:

1. 30 inches of cover (top of conduit to finish grade) shall be maintained.
2. For crossings of landscaping light conduit and other utilities and facilities: 6 inches of separation shall be maintained.

3. For landscaping lighting conduit that is installed parallel to other utilities, pipes or culverts, 12 inches of separation shall be maintained.

METHOD OF PAYMENT

The contract price paid per lump sum for Landscaping Lighting System shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, including conduit, 120V lighting relay, tree uplights with concrete footings, electrical wire, traffic bearing pull boxes, and for doing all work involved in furnishing and installation, as shown on the plans, as specified in the specifications, these special provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

STREET LIGHTING SYSTEM:

Attention is directed to "Cooperation" of these Special Provisions regarding construction of Street Lighting pole foundations by Southern California Edison forces. Prior to construction of splitter islands, Contractor shall block areas surrunding proposed street lighting poles and hand holes to accommodate for the construction of poles foundations.

The street lighting system shall be constructed in accordance with the current edition of the National Electric Code, the standards and specifications of the Southern California Edison (SCE), the electrical plans as prepared by SCE, Street Light plans, which are included in the plan set issued to plan holders, and as directed by the Engineer.

The Contractor shall install the street lighting conduit so as to protect all existing utilities in-place. Horizontal and vertical alignment of conduit shall be adjusted to protect all existing utility, road and private facilities in-place. Additionally, conduit sweeps to street lighting locations shall be place so as to protect all existing utility, road and privately owned facilities in-place.

The contractor shall provide necessary coordination with SCE for all work associated with the street lighting system.

3. The Contractor shall furnish and install all conduits with pull-ropes, including the sweeps and risers to service poles, trenching, trench backfilling and compaction. The first 10' of riser conduit shall be Schedule 80, for risers and sweeps, unless specified otherwise on the Edison Company's street lighting plans. Conduit in trench shall be Schedule 40. All other facilities shown on the Edison Company's street lighting plans shall be installed, if shown to be installed by the "customer" or the County of Riverside, including but not limited to pads for transformers, pull boxes, etc. The Contractor shall coordinate with the Edison Company's inspector in all matters pertaining to the installation of street lighting.

4. The Edison plans should be carefully reviewed prior to bidding to ensure that the bidding contractor and specialty sub-contractor, if utilized, understands the Contractor's responsibilities.

5. Edison's contractor to install pole foundations, and will furnish and install the electroliers.

6. Edison crews to pull cable, install transformers as required, and energize.

The street lighting conduit shall be installed so as to provide the following clearances:

4. 30 inches of cover (top of conduit to finish grade) shall be maintained.
5. For crossings of street light conduit and other utilities and facilities: 6 inches of separation shall be maintained.
6. For street lighting conduit that is installed parallel to other utilities, pipes or culverts, 12 inches of separation shall be maintained.

The SCE, as owner of the electrical system, will furnish and install transformers, furnish and connect conductors between transformers and primary electric conductors, install risers on power poles, and will make final connections of street lighting conductors to transformers. SCE will remove existing street lights after installation and energization of the new street lighting system.

All fees to the Edison Company associated with the street lighting system will be paid directly by the County of Riverside.

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article and the plans including hand holes, and all labor, equipment, materials and incidentals, shall be paid for on a lump sum basis and no additional compensation will be allowed therefor.

GROUND PREPARATION AND LANDSCAPING:

PART 1 - GENERAL

1.01 SUMMARY:

A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work indicated on the Drawings and as specified.

1.02 RELATED REQUIREMENTS:
- A. Irrigation System
- B. Landscape Maintenance

1.03 SUBMITTALS:

A. Submit certificates of compliance and invoices for soil amendments, fertilizers, and plant materials, with quantities of each.

B. Tree Samples: Deliver to the site, a minimum of one sample of each tree variety and size indicated, 15 gallons in size and larger, a minimum of 15 days before planting operations. At the Contractor's

option and expense, he may retain the services of the Resident Engineer to review trees 15 gallon and larger tagged at the nursery or at its place of growth, or as otherwise indicated.

C. Shrub and Tree Samples: Submit 3 samples of each variety and size of plant materials at the site a minimum of 15 days before planting operations. Accepted samples shall remain on the site and shall be maintained as standards of comparison for plant materials to be furnished. Samples may be incorporated into the work.

D. A sample of the soil amendments and proposed mulch material(s), including manufacturer or supplier certificate or invoice, shall be delivered to the Resident Engineer within thirty-five (35) days after recording of the Contract.

1.04 GUARANTEES AND REPLACEMENTS:

A. Shrubs, vines and groundcovers shall be guaranteed to remain healthy and vigorously growing for a period of ninety (90) days from date of final acceptance of Maintenance Period of project.

B. Trees shall be guaranteed to live in a healthy condition for a period of one (1) year from date of final acceptance of Maintenance Period of project.

C. Plants found to be dead or not in a vigorous condition within the Maintenance and Guarantee Periods shall be replaced within fourteen (14) days at Contractor's expense.

D. Plants used for replacement shall be the same kind and size as specified in the plant list. They shall be furnished, planted and fertilized as originally specified. The expense of all repair work on existing improvements damaged during replacement shall be borne by the Contractor.

1.05 QUALITY ASSURANCE:

A. Reviews herein specified shall be made by the Resident Engineer or Landscape Inspector. The Contractor shall request review in writing a minimum of 48 hours in advance, for the following parts of work:

1. Pre-job meeting to introduce Resident Engineer, Landscape Inspector, Contractor, job project manager and job superintendent and to discuss the particular requirements of the job.

2. Incorporation of soil conditioning and fertilizing into the soil. Observation shall begin prior to amendments being rototilled into the soil. Amendment materials shall be distributed in piles around the site in quantities corresponding to the soils analysis recommendations "per 1,000 sq. ft.". Invoices showing materials and quantities purchased shall be available for review.

3. Upon completion of grading prior to planting. Review of plant materials is to coincide with this review.

4. When trees, shrubs and vines are spotted in place for planting, but before planting holes are excavated.

5. Upon completion of finish grades and planting. Application of pre-emergent herbicide is to coincide with this review.

6. When planting, and all other indicated and specified work, except the Maintenance Period, has been completed. Acceptance, in writing, shall establish beginning of the Maintenance Period.

7. Final review at the completion of the Maintenance Period. Contingent on acceptance, this review shall establish the beginning date for the Guarantee Period.

1.06 MAINTENANCE:

A. The Contractor shall continuously maintain all involved areas during the progress of the work and during the maintenance period until the final acceptance of the work.

B. The Maintenance Period begins on the first day after written acceptance of planting operations is received from the Resident Engineer, and shall continue thereafter for no less than ninety (90) continuous calendar days.

C. The contract completion date of the contract maintenance period will be extended, when in the opinion of the Resident Engineer, improper maintenance or possible poor or unhealthy condition of planted material or poorly established non-covering turf areas are evident at the termination of the scheduled maintenance period. The Contractor shall be responsible for additional maintenance of the work until work is completed and acceptable.

D. See Section 320533 for specific Maintenance Requirements.

1.07 GENERAL REQUIREMENTS:

A. The term "Planting Area" shall mean all areas to be planted with trees, shrubs, groundcovers, sod and seed.

B. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.

C. All rock and other growth or debris accumulated during the duration of the project shall be removed from the site.

D. Prior to excavation for planting or placing of plant materials, locate all underground improvements, utility lines, etc. and take proper precautions to avoid damage. In the event of a conflict between such lines and plant locations, notify Resident Engineer and receive direction prior to proceeding. The Contractor assumes responsibility for making repairs for damages resulting from work as herein specified.

E. Grading and soil preparation work shall be performed only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, spreading and grading operations shall be suspended until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

F. Scaled dimensions are approximate. Before proceeding with work, carefully check and verify dimensions and immediately inform the Resident Engineer of discrepancies between the drawings and specifications and actual conditions.

G. Quantities for plant materials are shown for convenience only, and not guaranteed. Check and verify count and supply sufficient number to fulfill intent of drawings.

H. Adequately stake, barricade, and protect irrigation equipment, manholes, utility lines, and other existing property during all phases of the soil amending and grading operations.

I. Rejection and Substitution: Plants not conforming to the requirements herein specified shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and be immediately removed from the site of the work and replaced with acceptable plant materials. The plant materials shall meet all applicable inspections required by law. Plants shall be of the species, variety, size, age, flower color and condition as specified herein and/or as indicated on the drawings. Under no condition will there be any substitution of plant species, variety, or reduced sizes for those listed on the accompanying drawings, except with the expressed written consent of the Resident Engineer.

J. All utilities (water and electricity) used during the installation and maintenance of the landscaping and irrigation systems for this project shall be paid for by the Owner.

1.08 FINAL SOIL AMENDMENT QUANTITIES:

A. Upon completion of all backfill and/or rough grading of planted areas, a minimum of six (6) representative samples of existing soil found in the planting areas shall be taken by the Contractor and at his/her expense sent to an independent soil testing laboratory for an agricultural suitability analysis and recommendations for quantity and application rate of amendments and include any corrective measures required to adjust pH or salt to acceptable levels. These recommendations shall then be compared with those listed in Paragraphs 2.02 and 3.01 and the contract modified accordingly.

1.09 SOIL PREPARATION CONFORMANCE

A. Amendment materials shall be distributed in piles around the site in quantities corresponding to the soils analysis "per 1,000 sq. ft." recommendations. Invoices showing materials and quantities purchased shall be available for review. The Resident Engineer will compare the distribution piles and total quantities of each material furnished against the soils analysis recommendations. If the minimum rates of application have not been met, the Resident Engineer will require the distribution of additional quantities of these materials to fulfill the minimum application requirements specified. After approval by the Resident Engineer of the distribution and quantities of soil amendments, the Contractor will then commence with soil conditioning operations per section 3.01.

1.10 PLANT MATERIAL QUANTITY CONFORMANCE

A. After installation of plant materials, and coinciding with the pre-maintenance observation, the Resident Engineer, with the heretofore specified signed copies of the required certificates, trip slips

and invoices for the plant materials and related items, will inventory such material, comparing the total area and/or the amounts specified. If the minimum amounts have not been furnished, the Resident Engineer may require the installation of additional materials to fulfill the minimum requirements specified or require that the Contractor provide credit(s) to the Owner.

PART 2 - PRODUCTS

2.01 SOIL AMENDMENT AND FERTILIZER:

A. Provide singly or in combination as required to meet specified requirements for topsoil. Soil conditioners shall be nontoxic to plants.
   1. Composted Derivatives: Ground bark, nitrolized sawdust, humus, or other wood green waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:
   2. Particle Size: Minimum percent by weight passing:
      a. No. 4 mesh screen 95
      b. No. 8 mesh screen 80
   3. Nitrogen Content: Minimum percent based on dry weight:
      a. Fir Sawdust 0.7
      b. Fir or Pine Bark 1.0

B. Gypsum shall be a commercially processed and packaged gypsum (CaSo, 2H 0) with minimum 80% grade containing 14% minimum combined sulfur.

C. Iron Sulphate: Ferric or ferrous sulphate in pelleted or granular form containing not less then 18 percent metallic iron. Material shall conform to the Agricultural Code of the State of California.

D. Pre-plant fertilizer for incorporation with rototilling or plant pit backfill mix shall be of a uniform 'beaded' homogeneous granular composition suitable for application with approved equipment and shall contain the following minimum available percentages by weight of plant food:

Nitrogen	5% minimum
Phosphoric acid	3% minimum
Potash	1% minimum
Iron	1%
Manganese	.05%
Zinc	.05%
Humic Acids (derived from compost)	15%
Soil Penetrant (alkyl naphthalene sodium sulfonate)	15%

E. Post-planting Fertilizer for Maintenance Period Fertilization: Organic base, long lasting, nonburning, controlled slow release, free flowing, uniform in composition, suitable for application with approved equipment, and shall contain the following minimum available percentages of weight of plant food :

Nitrogen	12% minimum
Phosphoric acid	8% minimum
Potash	8% minimum
Sulphur	7%
Iron	2%

Manganese	.05%
Zinc	.05%
Humic Acids (derived from compost)	5%

WARNING: Some fertilizers contain chelated iron which has caused staining of concrete surfaces in other projects. Contractor shall be responsible for removing all iron stains from concrete by sandblasting, or as directed by architect, at no additional cost to the Owner.

F. Planting Tablets: Tightly compressed chip type commercial grade planting tablets of varying weighted sizes with the following available percentages by weight of plant food:

Nitrogen	20% minimum
Phosphoric acid	10% minimum
Potash	5% minimum

2.02 PLANTING BACKFILL:

A. Planting backfill shall be a thoroughly blended mixture of topsoil amendments at the following mixture:

Soil Conditioner	1 part
Stock-piled on site soil	3 parts
Iron sulphate	2 lbs/per cu. yd. of mix
Gypsum	10 lbs/per cu. yd. of mix
Pre-plant fertilizer	4 lbs/per cu. yd. of mix

Soil to be used as planting medium for the project shall be fertile, well-drained, of uniform quality, free of stones over 1 inch diameter, sticks, oils, chemicals, plaster, concrete and other deleterious materials. On-site soil may be stockpiled for re-use provided it meets all requirements.

2.03 PLANT MATERIALS:

A. Nomenclature: The scientific and common names of plants herein specified conform with the approved names given in "Sunset Western Garden Book ", published by Lane Publishing Company, Menlo Park, California, latest edition. See list of plant material on drawings.

B. Quality and size of all plants shall be No. 1, of Pinto Tag stock. They shall be vigorous, of normal growth, free from disease, insects, insect eggs, and/or exceed the measurements specified or the American standards for nursery stock. Pinto Tags shall be submitted to the Resident Engineer.

C. Container stock (1 gal., 5 gal., and 15 gal.) shall have grown in containers for at least six months, but not over two years. No container plants that have cracked or broken balls of earth, when taken from the container, shall be planted, except upon special approval. No trees with damaged roots or broken balls shall be planted and no shrubs, vines or groundcovers shall be planted that are "pot-bound" or that have damaged roots.

D. Pruning shall not be done, prior to delivery, except by written approval.

E. Observation of Plant Materials, required by County authorities, shall be a responsibility of the contractor, and where necessary, the contractor shall have secured permits or certificates prior to delivery of plants to site.

F. Plants shall be subject to observation and approval or rejection, at the project site at any time before or during progress of work, for size, variety, condition, latent defects and injuries. Rejected plants shall be removed from the project site immediately.

G. Substitutions will not be permitted except that if proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size, variety and cost.

H. Quantities shall be furnished as needed to complete work as shown on drawings.

I. The Resident Engineer reserves the right to observe root condition of any species, particularly those grown from seed, and if found defective, to reject the plants represented by the defective sample.

J. Identify plant species or varieties correctly on legible, weather-proof labels attached securely at the job site. There shall be a minimum of one labeled plant for each 5 plants in a lot.

K. Groundcover plants shall be healthy vigorous rooted cuttings grown in flats until transplanting.

2.04 HERBICIDE:

A. Weed Contact Spray, post emergent, systemic product with no soil residual activity formulated as a water soluble liquid containing 50% glyphosate and 14.5% surfactant with surflan additive.

2.05 RODENT REPELLENT:

A. Rodent Repellent: Repellent X or approved equal.

2.06 MULCHING MATERIAL:

A. Mulching material shall be 3/8" - 1/2" dia. screened fir bark or approved equal, approved in writing, by the Resident Engineer.

2.07 GUYING MATERIALS FOR TREES 48" BOX SIZE AND GREATER:

A. Guy wires shall be of pliable, zinc-coated steel of No. 12 gauge.

B. Anchors (deadman) for holding guy wires shall be of 4 inch by 4 inch (4" x 4") solid lumber, 1'-6" in length, or "duckbill" style anchor materials as shown on the details on the drawings.

C. Hose for covering wire shall be of 2-ply reinforced rubber, used or new, garden hose type of at least 1/2 inch in diameter.

D. Warning indicators, to be attached to guys, shall be of 1/2" PVC pipe and four feet long.

2.08 ROOT BARRIERS FOR TREES:

A. #UB-24-2 root barriers as manufactured by Deep Root Corp. or approved equal.

PART 3 - EXECUTION

3.01 LEACHING, SOIL CONDITIONING, ROTOTILLING AND FERTILIZING:

A. Deep Water Leaching:
   1. After complete installation and testing of the irrigation system, all areas shall be deep water leached and compacted and settled by continuous application of irrigation water or other means of watering if irrigation system is insufficient until the soil has received a minimum of 12" of water.

   2. After leaching operation, soil samples shall be taken by contractor per Resident Engineer's direction and given to the Owner's soil laboratory for testing. Soil test shall meet the following requirements:

ECe	- Maximum 3.0
pH	- Maximum 7.50
	- Minimum 6.00

   3. Deep water leaching shall be done prior to the application of the commercial fertilizer.

   4. Care shall be taken that the rate of application of water does not cause erosion or sluffing of soils. Do not undertake leaching operations in expansive soils.

   5. All depressions, voids, erosion scars and settled trenches generated by the deep watering shall be filled with conditioned topsoil and brought to finish grade prior to digging planting pits.

B. After leaching operations and after the areas have been graded, follow the Soil Preparation Conformance procedures per section 1.09. After approval by the Resident Engineer of the requirements in section 1.09, the soil conditioning and amendment materials shall be evenly spread over all planting areas and shall be thoroughly scarified to an average depth of six (6) inches by rototilling a minimum of two (2) alternating passes:

The following materials and quantities are to be used as a basis for bidding, and may be modified based on soil analysis results.

Soil conditioner:	4 cu. yd. per 1,000 sq. ft.
Soil sulphur:	20 lbs/per 1,000 sq. ft.
Iron sulphate:	20 lbs/per 1,000 sq. ft.
Gypsum:	100 lbs/per 1,000 sq. ft.
Pre-plant fertilizer:	20 lbs/per 1,000 sq. ft.

   1. Fertilizer shall be incorporated into the top six (6) inches of finish grade. Fertilizer shall be applied after leaching operation.

2. The thoroughness and completeness of the rototilling and incorporation of the soil conditioners/amendments shall be accepted by the Resident Engineer in writing, prior to digging planting pits. For slopes 2:1 and steeper, or as per the drawings, omit soil conditioner application and rototilling.

3.02 FINISH GRADING:

A. Finish grades shall be as indicated on landscape and civil drawings. Contractor shall notify Resident Engineer for a decision should any discrepancies exist between the drawings and site conditions.

B. Finish grades shall be measured as the final water compacted and settled surface grades and shall be within $\pm$ 0.1 foot of the spot elevations and grade lines indicated. Grades adjacent to hardscape shall be within +/- .01 feet of the grades indicated on the drawings.

C. Molding and rounding of the grades shall be provided at all changes in slope.

D. All undulations and irregularities in the planting surfaces resulting from tillage, rototilling and all other operations shall be leveled and floated out before planting operations are initiated.

E. Take every precaution to protect and avoid damage to erosion control materials, sprinkler heads, irrigation lines, and other underground utilities during grading and conditioning operations.

F. Final finish grades shall insure positive drainage of the site with all surface drainage away from buildings, walls, and toward roadways, drains and catch basins.

G. Final grades shall be accepted by the Resident Engineer in writing on company letterhead prior to digging planting pits and/or before planting operations will be allowed to begin.

H. Planting surfaces shall be graded with no less than 2 percent surface slope for positive drainage.

3.03 PLANTING:

A. The layout of locations for plants and outlines of groundcover beds to be planted shall be accepted by the Resident Engineer in writing prior to digging plant pits for planting. All such locations shall be checked by the contractor for possible interference with existing underground piping prior to excavation of holes. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for the planting may be selected by the Resident Engineer at no additional cost to the owner. Damage to existing utilities shall be the responsibility of the contractor.

B. Planting Trees and Shrubs:
   1. All excavated holes shall have vertical sides with roughened surfaces and shall be of the minimum sizes indicated on drawings. Holes shall be, in all cases, large enough to permit handling and planting without injury or breakage of root balls or roots.

2. Excavation shall include the stripping and stacking of all acceptable soil encountered within the areas to be excavated for plant pits and planting beds. Protect all areas that are to be trucked over and upon which soil is to be temporarily stacked pending its re-use for the filling of holes, pits and beds.

3. Excess soil, generated from the planting holes shall be spread evenly on the site within the tolerances indicated in section 3.02, or as directed by the Resident Engineer.

4. The plants shall be planted at approved locations with the heretofore specified plant pit fertilizer and soil planting backfill. Place plant pit fertilizer after two thirds of backfill material is installed at the rates specified by the manufacturer and soils report.

5. The plants shall be placed in the planting pits, which have been hand-tamped, and water settled to the rootball base levels prior to the placement of the plants. After setting the plants, the remaining backfill material shall be carefully tamped and settled around each rootball to fill all voids.

6. Each tree and shrub shall be placed in the center of the hole and shall be set plumb and held rigidly in position until the planting backfill has been tamped around each rootball.

7. All plants shall be set at such a level that after settling they bear the same relationship to the surrounding finish grade as they bore to the soil line grade in the container, unless otherwise noted.

8. No plant will be accepted if the rootball is broken or cracked, either before, during, or after the process of installation.

9. Plants shall be thoroughly watered into the full depth of each planting hole immediately after planting.

10. Install shrubs as shown on the drawings.

11. For trees 48" Box size and greater guy all trees with the materials specified and as shown on the drawings.

12. The guying shall be accomplished in such a manner as to insure the proper and healthy growth and the safety of the plants, property, and the public.

13. The contractor shall be responsible for all the surface and subsurface drainage required which may affect his guarantee of the trees, shrubs, and vines.

14. Pruning after planting shall be required on all trees and shrubs when necessary to provide the specified or approved standard shapes, form and/or sizes characteristic to each plant. Pruning may include thinning, and/or cutting and shall be under the direction of the Resident Engineer or certified arborist.

C. Planting Groundcovers:

1. Groundcovers shall be planted in the areas indicated on the drawings. The groundcover plants shall be rooted cuttings grown in flats and shall remain in those flats until transplanting.
2. All groundcover plants shall be planted with soil around roots in staggered row, evenly spaced at the intervals called out on the drawings.
3. The groundcover plants shall be planted sufficiently deep to cover all roots.
4. The groundcover planting area shall be hand smoothed after planting to provide an even, smooth final finish grade.

3.04 HERBICIDE APPLICATION:

A. Herbicide or pesticide applications shall be performed only by personnel licensed for such work by the State of California.

3.05 RODENT REPELLENT:

A. Once plants have been planted and watered in, apply rodent repellent for plants indicated on plant legends on the drawings around the entire perimeter of the planting area at application rates and with methods as specified by the manufacturer.

3.06 MULCHING:

A. Landscape areas other than those hydroseeded or planted with turf shall be covered with the specified mulching material to the minimum depth indicated on the drawings.

3.07 CLEAN-UP:

A. As the project progresses on a daily basis, the contractor shall maintain all areas in a neat manner and remove unsightly debris as necessary, remove all debris and containers used in accomplishing work and sweep and clean all sidewalks, asphalt, and concrete areas adjacent to plantings.

3.08 SITE OBSERVATION & WALK-THROUGHS FOR SUBSTANTIAL COMPLETION:

A. General Observation: The Resident Engineer will visit the construction site at interim times during the construction process to access construction progress regarding installation of landscape material to be in compliance with the drawings, details, specifications and site conditions. The Resident Engineer will prepare a site report after each visit noting progress of installation, verbal communication with the contractor and identifying any field adjustments necessary that require modifications to the designed landscape. A copy of this site report will be delivered to both the owner and the contractor. The contractor is responsible to immediately address each item on the site report before proceeding with further construction.

B. Walk Through For Substantial Completion (Punch List #1):
   1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:
      a. The entire planting area is completely installed, and when letters of acceptance as described above have been obtained from the Resident Engineer and/or owner's

representative. If the contractor failed to notify the Resident Engineer for any of the above items as listed above than the contractor assumes full responsibility for any design modifications directed by the Resident Engineer during the walk through for substantial completion any of these issues at no additional cost to the owner.

b. All invoices, pinto tags and receipts have been delivered to the Resident Engineer and/or owner's representative.

2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

   b. A visual walk through of the entire site will take place consisting of an examination of planting areas as compared to the drawings, and installation procedures as shown on the details and specifications. A punch list will be established of deficiencies in the construction and workmanship of the landscaped area as compared to the construction drawings, details, and specifications.

3. Once the Walk Through for Substantial Completion has been completed the Resident Engineer will provide a copy of all punch list items to the owner for review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

C. Final Walk Through:

1. Before commencement of a final walk through is requested, each item on the walk through for substantial completion (punch list #1) must be thoroughly satisfied, addressed, and resolved by the contractor.

2. Once the above requirement has been met a final walk through may be requested. The following procedures will be used:
   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

   b. Unless new issues arise between walk throughs, only those items as indicated on the walk through for substantial completion punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the walk through for substantial completion, and examining outstanding items. Any remaining deficiencies in the construction and workmanship of the landscape as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.

3. Once the Final Walk Through is completed and all items created on the final punch list have been addressed, the Maintenance Period may begin. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

3.09 MAINTENANCE PERIOD:

A. The Maintenance Period shall last for ninety (90) days after notification from the Resident Engineer of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the Resident Engineer to the owner.
   1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.

   2. Once the contractor has fulfilled all maintenance agreement obligations the maintenance period will end see section "Landscape Maintenance" of these Special Provisions, for maintenance responsibilities.

METHOD OF PAYMENT

A. Full compensation, except as otherwise provided herein, for conforming to the requirements of this article, including furnishing all labor, materials, tools, equipments, incidentals and for doing all the work involved including but not limited to Fine Grading, Soil Preparation-Amendments, Fertilizers, Weed Prep., Mulching (Recycled Organic) 3" Thick Layer, and Top Soil Import- Up to 2", in accordance with the contract documents shall be included in the unit price bid, per square foot, for Ground Preparation and no additional compensation will be allowed therefor.

B. Full compensation, except as otherwise provided herein, for conforming to the requirements of this article, including furnishing all labor, materials, tools, equipments, incidentals and for doing all the work involved including but not limited to Guying (48" Box Tree), 4" PERF PVC Tree Drain Tubes With Drain Cap, and Root Barriers (Plastic-24" Deep), in accordance with the contract documents shall be included in the unit price bid, per each, for the following Bid Items and no additional compensation will be allowed therefor:

   - 48" BOX TREES
   - 1 GALLON SHRUBS/ GROUNDCOVER
   - 5 GALLON SHRUBS/ GROUNDCOVER

LANDSCAPE MAINTENANCE:

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work indicated on the Drawings and as specified. The conditions of the Contract and apply to this section as fully as if repeated herein.

1.02 RELATED REQUIREMENTS:
- A. Irrigation System
- B. Landscaping

1.03 DEFINITIONS:

A. Pesticide: Includes any of the following:
1. Fumigant
2. Herbicide
3. Insecticide
4. Fungicide
5. Rodent repellents.

B. Planting Bed: An area comprised of trees, shrubs, flowers, and ground cover, excluding grass.

1.04 DELIVERY, STORAGE AND HANDLING OF MATERIALS FOR PERMENANTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:

A. Fertilizer, Gypsum, and Iron Sulphate: Deliver to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, and gypsum may be furnished in bulk with a certificate indicating the above information.

B. Pesticides: Deliver to the site in original containers with legible label indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.

1.05 STORAGE FOR PERMANENTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:

A. Fertilizer, Gypsum, Iron Sulphate, and Mulch: Store in dry locations away from contaminants.

B. Pesticides: Do not store with other maintenance material. Store herbicides "downwind," relative to the airflow from other pesticides.

1.06 HANDLING FOR PERMANENTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:
- A. Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.01 pH ADJUSTERS:

A. See Specification Section: "Ground Preparation and Landscaping"

2.02 Soil Conditioners:
A. See Specification Section: "Ground Preparation and Landscaping"

2.03 PLANTING BACKFILL:
A. See Specification Section: "Ground Preparation and Landscaping"

2.04 FERTILIZERS:
A. See Specification Section: "Ground Preparation and Landscaping"

2.05 WATER:
A. See Specification Section: "Ground Preparation and Landscaping"

2.06 PESTICIDES:
A. See Specification Section: "Ground Preparation and Landscaping"

PART 3 - EXECUTION

3.01 MAINTENANCE REQUIREMENTS DURING THE NINETY (90) DAY MAINTENANCE PERIOD:

A. Shrubs:

1. The contractor is responsible for the restoration and maintenance of all vegetation included in these specifications for the duration of the maintenance period. During the first two weeks of the maintenance period, the contractor shall conduct a survey of all areas and identify by quantity, species, and location, all dead, dying, and diseased vegetation. The contractor shall be responsible for restoring dying and diseased vegetation to a healthy state in accordance with accepted Horticultural Practice and Treatment. The architect and/or owners representative will be the final authority in determining which vegetation is considered dead or irreparably damaged. Restoration and replacement of vegetation is considered routine maintenance and shall be accomplished as often as necessary during the maintenance period. Vegetation replacement shall be accomplished within 5 days after the contractor discovers or has been notified of the situation. Diseased or dead vegetation shall be removed and replaced with healthy plants of the same species. All replacement plants must be approved by the Resident Engineer and/or owner's representative before planting.

2. Planting beds shall be cultivated, pruned, trimmed, weeded, irrigated, fertilized, mulched, and otherwise maintained in a manner that presents a professionally landscaped appearance at all times. Plant beds shall be kept weed, gopher, squirrel, rabbit and pest free. Ground cover shall not be allowed to grow into flowers, shrubs or trees. Planting beds shall be maintained in a manner that provides balance between the various types of vegetation, and prevents dominance of any one species. The contractor shall provide and maintain a minimum of three-inch layer of mulch in all planting beds with a slope gradient of 3:1 or less. The contractor shall provide for the special needs of various species. Diseased or dead vegetation shall be removed and replaced with healthy plants of the same species.

3. The contractor shall not use steel bow type rakes or equipment of similar design to clean plant beds. Lightweight fan rakes or vacuum equipment may be used. The contractor shall maintain the soil level in the plant beds, and ensure all surface root systems and irrigation piping are covered as required. The contractor shall be responsible for damage caused by contractor operations at no additional cost to the owner.

4. Shrubs shall be trimmed pruned, irrigated, fertilized to present a healthy and manicured appearance. Shrubs will not be allowed to encroach into grass areas. A definite break shall be maintained between grass and shrub areas. In such areas the contractor shall maintain a healthy and well-balanced landscape.

5. All shrubs and other cultivated plants shall be trimmed and pruned according to their natural growth characteristics for proper health and attractive appearance. All clippings shall be removed and disposed of by the end of each day. Pruning shall be accomplished as necessary in accordance with conditions (a) through (d) specified below. Shrubs shall be trimmed to shape for aesthetic appearance and health at the frequency specified in this section.

    a. Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections. Shrubs around perimeter of buildings shall be trimmed to maintain natural growth characteristics.

    b. Remove dead, damaged or diseased branches or limbs and crossing, rubbing and interfering branches.

    c. Evenly form and balance the shrub to natural growth characteristics. Hedges are to be trimmed to maintain their natural growth characteristics and not allowed to obstruct pedestrian walkways. Shrubs shall be allowed to completely fill planter beds. Shrubs and hedges shall not be trimmed into round, square and or geometric shapes. Side growth shall be allowed to grow unless growth is in front of windows, over entrance ways, streets, driveways, parking area or walks, and/or any growth which will obstruct vision at street intersections.

    d. Remove growth against or over structures and into any type of electrical or telephone lines (leave growth on block walls).

6. Shrubs shall be pruned to evenly form and balance plant to natural growth characteristics. Shoots, suckers, and branches of shrubs not conforming to desired shape and size shall be removed. Retain typical growth habit of individual plants with as much height and spread as is practical. Shrubs shall be allowed to completely fill planter beds.

7. Any depression or mound around the base of shrubs intended to retain water in place for proper irrigation shall be maintained in good condition to permit the most efficient application of water and reduce waste.

8. Do not fertilize native plant material as shown on the planting legend during the maintenance period.

B. Trees:

1. Tree maintenance and care is considered routine on going maintenance and shall be accomplished as specified or as often as necessary during the maintenance period. Tree maintenance and care includes, staking trees, adjustment of ties and supports, removal of stakes, watering, fertilization, pest control, pruning, turf clearance, mulch clearance, removal of broken limbs and branches, tree removal/replacement, and fall cleanup.

2. The contractor shall maintain and/or replace tree staking and guying as necessary as specified in section 329300 Landscaping for the duration of the maintenance period. Stakes, ties and supports shall be inspected and adjusted monthly to prevent girdling and rubbing, and to promote natural development of trees. Stakes, ties, and supports shall be removed when the tree becomes capable of supporting itself.

3. Trees shall be pruned according to their natural growth characteristics to evenly form and balance the tree and to promote proper health and growth in accordance with accepted standards and horticultural practices of the National Arboriculture Society, of the Western Chapter. All tree maintenance must be performed in compliance with ANSI Z133.1 Safety Standards. Tree pruning shall include all areas of the project, which are permanently and/or temporarily irrigated for the duration of the maintenance period. All sucker growth shall be removed from and around the trees. All trees are to be inspected monthly to identify pruning needs. Pruning or trimming shall be accomplished at any time during the maintenance period as required in accordance with conditions (a) through (h) below:

   a. Remove dead, damaged or diseased wood or structurally weak limbs that may cause a safety hazard. Remove interfering branches, crossing and rubbing branches.

   b. Remove branches which endanger roofs, eaves, and windows or hang within eight feet of sidewalks, parking lot driveways, and which obstruct traffic signs or streetlights. This includes removal of dead or broken branches on the ground or still hanging in the tree.

   c. Provide clearance for buses, moving vans and similar vehicles along streets.

   d. Eliminate and prevent growth into electrical or telephone transmission lines. Anticipate the effects of wind on branches, which might fall on transmission lines. Shape the entire tree rather than notch the top.

   e. Prevent growth of trees in front of windows, over entranceways and walkways and which will obstruct vision at street intersections.

   f. Remove partially attached broken limbs and branches from trees regardless of diameter or length. Provide stakes or braces as required for future protection.

   g. "Skirting-Up" and "pollarding" a tree is prohibited.

   h. Topping of trees is prohibited.

C. Weeds, Rodent and Pest Control:

1. Weed and pest control shall be performed to prevent encroachment of undesirable vegetation and noxious weeds, and infestation of pest (rodent, insect and fungus) into established landscapes, including lawns and around trees, shrubs, flower beds, etc. Noxious weeds in landscaped and natural growth areas, plant beds and landscaped areas shall not be allowed to establish themselves and be maintained weed free. Additionally, weed control is to be performed to eliminate grass and weeds in cracks and joints on all paved and concreted areas. Weed control is to be performed to prevent the encroachment of vegetation into perimeter fences and fire breaks. Rodent control shall be performed as required to maintain healthy vigorous plant growth. Live or dead rodents shall be removed within 24 hours from the project property and properly disposed of. Trees, shrubs, turf and vegetation shall be protected from all varieties of insect and rodent damage. Pesticides may be used to control pests. Pesticides and herbicides shall be used in a manner, which will not affect landscape plants health.

2. All pesticides, including herbicides, insecticides, fungicides, etc., shall be applied only by persons holding a valid state license for each category of pest control work involved. Any required state, county, or local permits for possession, procurement, or use of any pesticide shall be obtained and complied with at no additional expense to the owner.

3. All pesticides shall be procured, transported, stored, handled, and applied in strict accordance with the manufacturer's label, which shall be registered with the Environmental Protection Agency and the State of California. The contractor shall comply with the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act, 40 CFR 170-171, CCR Title 3, and CCR Title 8. All pesticide containers shall be managed in accordance with the requirements of CCR Title 3, Section 6684 and disposed of in accordance with CCR Title 22. Each pesticide formulation shall be registered for use under the particular environmental conditions under which it was applied. The contractor shall exercise extreme care to prevent any damage or illegal contamination by pesticides to vegetation, water, fish, animals, and humans. The contractor shall be held responsible and liable for all damage, contamination, and effects resulting from contractor's pesticide use.

4. Pesticide spraying shall be performed only on still days and will be stopped when unfavorable weather or other conditions exist which would unduly increase the hazard to personnel or desirable vegetation by drift, runoff, or leaching through the soil. Any project property or desirable vegetation damaged by the contractor due to pesticide applications shall be repaired or replaced at no additional cost to the owner.

5. Pesticide rinse water or excess pesticides from contractor operations shall be collected by the contractor in an appropriate receptacle and disposed of at an approved disposal site; or shall be applied to a similar target area to which the original application was made and in the same manner of application if allowed by the EPA registered label.

6. Job site pesticide applications shall be made by personnel capable of identifying the pest species to be controlled, knowledgeable of control techniques, and able to apply pesticide active ingredients at prescribed dosages and rates of application, as required by the label to

achieve the required control under job site conditions, without danger to people, pets or other non-target animals, plants, or property.

7. The contractor shall be responsible for having a spill kit on service vehicles and for reporting and cleaning pesticide spills as required by state laws and regulations. The contractor shall submit a written report of spills on or in project property, within 8 hours of incident to the owner on company letterhead.

D. Irrigation and Irrigation System Maintenance:

1. The contractor shall plan and adjust irrigation schedules for automatic, hand or portable irrigation systems based on minimal water requirements with the following considerations:
    a. the precipitation rates of irrigation components
    b. soil water infiltration rate and holding capacity
    c. exposure
    d. plant material
    e. site climate conditions
    f. ET (Evapotranspiration) rate
    g. Slope

    It shall be the contractor's responsibility to adjust controllers and/or hand/portable irrigation application to compensate for weekly environmental changes for the duration of the maintenance period. The contractor shall perform irrigation in a manner that promotes the health, growth, color and appearance of cultivated vegetation while preventing over watering, water run-off, erosion and ponding.

2. Irrigation includes watering of shrubs, trees and plants for both permanently irrigated slopes and flat areas. Care shall be exercised by regulating the time and equipment to prevent wasting of water. Sprinkler heads shall be adjusted to prevent water spray on buildings, sidewalks, walls, monuments and adjacent hardscape. It shall be the contractor's responsibility to apply enough water to assure and maintain the health and vigor of all shrubs, trees, and planted areas. Irrigation controllers shall be programmed for no irrigation during periods of rain that exceed twelve hours of rainfall in one day or during rain storms of one day or more. Once rain has subsided controllers shall be reprogrammed for irrigation operations. Controllers shall also be checked and reset if necessary after power outages.

3. The contractor shall provide all equipment necessary to perform all irrigation operations. For temporarily irrigated slopes, flat areas and trees within future private lots that require manual irrigation, the contractor shall provide hoses and irrigation equipment to adequately irrigate this plant material for the duration of the maintenance period. In the event that an area has no water supply due to a system failure, the contractor shall provide a supply by either hose or truck. All valves and valve box covers shall be kept closed at all times except when in actual use.

4. Irrigation equipment shall be kept clear of any obstructions including plant material. Dirt or other debris surrounding emitter on risers and/or sprinkler heads, which prevents proper operation, shall be removed. The contractor shall be held responsible for any damage to

project property caused by careless handling of irrigation equipment including slope failure at no additional cost to the owner.

5. The contractor is responsible for the maintenance and repair of all components of the irrigation system for the duration of the maintenance period. This includes irrigation equipment items as shown on the original irrigation drawings. Maintenance and repairs of irrigation equipment during the maintenance period shall be done at no additional cost to the owner. Maintenance shall include but not be limited to the following:

   a. Repair or replace broken, missing, or inoperative emitter on risers, pop-up spray heads and pop-up rotors.

   b. Repair or replace defective emitter on risers, sprinkler head risers, rotors on risers, fittings, swing arms and breaks in piping. Adjust and align risers. Repairs shall include all fittings as specified in the original irrigation drawings.

   c. Clean and adjust pop-up emitter on risers, sprayheads, pop-up rotors, sprinkler head risers and rotors on risers and their gears and/or mechanisms, check and adjust for proper coverage.

   d. Remove dirt and debris from around emitter on risers, pop-up spray heads and pop-up rotors.

   e. Repair or replace defective or malfunctioning control valves (Electric and/or Manual) flow sensors and master valves. Clean and service valves. The contractor shall replace any damaged or missing valve boxes or valve lids. Valve box lids shall be kept in place at all times. Barricades shall be placed over any valve boxes with missing lids until replaced. Valve boxes shall be kept level with existing grade as shown on the drawings.

   f. Maintain, service, repair or replace controller systems as specified by the product manufacturer.

   g. System repairs and replacement shall be accomplished with new parts and equipment that are identical to existing.

   h. The contractor is responsible for required irrigation by any means during the periods of system breakdown.

E. Fertilizer Application During the Maintenance Period:

   1. Apply fertilizer in a manner that promotes health, growth, color and appearance of cultivated vegetation at applications rates described in Landscaping and Turf for the duration of the maintenance period.

F. Fallen Vegetation and Debris Removal:

1. The contractor shall police the entire project area including all paved areas, planters, lawn areas, sidewalks (including common area sidewalks) and trash enclosures and collect fallen leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks, and any and all other debris to prevent unsightly and inordinate accumulations during normal maintenance working hours. Sidewalks shall be swept or washed as necessary to keep free of trash and graffiti. Collected items shall be promptly removed and taken to a legal disposal site.

G. Removal of Dead Animals:

1. Removal and legal disposal of animal carcasses are considered a normal maintenance task for the duration of the maintenance period. Dead carcasses shall be legally removed immediately when discovered by the contractor.

H. Erosion Control:

1. The contractor is responsible for daily visual inspection of slopes and immediately reporting areas experiencing erosion to the Resident Engineer and/or owner's representative on the same day noticed. If the contractor fails to notify the Resident Engineer and/or owner's representative of areas experiencing erosion on the same day noticed, then the contractor assumes full responsibility for any erosion control measures and/or repairs as directed by the Resident Engineer and/or owner's representative at no additional cost to the owner.

2. Upon notification and agreement of the applicable erosion control measure by the Resident Engineer, the owner and the contractor, the contractor is responsible for immediately repairing and correcting any progressive rilling that may occur.

3. Erosion control measures may include but not be limited to:
    a. Filling
    b. Raking
    c. Redirecting runoff
    d. Properly programming irrigation operations
    e. Replanting
    f. Providing additional erosion control materials such as:
        1. jut matting
        2. filter fabric
        3. hay bales
        4. hay rolls
        5. silt fencing
        6. sand bags
        7. and/or other erosion control items as required to maintain healthy plant material and stable slopes.

4. Additional erosion control measures required due to irrigation operations programmed by the contractor that did not take into account cycle and soak functions of the controller will be installed and/or repaired as directed by the Resident Engineer and/or owner's representative at no additional cost to the owner.

I. Frequency of Maintenance Operations:

TASK:	FREQUENCY:
Shrub Restoration and Replacement:	As Required
Weeding:	Daily
Pruning:	As Required
Tree Replacement:	As Required
Tree Staking:	As Required
Pesticide Applications:	As Required
Debris Removal & Disposal:	As Required
Irrigation System Maintenance:	As Required
Fertilizer Application:	As Required
Fallen Vegetation and Debris Removal:	Twice Weekly
Removal of Dead Animals:	As Required
Re-Mulching (Maintained at 3 Inches):	As Required
Erosion Control:	As Required

J. At the end of the ninety (90) day maintenance period, the contractor shall request a post-maintenance walk through with the Resident Engineer. Prior to requesting this walk through the following requirements must be entirely satisfied:

1. Any outstanding maintenance items that were previously directed to be completed by the restoration specialist.

K. Preliminary Post Maintenance Walk Through: Once the above requirements have been met a preliminary post maintenance walk through may be scheduled. At the preliminary post maintenance walk through, the following procedures will be used:

1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

2. A visual walk through of the entire landscape area will take place consisting of an examination of planting areas and noting any remaining maintenance items to be completed.

3. Once the preliminary post maintenance walk through has been completed, the Resident Engineer shall prepare a punch list of outstanding items to be completed and will provide a copy of this list to the owner and contractor for review and use. It is the contractor's responsibility to repair, replace, and adjust all items on the punch list prior to requesting a final post maintenance walk through.

L. Final Post Maintenance Walk Through: Before commencement of a final post maintenance walk through, each item on the preliminary post maintenance walk through punch list must be thoroughly satisfied, addressed, and resolved by the contractor. Once the above requirement has been met a final post maintenance walk through may be requested. At the final post maintenance walk through, the following procedures will be used:

1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

2. Only those items as indicated on the preliminary post maintenance walk through punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the preliminary post maintenance walk through, and examining outstanding items. Any remaining deficiencies in the maintenance of the wetlands mitigation will be noted.

3. Once the final post maintenance walk through is completed and any outstanding items created on the final punch list have been addressed the maintenance period may end. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article, including furnishing all labor, materials, tools, equipments, incidentals and for doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per lump sum, for 90 Day Maintenance Period and no additional compensation will be allowed therefor.

IRRIGATION SYSTEM:

PART 1 - GENERAL

1.01 SUMMARY:

A. This section covers the furnishings of all materials and performing all operations to provide a complete operable landscape irrigation system as shown on the drawings including the following:

   1. Trenching, stockpiling excavated materials and refilling trenches.
   2. Irrigation system components including but not limited to: piping, backflow prevention devices and enclosures, valves, fittings, rotors, spray heads, central control system controllers, wiring and final adjustments as determined by the Resident Engineer to insure efficient and uniform distribution.
   3. Pipe connections to irrigation pump stations, water meters and backflow prevention devices.
   4. Testing and inspection of irrigation system.
   5. Clean-up and maintenance

B. The conditions of the Contract and apply to this section as fully as if repeated herein.

1.02 GENERAL REQUIREMENTS:

A. Code Requirements shall be those of State and Municipal Codes and Regulations locally governing this work, providing that any requirements of the Drawings and Specifications, not conflicting therewith but exceeding the Code Requirements shall govern, unless written permission to the contrary is granted by the Resident Engineer.

B. Conform to the requirements of the reference information listed below except where more stringent requirements are shown or specified in the most current set of construction documents:

1. American Society for Testing Material (ASTM), for test methods specifically referenced in this section.

2. Underwriter's Laboratories (UL), for UL wires and cables.

C. Work involving substantial plumbing for installation of brass piping, backflow prevention devices and other related work shall be executed by a licensed and bonded plumbing contractor. Any necessary permits shall be obtained prior to beginning work.

D. Specified depths of pressure supply lines, laterals and pitch of pipes as stated in this section are minimums. Settlement of trenches lower than grades specified on the final grading plans is cause for removal of finish grade treatment, refilling trenches, recompacting and repairing of finish grade treatment.

E. Follow current printed manufacturer's specifications and drawings for items or information not specified or graphically indicated in the most current set of construction drawings.

F. Scaled dimensions are approximate and at times it is not possible to indicate offsets, fittings and other related equipment graphically on the construction drawings. Contractor shall be responsible for minor changes caused by actual site conditions. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions of related architectural elements, utilities and landscaping and furnish and install required fittings.

G. Do not install the irrigation system as shown on the construction drawings when it is obvious that actual field conditions such as physical obstructions, grading discrepancies and field dimensions vary from those recorded on the construction drawings. Immediately bring any such discrepancies to the attention of the Resident Engineer prior to proceeding with work. If immediate notification is not given and such discrepancies exist, the contractor shall assume full responsibility for necessary revisions, as determined by the Resident Engineer.

1.03 EXISTING FIELD CONDITIONS:

A. Unless otherwise noted preserve and protect all existing trees, plants, monuments, structures, hardscape and architectural elements from damage due to work in this section. In the event that damage does occur to inanimate object and structures, the contractor will repair or replace such damage to the satisfaction of the owner or owner's representative. Damage or injury to living plant material will be replaced by the contractor at the contractor's expense.

B. Trenching or other work required in this section under the limb spread of existing trees shall be done by hand or by other methods so as to prevent damage or harm to limbs, branches and roots.

C. Trenching in areas where root diameter exceeds 2 inches shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in proximity to roots that are less than 2 inches, the wall of the trench shall be hand trimmed , making clean cuts through roots.

D. Trenches adjacent to or under existing trees shall be closed within 24 hours, and when this is not possible, the side of trench closest to the tree or trees affected shall be covered with moistened burlap.

E. Protect, maintain and coordinate work with other contracts, specifications, trades, and utilities. Extreme care shall be exercised in excavating and working in the area due to existing utilities. Contractor shall be responsible for damages caused by their operations. In the event that damage does occur, the costs of such repairs shall be paid by the contractor unless other arrangements have been made with the owner.

F. Use caution where trenches and piping cross existing roadways, sidewalks, hardscape, paths or curbs. In the event that damage does occur, the contractor will repair such damage at the contractor's expense.

1.04 REQUIRED DOCUMENTS:

A. Submittals
   1. Submit (6) six sets of all irrigation equipment to be used, manufacturer's brochures, service manuals, guarantees, and operating instructions for approval to the Resident Engineer prior to beginning work. Submittals should be in a bound form complete with table of contents. The contractor shall not proceed with work in the field until this submittal is approved in its entirety by the Resident Engineer.

B. Service Manuals
   1. The Contractor shall furnish (4) four service manuals to the owner prior to scheduling a walk through for substantial completion. Manuals shall be submitted in a bound form complete with a table of contents, and workmanship form on company letterhead copy of contractor's warranty, copy of the letter of certification for the irrigation control system on the irrigation control system manufacturer's letterhead and shall contain complete enlarged drawings of all equipment installed showing component warranties and catalog numbers together with the manufacturer's name and address. Manuals shall include operation instructions. Manuals shall be subject to approval by the owner or owner's representative as to completeness.

C. Record Drawings/As-builts
   1. Prior to beginning work in the field the contractor shall secure a complete set of irrigation plans at the original scale complete with details and specifications. The contractor shall be responsible for making a set of blueline prints for every week on the project. At the end of each working day, the contractor shall record all work accomplished for that day on the set

of blueline prints in red ink. These record drawings shall be brought up to date at the end of each work week by a qualified draftsperson. The drawings should indicate the following:

a. Any zoning changes.

b. Dimension from two permanent points of reference (building corners, fixed hardscape corners, road intersections, and permanent existing utilities) the location of the following items:

1 Connection to existing water lines.
2 Routing of pressure supply lines at every 100' along routing.
3 Isolation Ball Valves
4 Quick Coupling Valves
5 Electric Control Valves
6 Drip Valve Assemblies
7 Flush Valve Assemblies
8 Irrigation System Controllers
16 Grounding rods.
10 Control wire routing (if routed separately from pressure supply line).
11 Control wire splices that are outside of the controller.
12 Weather Station Equipment
13 Communication Equipment for Irrigation Control System
14 Other equipment as directed by the Resident Engineer.

2. Prior to scheduling a walk through for substantial completion, provide a record set of field as-built drawings as described above to the Resident Engineer for review. After review, the Resident Engineer will return the as-built set to the field foreman requesting further information or will notify the owner that the record set of field as-builts drawings are complete. After approval from the owner, a walk through for substantial completion may be scheduled.

3. Prior to scheduling the final walk through, the final set of irrigation as-built drawings shall be professionally drafted in auto-cadd.

4. The Resident Engineer and the contractor shall verify the final as-builts at the time of the final walk through and once successful the Resident Engineer shall deliver the final set of as-built drawings to the owner or owner's representative prior to initiating the maintenance period for the contractor.

D. Controller Charts

1. Prior to scheduling a walk through for substantial completion, provide a record set of field controller charts which have color coded each station within each controller to the Resident Engineer for review. After review, the Resident Engineer will return the controller charts to the field foreman requesting further information or will notify the owner that the record set of controller charts are complete. After approval from the owner, a walk through for substantial completion may be scheduled.

2. Prior to scheduling a final walk through, one set of controller charts shall be professionally drafted in auto-cadd for each controller unit installed on the project. The controller drawings shall be an actual auto-cadd reduction of the area covered by that controller unit and shall be at the maximum allowable scale that will fit inside the controller door without folding the drawing.

3. The Resident Engineer and the contractor shall verify each controller chart at the time of the final walk through and once successful the Resident Engineer shall deliver the final set of controller charts to the owner or owner's representative prior to initiating the maintenance period for the contractor. The controller chart sent to the owner shall be hermetically sealed between two (2) pieces of minimum 20 mils thick plastic.

PART 2 - PRODUCTS

2.01 PIPING

A. General Piping:
   1. Pipe sizes shown are nominal inside diameter unless otherwise noted.
   2. Pipe shall be identified with the following indelible markings:
      a. Manufacturer's name.
      b. Nominal pipe size.
      c. Schedule or class.
      d. Pressure rating.
      e. NSF (National Sanitation Foundation) seal of approval.
      f. Date of extrusion.

B. Solvent Weld Pressure Supply Line:

   1. Solvent Weld Pressure Supply Line: (downstream of Backflow prevention device) PVC CL315BE (1" - 3")
      a. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B.
      b. Type 1, Grade 1.

   2. Fittings: Standard weight, Schedule 80, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.
      a. Threads- Injection molded type (where required)
      b. Tees and Ells- side gated

   3. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

   4. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

C. Non-Pressure Lines Below Grade:

   1. Non-Pressure Lines: (downstream of electric remote control valve) PVC SCH 40.

2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.
   a. Threads- Injection molded type (where required)
   b. Tees and Ells- side gated
   c. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

3. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

D. Sleeving and Conduit:
1. All PVC sleeving for pressure supply line and non- pressure supply line shall be twice the nominal size of the pipe within and used for sleeves below grade as indicated in the following sleeve and conduit schedule:

2. Sleeving and Conduit Material Under Hardscape:
   a. PVC SCH 40 for 1"-2 1/2" pressure supply line.
   b. PVC SCH40 for 3" and larger pressure supply line.
   c. PVC SCH 40 for non- pressure lines.
   d. (1) one ¾" PVC SCH. 40 conduit for up to 5 wires.
   e. (1) one 1" PVC SCH. 40 conduit for up to 8 wires.
   f. (1) one 1 ¼" PVC SCH. 40 conduit for up to 15 wires.
   g. (1) one 1 ½" PVC SCH. 40 conduit for up to 20 wires
   h. (1) one 2" PVC SCH 40 conduit for up to 30 wires.
   i. (1) one 2 ½"" PVC SCH 40 conduit for up to 35 wires.

3. Sleeving and Conduit Material Over Concrete V-Ditches:

   a. Galvanized SCH. 40 for 1"-2 1/2" pressure supply line.
   b. Galvanized SCH.40 for 3" and larger pressure supply line.
   c. Galvanized SCH. 40 for non- pressure lines.
   d. (1) one ¾" Galvanized SCH. 40 conduit for up to 5 wires.
   e. (1) one 1" Galvanized SCH. 40 conduit for up to 8 wires.
   f. (1) one 1 ¼" Galvanized SCH. 40 conduit for up to 15 wires.
   g. (1) one 1 ½" Galvanized SCH. 40 conduit for up to 20 wires
   h. (1) one 2" Galvanized SCH. 40 conduit for up to 30 wires.
   i. (1) one 2 ½"" Galvanized SCH. 40 conduit for up to 35 wires.
   j. (1) one 3/4" Galvanized SCH. 40 wire conduit for flow sensing cable.
   k. (1) one 3/4" Galvanized SCH. 40 wire conduit for master valve wire.

E. Brass Pipe and Fittings:
1. Pressure Supply line (from point of connection through Backflow Prevention Device) Brass pipe shall be regular weight, 85% red brass, ANSI Schedule 40 screwed pipe.
2. Fittings: Medium brass, screwed at 125 pound class.

2.02 ISOLATION VALVES

A. Isolation Ball PVC Valves: Industrial grade sealed unit socket weld schedule 80 PVC ball valve (Use for mainline pipe 1-1/2" and smaller) as manufactured by Spears model 2122 or approved equal.

B. Isolation Gate Valve: Bronze, screw-in-bonnet, non-rising stem, cross handle, solid wedge, threaded valve (Use on mainline pipe 2" and 2-1/2" in size) as manufactured by Nibco model T-113-K, or approved equal.

2.03 QUICK COUPLING VALVES

A. Quick coupler valves shall have a body constructed of red brass with a wall thickness guaranteed to withstand normal working pressure of 150 P.S.I. without leakage with female threads (penning at base). Quick coupler valve shall have a hinge cover constructed of red brass with leather like vinyl cover bonded to it on such a manner that it becomes permanent type of cover. Quick couplers used with potable water shall have vinyl covers yellow in color. Quick coupler valves used for reclaimed water shall have vinyl covers purple in color with the appropriate reclaimed water warnings in English and Spanish as well as the international "Do Not Drink" symbol.

B. All quick coupler valves must have a schedule 80 ball valve to isolate mainline from quick coupler valve. Mainline shall be the size of quick coupler valve from mainline tee to quick coupler.

2.04 ELECTRIC CONTROL VALVES

A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.

B. Isolation Ball Valve at Manifold and/or Electric Control Valve: Industrial grade sealed unit socket weld schedule 80 PVC ball valve as manufactured by Spears model 2122 or approved equal.

2.05 DRIP VALVE ASSEMBLIES:

A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.

B. Wye Strainer: 150 mesh screen for point to point drip and sub surface

C. Isolation Ball Valve: Ball Socket Ball Valve with thermoplastic molded one piece construction and teflon seat with EDPM cushions.

2.06 HARD PIPED POINT TO POINT DRIP IRRIGATION:

A. Riser Assembly for Hard Piped Point to Point Drip Irrigation:
   1. 12" Long, ½" IPS flexible PVC tubing with factory attached ½" schedule 40 PVC MIPT adapters on both ends.

B. Emitters for Hard Piped Point to Point Drip Irrigation:
   1. Pressure compensating single outlet emitter with ½" FIPT base and 20 mesh screen. ½ GPH, 1 GPH or 2GPH. Mulch Camo Brown in color.

2.07 FLUSH VALVE ASSEMBLIES:

A. Schedule 80 Ball Valve, threaded schedule 80 nipples and fittings with polyethylene tubing for flush hose.

2.08 VALVE BOXES:

A. Jumbo rectangular valve boxes shall be 14-7/8 inch wide by 21-3/8 inch long and 12 inch high. Rectangular valve boxes shall be 11-3/4 inch wide by 17 inch long and 12 inch high. Round valve boxes shall be 10-inch diameter and 10 1/2 inch high. All valve boxes shall be constructed of rigid polyolefin.

B. Valve boxes shall have locking covers secure with a 3/8-inch stainless steel bolt and washer.

C. Jumbo rectangular valve boxes shall be used for master control valves.

D. Rectangle valve boxes shall be used for control valves, pressure regulators, flow sensors, wye strainers, filtration devices, ball valves and pull boxes.

E. Round valve boxes shall be used for gate valves quick coupler valves, flush valve assemblies and spare wires.

F. All valve boxes to be green in color unless otherwise specified for use of reclaimed water.

G. Heat brand all box lids with the appropriate two-inch high identification letters and/or numbers.

H. All valve boxes shall receive landscape fabric. Landscape fabric shall be constructed of 5.0 oz. weight proven polypropylene weed barrier with burst strength of 225 P.S.I. and capable of 12 gallons per minute of water flow and puncture strength of 60 lbs. Dewitt Pro, Mirify or approved equal.

I. All valve boxes shall receive 2 cubic feet of 3/4-inch gravel.

J. Valve Tag: Manufactured from UV stabilized plastic with 180lbs pull out resistance and hot stamped for maximum visibility. Top hole shall be designed to pass a 16 gauge or smaller solenoid pigtail or attach with a nylon tie.

2.09 BUBBLERS:

A. Bubblers shall be constructed of heavy duty plastic and be pressure compensation full circle. The bubbler shall have a 20 mesh screen to protect it from clogging.

B. Bubblers shall be from .25 - 1.0 GPM and operate between 20-90 PSI.

2.10 IRRIGATION CONTROL SYSTEM CONTROLLER

All controllers shall have the following specifications and capabilities:

A. The controller shall be of a modular design with a standard 6-station model. There shall be 6-station modules that enable the controller to be customized from 6 stations up to 30 stations in the plastic cabinet and up to 42 stations in the metal cabinet and plastic pedestal. The removable station modules shall allow servicing of, and removing of the module(s) without removing field wires from the controller.

B. The controller shall have four independent programs (A, B, C, and D) with 8 start times per program for programs A, B, and C; and 16 start times for program D for a total of up to 40 daily start times. Any two programs shall have the capability of running concurrently. Watering times shall be available from 1 minute to 12 hours in 1-minute increments per station. There shall be a programmable delay between stations available of up to 9 hours. The controller shall have 4 weekly schedule options to choose from: 7-day calendar, 31-day calendar, odd day programming and even day programming. It shall also have a 365-day calendar clock to accommodate true odd-even watering. Operation shall be available in automatic, semi-automatic and manual modes. All programming shall be accomplished by use of a programming dial and selection buttons with user feedback provided by a backlit LCD display. The front panel of the controller shall be removable and capable of being programmed when not attached to the controller cabinet.

C. The controller shall be equipped with a rain sensor on-off switch that allows the user to override a sensor that has suspended watering. The controller shall have a programmable rain delay that turns off the controller for a predetermined period of time, from 1 to 180 days.

D. The controller shall have a cycle and soak scheduling capability by station that allows a cycle to be programmed for up to 60 minutes and a soak period to be programmed for up to 120 minutes.

E. The controller shall have a seasonal adjustment feature with 3 different modes that allows station run times to be altered from 0% to 300% by program to compensate for weather changes. The modes shall include a Global Adjust, Monthly Adjust, and a Solar Sync Adjust. The Global Adjust shall increase the station run times in a given program by a fixed percentage. The Monthly Adjust shall allow all the seasonal adjustment values for the full year to be programmed into the controller, for each program.

F. The controller shall be capable of monitoring up to two Clik-type sensors or flow sensors in the plastic configuration, and up to 3 Clik-type sensors or flow sensors in the metal configuration.

G. The controller shall permit connection of a flow meter which is calibrated by the operator for the pipe diameter in which it is installed. The flow meter shall measure actual flow in gallons or liters. The controller shall have a learning mode in which the controller operates each single

station for a short period, learns the actual flow for each station, and stores the information internally by station.

H. When the learned flow is exceeded during normal operations the controller shall record a flow alarm event, cease irrigating the station or stations contributing to the high or low flow readings, and resume irrigation with any stations which do not cause alarms. The controller shall have the ability to determine high or low flow conditions when multiple stations are operating, and shall perform diagnostics to identify stations which contribute to the problem flow. Allowable limits and duration of incorrect flow shall be preset, but reprogrammable by the operator for unique local conditions. It shall also be possible to except certain stations from flow monitoring devices. The controller shall also be equipped with a flow-totalizing function that will provide a running total of all the gallons or liters of water used between two reference dates.

I. Automatic programs shall also permit the designation of non-water days, even when Odd/Even or Interval Day patterns have been set.Non-water window violations shall be detected and the operator shall be alerted when an irrigation program would have run during a non-water window.

J. The controller shall have a Quick Check test program, permitting all stations to run sequentially for a user-entered period of time, programmable in one-second increments up to 10 minutes each, for system startup and diagnostics.

K. The controller shall also save an Easy Retrieve Program which stores all original programming settings. The installing contractor shall be able to restore the system to this saved state at any time after initial installation. The stored Easy Retrieve settings may also be updated at any time by the operator.

L. The controller shall have a one-button manual station advance in Test mode for quick diagnostics checks.

M. The controller shall be equipped with a programmable pump start/master valve circuit that can activate the pump start relay by zone. It shall also have a programmable delay between valve stations. Delays between stations shall be programmable up to a maximum of 10 hours.

N. Transformer input shall be 120/240 VAC, 50/60Hz. Transformer output shall be 24 VAC, 1.5A (40VA). All AC power wiring connections shall be made in an internal junction box. Maximum output per station shall be 24 VAC, 0.56A. Program backup shall be provided by a non-volatile memory circuit that will hold the program information indefinitely. The controller shall have Metal Oxide Varistors (MOVs) on the AC power input portion and the secondary output portion to help protect the micro-circuitry from power surges. The secondary MOVs shall be enclosed in the station modules for easy servicing. There shall be self-diagnostic, electronic short circuit protection that detects a faulty circuit, continues watering the remainder of the program, and reports the faulty station on the display. The diagnostic procedure shall also be capable of being initiated by the user manually. The controller shall provide backup timekeeping in the event of a power outage with the use of an internal long-life lithium battery.

O. The controller shall have a diagnostic feature that provides a visual indication via LED lights that show the current status of sensor activity, station activity and flow activity. Any staion or flow alarms shall be report on the LCD display.

P. The controller shall have a multi-language capability that allows programming of the display in 6 different languages: English, French, Spanish, German, Italian, and Portuguese. It shall also be capable of setting the units of measure to either English (GPM) or Metric (LPM)

Q. The controller shall be installed in accordance with the manufacturer's published instructions. The controller shall carry a conditional five year exchange warranty. The automatic controller(s) shall be the IC series controller as manufactured for Hunter Industries Incorporated, San Marcos, California or approved equal.

2.11 ELECTRIC CONTROL VALVE WIRE

A. Low Voltage:
   1. AWG UF UL approved No. 14 direct burial copper wire for all control wires and No. 12 direct burial copper wire for all common wires.

   2. Wire Colors:
      a. Control Wires- As specified on drawings
      b. Common Wires- As specified on drawings.
      c. Spare Wires- Green (labeled at termination)

   3. Wire Splice Connectors: 3M DBY Direct Bury Splice Kits.

B. High Voltage:
   1. Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

2.12 SAND BEDDING

A. Sand bedding shall be construction grade.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine field conditions prior to beginning work described in this section. Grading operations shall be completed and approved prior to beginning work.

B. Verify all sleeve locations below future hardscape and/or across concrete v-ditches prior to beginning work in this section. Flag all existing sleeves and conduits installed by other trades. Report any conflicts and discrepancies to the Resident Engineer immediately.

C. Irrigation system shall be constructed to the sizes and grades at the locations shown on the drawings. Mark with powdered lime or marking paint routing of pressure supply line and stake the location of each emitter, electric control valve and other related equipment for the

first three zones. Resident Engineer shall review staking and direct any necessary changes with the contractor prior to proceeding to other zones. This review does not in any way alleviate the contractor from the responsibilities associated with proper uniformity and distribution of head placement after staking.

D. Install sleeves, to accommodate pipes and wires, under paving, hardscape areas, sidewalks, and paths prior to asphalt and concrete operations. Compact backfill around sleeves to 95% Modified Proctor Density within 2% of optimum moisture content in accordance with ASTM D1557.

3.02 EXCAVATION AND BACKFILLING OF TRENCHES

A. Trench excavation shall as much as possible follow the layout shown on the drawings. Trenches shall be straight in alignment and support pipe continuously on bottom of trench. Remove rocks and debris greater than 1" in diameter. Over excavate as required for bedding material.

B. Depth of Trench (in landscape areas):

Pressure Supply Line (3" and smaller): 18" from top of pipe to finish grade.
Non-Pressure Line (12" pop-up Rotors): 18" from top of pipe to finish grade.
Non-Pressure Line (6" and smaller pop-up Rotors): 12" from top of pipe to finish grade.
Non-Pressure Line (12" pop-up Spray Heads): 18" from top of pipe to finish grade.
Non-Pressure Line (6" and smaller pop-up Spray Heads): 12" from top of pipe to finish grade
Non-Pressure Line (Emitters) 12" from top of pipe to finish grade.
Control Wiring: directly at side and bottom of pressure supply line.
Pressure Supply line Locator Tape: 6" above top of pipe.

C. Depth of Trench (under asphalt paving or concrete):

Pressure Supply Line (3" and smaller): 24" from top of pipe to aggregate base.
Non-Pressure Line: 24" from top of pipe to aggregate base.
Control Wiring: directly at side and bottom of pressure supply line.
Pressure Supply line Locator Tape: 6" above top of pipe.

1. Piping located under asphalt paving or concrete shall be installed with the appropriate sized sleeve and backfilled with sand bedding (6" below pipe and 6" above pipe).

2. Compact backfill material in 6" lifts at 90% maximum density determined in accordance with ASTM D1557 using manual or mechanical tamping device.

3. Set in place, cap, and pressure test piping in the presence of the owner or owner's representative prior to backfilling.

D. Width of Trench:

Pipe Greater than 3": 14" minimum.
Pipe Less than 3": 7" minimum.

E. Width between Trenches:
Irrigation Trench to Irrigation Trench: 6" minimum.
Irrigation Trench and other Trade Trenches: 12" minimum.

F. Boring: Boring will only be permitted where pipe must pass under an obstruction that cannot be avoided or removed. Backfill shall match surrounding soil density and grain. Boring under existing paving, sidewalks, or hardscape may be permitted at contractor's own risk. Contractor is responsible for any repairs or damage to such items at their own expense.

G. Backfilling: Backfilling of trenches may not be done until all required testing for the irrigation system has been completed.

1. Material: Excavated material is generally considered to be adequate for backfilling operations. Before beginning the backfilling operation, insure that backfill material is free from debris and rocks greater than 1" in diameter, and is not mixed with topsoil. These materials after separated from backfill, shall be legally disposed of at contractor's expense.

2. Bedding: Bed pressure supply line with construction grade sand 6" above and 6" below pipe as shown on details. Remaining backfill may be as described above.

3. Bed all electrical control wire trenched separate from pressure supply line, with construction grade sand 6" above and 6" below wires.

4. When backfilling, slightly mound filled trenches for settlement after backfilling is compacted. Compact backfill to a 90% maximum density in accordance with ASTM D1557 with a mechanical tamper. Do not leave trenches open for a period greater than 48 hours. Open trenches shall be protected in accordance with current OSHA regulations.

5. Smooth trenches to finish grade prior to requesting a walk through for substantial completion with the Resident Engineer.

3.03 POINT OF CONNECTION(S)

A. Point of connection shall be approximately as shown on drawings. Connect new underground piping and valves and provide all flanges, adapters, or other necessary fittings.

3.04 INSTALLATION OF SOLVENT WELD POLYVINYL CHLORIDE PIPE (PVC)

A. Polyvinyl chloride pipe shall be cut with an approved PVC pipe cutter designed only for that purpose.

B. All plastic-to-plastic solvent weld joints shall use only the solvent recommended by the pipe manufacturer. Do not install solvent weld pipe when temperature is below 40° F.

C. Pipe ends and fittings shall be wiped with MEK, or approved equal, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.

D. Pipe shall be snaked from side-to-side on trench bottom to allow for expansion and contractions.

E. All changes of direction over 15 degrees shall be made with appropriate fittings.

F. When pipe laying is not in progress at the end of each working day, close pipe ends with tight plug or cap.

G. Install pressure supply line locating tape along the entire length of pressure supply line.

H. Coordinate pressure supply line with sand bedding operations.

I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.

J. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

3.05 INSTALLATION OF BRASS PIPE:

A. Brass piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where any change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Resident Engineer.

C. Joint compound shall be carefully and smoothly placed on the male thread only. All screwed joints must be tightened with tongs or wrenches. Caulking of any kind will not be permitted.

D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot (10') intervals in black lettering, 3/4" minimum high.

3.06 ISOLATION BALL VALVES

A. Install isolation ball valves in separate valve boxes as specified on the drawings.

3.07 QUICK COUPLING VALVES

A. Install quick coupling valves in separate valve box as specified on the detail drawings.

B. Angled nipple relative to pressure supply line shall be no greater than 45° and no less than 10°.

3.08 ELECTRIC CONTROL VALVES

A. Install each electric control valve in a separate valve box so that cross handle is 3" min. below valve box cover as specified on the detail drawings.

B. Group electric control valves together as specified on the drawings allowing a maximum of 12 " between each valve box. Install valve boxes in the same direction and parallel with one another and perpendicular to paving, hardscape, sidewalks and paths.

C. Install electric control valves on slopes within two feet from toe of slope. Use same trench as toe of slope non-pressure lateral line for pressure supply line and wire routing see section 3.02 B and C for pipe and wire depths.

3.09 CHECK VALVES

A. Install swing check valves as specified on drawings.

B. Install spring check valves as specified on drawings.

3.10 VALVE BOXES

A. Install valve boxes with each type of irrigation equipment so that top of valve box is above finish grade as specified on the detail drawings. Valve box extensions are not acceptable.

B. Place gravel sump below and around each valve box prior to installing valve box as specified on the drawings. Place remaining portion of gravel inside valve box allowing full access in and around all fittings. Valve box shall be fully supported by gravel sump. No brick or wood supports are allowed.

C. Brand valve box lid of associated equipment as follows:

Electric control valve box lid with "Controller Letter and Station Number".
Quick coupling valve box lid with the letters "QC".
Isolation ball valve box lid with the letters "BV".
Air relief valve box lid with the letters "AR".
Spare Wire box lids with the letters "SW"
Wire Splice box lid with the letters "WS".

Letter and number size of brand shall be no less than 1" and no greater than 1 1/2" in height and shall be 1/8" maximum in depth. Provide sample branding to the owner or owner's representative prior to commencement of work.

D. Walk through for substantial completion will not be allowed until all branding is complete.

3.11 AUTOMATIC CONTROLLER UNIT

A. Verify electrical power at location of automatic controller unit prior to installation of automatic controller unit. Notify Resident Engineer immediately if power source is not available.

B. Hardwire controller to the on/off switch and existing power source. Controller shall not be plugged into socket provided for other equipment.

C. Install automatic controller unit where shown on drawings per manufacturer's specifications. Controller shall be tested with complete electrical connections. The Contractor shall be responsible for temporary power to the Controller for operation and testing purposes.

D. Connect electric control valve wiring to controller unit in the same numerical sequence as indicated on the drawings and label within 1" of the terminal strip. Label all spare wires as "spare".

E. Connect flow sensing and master valve wiring to controller unit and label within 1" of the terminal strip if applicable.

F. Install a separate ground rod and wire for each controller unit as specified on the drawings and per manufacturer's specifications.

G. Above ground conduit shall be rigid galvanized pipe with the appropriate fittings. Below ground conduit shall be PVC SCH 40 pipe with appropriate fittings.

H. Label each automatic controller unit with the letter or number designated on the drawings. Letter or number shall be located in a visible location on the inside panel cover with 3" high vinyl letters.

I. Each automatic controller unit shall be completely operable prior to scheduling a walk through for substantial completion.

3.12 ELECTRICAL WIRE

A. Low Voltage Wiring:

1. Bury control wiring in same trench as pressure supply line as specified.

2. Bundle all 24 volt wires at 20' intervals with electrical tape.

3. Provide expansion loops at every pressure supply line angle fitting and at 250' length intervals along routing. Form expansion loop by wrapping wire a minimum of 10 times around a 3/4" pipe and withdrawing pipe as specified on the drawings.

4. Limit splicing of electrical wiring. Provide each splice made at intervals or in electric control valve and drip valve assembly valve boxes with 3M DBY Direct Bury Splice Kits.

5. Wire splices occurring at intervals outside electric control valve boxes shall be installed in a separate valve box.

6. Provide (1) one electrical control wire for every electric control valve. Piggy backing like zones on the same electrical control wire is not allowed.

7. Install (2) two spare #14-1 electrical control wires from the automatic controller unit pedestal to the last electric control valve on each leg of pressure supply line. Locate the

spare wires in their own valve box as specified on the drawings. In addition to these spare wires, check the drawings for any additional wires that may be required and locate them in the same valve box as the spare wires.

B. High Voltage Wiring:

1. Install 120 volt power from power source to automatic controller unit following local governing codes and ordinances.

3.13 QUALITY CONTROL

A. Preconstruction Meeting: The contractor is responsible for contacting the Resident Engineer prior to beginning construction and/or ordering materials to establish a meeting to review and discuss project objectives, concerns and to review the construction documents to insure a complete understanding of required installation procedures.

B. General Observation: The Resident Engineer will visit the construction site at interim times during the construction process to access construction progress regarding installation of irrigation equipment to be in compliance with the drawings, details, specifications and site conditions. The Resident Engineer will prepare a site report after each visit noting progress of installation, verbal communication with the contractor and identifying any field adjustments necessary which require modifications to the designed irrigation system. A copy of this site report will be delivered to both the owner and the contractor. The contractor is responsible to immediately address each item on the site report before proceeding with further construction.

C. Pressure Testing the Pressure Supply Line: After backfilling, flushing, and prior to the installation of each electric control valve, isolation ball valve and quick coupling valve the irrigation system shall be pressure tested.

1. Pressure testing shall be performed in the presence of the Resident Engineer and owner or owner's representative utilizing the following procedure:

   a. Pressurize the irrigation system to 40 psi greater than the designated static pressure or 150 psi whichever is greater for a period of no less than 2 hours. The pressure gauge used for the pressure test shall not exceed readings greater than 300psi. Pressure pump and other equipment necessary for the test shall be furnished by the contractor.
   b. Test is acceptable if no leakage occurs within the system for the duration of the testing period.
   c. If leaks occur, repair said leaks and begin pressure test again. Repeat this operation until no leaks occur in the irrigation system.
   d. Before requesting a walk through for substantial completion, the entire irrigation system shall remain under pressure for a period of no less than 48 hours.

2. The contractor is responsible for notifying the Resident Engineer one day in advance of the pressure test.

D. Flushing: Center load all piping prior to flushing. After all new irrigation piping and risers are in place and connected and all necessary diversion work has been completed and prior to

the installation of sprinkler heads, rotors and quick coupling valves, thoroughly flush piping system under full head of pressure. After the furthermost riser from the point of connection begins to flush, continue flushing for the duration of five minutes. After the system is thoroughly flushed, cap all risers.

E. Walk Through For Substantial Completion:

1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:

   a. The entire irrigation system is completely installed, flushed and satisfactorily pressure tested. If the contractor failed to notify the Resident Engineer for the pressure test and flushing procedures stated above than the contractor assumes full responsibility for any design modifications directed by the Resident Engineer during the walk through for substantial completion regarding pressure and flushing issues.
   b. All valve boxes have been branded.
   c. All automatic controllers are fully operable and have been certified in writing and checked at by the control system manufacturer on their letter head.
   d. Record as-built drawings have been submitted to the Resident Engineer for review as to completeness.
   e. (4) Four Services manuals have been delivered to the owner or owner's representative.

2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
   b. All valve box lids shall be removed from valve boxes and placed face up adjacent to the valve box prior to beginning the walk through.
   c. The walk through will be divided into (2) two sections and proceed as follows:

      1 Visual Walk Through: This will consist of walking through the entire irrigation system and examining all components of the system without turning on zones. A punch list will be established of deficiencies in the construction and workmanship of the irrigation system as compared to the construction drawings, details, and specifications.

      2 Operational Walk Through: This will consist of walking through the entire irrigation system observing each zone in a fully operable condition. Valves must be activated from theautomatic controller unit (Manual bleeding of individual electric control valves will not be acceptable). A punch list will be established of deficiencies in the operation of each zone in the irrigation system evaluating but not limited to head spacing, row spacing, nozzle sizing, and correct radius of throw, correct stationing, as compared to the construction drawings, details, and specifications.

      3 Once the Walk Through for Substantial Completion has been completed the Resident Engineer will provide a copy of all punch list items to the owner for

review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

F. Final Walk Through:

1. Before commencement of a final walk through is requested, the following requirements must be entirely satisfied:

   a. Each item on the walk through for substantial completion has been thoroughly addressed and resolved by the contractor.
   b. All final record as-built drawings and controller charts have been produced by the Resident Engineer for review by the Resident Engineer and contractor at the final walk through.

2. Once the above requirements have been met a final walk through may be requested. The following procedures will be used:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
   b. Only those valve box lids shall be removed from valve boxes as indicated on the walk through for substantial completion punch list. The valve box lids shall be placed faced up adjacent to the valve box prior to beginning the final walk through.
   c. The final walk through will be divided into (2) two sections and proceed as follows:

      1 Visual Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion, examining all components of the system without turning on zones. Any remaining deficiencies in the construction and workmanship of the irrigation system as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.
      2 Operational Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion and observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric control valves will not be acceptable). Any remaining deficiencies in the operation of each zone in the irrigation system including but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing as compared to the punch list generated at the time of the walk through for substantial completion construction drawings, details, and specifications.

      3 Once the Final Walk Through is completed and all items created on the final punch list have been addressed the maintenance period may begin. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

3.14 MAINTENANCE PERIOD

A. The Maintenance Period shall be for ninety (90) days after notification from the Resident Engineer of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the Resident Engineer to the owner.

1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.

2. At the end of the maintenance period and prior to turning the project over to the owner, the contractor shall deliver the following to the owner:

   a. Five (5) emitters on risers of each type used, for every 100 emitters installed on the project.

3. Once the contractor has fulfilled all maintenance agreement obligations and has provided the above items to the owner, the maintenance period will end see section "Landscape Maintenance" of these Special Provisions, for maintenance responsibilities.

METHOD OF PAYMENT

The contract price paid per each for:

- BOWSMITH SL200SERIES EMITTER W/ SALCO SLV-PVD-ACLXX FLEX RISER,
- HUNTER RZWS-36-50-CV DEEP TUBE BUBBLER,
- HUNTER IC-3600-M 36 STATION CONTROLLER,
- NIBCO T-113-K GATE VALVE - 2" / FITTINGS,
- TRUE UNION BALL VALVE AT ECV - 2",
- ELECTRIC CONTROL VALVE W/ PRESSREG/FITTINGS - 1",
- DRIP VALVE ASSEMBLY - BALL VALVE, DC SOLENOID, FILTER, FITTINGS,
- QUICK COUPLING VALVE,
- MANUAL FLUSH VALVE ASSEMBLY,
- GREEN PLASTIC STANDARD 10" ROUND VALVE BOX W/ SUMP/FILTER FAB,
- GREEN PLASTIC STANDARD RECTILINEAR VALVE BOX W/ SUMP/FILTER FAB,

shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installation, as shown on the plans, as specified in the specifications, these special provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

The contract price paid per linear foot for:

- NON- PRESSURE LATERAL LINE- SCH 40 - 3/4",
- PRESSURE SUPPLY LINE - SCH 40 - 2",
- PVC SLEEVING - SCH40 - 2",
- PVC SLEEVING - SCH40 - 4",
- PVC SCH 40 CONDUIT - 1 1/2",
- 14 GUAGE DIRECT BURIAL WIRE, MISCELLANEOUS FITTINGS, LATERALS,

shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, including MISCELLANEOUS FITTINGS, LATERALS and for doing all work

involved in furnishing and installation, as shown on the plans, as specified in the specifications, these special provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

SOLAR POWERED EQUESTRIAN CROSSWALK, FLASHING BEACON SYSTEM WITH EQUESTRIAN AND PEDESTRIAN PUSH BUTTONS:

Installation of solar powered equestrian crosswalk flashing beacons and payment shall conform to the provisions in Section 86, "Signals and Lighting" of the Standard Specifications and these Special Provisions.

Attention is directed to **Exhibit "A"-** "Proposed Traffic Control for Equestrian Crossing on Rancho California Road" attached to these Special Provisons, for construction of equestrian crossing.

County Furnished Equipment

County furnished equipment shall conform to the provisions in Section 6-1.02, "State Furnished Materials", of the Standard Specifications and these Special Provisions.

The County of Riverside will furnish the following equipment and materials to the Contractor for installation:

1. Solar Powered Pedestrian Crosswalk Flashing Beacons With Equestrian and Pedestrian Push Buttons
2. Type 1-A Standard (14' Aluminum) Poles

The Contractor shall pick up County furnished equipment and materials from the following location(s), or as directed by the Engineer, and transport them to the project site(s):

Traffic Signal Shop
Riverside County Transportation Department
2950 Washington Street
Riverside, California 92504
Telephone (951) 955-6894

Any County furnished equipment that is damaged after the Contractor has taken possession of the items shall be repaired to the satisfaction of the Engineer. If the damaged equipment is considered irreparable, it shall be replaced meeting the requirements stated in the Standard Specifications and these special provisions at the Contractor's cost.

METHOD OF PAYMENT

The contract unit bid price paid per each for Install County Furnished Solar Powered Pedestrian Crosswalk Flashing Beacon System With Equestrian and Pedestrian Push Buttons and Install County Furnished Type 1-A Standard (14' Aluminum) Pole shall include full compensation for

furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work necessary, including pole concrete foundations and hardware, as specified in the Standard Specifications and these Special Provisions, as directed by the Engineer, and no additional compensation will be allowed therefor.

MISCELLANEOUS DIRECTED WORK:

Miscellaneous directed work shall consist of necessary work that is not included in other contract bid items, as determined by the Engineer. Miscellaneous directed work shall be performed as directed by the Engineer and in accordance with the applicable standards and specifications.

METHOD OF PAYMENT

Payment for implementing miscellaneous directed work will be paid for on a force account basis, in accordance with Section 9-1.03 of the Standard Specifications, up to the fixed bid price, for the work performed.

RANCHO CALIFORNIA MUNICIPAL WATER DISTRICT:

Remove and reconstruct fire hydrant assembly, remove and reconstruct water quality sample station assembly, relocate CP test station, and reconstruct and raise valve riser and cap assembly to grade shall conform to the latest Rancho California Water District Standard Drawings, Specifications and approved materials list, the plans, these Special Provisions, and as directed by the Resident Engineer.

All material used for the reconstruction of fire hydrant assembly, and water quality sample station shall be furnished and installed by the Contractor. The Contractor shall submit certification of compliance to the Resident Engineer for all the materials being used for the respective items of work.

All the excess materials resulting from the removal, reconstruction and the relocation for items listed above will be the property of the Contractor.

Method of Payment

The contract unit bid prices paid per each for "Remove and Reconstruct Fire Hydrant Assembly, Remove and Reconstruct Water Quality Sample Station Assembly, Relocate CP test station, and Reconstruct and Raise Valve Riser and Cap Assembly to Grade" shall include full compensation for all labor, materials, tools, equipment, incidentals, and for doing all the work involved in this article and no additional compensation will be allowed therefor.

FURNISH AND INSTALL BOX CULVERT LINING, FURNISH AND INSTALL MANHOLE/ CATCH BASIN LINING:

PART 1 - GENERAL

1.01 SCOPE OF WORK

Work under this section involves the lining and joint sealing of the of the interior surfaces of the cast-in-place and/or pre-cast concrete box culverts, manholes and catch basins to eliminate possible exfiltration to protect waterlines buried below. The lining shall be installed at the locations shown on the plans.

Polyurethane and Epoxy Primer Protective Lining System for the box culverts, manholes, and catch basins shall comply with Section 500-2 and Subsection 500-2.7 of the Standard Specifications for Public Works Construction, attached to these provisions as Exhibit 'B'.

SUBMITTALS

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

B. Product Data:

1. Product Trade Name: Submit the trade name of the process, or process proposed to complete this project.

2. Product Manufacturer: Copy of the manufacturer's literature, material data sheets, and installation procedures.

C. Contractor Experience:

1. Protective Lining System Material Experience: List of at least ten municipal structure or manhole protective lining system projects that have been installed by the Contractors crews in Southern California using the process and materials specified. Five of these referenced projects must have been installed and passed the five-year warranty period. The list shall include the municipality, scope of project, contact, and phone number.

2. Protective Lining System Installation Experience: List of at least ten municipal manhole projects that have been installed by the Contractors own crews using the process and materials specified. Five of these referenced projects must have been installed and passed the five-year warranty period. The list shall include the municipality, scope of project, contact, and phone number.

PART 2 - PRODUCTS

2.01 LINING MATERIAL

The lining shall be polyurethane and epoxy primer protective lining system such as Sancon 100 as manufactured by Sancon Engineering, Huntington Beach, California (800) 726-7021 or equal. Lining material shall meet or exceed the requirements of 500-2.7 of the Standard Specifications.

The thickness of the epoxy primer shall be between 1-2 mils. The thickness of the polyurethane lining shall be between 125 and 150 mils.

PART 3 – EXECUTION

3.01 LINING APPLICATION

A. The Contractor shall furnish all labor, material and equipment necessary for all traffic control, preparation of surfaces, application of lining, safety procedures per Cal-OSHA Permit Required Confined Space Requirements, protection of existing utilities or surfaces and equipment / jobsite cleanup.

B. Any flow control or bypass pumping necessary to perform the lining operations will be submitted to the County for approval.

C. Lining shall be installed on the bottom and both sides of the structures and shall be coated in a single application without seams, bubbles or pinholes.

D. Cleaning, Surface Preparation. Surfaces to be lined shall be cleaned and prepared in accordance with the manufacturers recommendations. The Contractor shall provide the necessary debris containment devices. The Contractor shall remove and dispose of all debris collected from the cleaning operation per 500-1.1.4.

Prior to application in the specified locations in the box culverts:

- The termination at the leading and tailing edges of the lining materials to the existing subsurface shall be keyed into the subsurface by mechanically scoring. The keyway shall be a minimum of a ¼ inch X ¼ inch to anchor the coating.

- Sand blast the entire area

- Clean by high-pressure water blast at pressures of 5,000-psi minimum to 10,000 psi maximum.

E. Cast-in-place and/or pre-cast box culvert sections, joints, and structures shall be lined and sealed after installation.

F. During the lining application, the Contractor shall take wet gauge thickness readings as required to insure correct lining thickness.

G. Application of the lining shall not take place when exposed to rain, or high winds. It is the Contractor's responsibility to insure protection of the work from these conditions.

3.02 SPARK TESTING

The finished protective liners will be 100% spark tested for pinholes with a spark tester set at minimum of 12,500 volts. All areas in question shall be marked and patched. These patched areas will be retested with the spark tester set at 12,500 volts minimum.

3.03 WARRANTY

The lining system shall be warranted for five (5) years against any type of failure. A signed copy of the warranty from the material supplier and the application Contractor shall be submitted to the County prior to application. The lining contractor shall remove and replace all failures at no expense to the owner during the warranty period.

PART 4 – MEASUREMENT AND PAYMENT

The contract unit prices paid per linear foot for Furnish and Install Box Culvert Lining and per square foot for Furnish and Install Manhole/ Catch Basin Lining shall include full compensaton for furnishing all labor, tools, materials, equipment and incidentals, and for doing all the work involved in installing protective lining system for each box culvert, manhole, and catch basin, complete in place, as shown on the plans, as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

WATERSTOP STRUCTURE CONNECTION:

Waterstop structure connection shall conform to Type 3: Waterstop by Advanced Drainage Systems, Inc. (ADS) or approved equal.

For catch basins and manhole requiring lining, as shown on Sheet 53 of 53 of the plans, a waterstop structure connection shall be constructed at the manhole or catch basins inlets and/or outlets per detail on **Exhibit "C",** attached to these provisions.

Grout material used for the waterstop shall be installed per the manufacturer's specifications of one of the following, or a Resident Engineer approved equal.

A. Sikadur 42, Grout-Pak epoxy grouting system manufactured by Sika.

B. E^3-G epoxy grout system manufactured by The Euclid Chemical Company.

Method of Payment:

Full compensation for furnishing and installing Waterstop Structure Connection including all labor, tools, materials, equipment and incidentals, including furnishing and installing stainless steel take-up clamps, screws, and grout material, complete in place, as shown on the plans, as specified in these Special Provisions, and as directed by the Engineer, shall be considered as included in the unit price paid per square foot for Furnish and Install Manhole/ Catch Basin Lining and no additional compensation will be allowed therefor.

FURNISH AND INSTALL BOX CULVERT OUTSIDE LINING, FURNISH AND INSTALL MANHOLE/CATCH BASIN OUTSIDE LINING AND FURNISH AND INSTALL OUTSIDE LINING [HDPE PIPE JOINTS]:

Work under this section involves the placement of an outside lining at the joints of the HDPE pipe, Box Culvert and Manhole/Catch Basin to eliminate possible exfiltration to protect waterlines buried below. The lining shall be installed at the locations shown on the plans on **Exhibit "D"**, attached to these provisions.

Outside lining shall be installed per the plans and details shown on **Exhibit "D"** and per the manufacturer's specification for PPL-20 by BTL Liner, Inc. or approved equivalent.

The Contractor shall submit certification of compliance to the Resident Engineer for outside lining specified on the details and plans.

The contract unit prices paid per linear foot for Furnish and Install Box Culvert Outside Lining, and per each for Furnish and Install Manhole/ Catch Basin Outside Lining, and Furnish and Install Outside Lining [HDPE Pipe Joints], shall include full compensation for furnishing all labor, tools, materials, equipment and incidentals, and for doing all the work involved in installing protective lining system for each box culvert, manhole, and catch basin and at the joints, as shown on the plans, detail, and as specified in these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor."