

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.

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

Asphalt concrete driveway approaches shall be reconstructed to match existing as directed by the Engineer.

Unless otherwise specified on the plans, asphalt concrete placed on driveways shall be two and a half inches (2 1/2") in thickness and will be paid for at the same unit price as for material placed on the roadbed.

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. The Contractor shall use a ski device with a minimum length of 30 feet or as directed by the Engineer. 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 be 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 specified 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:

Hot Mix Asphalt 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 for paint binder (tack coat) shall be considered as included in the contract price paid for Hot Mix Asphalt.

The contract bid price paid per ton for Hot Mix Asphalt shall include full compensation for furnishing all labor, tools, materials, equipment, and incidentals, and for doing all the work involved including the furnishing/application of asphaltic emulsion (paint binder) and header cutting and joining existing pavement as shown on the plans and/or as directed by the Engineer

Header Cuts:

At road connections and at limits of asphalt paving, existing pavement shall be header cut 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 ton for the various asphalt concrete items and no additional compensation will be allowed therefor.

COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS:

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

ITEM CODE	ITEM
390130	Hot Mix Asphalt

The compensation payable for asphalt binder used in hot mix asphalt will be increased or decreased in conformance with the provisions of this section for paying 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 adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete and asphalt rubber hot mix 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 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 paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer.

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 State 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.

ASPHALT CONCRETE DIKES:

Asphalt concrete dikes 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 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 64-10 in accordance with the Special Provision for Asphalt, or as directed by the Engineer.

Payment for the removal of existing asphalt concrete dike as shown on the plans and as directed by the Engineer shall be included in the contract unit price paid per linear foot for Asphalt Concrete Dike of the different kinds provided in the bid items list.

Method of Payment:

The contract unit prices paid per linear foot for Place Asphalt Concrete Dike of the different types as provided on the bid items list shall include full compensation for furnishing all labor, materials other than asphalt concrete, tools, and equipment and for doing all the work involved in removing existing dikes, placing and compacting the new dikes and no additional compensation will be allowed therefore.

ASPHALT CONCRETE MISCELLANEOUS AREA:

Asphalt concrete miscellaneous area (asphalt concrete driveways tie-ins) shall conform to the these Special Provisions, the plans and as directed by the Engineer.

The paid quantity of asphalt concrete miscellaneous area 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 64-10 in accordance with the Special Provision for Asphalt, or as directed by the Engineer.

Method of Payment:

The contract unit prices paid per square yard for Place Asphalt Concrete (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 asphalt concrete miscellaneous areas and no additional compensation will be allowed therefor.

THERMOPLASTIC PAVEMENT MARKING:

Thermoplastic 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 paint is thoroughly dry. Any newly painted traffic striping which are damaged as a result of the construction, including wheel markings by public traffic and the construction equipment, shall be repainted by the Contractor and any associated removals shall be performed as called for in these Special Provisions

Method of Payment:

The contract unit bid price paid per square foot for Thermoplastic Pavement Marking shall be considered as full compensation for furnishing all labor, materials, tools, equipment, and incidentals and doing all the work necessary to place the pavement markings complete in place and no additional compensation will be allowed therefor.

PAINT TRAFFIC STRIPE:

Painting traffic stripe shall conform to the provisions in Sections 84-1, "General" and 84-3, "Painted Traffic Stripes and Pavement Markings" of the Standard Specifications and these Special Provisions.

Traffic striping shall be applied in two coats with airless equipment and shall be performed with a roadliner truck mounted striping machine. Where the configuration or location of a traffic stripe is such that the use of a roadliner truck mounted striping machine is unsuitable, traffic striping and glass spheres may be applied by other methods and equipment approved by the Engineer.

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

Method of Payment:

The contract price paid per linear foot for Paint Traffic Stripe (2-Coat) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in painting traffic stripe (regardless of the number, widths, and types of individual stripes involved in each traffic stripe) including any necessary cat tracks, dribble lines any layout work, complete in place as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

PAVEMENT MARKER:

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

Certificates of compliance shall be furnished for pavement markers as specified in "Prequalified and Tested Signing and Delineation Materials," elsewhere in these Special Provisions.

Reflective pavement markers shall comply with the specific intensity requirements for reflectance after abrading the lens surface in accordance with the "Steel Wool Abrasion Procedure," specified for pavement markers placed in pavement recesses in Section 85-1.05, "Reflective Pavement Markers", of the State of California Standard Specifications.

Non-reflective pavement markers shall conform to the requirements of Section 85-1.04 "Non-Reflective Pavement Markers," of the State of California Standard Specifications. The bituminous adhesive used to install the markers shall be a hot melt bituminous adhesive asphaltic material with homogeneously mixed mineral filler and shall conform to the requirements specified in Section 85-1.055, "Adhesives," of the State of California Standard Specifications.

Reflective pavement markers shall be installed at locations as established by the applicable Caltrans striping detail noted on the approved striping Plan, which includes, but is not limited to temporary painted line(s), new striping or existing striping. There shall be one marker for each location. All work necessary to establish satisfactory locations for markers shall be performed by the Contractor.

Existing reflective pavement markers that do not conform to the approved Plan shall be removed by the Contractor.

Reflective pavement markers shall be of the prismatic reflector type (3M model white RP290w and yellow RPM 2912y or equal) as outlined in Subsection 85-1.05, "Reflective Pavement Markers," of the State of California Standard Specifications.

Blue reflective pavement markers designating the location of fire hydrants within project limits shall be replaced after the paving is completed at all fire hydrants locations, whether the blue reflective markers exist or not prior to paving. Installation of blue markers shall comply with the requirements of Riverside County Fire Department, Standard No. 06-11, attached to these Special Provisions.

Method of Payment:

Full compensation for reflective pavement markers, non-reflective pavement markers, and blue pavement markers (at fire hydrants) shall be considered as included in the price paid per each for Pavement Markers (Reflective), and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing pavement markers (reflective, non-reflective, or blue) complete, in place, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions and as approved by the Engineer.

Section 4-1.03 B(1), Increases of More Than 25 Percent, of the State Standard Specifications will not apply to Pavement Markers (Reflective). , No adjustment to the contract unit bid price will be allowed for any excess of over 25 percent of the estimated quantity for Pavement Markers (Reflective).

DETECTORS LOOP:

Detectors shall conform to the provisions in Section 86-5, "Detectors", of the Standard Specifications and these Special Provisions.

Delay timers shall delay calls only during display of the associated red or yellow indications. If a vehicle departs the area of detection prior to expiration of the assigned delay period, the timer shall reset and no call shall be placed upon the controller. During display of the associated green indication, detectors shall operate in the present mode and calls shall not be delayed.

Inductive Loops

Detector loops' configuration shall be Type E unless otherwise shown on the construction plan, in the Special Provisions or as directed by the Engineer.

Limit Line detector loop configuration shall be modified Type E with diagonal saw cuts and wire winding conforming to Type D loop configuration; except within Caltrans right-of-way where Type D detector loops shall be used.

Detector loops' wire shall be Type 2.

Detector loops' lead-in cable shall be Type B.

Detector loops' curb terminations shall be Type A in accordance with Standard Plans ES-5D. The conduit shall extend 18 inches into the paved roadway; except in Caltrans right-of-way.

Loop sealant shall be the Hot-Melt Rubberized Asphalt sealant type, unless otherwise directed by the Engineer. Loop conductors and sealant shall be installed on the same day the loop slots are cut.

All detector loops shall be tested sequentially by the following methods:

- impedance (measured by megaohms)
- resistance (measured by ohms)
- inductance (measured in microhenries)

Method of Payment:

The contract unit bid price paid per each for Detector Loops including the removal and disposal of existing detector loops as shown on the plans and as specified in the special provisions and as directed by the Engineer shall include full compensation for furnishing all labor, materials, tools, and equipment and no additional compensation will be allowed therefor.

MINOR CONCRETE:

New and reconstructed concrete **curb ramps, cross gutters, spandrels, curb and gutter, sidewalk, driveway approaches and driveways** shall be constructed in accordance with the County of Riverside Road Improvement Standards and Specifications and in conformance with Sections 51, 73 and 90 of the Standard Specifications.

Class 2 concrete shall be used for Cross Gutter and spandrel.

Class 3 concrete shall be used for curb and gutter, curb ramp, driveways and approaches, and sidewalk.

Construction of concrete improvements shall include all removal and restoration of the affected irrigation and landscaping, and related work, to return the area adjacent to the new improvements to its original condition and to conform the area to the new improvements.

The area behind and along the concrete improvements shall be filled and compacted with native or select material and graded to match and provide a smooth transition from the edge of the new improvements, to the satisfaction of the Engineer.

Preparation of subgrade for the concrete structures shall be done in conformance with the requirements of Section 73-1.02 of the Standard Specifications. Unless otherwise specified, all curbs and gutters will be backfilled as shown on the plans.

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

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

Construction of curb and gutter, cross gutter, spandrel, curb ramps, sidewalk, and driveway approaches shall include, but not be limited to, the following:

- 1) Removal and disposal of existing sidewalk, curb, and/or curb and gutter, curb outlet, driveway approaches, cross-gutter, spandrel, and existing soil and aggregate as required;
- 2) Establishing grades, and assuring that all grades are met;
- 3) Performing all grading and compaction – including all required aggregate import, as directed by the Engineer and in accordance with County Standard 403;
- 4) Construction of new curb ramp, sidewalk, curb, and/or curb and gutter, driveway approaches, cross-gutter, and spandrel;
- 5) All scoring/grooving and required saw cutting;
- 6) Repair of existing asphalt and PCC surfacing;
- 7) Installing 1/2" wide expansion joints;
- 8) All landscaping, and related work, to return the area adjacent to the sidewalk, curbs, ramps, driveways, driveway approaches, curb and/or curb and gutter to its original condition and to conform the area to the new improvements;

At a minimum, the area from the BCR to ECR shall meet all required ADA standards. Therefore, to conform to existing conditions and/or to achieve the required four-foot level area (maximum of 2.0% crossfall) at the top portion of the curb ramp, it may be necessary to extend the work beyond the BCR/ECR in certain instances.

Driveway approaches shall be constructed as shown on the plans or as directed by the Engineer.

With the exception of unimproved driveways and concrete driveway aprons, surfacing for driveways shall consist of a replacement in kind of the existing driveway surfacing, using the contract item material most resembling that in place on the driveway. If there is no item in the contract for a similar material or if a special driveway surfacing is requested by the Engineer, said special surfacing shall be furnished and placed by the Contractor, and the cost thereof will be paid for as extra work as elsewhere provided herein.

Except as noted above, all other driveway work shall be paid for on the basis of the applicable contract item and no additional allowance will be made therefor.

Full compensation for the sidewalk construction shall include the placing of private drain through concrete curb to tie in existing drain pipe as directed by the Engineer and no additional compensation will be allowed therefor.

Method of Payment:

The contract payment per square foot for Minor Concrete (Driveway Approach) shall include full compensation for the construction of the driveway approaches and the concrete driveways and no additional compensation will be allowed therefor.

The contract unit bid prices paid per each for Minor Concrete (Curb Ramp) of the different kinds as provided in the bid items list ; per square foot for Minor Concrete (Driveway Approach), Minor Concrete (Cross-Gutter), Minor Concrete (Spandrel), and Minor Concrete (Sidewalk); and per linear foot for Minor Concrete (Curb and Gutter), shall include full compensation for furnishing all labor, equipment, including the removal of existing curb and gutter, curb ramps, cross-gutters, spandrels, sidewalk, or driveway approaches, excavation, placing of suitable fill to prepare the sub-grade, furnishing and placing expansion joint material, materials and tools, and incidentals, and for doing all the work involved in the construction and complete in place as shown on the plans, or as herein specified, or as directed by the Engineer.

CURB RAMP DETECTABLE WARNING SURFACE (TRUNCATED DOMES):

This work includes installing detectable warning surface on the existing curb ramps or on the areas as shown on the plans, and as specified in these Special Provisions, and as directed by the Resident Engineer.

Curb Ramp Detectable Warning Surface (Truncated Domes) constructed, or furnished and installed on new Curb Ramps shall be considered as included in the contract unit price paid for Minor Concrete (Curb Ramp) and no separate payment will be made therefor.

Curb ramp detectable warning surface must be:

1. Yellow color complying with Federal Standard 595B, Color No. 33538.
2. Raised truncated domes.

The manufacturer must provide a written 5-year warranty for detectable warning surface, guaranteeing replacement when there is defect in the dome shape, color fastness, sound-on-cane acoustic quality, resilience, or attachment. The warranty period will begin upon acceptance of the contract.

Installation of curb ramp detectable warning surface must comply with the manufacturer's recommendations.

Curb ramp detectable warning surface will be determined as units from the actual count in place.

Method of Payment:

The contract price paid per each for Curb Ramp Detectable Warning Surface (Truncated Domes) includes full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in constructing detectable warning surface on existing curb ramps, complete in place, as shown on the plans, as specified in these Special Provisions, and as directed by the Engineer.

UNDER SIDEWALK DRAIN CAST IN PLACE:

Under sidewalk drains shall conform to the County of Riverside Road Improvement Standards and Specification, and as specified and directed by the Engineer.

Metal components of the removed under sidewalk drain shall be delivered to the County Maintenance Yard located at 2950 Washington Street, Riverside, CA 92504 or as directed by the Engineer.

Method of Payment:

The contract unit bid price paid per each for Under sidewalk Drain shall include full compensation for furnishing all labor, materials, tools, equipment, and complete in place including removal/salvage of the metal components of the existing under sidewalk drain and no separate compensation will be allowed therefor.

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 Specifications, Palm Desert Standard Drawings, and these Special Provisions.

All Signs shall be installed on new square perforated steel tube posts in accordance with County Standard No. 1222.

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

ROADSIDE SIGN (RELOCATE/ REMOVE AND SALVAGE):

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

Roadside Signs to be relocated shall be installed per the provisions in Section 56-2 "Roadside Signs" of the Standard Specifications and these special provisions.

All Relocated Signs shall be installed on new square perforated steel tube posts in accordance with County Standard No. 1222.

The Contractor shall install roadside signs, in accordance with Standard Plans RS-2, at the locations shown on the plans or as directed by the Engineer.

Roadside signs with steel posts shall be installed at the location shown on the construction plans or where directed by the Engineer.

All signs shall be installed using hex head bolts, washers, nuts and jam nuts in accordance with Standard Plans RS2 or as directed by the Engineer.

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:

2950 Washington Street
Riverside, CA 92504

Method of Payment:

The contract price paid per each for Relocate Sign shall include full compensation for 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 Specification and these Special Provisions and no additional compensation will be

allowed therefor.

The contract price paid per each for Salvage Roadside Sign shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and for doing all the work including sign removal, excavation and backfill, protecting, storing, transporting and delivering road sign as specified in the Standard Specification and these Special Provisions and no additional compensation will be allowed therefor.

DELINEATORS:

Delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 .

Method of Payment:

The contract price paid per each Delineator (Class 1) shall include full compensation for furnishing all labor, materials, tools, equipment, incidentals and no additional compensation will be allowed therefor.

JOINTED PLAIN CONCRETE PAVEMENT:

GENERAL

Jointed plain concrete pavement shall be constructed in conformance with the provisions in Section 40, "Portland Cement Concrete Pavement" of the Standard Specifications and these Special Provisions, and as shown on the plans. Insert method for forming joints in pavement shall not be used.

PRE-PAVING CONFERENCE

Supervisory personnel of the Contractor and subcontractors who are to be involved in the concrete paving work shall meet with the Engineer at a pre-paving conference, at a mutually agreed time, to discuss methods of accomplishing the paving work.

The Contractor shall provide a facility for the pre-paving conference within 3 miles of the construction site or at a nearby location agreed to by the Engineer. Attendance at the pre-paving conference is mandatory for the Contractor's project superintendent, paving construction foreman, subcontractor's workers, including foreman and personnel performing sawcutting, joint sealing, concrete plant manager, and concrete plant operator. Conference attendees shall sign an attendance

sheet provided by the Engineer. Production and placement shall not begin nor proceed unless the above-mentioned personnel have attended the mandatory pre-paving conference.

JUST-IN-TIME TRAINING

Attending a 4-hour Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on Portland cement concrete and paving techniques. Construction operations for Portland cement concrete paving shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel included in the list of participants for the pre-paving conference as well as the Engineer's representatives shall attend JITT. JITT shall be in addition to the pre-paving conference.

The JITT class will be conducted for not less than 4 hours on Portland cement concrete pavement and paving techniques. The training class may be an extension of the pre-paving conference and shall be conducted at a project field location convenient for both the Contractor and the Engineer. The JITT class shall be completed at least 15 days, not including Saturdays or holidays, prior to the start of Portland cement concrete paving operations. 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 construction of Portland cement concrete pavement and paving techniques. The instructor shall not be an employee of the Contractor or a member of the Engineer's field staff. A copy of the course syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. The Contractor and the Engineer shall mutually agree to course instructor, the course content, and training site. The instructor shall issue a certificate of completion to the participants upon completion of the class. The certificate of completion shall include the course title, date and location of the class, the name of the participant, instructor's name, location and telephone number.

The Contractor's or Engineer's personnel involved with Portland cement concrete paving operations will not be required to attend JITT if they have completed equivalent 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 class. The Engineer will provide the final determination for exclusion of staff member's participation. Attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The Engineer will provide the course evaluation form.

Just-In-Time Training shall not relieve the Contractor of responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications.

MATERIALS

Concrete

Attention is directed to Section 90, "Portland Cement Concrete" of the Standard Specifications, regarding mix proportions for concrete being determined by the Contractor.

Primary aggregate gradings shall conform to the gradation requirements of Section 90-3, "Aggregate Gradings" of the Standard Specifications. 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 exceed 675 pounds per cubic yard.

An air-entraining admixture conforming to the provisions in Section 90-4, "Admixtures" of the Standard Specifications shall be added to the concrete pavement in the amount required to result in an air content of 4 ± 1.5 percent in the freshly mixed concrete.

Tie Bars

Tie bars shall be deformed reinforcing steel bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 40 or 60, A 996/A 996M, Grade 50 or 60, or A 706/A 706M. Tie bars shall be epoxy-coated in conformance with the requirements in ASTM Designation: A 934/A 934M or A 775/A 775M and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement" of the Standard Specifications, except the epoxy-coating thickness after curing shall be between 7 mils to 16 mils. Fabrication, sampling and jobsite 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 the 2 samples shall be 30 inches long. Epoxy-coated tie bars shall not be bent.

Epoxy (Drill and Bond)

Epoxy for bonding tie bars and dowel bars to Portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class 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.

Tie Bar Baskets

Tie 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. Tie bar 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 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.

Reinforcement

Reinforcement shall be epoxy coated and shall conform to the provisions in Section 52, "Reinforcement" of the Standard Specifications.

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

PAVEMENT CONCRETE MIX PROPORTIONS

The Contractor shall determine the mix proportions for pavement concrete. The laboratory used to develop the mix proportions shall meet the requirements of ASTM Designation: C 1077, and shall have current AASHTO accreditation for test methods AASHTO Designation: T 97 or ASTM Designation: C 78, and AASHTO Designation: T 126 or ASTM Designation: C 192.

The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be determined in conformance with the requirements in California Test 559. Trial mixtures shall be made no more than 24 months before field qualification. The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be that determined from the trial mixtures curve to produce a minimum modulus of rupture of 560 pounds per square inch at 28 days age and 650 pounds per square inch at 42 days age. To account for variances in materials, production of concrete, and modulus of rupture testing, the Contractor shall include as part of the proposed mix proportions an increase to the cementitious material content or a decrease to the water to cementitious materials ratio, determined from trial mixtures, to ensure that portland cement concrete produced during paving operations conforms to the requirements in "Modulus of Rupture" of these Special Provisions.

At least 15 days prior to field qualification, the Contractor shall submit the proposed pavement concrete mix proportions with laboratory test reports. Laboratory test reports shall include modulus of rupture determined for each trial mixture at ages of 10, 21, 28 and 42 days in conformance with the applicable portions of California Test 559.

Field Qualification

Field qualification of proposed mix proportions will be required prior to placement of pavement concrete. The Contractor shall perform field qualification and submit certified test data to the Engineer. Field qualification data shall be based upon the proposed use of materials, mix proportions, mixing equipment, procedures and size of batch.

Proposed concrete mix proportions will be field qualified when the test results of five beams from a single batch of concrete indicate the average modulus of rupture is at least 560 pounds per

square inch with no single beam lower than 550 pounds per square inch at an age of the Contractor's choice but not later than 28 days. Beams shall be tested for modulus of rupture at a minimum of 10, 21, and 28 days of age. Test specimens shall be made and tested in conformance with the requirements in California Test 523.

The certified field qualification test data reports shall include the following:

1. Date of mixing,
2. Mixing equipment and procedures used,
3. Volume of batch in cubic yards and the weight or volume,
4. Type and source of ingredients used,
5. Penetration and slump of the concrete,
6. The air content of the concrete, and
7. The age at time of testing and strength of concrete specimens tested.

Field qualification test data reports shall be signed by a certified representative in charge of the laboratory that performed the tests.

If the Contractor changes a source of supply or proportions, the Contractor shall submit a new proposed mix design and furnish samples from the new source, or sources, at least 60 days prior to their intended use. The new mix proportions shall be trial batched and field qualified, unless, the Engineer determines the change is not substantive. No extension of contract time will be allowed for the time required to perform the sampling, testing, preparing and qualifying new mix proportions for new aggregate sources proposed by the Contractor.

MODULUS OF RUPTURE

The Engineer will test Portland cement concrete pavement for modulus of rupture in conformance with the requirements in California Test 523. Acceptance will be on a lot basis. Each lot shall not to exceed 1,000 cubic yards of concrete pavement. The Engineer will determine sample locations. A minimum of six beam specimens shall be made from each sample. Beam specimens will be tested for modulus of rupture at 10, 21, and 28 days. The modulus of rupture for each lot will be calculated by averaging the results of two beams representing that lot tested at 28 days of age. The difference in modulus of rupture between each individual beam result shall not exceed 65 pounds per square inch.

The Contractor shall perform sampling and testing of beam specimens to determine if concrete pavement has achieved a modulus of rupture of 350 pounds per square inch when requesting early use of concrete pavement in conformance with the provisions in Section 90-8.03, "Protecting Concrete Pavement" of the Standard Specifications. Beam specimens shall be made and tested in conformance with the requirements in California Test 523.

INSTALLING TIE BARS

Tie bars shall be installed at longitudinal contact joints and longitudinal weakened plane joints as shown on the plans. Contiguous width of new portland cement concrete pavement tied together with tie bars shall not exceed 50 feet. Tie bars shall not be installed at joints between portland cement concrete and hot mix asphalt pavements.

Tie bars shall be installed at longitudinal joints by one of the following methods:

1. Drilling and bonding tie bars with two-component, epoxy-resin that conforms to this section. Drilled holes shall be cleaned in conformance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Tie bars will be rotated 180° while being inserted into the epoxy filled holes. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during curing and shall remain undisturbed until the epoxy has cured as specified by the manufacturer instructions. Tie bars that are improperly placed or bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled and new tie bars shall be placed and securely bonded to the concrete. Rejected tie bars shall be cut flush with the joint face. Exposed ends of tie bars shall be epoxy coated. The center of the new holes shall be offset 3 inches horizontally from the center of the rejected hole to maintain the minimum clearance to the dowel bar. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.
2. Inserting tie bars into the plastic slipformed concrete before finishing the concrete. Inserted tie bars shall have full contact between the bar and the concrete. When tie bars are inserted through the pavement surface, the concrete over the tie bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been an insertion performed. Loose tie bars shall be replaced by drilling and bonding as described in A above, at the Contractor's expense.
3. Using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers 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 installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.
4. Using tie bar baskets that conform to these Special Provisions.

Tie bars shall be oriented perpendicular to the pavement joint and parallel with the surface of the pavement at mid-slab depth. Tie bar alignment tolerances shall conform to the requirements for dowel bars except embedment length tolerance shall be ± 2 inches.

If tie bar baskets are used, they shall be anchored to the base to hold the tie 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 basket (4 per lower runner wire). Temporary spacer wires shall be cut or removed after the baskets are anchored into position before concrete placement. Concrete pavement shall not be placed if the 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 that the baskets are anchored and shall 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 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 Replace Concrete Pavement (Rapid Strength Concrete) and no additional compensation will be allowed therefor.

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 at longitudinal joints as shown on the plans.

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

When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used. 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 Replace Concrete Pavement (Rapid 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

CORE DRILLING FOR DOWEL BAR AND TIE BAR PLACEMENT ALIGNMENT ASSURANCE TESTING

Coring to confirm dowel bar and tie bar placement, alignment, and concrete consolidation shall be provided by the Contractor throughout the project, at locations determined by the Engineer. Each day's paving shall be cored within 2 days by performing a minimum of 2 and a maximum of 4 tests for dowel bar placement and position for every 2,000 square yards of doweled pavement or fraction thereof and one test for tie bar placement and position for every 4,000 square yards of pavement with tie bars. One test shall consist of drilling two cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. The minimum core hole diameter shall be 5 inches. If the cores indicate that dowel bars or tie bars are not within the allowable tolerances or if air voids exist surrounding the dowel bars or tie bars, additional cores will be required to determine the limits and severity of unacceptable work.

The holes shall be cored by methods that will not damage the concrete adjacent to the holes. Immediately after coring, the concrete cores shall be submitted to the Engineer for inspection, and the cores shall be identified by the Contractor with a location description.

After removal of cores, core hole voids in concrete pavement shall be cleaned and filled with hydraulic cement grout (non-shrink). After placement of hydraulic cement grout, the material while still plastic shall be finished and textured to match the adjacent pavement surface. The backfill material shall be the same level as the pavement surface.

Water for core drilling operations shall be from a local domestic water supply, and shall contain not more than 1,000 parts per million of chlorides as CL, nor more than 1,300 parts per million of sulfates as SO₄, nor shall it contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities. Dowel bar and tie bar alignment shall be within the specified tolerances. If dowel bars or tie bars are found to be installed improperly, the paving operations shall not continue until the Contractor has demonstrated to the Engineer that the problem which caused the improper dowel bar or tie bar positioning has been corrected.

Dowel bars in rejected joints shall be replaced by the Contractor by sawcutting on each side of the rejected joint a minimum of 3 feet, lifting out concrete to be removed, installing new dowel bars at the new transverse joints, installing dowel bars and preformed sponge rubber expansion joint filler along the longitudinal joints, placing concrete, and installing new joints. Preformed sponge rubber

expansion joint filler shall conform to the requirements in ASTM Designation: D 1752. New dowel bar holes shall be drilled, not more than 1/8 inch greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowels to be installed at the contact joints. Dowel bars shall be placed, as shown on the plans, for the 2 new transverse contact joints. Original exposed tie bars, located within the slab replacement area, shall be cut flush with the lane or pavement edge and dowel bars shall be installed to replace the tie bars at an offset of 3 inches, horizontally from the tie bar location. Holes for dowel bars to be placed along the longitudinal joint shall be drilled, not more than 1/8 inch greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowel bars to be installed at the contact joints.

When requested by the Contractor and approved by the Engineer, dowel bars which are more than ± 2 inches but less than ± 3 inches from being centered directly over the sawcut for the transverse weakened plane joint, may remain in place, and the Contractor shall pay to the County the amount of \$27.00 per square yard for the quantity of concrete pavement panels represented by the cores indicating incorrect dowel bar alignment or improper concrete consolidation around dowels. The quantity of concrete pavement area used to determine the amount of payment to the County will be calculated using the panel dimensions for panels adjacent to and inclusive of the joints with incorrect dowel bar alignment or improper concrete consolidation around dowel bars. The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation shall be in addition to other adjustments for incorrect tie bar alignment or improper concrete consolidation around tie bars as specified in these Special Provisions and for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness" of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate" of the Standard Specifications.

Tie bars which are not within the specified tolerance for placement and position, as determined from inspection and measurements of cores, may remain in place when requested by the Contractor and approved by the Engineer. The Contractor shall pay to the County the amount of \$20 per square yard for the quantity of concrete pavement panels represented by the cores indicating incorrect tie bar alignment or improper concrete consolidation around tie bars. The quantity of concrete pavement area used to determine the amount of payment to the County will be calculated using the panel dimensions for panels adjacent to and inclusive of the joints with incorrect tie bar alignment or improper concrete consolidation around tie bars. The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation will be in addition to other adjustments for incorrect dowel bar alignment or improper concrete consolidation around dowel bars as specified in these Special Provisions and for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness" of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate" of the Standard Specifications.

LIQUID JOINT SEALANT INSTALLATION

The joint sealant detail for transverse and longitudinal 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. Longitudinal weakened plane joints shall be Type A2 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 \pm $1/32$ 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 INSTALLATION

The compression seal alternative joint detail for transverse and longitudinal 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. Longitudinal weakened plane joints shall be Type A2 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 \pm $1/32$ 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.

CONSTRUCTING TRANSVERSE CONTACT JOINTS

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 weakened plane joint location.

If sufficient concrete has not been mixed to form a slab to match the next 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.

CONSTRUCTING LONGITUDINAL ISOLATION JOINTS

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 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 above, except references to backer rods shall not apply.

CONSTRUCTING TRANSVERSE JOINT CONNECTIONS AND ANCHORS

Concrete pavement joints at transitions to hot mix asphalt pavement, pavement end anchors and bridge approach slabs shall conform to the details as shown on the plans. Paint binder shall be applied to the concrete surface that hot mix asphalt pavement will contact. Paint binder shall be applied in conformance with the provisions in Section 39, "Hot Mix Asphalt" of the Standard Specifications.

PROFILE INDEX

The pavement surface shall be profiled, by the Contractor not more than 10 days following concrete placement, in the presence of the Engineer, using a California Profilograph or equivalent in conformance with the requirements in California Test 526, except a blanking band of zero (null) shall be used to determine the Profile Index. Two profiles shall be made within each traffic lane, one yard from and parallel with each lane line.

Profiled pavement shall conform to the following Profile Index requirements:

1. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 2,000 feet or more shall have a Profile Index of 40 inches per mile or less.
2. Pavement on horizontal curves having a centerline radius of curve 1,000 feet or more but less than 2,000 feet and pavement within the super elevation transition of those curves shall have a Profile Index of 80 inches per mile or less.

Individual high points in excess of 5/16 inch, as determined by measurements of the profilogram in conformance with the requirements in California Test 526, except using a blanking band of zero (null), shall be reduced by grinding in conformance with the requirements in Section 40-1.10, "Final Finishing" of the Standard Specifications until the high points as indicated by reruns of the profilograph do not exceed 5/16 inch.

Pavement grinding shall not be performed before 10 days have elapsed after concrete placement, nor before the concrete has developed a modulus of rupture of at least 550 pounds per square inch.

CONSTRUCTING WEAKENED PLANE JOINTS (EARLY ENTRY SAW METHOD)

The Contractor may construct weakened plane joints using lighter weight concrete saws (early entry saws) specifically designed for sawing fresh concrete without the use of water. The early entry saws shall be capable of sawing joints within 2 hours of cure time after placement of the concrete pavement without ravelling or tearing, as defined in Section 40-1.08B(1), "Sawing Method" of the Standard Specifications. Joints sawed with early entry saws that develop random cracking shall be removed to the nearest controlled joint and replaced with concrete pavement containing dowel bars and tie 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. Weakened plane joints not sawed within 2 hours of placing concrete pavement shall be sawed by conventional power driven wet-type concrete saws in conformance with the requirements of Section 40-1.08B(1), "Sawing Method" of the Standard Specifications.

Sawed grooves shall be cut to a maximum of 0.12-inch in width for longitudinal and transverse weakened plane joints made with early entry saws. The minimum depth of cut shall be calculated utilizing the formula in Section 40-1.08B(1), "Sawing Method" of the Standard Specifications except $d = t/4$.

TIE BARS ALONG LONGITUDINAL JOINT FOR SHORT RADIUS CURVES

When paving along short radius curves, the transverse joints shall be maintained in a single continuous straight line across lanes, through the radius point. Tie bars shall maintain minimum clearance from the transverse joint as shown on the plans. If the inside or outside curve of the panel does not allow equal uniform spacing of tie bars at 30 inches between tie bars, then the tie bars shall be equally spaced so that a minimum spacing of 15 inches to a maximum spacing of 30 inches is maintained between tie bars. Additional tie bars shall be considered as included in the contract price paid per cubic yard for Replace Concrete Pavement (Rapid Strength Concrete) and no additional compensation will be allowed therefor.

If dowel bars are specified along longitudinal joint for short radius curves, then dowel bars shall conform to the requirements of these Special Provision for tie bars spacing and tolerance.

Method of Payment:

Sealing longitudinal and transverse weakened plane joints, and longitudinal isolation joints in Portland cement concrete pavement shall be considered as included in the contract price paid per cubic yard for Jointed Plain Concrete Pavement 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 Jointed Plain Concrete Pavement 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 Jointed Plain Concrete Pavement 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, epoxy-coated tie bars and, when used, tie bar baskets with fasteners 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 Jointed Plain Concrete Pavement 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 furnishing and placing epoxy-coated dowel bars, epoxy-coated tie bars and, when used, any tie bar baskets 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 in arranging and holding the pre-paving conference, for constructing and repairing all joints; for performing all profile checks for Profile Index and furnishing final profilograms to the Engineer; 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 drilling holes and bonding tie bars with epoxy resin shall be considered as included in the contract price paid per cubic yard for Jointed Plain Concrete Pavement and no additional compensation will be allowed therefor.

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 Jointed Plain Concrete Pavement and no additional compensation will be allowed therefor.

Costs for providing JITT shall be considered as included in the contract price paid for Jointed Plain Concrete Pavement and no additional compensation will be allowed 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.

Full compensation for core drilling for dowel bar or tie bar alignment and backfilling with hydraulic cement grout shall be considered as included in the contract price paid per cubic yard for Jointed Plain Concrete Pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are out of alignment tolerances and the Engineer orders additional dowel bar or tie bar coring, full compensation for drilling the additional cores shall be considered as included in the contract price per cubic yard for Jointed Plain Concrete Pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel bar coring the additional cores will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work" of the Standard Specifications.

Full compensation for furnishing and placing epoxy coated reinforcement for transition end panel shall be considered as included in the contract price paid per cubic yard for Jointed Plain Concrete Pavement 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 Jointed Plain Concrete Pavement and no additional compensation will be allowed therefor.

OBSTRUCTIONS:

Attention is directed to Sections 8-1.10, "Utility and Non-Highway Facilities", and 15, "Existing Highway Facilities" of the Standard Specifications and these Special Provisions.

Existing utility and privately owned facilities shall be protected in accordance with Section 7-1.11, "Preservation of Property" and these Special Provisions. The Contractor is also responsible to protect those facilities that are to be relocated by others prior to or during construction, and shall protect those facilities in both their existing and their ultimate locations. The Contractor shall cooperate with owners and their Contractors of utility and privately owned facilities, for the relocation of said facilities, in accordance with Section 7-1.14, "Cooperation" of the Standard Specifications.

All water valves and covers, gas valves and covers, sewer manholes, survey monuments, survey markers and any other utility appurtenances shall be protected in place.

The Contractor's attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workmen and the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipe lines greater than 6 inches in diameter or pipe lines operating at pressures greater than 60 psi (gage); underground electric supply system conductors or cables either directly buried or in duct or conduit which do not have concentric neutral conductors or other effectively grounded metal shields or sheaths; and underground electrical conductors with potential to ground of more than 300 volts. The Contractor shall notify the Engineer at least twenty-four hours prior to performing any work in the vicinity of such facilities.

Attention is directed to the requirements of Government Code Sections 4216-4216.9 pertaining to existing utility facilities.

The Contractor shall assume that every house, building and lot within the project limits has utility service pipes and conductors (laterals), and that utility main and trunk facilities exist within the project limits. The Contractor shall determine if it is warranted to determine the exact location of these utility service laterals and existing main lines, unless directed by the Engineer to pot-hole at specific locations, or as otherwise required herein. The Contractor will not be directly reimbursed for determining the exact location of the utility main lines or services laterals but shall include any compensation for this work in the contract price paid for the various items of work. Any damage to existing main lines or service laterals for which pot-holing was not performed shall be considered damage due to not using reasonable care and the damage shall be repaired at the Contractor's expense.

The Contractor shall conduct his operations with the assumption that underground utility facilities exist within the project limits. The Contractor shall exercise caution and best construction practices for safety and for protection of underground facilities. The approximate locations of underground utility facilities, as shown on the plans, are based on information provided by the respective owners, listed below. The Contractor shall also utilize the markings of the regional

notification center (Underground Service Alert), and above-ground utility appurtenances to determine the existence and approximate location of underground utilities.

No excavation shall be made within 4 feet of any underground utilities, as shown on the plans and/or marked by Underground Service Alert, unless and until such utilities have been positively located as to horizontal and vertical position. This requirement applies to all underground electric, natural gas, toxic or flammable gas, chlorine, oxygen or petroleum facilities.

Forty-eight hours prior to beginning construction, the Contractor shall notify the following agencies:

Underground Service Alert	800-227-2600
Southern California Edison Company	951-928-8318
Southern California Gas Company	909-335-7561
Verizon Communications	951-925-5319
Time Warner Cable	951-549-3977
City of Hemet	951-765-3710
Lake Hemet Municipal Water District	951-658-3241
Santa Ana Watershed	951-354-4220

Method of Payment

Full compensation for all costs, including labor, equipment, materials and incidentals, required to comply with the requirements of this section above, including protection of water valves and covers, gas valves and covers, sewer manholes, survey monuments, survey markers and any other utility appurtenances, shall be considered as included in the various items of work, and no additional compensation will be allowed therefor.

Adjustments to Grade for Obstructions

The Contractor shall adjust to finish grade any valve covers encountered within the project limits, as required, for those utility valves that are provided with slip cans and are adjustable without the replacement of parts or the removal of concrete collars. In cases where the owning utility company insists upon upgrades in the standards, or when additional parts or the removal of concrete collars are required for the adjustment, said adjustment will be the responsibility of the owning utility company.

Communication and coordination with the owning utility company shall be the responsibility of the contractor.

For public safety, traffic shall not be allowed on temporary or permanent pavement until all manholes are either adjusted to grade or otherwise protected, as approved by the Engineer. The Contractor shall adjust to grade manholes and valves when and as necessary for the protection of the traveling public during construction, and shall coordinate all work on said facilities with the owning utility companies. This requirement is intended for traffic that is to

be allowed on temporary surfaces during the course of construction. Final adjustment to grade will be the responsibility of the owning utility company, except as provided herein.

Said work shall be performed in accordance with Section 15-2.05A, "Frames, Covers, Grates, and Manholes" of the Standard Specifications. Full compensation for adjustment of valve covers shall be considered as included in the contract price paid for asphalt concrete, or applicable items of work in the event that there is no asphalt concrete bid item, and no additional compensation will be allowed therefor.

All existing utility facilities shall be protected from damage by the Contractor's operations.

Unless otherwise provided herein, the owning utility companies will not be obligated to lower their surface utilities (manholes and valve covers) for Contractor's grading, grinding and/or paving operations. The contractor shall lower surface facilities, including manholes and valve covers, to facilitate construction, and the following shall apply:

1. Contractor shall coordinate all work with the utility owner.
2. Contractor shall be responsible for all costs and shall be responsible for any damage caused to the owner's facilities. If the Contractor observes any pre-existing damage to the utility facilities, the Contractor shall notify the Engineer and the utility owner of that damage prior to performing additional work on the facility.
3. Contractor shall, after removing grade rings and covers, arrange for pickup by, or delivery to, the owner's yard. Any and all concrete collars removed by the Contractor shall become the property of the Contractor, and shall be disposed of as specified elsewhere in these special provisions.
4. The Contractor is advised that he is responsible for ensuring that construction materials do not enter the utility owner's facilities. The Contractor shall install traffic bearing steel plates for this purpose, and provide all coordination and transportation necessary. It is recommended that the Contractor request the utility owner to provide such steel plates. If the Contractor provides steel plates, it shall be the Contractor's responsibility to coordinate with the utility owner for the return of the steel plates to the Contractor after final adjustment to grade. If the Contractor utilizes utility owner's steel plates, and if the Contract items of work include adjustment to final grade, the Contractor shall return the steel plates to the Utility owner's yard, or as otherwise arranged with the Utility owner.
5. Prior to paving or covering the plated utility facility, the Contractor shall tie-out the facility utilizing a method acceptable to the utility owner and provide notes and data of all covered facilities to both the utility owner and the Engineer.
6. The Contractor shall notify the utility owner, upon completion of the Contractor's work, when the utility owner may move in to make the final adjustments to grade.

7. The requirements for lowering of surface facilities shall not apply to vaults. The Contractor shall notify the utility owner of the need to make adjustments to such major facilities.
8. The Contractor is reminded that the utility facilities are owned by public and private utility companies that operate their facilities within public rights of way. The utility owner's preferences with regards to the handling of its facilities shall be complied with to the greatest extent feasible.

Method of Payment

Full compensation for initial lowering of surface utilities facilities shall be considered as included in the contract price paid for asphalt concrete, or applicable items of work in the event that there is no asphalt concrete bid item, and no additional compensation will be allowed therefor.

MISCELLANEOUS WORK (AS DIRECTED):

Miscellaneous Work (As Directed) shall consist of necessary work that is not included in other contract bid items, as determined by the Engineer. Miscellaneous 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 work (as directed) 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.

RELOCATION/ ADJUSTMENT OF LHMWD FACILITIES (WATER METER, WATER METER BOX, FIRE HYDRANT):

Relocation and adjustment of facilities (Water Meter, Water Meter Box, Fire Hydrant) that are owned by the Lake Hemet Municipal Water District (LHMWD) shall be performed in accordance with the attached LHMWD Standards, these Special Provisions, and as directed by the Engineer.

Existing Water Meter, Water Meter Box, Fire Hydrant shall be adjusted to finish grade with materials similar in quality to those in the original structure in accordance with the applicable provisions of Sections 15-2 of the Standard Specifications and these Special Provisions.

After the Water Meter, Water Meter Box cover frames have been removed, the top of the structures shall be carefully trimmed to provide a suitable foundation for the new material.

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:

The contract unit bid price paid per each for Adjust Water Meter Box to Grade, Relocate Water Meeter, and Adjust Fire Hydrant shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for doing all the work involved and no additional compensation will be allowed therefor.

Any relocation and adjustment of other facilities that are owned by the LHMWD, that are ordered by the Engineer shall be per Section 11 "Payment for Extra work (Force Account Basis)" of the General Provisions.

ADJUST MANHOLE TO GRADE:

Existing Manhole covers shall be adjusted to finish grade and new concrete collars poured with materials similar in quality to those in the original structure in accordance with the applicable provisions of Sections 15-2 and 71 of the Standard Specifications, the requirements of the owning utility company and these Special Provisions.

Unless otherwise specified by the owners of the facilities, the Contractor shall provide new manhole covers and frames as necessary for the project. The Contractor shall be responsible to coordinate with the owners to obtain the materials approval.

After the structure frame has been removed, the top of the structure shall be carefully trimmed to provide a suitable foundation for the new material.

Steel plates shall be used as necessary and when directed by the Engineer to prevent asphalt and debris from entering the sewer system.

Additionally, a "False Bottom" shall be fabricated and temporarily placed in the manhole cone as a second barrier to prohibit foreign objects from entering the sewer system. Said "false bottom" shall be made from plywood of suitable thickness (3/4" minimum) or stronger material to prohibit heavy objects from breaking the barrier. "False Bottom" shall be fabricated and installed in accordance with the requirements and standards of the owner. The false bottom shall comply with the attached "Standard No. 11" of the Lake Hemet Municipal Water District, or as otherwise approved by the Engineer.

After completion of the work, the structure covers, frames, grade rings and old concrete collar debris that were removed from the roadbed shall become the property of the Contractor.

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.

Coordination and communication shall be maintained between the Contractor and the owning sewer company.

The Contractor shall adjust to final grade all manhole covers owned by the Riverside County Flood Control and Water Conservation District.

The adjustment to grade of other manhole covers, such as those owned by phone and electric companies, will be performed by the utility owner.

Water and gas valve covers shall be adjusted by the Contractor as provided elsewhere in these Special Provisions.

Method of Payment:

The contract unit bid price paid per each for Adjust Manhole to Grade of the different types as provided on the bid items list shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for doing all the work involved including the installation of the concrete ring and no additional compensation will be allowed therefor.

ADJUST PULL BOX:

Pull boxes shall be adjusted to grade in conformance with the applicable provisions in Section 15-2.05, "Reconstruction", of the Standard Specifications, and as directed by the Engineer.

Existing pull boxes shall be adjusted to finish grade with materials similar in quality to those in the original structure.

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:

The contract unit bid price paid per each for Adjust Pull Box shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for doing all the work involved and no additional compensation will be allowed therefor.

SIGNAL AND LIGHTING

A. General

Furnishing and installing traffic signal and highway lighting systems, and payment shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems", of the latest edition Standard Specifications, amendments to the Standard Specifications, and these Special Provisions.

B. Start of Work

Location where signalization and highway lighting work is to be performed:

Location	Area
1. Stanford Street and Mayberry Avenue	East Hemet

C. 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:

- 3. Signal and Lighting Standards and Anchor Bolts
- 4. 10' Galvanized Steel IISNS Mast Arms

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):

- 1. Traffic Signal Shop
Riverside County Transportation Department
McKenzie Highway Operations Center
2950 Washington Street
Riverside, California 92504
Telephone (951) 955-6894
- 2. County District Maintenance Yard
595N. Juanita Street
Hemet, 92543

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.

D. Equipment Orders

The Contractor shall furnish all equipment and materials specified in plans and these special provisions that are not furnished by the County. All equipment shall be new and purchased by the Contractor for this project only.

Submittals and issuance of Notice to Proceed

Within twenty one (21) calendar days after the award of the contract, the Contractor shall submit equipment and materials submittals to the Engineer for review and approval. The Contractor shall allow fourteen (14) calendar days for the Engineer to review the equipment and materials submittals. If revisions are required as determined by the Engineer, the Contractor shall revise and resubmit the equipment and materials submittals within seven (7) calendar days of receipt of the Engineer's comments and shall allow seven (7) working days for the Engineer to review the revisions. Once the submittals are approved by the Engineer, the Contractor must order equipment and materials and then submit a copy of each vendor Equipment and Material Purchase Order within (7) calendar days to the Engineer.

The Contractor must have copies of approved Equipment and Material submittal(s) and Purchase Order(s) prior to the coordination and issuance of the Notice to Proceed. Delay in equipment delivery shall not be considered as justification for the suspension of the construction contract.

Additional Liquidated Damages

In addition to the liquidated damages set forth in Special Provision section "Liquidated Damages" of these contract documents, the Contractor shall pay to the County of Riverside the sum of \$800.00 per day for each and every calendar day delay in receiving all of the below listed equipment furnished by the Contractor, onto the job site or the Contractor's storage facility, and available for installation, within sixty (60) calendar days of the contract award date:

1. Traffic Signal Controller Assemblies
2. Service Equipment Enclosures
3. Traffic Signal and Pedestrian Signal Heads
4. LED Modules
5. Edge-Lit Internally Illuminated Street Name Signs and mounting brackets

E. Equipment List and Drawings

Equipment list and drawings shall conform to the provisions in Section 86-1.04, "Equipment List and Drawings", of the Standard Specifications and these Special Provisions.

The Contractor shall furnish four complete cabinet wiring diagrams for each furnished controller assembly, battery backup system, video detection system, and emergency vehicle preemption system. The cabinet wiring diagram shall include an approximately 6 inches x 8 inches or larger schematic drawing of the project intersection and on a separate 8 ½" x 11" sheet of paper, which shall include the following information, at a minimum:

1. North arrow
2. Street names
3. Pavement delineation and markings
4. Signal poles
5. Traffic signal heads with phase designations
6. Pedestrian signal heads with phase designations
7. Loop detectors with input file designations

F. Warranties, Guaranties, Instruction Sheets, and Manuals

Warranties, guaranties and instruction sheets shall conform to these Special Provisions.

- a. LED modules shall have five (5) years of manufacturer warranty.
- b. Battery Backup System (BBS) shall have five (5) years of manufacturer warranty. The first three (3) years shall be termed the "Advanced Replacement Program". Under this program, the manufacturer will send out a replacement within two business days of the call notifying them of an issue. The replacement unit may be either a new unit or a re-manufactured unit that is up to the latest revision. The last two years of the warranty will be factory-repair warranty for parts and labor on the BBS.
- c. Video Detection System shall have three (3) years of manufacturer warranty. During the warranty period, technical support from factory-certified personnel or factory-certified installers shall be available via telephone within four (4) hours of the time when a service call is made.
- d. Edge Lit LED internally illuminated street name sign shall have two (2) year of manufacturer warranty.
- e. All other equipment and systems shall have at least one (1) year of manufacturer warranty.

Furnish the manufacturer's standard written warranty pertaining to defects in materials and workmanship for all equipment, and two (2) sets of user, operation, and maintenance manuals, written in English, on all equipments and components for the traffic signal and highway lighting system to the Engineer.

G. Foundations

Foundations shall conform to the provisions in Section 51, "Concrete Structures", and Section 86-2.03, "Foundations", of the Standard Specifications and these Special Provisions.

Portland cement concrete shall conform to Section 90-10, "Minor Concrete", of the Standard Specifications and shall be Class 3 except pole foundations shall be Class 2.

Construct Type 332 controller cabinet foundation per Standard Plans ES-3C.

Vibrate all foundation concrete to eliminate air pockets.

H. Standards, Steel Pedestals and Posts

Standards, steel pedestals, and posts shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts", of the Standard Specifications and these Special Provisions.

Type 1A pole material shall be spun aluminum unless otherwise specified.

Poles installed at the near-right approach of each intersection shall be banded conforming to the strap and saddle method per Standard Plans RS4 for the emergency installation of stop signs.

Signal mast arms shall be installed in accordance with the "Signal Arm Connection Details" of the Standard Plans unless otherwise specified.

Internally Illuminated Street name sign (IISNS) mast arm shall be 10 foot long galvanized steel mast arm constructed to prevent deformation or failure when subjected to 100 mph wind loads. IISNS mast arm shall extend from the shaft of the pole above and parallel to the signal mast arm in accordance with County Standard No. 1200. Two set-bolt /set-screw shall be used to assure the mast arm will not change position after it is installed and aligned.

If required by the serving electric utility, and confirmed by the Engineer, State Certified Electric Workers shall be utilized for the installation of standards, steel pedestals, and posts in accordance with State of California High Voltage Safety Orders.

I. Conduits

Conduit shall conform to the provisions in Section 86-2.05, "Conduit", of the Standard Specifications and these Special Provisions.

Conduits shall be Type 3, Schedule 80 Polyvinyl Chloride (PVC) conforming to requirements in UL Publication 651 for Rigid Non-Metallic Conduit, for underground installation only.

Conduit depth shall not exceed 60 inches below finish grade.

Conduit size shall be 2 inches minimum unless otherwise specified. New conduit shall not pass through foundations or standards.

Conduit bends shall be factory bends. Bend radius for signal interconnect conduits shall be 3 feet minimum.

A pull rope and a bare #12 AWG wire shall be installed in conduits intended for future use.

Bell bushings are required for all conduit ends. The ends of conduits terminating in pull boxes and controller cabinets shall be sealed with sealing compound approved by the Engineer after conductors have been installed.

Conduits shall be installed via jacking or drilling method per Section 86-2.05C, "Installation", of the Standard Specifications.

Pot-holing shall be performed prior to all conduit installation to determine utility underground location, including service laterals, to avoid damage to utility owner facilities.

Trenching Installation

The Engineer shall approve trenching installation on a case-by-case basis where conduit cannot be installed by jacking or drilling. Jacking or Drilling shall be attempted a minimum of three times prior to requesting trenching installation.

If ordered by the Engineer, all pavements shall be cut to a depth of 3 inches 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 surface outside the removal area.

Trench shall be 2 inches wider than the outside diameter of the conduit being installed however not exceeding 6 inches in total width. The conduit shall be placed in the bottom of the trench. Conduit depth shall be at a minimum of 30 inches below finished grade, with a minimum of 26 inches cover over the conduit.

The trench shall be backfilled with two-sack slurry to the finish grade before final paving. Prior to final paving, grind pavement centered along the length of the trench a minimum width of 3 feet and depth of 0.10 feet, and excavate backfilled to a depth of 0.30 feet below the final pavement surface. Final paving with commercial Type A ½" PG64-10 asphalt concrete.

If directed by the Engineer, the two-sack slurry backfill can be installed to a depth of 0.30 feet below the final pavement surface and cured for a minimum of two days prior to final paving if the trench area is not open to traffic.

J. Pull Boxes

Pull boxes shall conform to the provisions in Section 86-2.06, "Pull Boxes", of the Standard Specifications and these Special Provisions.

Traffic pull boxes shall conform to the provisions in Section 86-2.07, "Traffic Pull Boxes", of the Standard Specifications and these Special Provisions.

Pull boxes shall have a "Fibrelyte" or equivalent cover and bolt down design. Cover shall have a non-skid surface.

Pull box covers shall be marked in accordance with Standard Plans ES-8 without the word "CALTRANS" unless the project is on State of California right of way.

Pull boxes shall be placed with their tops flush with surrounding finish grade or as directed by the Engineer.

Pull boxes shall be installed behind the curb or as shown on the plans and shall be spaced at no more than 500 feet intervals. The Engineer shall determine the exact locations.

Pull boxes installed in unimproved areas, locations not protected by concrete curb and gutter, shall be traffic pull box and marked with Type L markers.

K. Conductors and Wiring

Conductors shall conform to the provisions in Section 86-2.08, "Conductors", of the Standard Specifications and these Special Provisions.

Wiring shall conform to the provisions in Section 86-2.09, "Wiring", of the Standard Specifications and these Special Provisions.

Specific cabling and wiring requirements for various systems or components shall be in accordance with the Special Provisions entitled to each herein.

Signal cable shall be installed continuously without splicing from the controller cabinet to each traffic signal pole. Traffic signal conductors, multiple circuit conductors, and signal cable conductors shall not be spliced unless otherwise shown.

All outer cable jacket for 12 conductor cable shall be removed from the traffic signal standard hand hole to the terminal block located at the side mount traffic signal head.

Where splice is required, Type C or Type T splice shall be used and insulated as shown in the Standard Plans, ES-13A.

Where splice is required, "Liquid Electrical Tape" or equivalent in black color shall be used to provide a watertight electrical insulating coating with "Method B" as shown in the Standard Plans, ES-13A.

Minimum luminaire wiring shall be No. 10 AWG, including wiring within poles and mast arms.

L. Bonding and Grounding

Bonding and grounding shall conform to the provisions in Section 86-2.10, "Bonding and Grounding", of the Standard Specifications and these Special Provisions.

Grounding jumper shall be attached by a 3/16 inch or larger brass bolt in the signal standard or controller pedestal and shall be run to the conduit, ground rod or bonding wire in the adjacent pull box.

Grounding jumper shall be visible after cap has been poured on foundation.

For equipment grounding jumper a No. 8 bare copper wire shall run continuously in all circuits except a No. 12 bare copper wire shall run continuously in conduits that contain only signal interconnect cable and/or loop detector cable.

M. Service

Service shall conform to the provisions in Section 86-2.11, "Service", of the Standard Specifications and these Special Provisions.

Service equipment enclosure shall be Type III-CF, as shown on the Standard Plans, ES-2F, and shall conform to the following:

1. 120 / 240 volt, 2 meter service unless otherwise shown on the plans.
2. Circuit breakers required:
 - 2 - 100 Amp 2 pole (signal main and lighting main)
 - 1 - 30 Amp 1 pole (luminaires)
 - 1 - 20 Amp 1 pole (illuminated street name signs)
 - 1 - 30 Amp 1 pole (signals)
 - 1 - 15 Amp 1 pole (luminaire photoelectric control)
 - 1 - 15 Amp 1 pole (street name sign photoelectric control)
 - 1 - 20 Amp 1 pole (for each beacon, if applicable)
3. Cabinet shall be fabricated from aluminum sheeting and finish shall be anodic coating in accordance with Section 86-3.04A "Cabinet Construction".
4. Circuit breakers shall be marked with identifying labels for each circuit breaker.

Type V photoelectric control contactor and test switch assembly shall be installed in the service cabinet. Photoelectric control contactors shall be as follows:

1. Luminaires - 60 Amp electrically held contact
2. Street name signs - 30 Amp electrically held contact

A GFCI outlet shall be installed on the interior side of service cabinet door.

Photo Electric Control assembly shall be installed within the circuit breaker compartment of the service equipment enclosure, and accessible to the County after installation of electrical meters.

Direct burial service conductors are not allowed.

The Contractor shall be responsible for contacting the power company, arranging and providing for the electrical service connection, and ensuring that adequate notice is provided to the serving

electric company in advance of need. *The County of Riverside will pay all electric company fees required.*

The service equipment enclosure shall be a minimum of 15 feet from the controller cabinet, and a minimum of 10 feet from all utility poles, unless otherwise directed by the Engineer.

Service Identification

The service address shall be shown on the front upper panel of the service equipment enclosure, and the meters shall be labeled "LS3" (lighting meter) and "TC1" (signal meter) by lettering applied to the exterior of the enclosure in accordance with these special provisions, or as directed by the Engineer.

Lettering markings shall be black with a two-inch minimum size in block letter form. Markings shall be applied to a brushed aluminum, stainless steel, or other non-corroding metallic plate, as approved by the Engineer. Plate shall be white in color. All paint and markings shall conform in all respects to Federal Specification TT-E-489, latest revision, Class A, Air Drying. Said plate shall be affixed in a permanent manner by riveting or with stainless steel bolts and nuts. Bolts shall be peened after tightening. All materials used for affixing address plate shall be non-corroding. The Engineer shall approve all alternate materials and methods prior to installation.

N. Testing

Testing and Field Testing shall conform to the provisions in Section 86-2.14, "Testing", of the Standard Specifications and these Special Provisions.

Specific testing requirements for various systems and components shall be in accordance with the Special Provisions entitled to each herein.

The complete controller assembly and Battery Backup System shall be delivered to the following location or location as directed by the Engineer for testing:

Traffic Signal Shop
Riverside County Transportation Department
McKenzie Highway Operations Center
2950 Washington Street
Riverside, California 92504
Telephone (951) 955-6894

A minimum of 15 working days for operational testing and adjustment is required. An additional 15 working days period shall be allowed for retesting should the equipment fail.

The conflict monitor unit shall be tested in the field before signal turn on.

O. Controller Assembly

Controller assembly shall conform to the provisions in Section 86-3, "Controller Assemblies", of the Standard Specifications and these Special Provisions.

Controller assembly shall be Model 170 controller assembly consisting of the additional features:

1. Model 332AL controller cabinet:
 - Anodic coating for both interior and exterior finish
 - A Corbin No. 2 door lock
2. An interior fluorescent lamp with an on/off switch and a door switch that will automatically turn on the lamp when cabinet door is opened.
3. A interior thermostatically controlled, 24 volt electric fan with ball or roller bearing that has capacity rating of 100 cubic feet per minute minimum.
4. Rack mounted push buttons for manual actuation of the following:
 - 8 vehicular phases,
 - 4 pedestrian phases,
 - 4 Emergency Vehicle Preemption (EVP) phases; and,
 - 2 Railroad preemption phases.
5. Model 170E local controller unit:
 - Dual Asynchronous Communications Interface Adaptor (ACIA) capability. ACIA shall be integral to the controller unit. Horizontal printed circuit board controllers will not be accepted.
 - A Model 412F Program Module with 32K 27256 EPROM, 16K RAM, and 8K zero power RAM (memory method two, memory select four).
 - Bitrans Systems, Inc. 233RV2.5 or latest version firmware, test program and a loopback cable.
6. If required, provide a Model 170E field master controller unit that has the same features as the 170E local controller except the firmware shall be Bitrans Systems, Inc. No. 245 FM. It shall be mounted above the local controller unit.
7. A pullout shelf/drawer assembly made of aluminum with telescoping drawer guides for full extension installed below the local controller unit. The top shall have a non-slip plastic laminate permanently attached. The non-slip laminate shall not be attached with silicon adhesive.
8. Load Switches:

Switching circuit shall be contained in a replacement module (cube type) sealed in epoxy and rated at 15 amperes load (25 Amp triac). Pin 11 on all load switch sockets shall be wired to AC. Input and output indicators shall be installed on all load switches.

All load switch sockets shall have individual wire terminals. Printed circuit boards will not be allowed.

9. Flasher units:

Switching circuit shall be contained in a replacement module (cube type) sealed in epoxy and rated at 15 amperes load (25 Amps triac).

10. Conflict monitor shall be EDI Model 2010ECL or equivalent with a red monitor assembly circuit board and capable of monitoring green, amber and red indications.

11. Loop detector sensor unit shall be Model 222:

- Detector unit shall have delay timers adjustable from zero to a minimum of 30 seconds and extension timers adjustable from zero to a minimum of 7 seconds.
- Delay timers shall delay calls only during display of the associated red or yellow indications. If a vehicle departs the area of detection prior to expiration of the assigned delay period, the timer shall reset and no call shall be placed upon the controller. During display of the associated green indication, detectors shall operate in the present mode and calls shall not be delayed.

12. Power Distribution Assembly shall be Model PDA-2.

13. A twelve-position interconnect terminal strip.

The contractor shall furnish the following spare equipments / components:

Description	Model	Quantity
Cabinet	332	0
Controller Unit (local)	170E	0
Controller Unit (master)	170E	0
Switch Pack	200	0
Flasher Unit	204	0
Conflict Monitor Unit	2010	0
2-Channel Loop Detector	222	0
2-Channel DC Isolator	242	0
Modem Module	400	0
Program Module	412F	0

Spare equipments or components shall be delivered to the following location or as directed by the Engineer:

Traffic Signal Shop
Riverside County Transportation Department
McKenzie Highway Operations Center
2950 Washington Street
Riverside, California 92504
Telephone (951) 955-6894

The controller unit and controller cabinet shall be manufactured and furnished by the same manufacturer to form a complete functional controller system capable of providing the traffic signal operation specified. All traffic control equipment to be furnished shall be listed on the California Department of Transportation Qualified Products List.

The controller unit and controller cabinet manufacturer or supplier shall perform operational and functional testing of the supplied controller assembly and additional supplied equipment in accordance with the State of California Department of Transportation's Transportation Electrical Equipment specifications (TEES), and a Certificate of Compliance shall be issued for each successfully tested controller assembly and additional supplied equipment.

Modify traffic signal controller assembly if necessary and provide any necessary auxiliary equipment and cabling to achieve the intended traffic signal operation as shown on the plans. The Contractor shall make all field wiring connections to the terminal blocks inside the controller cabinet.

A technician who is qualified to work on the controller assembly from the controller manufacturer or their representative shall install the program module and program the signal controller in accordance with ~~County~~ the Engineer provided signal timing sheets, and to be present when the equipment is turned on.

P. Vehicle Signal Assemblies

Vehicle signal assemblies and auxiliary equipment shall conform to the provisions in Section 86-4.01 "Vehicle Signal Faces", Section 86-4.01B (1), "Metal Signal Sections", Section 86-4.01D "Visors", Section 86-4.04, "Backplates", and Section 86-4.08 "Signal Mounting Assemblies" of the Standard Specifications and these Special Provisions.

Signal sections, backplates, visors and signal mounting assemblies shall be the metal type and shall be made from the same manufacturer. The section assemblies shall be uniform in appearance and alignment.

Backplates shall be louvered. Visors shall be the "tunnel" type. Top opening of signal sections shall be sealed with neoprene gaskets.

Vehicle signal indications shall be 12-inch diameter Light Emitting Diode (LED) modules in accordance with the following:

1. All circular LED modules shall comply with Institute of Transportation Engineers (ITE) Vehicle Traffic Control Signal Heads (VETCH) - LED Circular Supplement, Adopted June 27, 2005.
2. All arrow LED modules shall comply with ITE VETCH - LED Vehicle Arrow Traffic Signal Supplement, Adopted July 1, 2007.
3. All modules shall fit in existing signal housings without the use of special tools.
4. All modules shall be certified in the Intertek LED Traffic Signal Modules Certification Program and be labeled with the ETL Verified Label as follows:



5. Luminous intensity requirements of the VTCSH must be met across the entire temperature range from -40°C to $+74^{\circ}\text{C}$, (-40°F to $+165^{\circ}\text{F}$).
6. The following cable colors shall be used for the AC power leads on all modules: white for common, red for the red module line, yellow for the yellow module line, and brown for the green module line.
7. The AC power leads shall exit the module via a rubber grommet strain relief, and shall be terminated with quick connect terminals with spade tab adapters. The leads shall be separate at the point at which they leave the module.
8. All external wiring used in the module shall be anti-capillary type cable to prevent the wicking of moisture to the interior of the module.
9. All power supplies shall be coated for additional moisture and thermal protection.
10. The module shall have an incandescent, non-pixelated appearance when illuminated.
11. Nominal power usage is measured at 25°C , 120 VAC. For the 8 inch modules, it shall not exceed 8 watts for Red, 8 watts for Yellow, and 8 watts for Green modules. For the 12 inch modules, it shall not exceed 10 watts for Red, 19 watts for Yellow, and 11 watts for Green modules. For the arrows, it shall not exceed 6 watts for any color.
12. All modules shall use LEDs that have been manufactured with materials that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.

13. The external lens shall have a smooth outer surface to prevent the buildup of dirt and dust and shall be designed to minimize the potential for sun phantom signals.
14. The circular LED module lens material must be tinted. A tinted transparent film or coating is not permitted.
15. A module shall be sealed against dust and moisture intrusion, including rain and blowing rain per Mil-Std-810F Method 506.4, Procedure 1.
16. Arrow modules shall be clearly marked with the phrase "Suitable for mounting in any orientation".
17. Modules shall be repaired or replaced if the module fails to function as intended due to workmanship or material defects within warranty period.
18. Modules shall be repaired or replaced if the module exhibit luminous intensities less than the minimum specified values within 60 months of the date of delivery.
19. The Manufacturer shall clearly disclose the country in which the factory of module origin is located, the name of the company or organization that owns the factory including all of its parent companies and/or organizations, and their respective country of corporate citizenship.

Q. Pedestrian Signal Assemblies

Pedestrian signals assemblies shall conform to the provisions in Section 86-4.06, "Pedestrian Signal Faces", of the Standard Specifications and these Special Provisions.

Pedestrian Signal Mounting Assemblies and Pedestrian Signal Housings shall be made from the same manufacturer and the section assemblies shall be uniform in appearance and alignment.

Pedestrian signals shall be provided with a polycarbonate egg crate or Z-crate screen.

Pedestrian signals shall be equipped with light emitting diode countdown pedestrian module in accordance to the following:

1. It shall comply with ITE specification: Pedestrian Traffic Control Signal Indications (PTCSI) Part 2: LED Pedestrian Traffic Signal Modules, Adopted March 19, 2004.
2. All modules shall fit in existing signal housings without the use of special tools.
3. All modules shall be certified in the Intertek LED Traffic Signal Modules Certification Program and be labeled with the ETL Verified Label as follows:



The PTCSI does not cover the countdown features of countdown pedestrian signal LED modules. The countdown features shall incorporate the following:

1. Fully compliant to NEMA TS-1, NEMA TS-2, Type 170, and Type 2070 traffic signal controller specifications.
2. The countdown portion of the pedestrian (ped) module shall have a high off-state input impedance so as not to provide a load indication to conflict monitors and interfere with the monitoring of the pedestrian signal. The input impedance of the countdown circuitry shall maintain a voltage reading above 25 VAC to the conflict monitor for up to four units connected on the same channel.
3. The countdown drive circuitry shall not be damaged when subjected to defective load switches providing a half wave signal input.
4. The countdown ped module shall have an internal conflict monitor circuit preventing any possible conflicts between the Hand, Person, and Countdown signal indications. It shall be impossible for the display to countdown during a solid Hand indication.
5. Per CA MUTCD Manual, section 4E.07: "The countdown pedestrian signal shall display the number of seconds remaining until the termination of the pedestrian change interval. Countdown displays shall not be used during the walk interval or during the red clearance interval of a concurrent vehicular phase".
6. The countdown ped module shall have a micro-processor capable of recording its own time when connected to a traffic controller. It shall be capable of displaying the digits 0 through 99.
7. When power is first applied or restored to the ped module, the countdown display will be blank during the initial cycle while it records the countdown time using the walk (person) and don't walk (flashing hand) signal indications. The normal hand and person icons shall be displayed during this cycle.
8. The countdown ped module shall continuously monitor the traffic controller for any changes to the pedestrian phase time and re-program itself automatically if needed.
9. The countdown ped module shall register the time for the walk and clearance intervals individually and shall begin counting down at the beginning of the pedestrian clearance interval. The digits shall not flash during the countdown.

10. When the flashing hand becomes solid, the ped module shall display 0 for one second and then blank-out. The display shall remain dark until the beginning of the next countdown.
11. In the event of a pre-emption, the countdown ped module shall skip the remaining time, reach 0 at the same time as the flashing Hand becomes solid, and remain dark until the next cycle.
12. In the cycle following preemption call, the signal shall display the correct time and not be affected by the reduced previous cycle. The countdown shall remain synchronized with the signal indications and always reach 0 at the same time as the flashing Hand becomes solid.
13. If a pedestrian button is activated during the clearance interval, some controllers can change to a second walk cycle without a don't walk phase. The countdown module shall also be capable of consecutive walk cycles. The display digits will be blank during the second walk and countdown properly during the second flashing hand.
14. The countdown ped module shall not display an erroneous or conflicting time when subjected to defective load switches. Should there be a short power interruption during the ped clearance interval or if voltage is applied to both the hand and person simultaneously the display will go to "0" then blank.
15. The countdown ped module shall have accessible dip-switches for the user selectable options. The unit shall have a removable plug on the rear allowing easy access to control the user selectable functions. The countdown is disabled when all the switches are in the "ON" position. The unit shall be shipped from the factory with the specified default setting.
16. Switch 1 – Blank Cycle Following a Timing Change – Factory default is "OFF". When this switch is "OFF" the unit will allow the time to be displayed normally during the cycle following a truncated timing such as a preemption call. The countdown shall be capable of displaying the correct time and not affected by the previous reduced cycle. The unit will require 2 consecutive reduced cycles of identical value to validate and record a new time setting. If the timing is extended, the unit will record it immediately. In the "ON" position when a change in timing is detected the unit will blank out during the following cycle while the new cycle time is measured and recorded if confirmed.
17. Switch 2 – Disables Auto-sync Mode- Factory default setting is "OFF". When this switch is in the "OFF" position the auto-sync is enabled. When the clearance interval begins and the initial flash of the hand is not in sync with the walk signal the unit will measure the offset and reduce the duration of the first second by the value of the offset. This will ensure the countdown reached zero at the same time as the flashing hand becomes solid. In the "ON" position there is no time correction when the flashing hand is in offset with the walk signal. The duration of the first second will not be reduced and the hand will appear solid shortly before the countdown reaches zero.

18. Switch 3 – Countdown Starts with Flashing Hand Signal – Factory default setting is “ON”. When this switch is “ON” the countdown begins when the hand signal is turned on. With this switch “ON” and the auto-sync mode enabled a short power interruption will have no effect on the countdown display. With switch 3 in the “OFF” position the countdown begins when the walk signal is turned off. This eliminates the effect of an offset hand signal. When switch 3 is in the “OFF” position the auto-sync switch 2 has no effect on the countdown. In this mode if the power to the walk signal is interrupted, the unit will interpret this as the start of the clearance interval and will display the countdown time for 2 seconds before the operation is cancelled. The countdown will resume with the normal ending of the walk signal.
19. Switch 4 – Stores Time Value in Memory, Immediate. Restart. - Factory default setting is “OFF”. When this switch is in the “OFF” position and power is removed from the unit, the time value stored in the unit is erased. The unit will need to run a dark cycle before it can display the countdown again. In the “ON” position the countdown timing is stored in memory. Following a power interruption, the unit will restart with the stored value and not remain dark during the learning cycle. If the value is different after restart, it will be recorded and displayed correctly at the following cycle.
20. Switch 5 – All LEDs “ON”, Test Mode – Factory default setting is “OFF”. With this switch in the “ON” position all LEDs are turned on simultaneously. With both switches 4 and 5 in the “ON” position the LED test mode will also scan the 7 individual segments of both digits.
21. The countdown shall be disabled when all switches are placed in the “ON” position.
22. Nominal power usage for Ped Modules at 25°C (77°F), 120 VAC input shall not exceed the values shown in Table 1.

Table 1 -- Nominal Power of Pedestrian Signals

Size	Description	Wattage @ 25°C		
		Hand	Person	Countdown ¹
16”x18”	Side by Side Hand & Person	8	7	N/A
16”x18”	Hand & Person Overlay with Countdown	9	7	5

¹ Wattage for the countdown is measured when the digits 18 are displayed.

23. All wiring shall meet the requirements of Section 13.02 of the VTCSH standard. Secured, color coded, 600V, 18 AWG jacketed wires, 1 meter (39 in) in length, conforming to the NFPA 70, National Electrical Code, and rated for service at +105°C, shall be provided.
24. The following color scheme shall be used for the ped module’s AC power leads: Orange for the upraised hand, Blue for the walking person, and White for common. The

countdown portion of the LED ped module shall be internally wired to the hand and walking person power.

25. The AC power leads shall exit the ped module via a rubber grommited strain relief, and shall be terminated with insulated female quick connect terminals with spade / tab adapters. The leads shall be separate at the point at which they leave the ped module.
26. All external wiring utilized in the ped modules shall be anti-capillary type wire to prevent the wicking of moisture to the interior of the ped module.
27. The Hand and Person Icons shall utilize separate power supplies. On countdown products, the countdown ped module must have its own power supply but may take the incoming AC power from the hand / person AC signal lines. All power supplies shall be located inside the ped module.
28. All power supplies shall be conformally coated for additional protection.
29. Off State Voltage Decay: When the hand or person icon is switched from the On state to the Off state the terminal voltage shall decay to a value less than 10 VAC RMS in less than 100 milliseconds when driven by a maximum allowed load switch leakage current of 10 milliamps peak (7.1 milliamps AC).
30. For a minimum period of 60 months, measured at 80 to 135 VAC RMS and over the ambient temperatures of -40°C to +74°C (-40°F to +165°F), the minimum maintained luminance values for the ped modules, when measured normal to the plane of the icon surface, shall not be less than:
 - Walking Person, White: 2,200 cd/m²
 - Upraised Hand, Portland Orange: 1,400 cd/m²
 - Countdown Digits, Portland Orange: 1,400 cd/m²
31. The external lens shall have a textured outer surface to reduce glare.
32. Icons that are printed on the lens shall be on the interior surfaces in order to prevent scratching and abrasion to the icons.
33. All icons and numbers shall have a uniform incandescent non-pixelated appearance.
34. All exposed components of a ped module shall be suitable for prolonged exposure to the environment, without appreciable degradation that would interfere with function or appearance. As a minimum, selected materials shall be rated for service for a period of a minimum of 60 months in a south-facing Arizona Desert installation.
35. All LEDs used to illuminate the ped module shall use material that has industry acceptance for use in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.

36. The countdown display shall consist of two 7 segment digits as shown below. All countdown display digits shall be 9 inches in height for use in all size crosswalks in compliance with MUTCD recommendations.

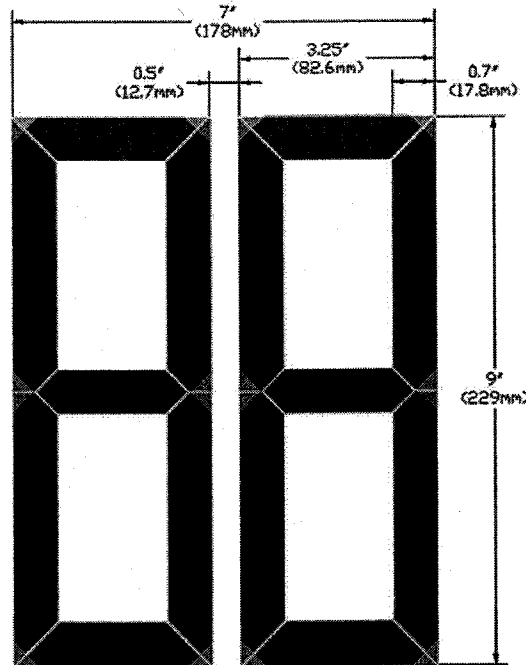


Figure 2: Countdown Display

37. Ped modules shall be repaired or replaced if the ped module fails to function as intended due to workmanship or material defects within warranty period.
38. Ped modules shall be repaired or replaced if the ped module exhibit luminous intensities less than the minimum specified values within 60 months of the date of delivery.
39. The manufacturer shall clearly disclose the country in which the factory of ped module origin is located, the name of the company or organization that owns the factory including all of its parent companies and organizations, and their respective country of corporate citizenship.

R. Pedestrian, Bicycle and Equestrian Push Buttons

Pedestrian, bicycle, and equestrian push buttons shall conform to the provisions in Section 86-5.02, "Pedestrian Push Button Assemblies", of the Standard Specifications and these Special Provisions.

Push button assembly shall be Type B per Standard Plans ES-5C.

Push button housing shall be die-cast or permanent mold cast aluminum powder coated frame with stainless steel inserts and sign screws.

Push button sign shall be white powder coat base with black heat cured ink. Right and left arrow signs shall be doubled sided.

Push button shall be Polara Engineering, Inc. model BDLM2-Y, or approved equal.

Push button shall utilize solid state Piezo switch technology, pressure activated, two-tone audible, visual LED confirmation of actuation and shall be ADA compliant.

The equestrian push buttons (EPB) shall be installed at 6 feet above finish grade or as directed by the Engineer. The Engineer shall approve the EPB placement on each pole prior to installation.

S. Detectors

Detectors shall conform to the provisions in Section 86-5, "Detectors", of the Standard Specifications and these Special Provisions.

Delay timers shall delay calls only during display of the associated red or yellow indications. If a vehicle departs the area of detection prior to expiration of the assigned delay period, the timer shall reset and no call shall be placed upon the controller. During display of the associated green indication, detectors shall operate in the present mode and calls shall not be delayed.

Video Detection

The contractor shall furnish and install video detection cameras (VDC), video detection processors (VDP), extension modules (EM), access module (AM), an industry standard 3-button USB mouse, a drawer mounted 17 inch LCD monitor, surge suppressors, and all necessary cabling and auxiliary equipment to make the video detection systems fully functional for the intended operation. The Contractor shall furnish a spare VDC, a spare EM, and a spare VDP to the Engineer.

All equipment supplied shall come from and qualified by the VDP supplier to ensure proper system operation.

The VDC shall attach to the top of luminaire mast arm using mounting bracket provided by manufacturer, or the backside of signal mast arm using Pelco Astrobrac with 6' extension or approved equal. The Engineer shall approve the final camera placements.

The video detection systems shall be installed by supplier factory certified installers per recommended method provided in the supplier's installation manuals. Proof of factory certification shall be provided.

Video Detection Zones:

Placement of detection zones shall be done by using the supplied USB mouse connected to the VDP. Detection zones are drawn on the video image from the video camera displayed

on a video monitor using the menu and graphical interface built into the VDP. The menu shall facilitate placement of detection zones and setting of zone parameters or to view system parameters.

Detection zone setup shall not require site-specific information such as latitude, longitude, date and time to be entered into the system. No separate computer shall be required to program the detection zones.

Each detection zone shall be user definable in size and shape to suit the site and the desired vehicle detection region. A detection zone shall be approximately the width and length of one car.

A single detection zone shall be able to replace multiple inductive loops and the detection zones shall be OR'ed as the default or may be AND'ed together to indicate vehicle presence on a single phase of traffic movement.

The VDP shall provide a minimum of 24 channels of vehicle presence detection/detection zones per camera through a standard detector rack edge connector and one or more EMs.

The Video Detection System shall be in compliance with California State Assembly Bill 1581. The system will be able to discriminate between bicycles and automobiles and be able to send bicycle and vehicle actuations from the same lanes to different detection outputs. Additionally the system shall allow an extension time for bicycles that will not apply to vehicular traffic.

Functional Capabilities:

System must have a single point access to multiple rack-mounted video detection units. The access device shall provide interface capabilities to enable multiple rack-mounted video detection processors to be locally and remotely accessed from a single point via one set of user interface devices.

The camera shall be able to transmit the composite video signal, with minimal signal degradation, up to 1000 feet under ideal conditions.

The EM shall be plugged into the appropriate slot in the detector rack to avoid the need of rewiring the detector rack. The extension module shall be connected to the VDP by an 8-wire cable with modular connectors.

The EM and VDP communications shall be accommodated by methods using differential signals to reject electrically coupled noise. The EM shall be available in both 2 and 4 channel configurations programmable from the VDP.

The VDP shall have video input in NTSC composite video format and shall be digitized and analyzed in real time.

The VDP shall have a nine-pin RS232 port that is multi-drop compatible for communications with an external computer. The VDP shall be able to accept new detector

patterns from and send its detection patterns to an external computer through this RS-232 port. A Windows™ based software designed for local or remote connection for uploading and downloading data, and providing video capture, real-time detection indication and detection zone modification capability shall be provided with the system.

The VDP shall store up to three different detection zone patterns within the VDP memory. The VDP's memory shall be non-volatile to prevent data loss during power outages. The VDP shall continue to operate (e.g. detect vehicles) using the existing zone configurations even when the operator is defining/modifying a zone pattern. The new zone configuration shall not go into effect until the operator saves the configuration. Each configuration can be uniquely labeled for identification and the current configuration letter is displayed on the monitor. The selection of the detection zone pattern for current use shall be done through a local menu selection or remote computer via RS-232 port. It shall be possible to activate a detection zone pattern for a camera from VDP memory and have that detection zone pattern displayed within 1 second of activation.

The VDP shall provide dynamic zone reconfiguration to enable normal detector operation of existing channels except the one where a zone is being added or modified during the setup process. The VDP shall output a constant call on any detection channel corresponding to a zone being modified.

The VDP shall detect vehicles in real time as they travel across each detector zone.

The VDP shall output a constant call for each enabled detector output channel if a loss of video signal occurs. The VDP shall output a constant call during the background learning period. The background learning period shall be not more than three minutes.

The VDP shall be capable of detecting a low-visibility condition automatically, such as fog, and place all defined detection zones in a constant call mode. The VDP shall automatically revert to normal detection mode when the low-visibility condition no longer exists. A user-selected output shall be active during the low-visibility condition that can be used to modify the controller operation if connected to the appropriate controller input modifier(s).

Detection shall be at least 98% accurate in good weather conditions and at least 96% accurate under adverse weather conditions (rain, snow, or fog). Detection accuracy is dependent upon site geometry; camera placement, camera quality and detection zone location, and these accuracy levels do not include allowances for occlusion or poor video due to camera location or quality.

Detection zone outputs shall be configurable to allow the selection of presence, pulse, extend, and delay outputs. Timing parameters of pulse, extend, and delay outputs shall be user definable between 0.1 to 25.0 seconds.

Up to six detection zones shall be capable to count the number of vehicles detected. The count value shall be internally stored for later retrieval through the RS-232 port. The data collection interval shall be user definable in periods of 5, 15, 30 or 60 minutes.

System software shall

- Utilize a dual redundant hybrid tracking algorithm to enhance vehicle presence detection and data collection.
- Include a moving shadow and occlusion rejection algorithm that is activated by selection of a drop down menu tab.
- Include a menu selectable zone type labeled "Bike" that is specifically designed to detect bicycles.
- Include a virtual QWERTY keyboard that is present when performing any labeling functions for the detection zones and cameras.
- Include the ability to copy completed zones with one mouse click, drag and drop single zones, rows of zones together and entire detection configurations.

VDP & EM Hardware:

The VDP and EM shall be specifically designed to mount in a standard NEMA TS-1, TS-2, 2070 ATC, 170 type detector rack, using the edge connector to obtain power and provide contact closure outputs. No adapters shall be required to mount the VDP or EM in a standard detector rack. Detector rack rewiring shall not be required or shall be minimized.

Both VDP and EM shall operate in a temperature range from -34°C to +74°C and a humidity range from 0% RH to 95% RH, non-condensing.

Both VDP and EM shall be powered by 12 or 24 volts DC. These modules shall automatically compensate for the different input voltages.

Both VDP and EM shall include detector output pin out compatibility with industry standard detector racks.

Both VDP and EM shall have a detector test switch on the front panel to allow the user to place calls on each channel. The test switch shall be able to place either a constant call or a momentary call depending on the position of the switch.

The VDP power consumption shall not exceed 300 milliamps at 24 VDC. The EM power consumption shall not exceed 120 milliamps at 24 VDC.

The VDP shall utilize flash memory technology to enable the loading of modified or enhanced software through the RS232 port without modifying the VDP hardware.

The VDP shall include the following on the front panel:

- A multi-drop compatible RS232 port, a 9-pin "D" subminiature connector, for serial communications with a remote computer.

- Detection indication such as LED for each channel of detection that display detector outputs in real time when the system is operational.
- One or two BNC video input connection suitable for RS170 video inputs as required. The video input shall include a switch selectable 75-ohm or high impedance termination to allow camera video to be routed to other devices, as well as input to the VDP for vehicle detection. Video must be inputted via a BNC connector on the front face of the processor. RCA type connectors/jacks for video input are not allowed. Video shall not be routed via the edge connectors of the processor.
- One BNC video output providing real time video output that can be routed to other devices. A RCA type connector/jack for video output is not allowed.

Video Detection Camera:

The camera shall be housed in a weather-tight sealed enclosure consists of the following:

1. The enclosure shall be made of 6061 anodized aluminum.
2. The enclosure shall be field rotatable to allow proper alignment between the camera and the traveled road surface.
3. The enclosure shall be equipped with a sunshield. The sunshield shall include a provision for water diversion to prevent water from flowing in the camera's field of view. The camera enclosure with sunshield shall be less than 6" diameter, less than 18" long, and shall weigh less than 6 pounds when the camera and lens are mounted inside the enclosure.
4. The enclosure shall be design so that the pan, tilt and rotation of the camera assembly can be accomplished independently without affecting the other settings.
5. The enclosure shall include a proportionally controlled Indium Tin Oxide heater design that maximizes heat transfer to the lens. The output power of the heater shall vary with temperature, to assure proper operation of the lens functions at low temperatures and prevent moisture condensation on the optical faceplate of the enclosure.
6. The glass face on the front of the enclosure shall have:
 - a. An anti-reflective coating to minimize light and image reflections.
 - b. A special coating to minimize the buildup of environmental debris such as dirt and water.

The camera shall produce a useable video image of the bodies of vehicles under all roadway lighting conditions, regardless of time of day. The minimum range of scene luminance over which the camera shall produce a useable video image shall be the minimum range from nighttime to daytime, but not less than the range 1.0 lux to 10,000 lux.

The imager luminance signal to noise ratio shall be more than 50 dB. In harsh backlit conditions, vehicles can be detected flawlessly with >100dB of dynamic range.

The camera shall be digital signal processor based and shall use a CCD sensing element and shall output color video with resolution of not less than 540 TV lines. The CCD imager shall have a minimum effective area of 811(h) x 508(v) pixels.

The camera shall include an electronic shutter control based upon average scene luminance and shall be equipped with an auto-iris lens that operates in tandem with the electronic shutter.

The camera shall utilize automatic white balance.

The camera shall include a variable focal length lens with variable focus that can be adjusted, without opening up the camera housing, to suit the site geometry by means of a portable interface device designed for that purpose and manufactured by the detection system supplier.

The horizontal field of view shall be adjustable from 5.4 to 50.7 degrees. This camera configuration may be used for the majority of detection approaches in order to minimize the setup time and spares required by the user. The lens shall have a 27x zoom.

The lens shall also have an auto-focus feature with a manual override to facilitate ease of setup.

The camera shall incorporate the use of preset positioning that store zoom and focus positioning information. The camera shall have the capability to recall the previously stored preset upon application of power.

The camera electronics shall include automatic gain control to produce a satisfactory image at night.

When mounted outdoors in the enclosure, the camera shall operate satisfactorily in a temperature range from -34 °C to +60 °C and a humidity range from 0% RH to 100% RH. Measurement of satisfactory video shall be based upon VDP system operation.

The camera shall be powered by 120-240 VAC 50/60 Hz. Power consumption shall be 30 watts or less under all conditions.

The camera shall view approaching vehicles at a distance not to exceed 350 feet for reliable detection (height to distance ratio of 1:10). Camera placement and field of view shall be unobstructed and as noted in the installation documentation provided by the supplier.

There shall be at least 2 options for camera set up, diagnostic testing, and viewing video when it is mounted on mast arm or pole using lens adjustment module supplied by the VDP supplier:

1. Connected directly to the camera.

2. Connected to the coaxial cable from the cabinet.

The video signal shall be fully isolated from the camera enclosure and power. Cable terminations at the camera for video and power shall not require crimping tools.

No BNC or other connector shall be used for the coaxial video cable termination at the camera.

The power connection at the camera shall use connector terminations that only require the use of wire strippers and a standard screwdriver. No special crimping tools or other types of terminations shall be used.

A weather-proof protective cover shall be provided to protect all terminations at the camera. No special tooling shall be required to remove or install the protective cap.

Cabling and Cable Connections:

The coaxial cable to be used between the camera and the VDP in the traffic cabinet shall be Belden 8281. The coax cable shall be a continuous unbroken run from the camera to the VDP. This cable shall be suitable for installation in conduit or overhead with appropriate span wire. A BNC plug connector shall be used at the cabinet end. The coaxial video cable shall be stripped and terminated at the camera and cabinet per manufacturers' instructions (no BNC or other connector shall be used at the camera). The coaxial cable, BNC connector used at the cabinet termination, and crimping tool shall be approved by the supplier of the video detection system and the manufacturer's instructions must be followed to ensure proper connection.

The power cable shall be three 16 AWG conductor cable with a minimum outside diameter of 0.325 inch and a maximum diameter of 0.490 inch. The power cable shall be terminated at the camera per manufacturers' instructions and shall only require standard wire strippers and a screw driver for installation (no special connectors or crimping tools shall be used for installation). The cabling shall comply with the National Electric Code, as well as local electrical codes. Cameras shall not acquire power from the luminaire.

A Din Rail mounted AC power panel assembly shall be supplied by the video detection manufacturer that will include a minimum of one convenience receptacle, four camera chassis ground connections, four camera AC neutral (AC-) connections, four 2 amp camera circuit breakers for hot (AC+) connections, and one AC source connection for Line, Neutral and Ground wires. A Din Rail video surge suppression protection panel assembly shall also be supplied by the video detection manufacturer. One panel shall accommodate up to six EDCO surge suppressors. This equipment shall be installed, including termination of all necessary wiring, per the video detection manufacturer requirements for the intended use.

Maintenance and Support:

The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the system. These parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale for said parts.

The supplier shall maintain an ongoing program of technical support for the access unit and video detection system. This technical support shall be available via telephone, or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale for on-site technical support services.

Installation or training support shall be provided by factory-authorized representative.

All product documentation shall be written in the English language.

T. Luminaries

Luminaires shall conform to the provisions in Section 86-6, "Lighting", of the Standard Specifications and these Special Provisions.

Luminaires shall be of the cutoff type and shall be 200, 250 or 400 ~~or 250~~ Watt High Pressure Sodium Vapor as shown on the plans. The fixtures shall be constructed with flat lenses, integral ballasts, and detachable power unit assemblies. The power unit assemblies shall contain the ballast, starter board, capacitors, and a heavy-duty terminal block.

Each luminaire shall be furnished without the photoelectric unit receptacle.

Each luminaire shall have a 5-amp inline fuse installed inside the standard's hand hole.

U. Internally Illuminated Street Name Sign

Internally illuminated street name signs (IISNS) shall conform to the provisions in Section 86-6.09, "Internally Illuminated Street Name Signs", of the Standard Specifications and these Special Provisions.

The sign fixture, panels, and mounting assemblies shall be designed and constructed to prevent deformation, warp or failure when subjected to a minimum of 100 mph wind loads, as set forth in the latest AASHTO publication, "Standard Specifications for Structural Supports of Highway Signs, Luminaires, and Traffic Signals", and amendments thereto. The IISNS manufacturer shall submit a certificate of compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance", with each lot of IISNSs delivered.

The IISNS shall be double-faced Edge-lit LED sign with white translucent diamond grade reflective border, arrows, and lettering using 12" uppercase and 9" lowercase Clearview Series 5-W fonts. The background shall be green match color no. 14109 of FED-STD-595.

The standard IISNS height shall be 2' and length shall be 6', 8' or 10' attached to the 10 feet IISNS mast arm with Pelco SE-5015 mast arm sign bracket, or approved equal, per County Standard No. 1200.

V. Photoelectric Controls

Photoelectric controls shall conform to the provisions in Section 86-6.07, "Photoelectric Controls", of the Standard Specifications and these Special Provisions.

Photoelectric controls shall be a dual Type V for luminaires and internally illuminated street name signs conforming to the County Standards No. 1207.

Photoelectric units shall be the delay type.

W. Emergency Vehicle Preemption System

Furnish and install complete and functioning emergency vehicle preemption (EVP) system as intended per plans, the manufacturer, and these special provisions.

The EVP system shall consist of the following equipments or components:

- Optical detector for each approach, as shown on the plans
- Rack-mounted 24-channel phase selectors for 8-phase operation
- Detector cable

The Contractor shall furnish the following spare EVP equipments or components:

- One (1) rack-mounted 24-channel phase selector
- One (1) optical detector

The EVP system shall be designed to prevent simultaneous pre-emption by two or more emergency vehicles on separate approaches to the intersection.

The Engineer shall approve EVP sequence of operation prior to timing and turn-on of each respective traffic signal.

At locations where optical detectors are not to be installed, EVP cable shall be installed for future use. The following also apply:

1. EVP cable shall be installed, without splices, between the controller cabinet and each mast arm traffic signal pole.
2. EVP cable shall be connected to the EVP rack terminals within the controller cabinet.

3. Each mast arm EVP detector mounting shall be drilled and tapped in its ultimate location. In lieu of the detector, install approved water tight UL listed electrical box. EVP cable shall be installed to terminate within the mast arm mounted electrical box. Excess cable shall be coiled within the electrical box sufficient for future installation of the EVP system.

Optical Detector

The optical detector shall be mounted on the indicated signal mast arm per County Standard No. 1202.

Each optical detector shall be waterproof unit capable of receiving optical energy from dual directions and have an adjustable turret configuration. The reception angle for each optical detector unit shall be a minimum of eight (8) degrees in all directions about the aiming axis of the unit.

Dual detectors shall utilize only one optical cable per detector.

Internal circuitry shall be solid state and electrical power shall be provide by the associated discrimination module.

Each optical detector unit shall have a minimum of a $\frac{1}{2}$ 3/4 inch NPT opening used for mounting and for bringing the connecting cable into the terminal block located within the assembly. The housing shall be provided with weep holes to permit drainage of condensed moisture.

Each optical detector shall be installed, wired, and aimed as specified by the manufacturer.

Cable

Optical detector cable shall meet the requirements of IPCEA-S-61-402/NEMA WC 5, Section 7.4, 600 V Control cable, 75 degrees C, Type B, and the following:

1. The cable shall contain 3 conductors, each of which shall be AWG# 20 (7 x 28) stranded, tinned copper. Insulation of individual conductors shall be color-coded: 1-Yellow, 1-Orange, and 1-Blue.
2. The shield shall be either tinned copper braid or aluminized polyester film with a nominal 20% overlap. When film is used, an AWG# 20 (7 x 28) stranded, tinned, bare drain wire shall be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
3. The jacket shall be marked as required by IPCEA/NEMA.

The cable run between each detector and the Traffic Controller cabinet shall be continuous without splices.

Phase Selector

Each phase selector shall be compatible and usable with a Model 170E or 2070 controller unit, and shall be mounted in the input file of a Model 332 or Model 333 JP controller cabinet.

Each phase selector shall be capable of operating at least two or more channels, each of which shall provide an independent output for each separate input.

Phase Selector shall be a four-channel, dual priority, Multimode encoded signal device designed for use with both infrared and GPS emitters and optical detectors.

Phase Selectors and Optical detectors shall be manufactured by a single manufacturer

Phase Selector shall recognize and discriminate among three distinct frequency rates via high priority, low priority and probe priority infrared and GPS signals.

Phase selector shall further discriminate among 254 agency ID's, 15 classes of vehicle identification codes and 10,000 individual vehicle codes per class, for more than 38 million total per priority level.

Phase selector shall be capable of operating unlimited intersections and directions.

Phase selector shall have on the front panel, USB, serial and Ethernet capabilities

Phase selector shall be capable of accepting infrared signals from LED and or strobe technologies

Phase selector shall store the following records:

Intersection name

Date and time of activity

Vehicle class and code of activating vehicle

Activating vehicle's ID number

Agency ID

Channel called

Priority of the activity

Final green activity displayed at end of call

Time spent in the final greens

Duration of the activity

Turn signal status

Relative priority level

Capability to playback up to the last 250 seconds of the 100 most recent calls

Each phase selector, when used with its associated optical detectors, shall perform as a minimum, the following:

1. Receive Class I and Class II signals.
2. Decode the signals based on optical frequency, at 9.639 Hz + or -0.119 Hz for Class I signals and 14.035 Hz + or -0.255 Hz for Class II signals.

3. Establish the validity of received signals based on optical frequency and length of time received. A signal shall be considered valid only when received for more than 0.50 second. No combination of Class I signals shall be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of 10 signals. Once a valid signal has been recognized, the effect shall be held by the module, in the event of temporary loss of signal for a minimum period of 4.0 seconds.
4. Provide an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 170 controller unit. For a Class I signal, the output shall be a 6.25 Hz + or - 0.1 %, rectangular waveform with a 50 % duty cycle. For Class II signal, the output shall be steady.

Each phase selector shall receive power from the controller cabinet at either 12 VDC or 120 VAC.

Auxiliary inputs for each channel may enter each module through a front panel connector or by a parallel hook-up of the associated detector cables at the input location.

The phase selector shall provide an optically isolated output for each channel to the Model 170 controller unit. All outputs signals shall comply with NEMA signal level definitions and shall be compatible with the Model 170 controller assemblies' inputs.

Each phase selector shall be provided with means of preventing transients received by the detector from affecting the Model 170 controller assembly.

Each phase selector shall have a single connector board and shall occupy one slot of the input file. The front panel of each phase selector module shall have a handle to facilitate withdrawal and have the following controls and functions for each channel:

1. Range adjustments for both class I and Class II signals.
2. A 3-position, center off, momentary contact switch, one position (down) labeled for test operation of Class I signals, and one position (up) labeled for test operation of Class II signals.
3. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indications denote that a signal, which is not valid, has been received; a "call" indication denotes a steady, valid signal has been received. These 2 indications may be accomplished with a single indication lamp.

In addition, the front panel shall be provided with additional connectors or ports used to perform other functions as specified by the manufacturer.

Cabinet Wiring

Wiring for a Model 332 cabinet shall conform to the following:

1. Slots 12 and 13 of input file "J" shall be wired to accept either a 2 channel or a 4 channel module.
2. Field wiring for the primary detectors, except the 24 VDC power, shall terminate on either terminal block TB-9 in the controller cabinet or on the rear of input file "J", depending on cabinet configuration. Where TB-9 is used, position assignments shall be as follows:
 - a. TB-9 - 1 = Not Used
 - b. TB-9 - 2 = + 24 VDC Out (Orange)
 - c. TB-9 - 3 = + 24 VDC Out (Orange)
 - d. TB-9 - 4 = EVA Detector (Yellow)
 - e. TB-9 - 5 = EVC Detector (Yellow)
 - f. TB-9 - 6 = DC Common Out (Blue)
 - g. TB-9 - 7 = EVB Detector (Yellow)
 - h. TB-9 - 8 = EVD Detector (Yellow)
 - i. TB-9 - 9 = DC Common Out (Blue)

Assuming TB9 - 2 and TB9 - 3 are unused on the "J" File, move wires on J11-J & J11-K (Twisted Pair) to J12-E & J13-E, respectively.

Field wiring for auxiliary detectors may terminate on terminal board TB-0 (If unused) in the controller cabinet. Use manufactures recommended wiring for these connections.

System Operation

The contractor shall demonstrate that the components of each system are compatible and will perform satisfactorily as a system. Satisfactorily performance shall be determined using the following test procedure during the functional test period:

1. Each system to be used for testing shall consist of an optical detector, an optical detector cable and a phase selector module.
2. The phase selector shall be installed in the proper input file slot of the Model 332 or 333 controller cabinet assembly.
3. Two tests shall be conducted; one using a Class I signal emitter and a distance of 1000 feet between the emitter and the detector, the other using a Class II signal emitter and a distance of 1800 feet between the emitter and the detector. Range adjustments on the phase selector shall be set to "Maximum" for each test.
4. During the tests of the Class I and Class II emitters, the proper response from the Model 170E and 2070 controller unit during the "ON" interval and there shall be no

improper operation of the Model 170E or 2070 controller unit or the monitor during the "OFF" interval.

Arrange for a technician from the EVP manufacturer, to be present for the first day of the traffic signal and lighting function test to insure proper installation and functioning of the EVP equipment.

Arrange for a technician from the controller assembly manufacturer to perform any controller modifications required for the installation, or operation, of the EVP equipment.

X. GPS Universal Time Sources

The GPS Universal Time Source shall be a McCain model M32755 or approved equal. The Engineer shall approve any alternate GPS time source prior to installation.

The GPS Universal Time Source shall incorporate a precision GPS receiver and a microprocessor to decode the time signals received from the GPS satellite network. The Universal Time Source shall interface this time signal to a model 170E controller (using Bi-Tran local software) to provide an accurate clock update to the traffic signal controller.

The GPS Universal Time Source shall meet or exceed the following criteria:

- Operate in temperatures from -30°C to $+80^{\circ}\text{C}$.
- Receive power through 170E controller's ACIA port.
- Provide 170E controller with the time, date, and day of the week data.
- Software configured time zone and daylight savings operations.
- Support RS-232C serial data rates at 300, 600, 1200, 2400, 48000, 9600 and 19200 bps.
- Provide LED indicators for communication status to a satellite.
- Provide a weatherproof disc antenna no greater than 3" diameter x 1" height to be mounted directly to the top of the traffic signal controller cabinet.
- Provide all cabling and connectors with the correct pin assignments to interface the GPS unit to antenna and to 170E controller.

Proper gaskets or other weatherproofing materials for the antenna shall be supplied and installed to prevent water or moisture from entering the traffic signal controller cabinet.

Y. Battery Backup System

This special provision establishes the minimum requirements for a battery backup system (BBS) that shall provide power to a traffic signal system in the event of a power failure or interruption.

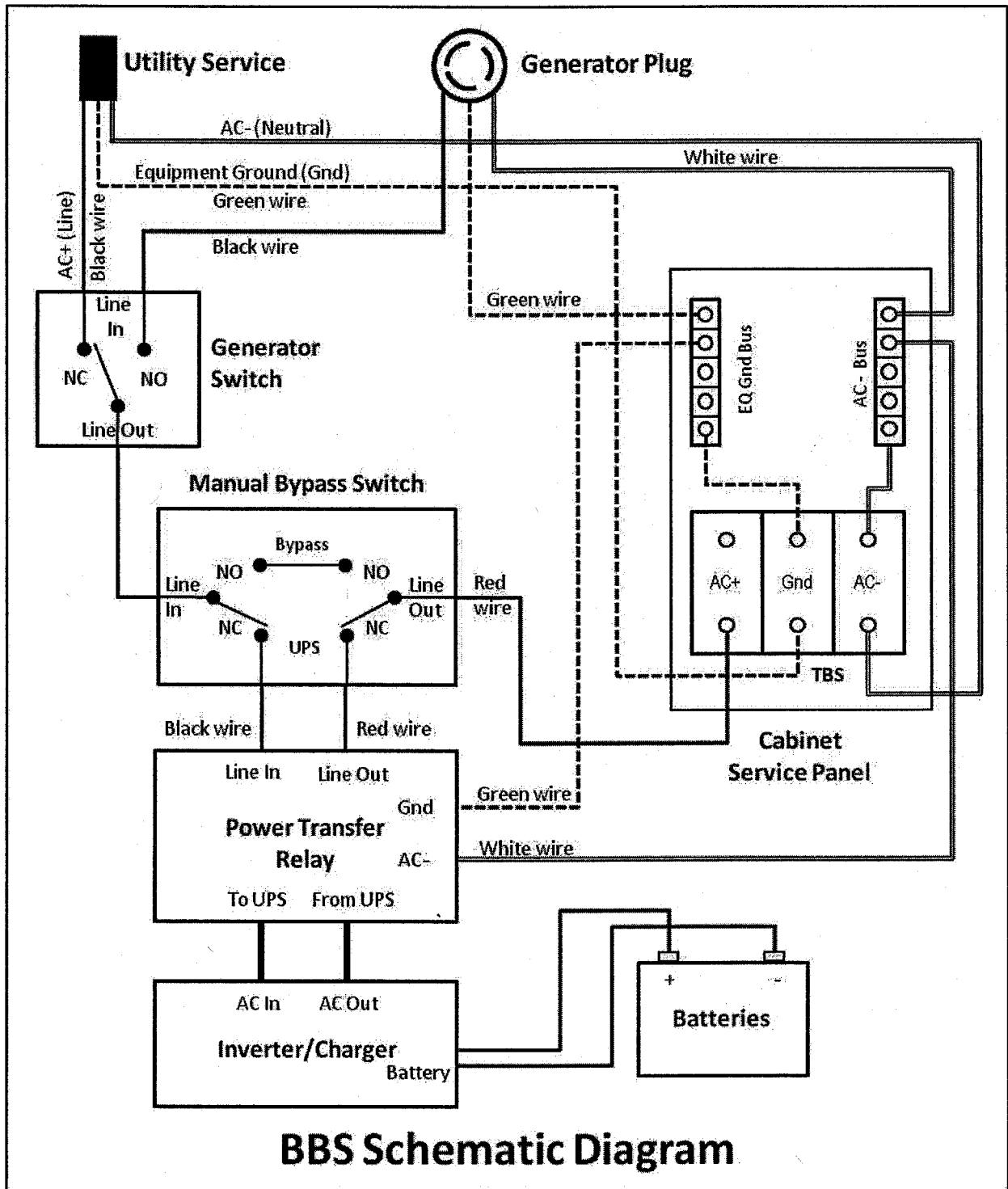
The BBS shall be designed for outdoor applications, in accordance with the current edition of Chapter 1, Section 8 requirements of Transportation Electrical Equipment Specifications (TEES).

The BBS batteries shall be external to the traffic signal controller cabinet as specified under "External Battery Cabinet Option" herein unless specified otherwise.

BBS cabinet shall be listed on the current Caltrans pre-qualified product list. The BBS shall include, but not limited to the following:

- cabinet,
- utility line/generator switch,
- inverter/charger,
- power transfer relay,
- a separate manually operated non-electronic bypass switch,
- batteries,
- all necessary hardware, shelving, and interconnect wiring.

The following figure shows BBS components interconnecting with each other and the controller cabinet to ensure interchangeability between all BBS manufacturers.

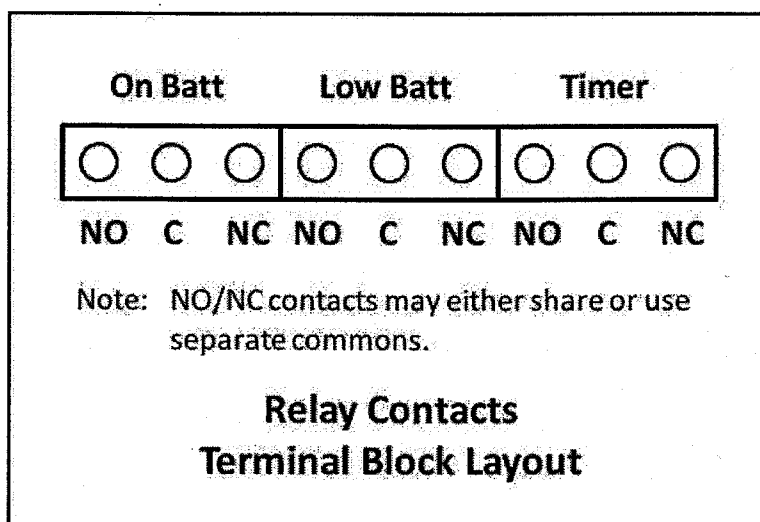


Operation

The BBS shall provide a minimum two (2) hours of full run-time operation for an intersection equipped with all LED traffic signal indications (minimum 1100W active output capacity, with 80% minimum inverter efficiency)- and 2 (2) hours of flashing operation.

The maximum transfer time allowed, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries, shall be 65 milliseconds. The same maximum allowable transfer time shall also apply when switching from inverter line voltage to utility line voltage.

The BBS shall provide the user with six (6)-sets of fully programmable normally open (NO) and normally closed (NC) single-pole double-throw (SPDT) dry relay contact closures, available on a panel-mounted terminal block, rated at a minimum 120V/1A, and labeled so as to identify each contact. See below figure for typical configuration.



The first set of NO and NC contact closures shall be energized whenever the unit switches to battery power. Contact shall be labeled or marked “On Batt”.

The second set of NO and NC contact closures shall be energized whenever the battery approaches approximately 40% of remaining useful capacity. Contact shall be labeled or marked “Low Batt”.

The third set of NO and NC contact closures shall be energized two hours after the unit switches to battery power. Contact shall be labeled or marked “Timer”.

The six programmable NO and NC contact closures shall be independently configured to activate under any of the following conditions: On Battery, Low Battery, Timer, Alarm, or Fault.

Operating temperature for inverter/charger, power transfer relay and manual bypass switch shall be $-37\text{ }^{\circ}\text{C}$ to $+74\text{ }^{\circ}\text{C}$.

Both the Power Transfer Relay and Manual Bypass Switch shall be rated at 240VAC/30 amps, minimum.

The BBS shall use a temperature-compensated battery charging system. The charging system shall compensate over a range of $2.5 - 4.0\text{ mV/ }^{\circ}\text{C}$ per cell.

The temperature sensor shall be external to the inverter/charger unit. The temperature sensor shall come with 10' of wire.

Batteries shall not be recharged when battery temperature exceeds $50\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

BBS shall bypass the utility line power whenever the utility line voltage is outside of the following voltage range: 100VAC to 130VAC ($\pm 2\text{VAC}$).

When utilizing battery power, the BBS output voltage shall be between 110 VAC and 125 VAC, pure sine wave output, $\leq 3\%$ THD, $60\text{Hz} \pm 3\text{Hz}$.

BBS shall be compatible with NEMA and Model 332 and 333JP Cabinets, and Model 170, 390 & 2070 Controllers and cabinet components for full time operation.

In cases of low (below 100VAC) or absent utility line power, when the utility line power has been restored at above $105\text{ VAC} \pm 2\text{ VAC}$ for more than 30 seconds, the BBS shall transfer from battery backed inverter mode back to utility line mode.

In cases of high utility line power (above 130VAC), when the utility line power has been restored at below $125\text{VAC} \pm 2\text{ VAC}$ for more than 30 seconds, the BBS shall transfer from battery backed inverter mode back to utility line mode.

The BBS shall have an automatic tap to step up or step down the output voltage by 10 percent. The resulting output voltages shall remain within the above prescribed voltage range: 100VAC to 130VAC. This capability will extend BBS range for operating on input AC and not reverting to battery power.

BBS shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service.

In the event of inverter/charger failure, battery failure or complete battery discharge, the power transfer relay shall revert to the NC (and de-energized) state, where utility line power is connected to the cabinet.

Recharge time for the battery, from "protective low-cutoff" to 80% or more of full battery charge capacity, shall not exceed twenty (20) hours.

Mounting / Configuration

Generator Switch, Inverter/Charger, Power Transfer Relay and manually operated Bypass Switch shall fit inside a typical fully equipped traffic signal controller cabinet.

Mounting method inside the 332 and 333JP cabinet shall be shelf-mount, rack-mount or combination of either. Available rack space for front-mounted inside the 332 and 333JP cabinet is 3U or approximately 6 inches.

All interconnect wiring provided between Generator Switch, Inverter/Charger, Power Transfer Relay, Bypass Switch and Cabinet Terminal Service Block shall be no less than 9 feet of UL Style 1015 CSA TEW with the following characteristics:

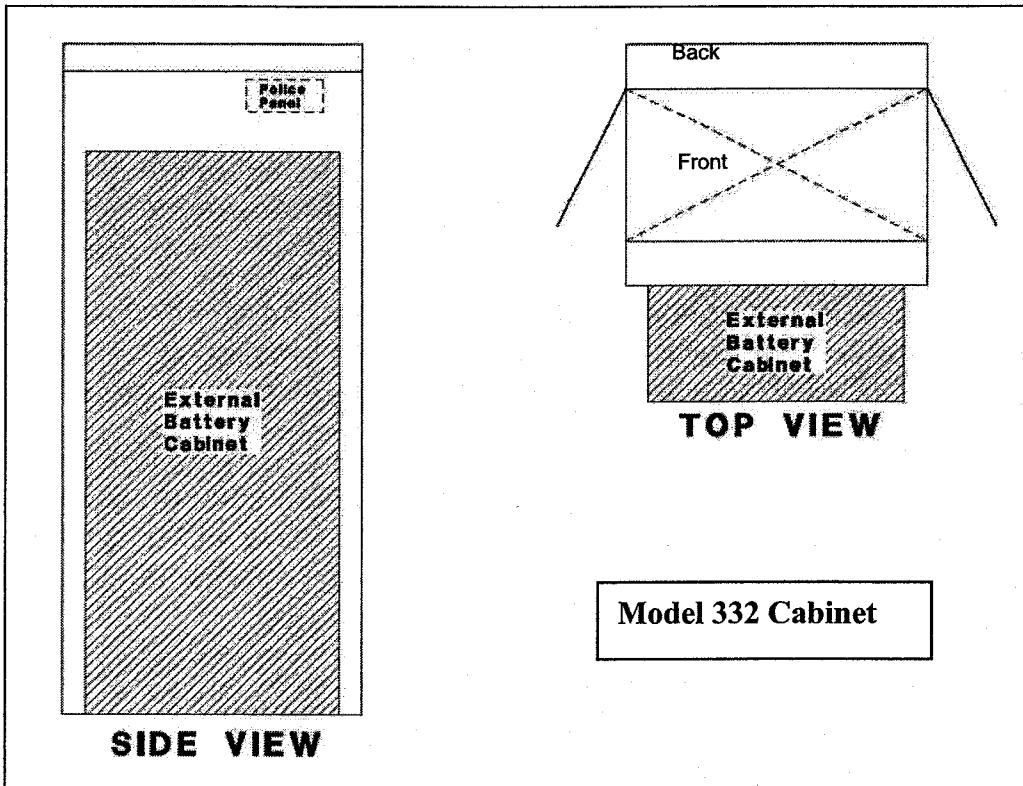
- AWG Rating: 10 AWG
- Stranding: 105 strands of 30 10 AWG tinned copper
- Rating: 600 V, 105 °C, PVC Insulation

Relay contact wiring provided for each set of NO/NC relay contact closure terminals shall be 9 feet of UL Style 1015 CSA TEW 18 AWG wire, same ratings as above, except 16 strands of 18 AWG tinned copper.

All necessary hardware for mounting (shelf angles, rack, etc) shall be included in the **contract price paid** for the BBS, and no additional compensation will be allowed therefor.

External battery cabinet option

Batteries shall be housed in an external cabinet mounted to the side of the controller cabinet as shown in the following figure or as directed by the Engineer with a minimum of eight (8) bolts:



If BBS is installed at the back of controller cabinet, the modification shall include a minimum of 36 inches wide concrete walkway access to the BBS without encroaching outside the right-of-way. BBS shall be installed at the front of the controller cabinet (in locations where the back of the controller cabinet has limited ROW or conflicting structures and facilities and other obstructions), the BBS cabinet shall not cover the police panel. The BBS cabinet shall also not hinder the access ramp's compliance with ADA requirements.

Four shelves shall be provided within the battery cabinet. There shall be a minimum of 12 inches clearance between shelves. Each shelf shall be a minimum of 9" X 25", and capable of supporting a minimum of 125 lbs. Batteries shall be mounted on individual shelves.

The external battery cabinet shall be NEMA 3R rated in accordance to Section 2-Housings of the Chapter 7 of TEES, for the construction of the cabinet and anodic coating finish.

The external battery cabinet shall be ventilated through the use of louvered vents, filter, and one thermostatically controlled fan in accordance to Section 2-Housings of the Chapter 7 of TEES.

External battery cabinet fan shall be AC operated from the same line output of the Manual Bypass Switch that supplies power to the controller cabinet.

The external battery cabinet shall have a door opening to the entire cabinet. The door shall be attached to the cabinet through the use of a continuous stainless steel piano hinge or four, two-bolts per leaf, hinges in accordance to Section 2-Housings of the Chapter 7 of TEES. The door shall use a three-point, roller locking mechanism and standard #2 key lock to lock the door. The door shall have a stainless steel handle.

The external cabinet shall be equipped with a generator twist lock flanged inlet receptacle, manual transfer switch and bypass switch.

The twist lock flanged inlet receptacle shall be Hubbell 2615, NEMA L5-30P, Twist Lock Flanged Male Inlet Rated for 30A/125V or approved equal. Receptacle shall be mounted flush to the cabinet in a weatherproof lift cover plate made of impact-resistant thermoplastic and gray in color.

The bypass switch shall transfer the load, including the UPS to the twist lock inlet receptacle. The manual transfer switch shall be wired to prevent any back feed to the utility service. Both the bypass switch and manual transfer switch shall be rack mounted independently in BBS cabinet meeting industry standards.

The BBS with external battery cabinet shall come with all bolts, conduits and bushings, gaskets, shelves, and hardware needed for mounting.

Maintenance, Displays, Controls and Diagnostics

The BBS shall include a 2 line by 40 character LCD display to indicate current battery charge status, input/output voltages, time and settings of various conditions. The same parameters shall be available via RS232 or USB interfaces on the face of the BBS.

The BBS shall have lightning surge protection compliant with IEEE/ANSI C.62.41.

The BBS shall be capable of accepting firmware upgrades of the non-volatile, read-only memory via serial port communications. The updates shall be accomplished by uploading the software to the BBS over the RS232 serial port located on the face of the BBS.

The BBS shall be equipped with an integral system to prevent battery from destructive discharge and overcharge.

The BBS shall be capable of performing a SELF-TEST, locally from the BBS front panel LCD, or remotely via RS232 or USB interface. The duration of the SELF-TEST shall be programmable in 1-minute increments from 1 minute to 255 minutes.

The BBS and batteries shall be easily replaced with all needed hardware and shall not require any special tools for installation.

The BBS shall include a re-settable inverter event counter to indicate the number of times the BBS was activated and the total number of hours the unit has operated on battery power, accessible via the LCD screen or remotely via RS232 or USB.

The BBS shall be equipped with an event log that stores for a minimum the last 100 events. The events shall be time and date stamped. The event log shall be retrievable via RS232, USB or from the BBS LCD screen. The event log shall be display and print out in plain English when output the RS232 or USB ports.

Battery System

Individual battery shall be 12V, rated 105 amp-hour for 20 hours @ 77°F to 1.70 VPC, deep cycle, sealed prismatic lead-calcium based Absorbed Glass Mat/ Valve Regulated Lead Acid (AGM/VRLA) battery and shall be easily replaced and commercially available off the shelf.

The manufacturer shall certify batteries to operate over a temperature range of -25 °C to +74 °C.

The batteries shall be provided with appropriate interconnect wiring and corrosion-resistant mounting trays and/or brackets appropriate for the cabinet into which they will be installed.

Batteries shall indicate maximum recharge data and recharging cycles.

Furnish four (4) batteries for the BBS.

Battery Harness

Battery interconnect wiring shall be via two-part modular harness:

- Part I shall be equipped with red (+) and black (-) cabling that can be permanently connected to the positive and negative posts of each battery. Each red and black pair shall be terminated into a Molex, polarized – keyed battery cable connector or equivalent. The length of the harness between batteries shall be a minimum of 12 inches.
- Part II shall be equipped with the mating Power Pole style connector for the batteries and a single, insulated Power Pole style connection to the inverter/charger unit. Harness shall be fully insulated and constructed to allow batteries to be quickly and easily connected in any order to ensure proper polarity and circuit configuration. The length of the battery interconnect harness shall be a minimum of 60 inches from the Inverter/Charger plug to the first battery in the string.

Power Pole connectors may be either one-piece or two-piece. If a two-piece connector is used, a locking pin shall be used to prevent the connectors from separating.

All battery interconnect harness wiring shall be UL Style 1015 CSA TEW or Welding Style Cable or equivalent, all of proper gauge with respect to design current and with sufficient strand count for flexibility and ease of handling.

Battery terminals shall be covered and insulated with molded boots to prevent accidental shorting.

BBS Quality Assurance

Each Battery Backup System (BBS) shall be manufactured in accordance with a manufacturer Quality Assurance (QA) program. The QA program shall include two Quality Assurance procedures:

1. Design QA - The manufacturer, or an independent testing lab hired by the manufacturer, shall perform Design Qualification Testing on new BBS system(s) offered, and when any major design change has been implemented on an existing design. A major design change is defined as any modification - material, electrical, physical, or theoretical, that changes any performance characteristics of the system, or results in a different circuit configuration. Where a dispute arises in determining if a system is a new design or if the system has had a major design change, the County will make the final determination if Design Qualification Testing is required prior to production consideration.
2. Production QA - The Production QA shall include statistically controlled routine tests to ensure minimum performance levels of BBS units built to meet this specification and a documented process of how problems are to be resolved.

QA process and test results documentation shall be kept on file for a minimum period of seven years.

Battery Backup System designs not satisfying Design QA Testing and Production QA Testing requirements shall not be labeled, advertised, or sold as conforming to this specification.

A technician whom is qualified to work on the battery backup system and employed by the battery backup system manufacturer or the manufacturer authorized distributor, shall be present at the time the equipment is turned on.

It shall be the responsibility of the Contractor to implement and fund any traffic signal controller assembly modifications required to achieve the traffic signal operation as shown on the construction plans and as required in the Special Provisions.

Z. Payment Method

See Signal and Lighting subsection M, "Service" for payment of all electric company fees required.

The contract price paid **per Lump Sum** for Signal and Lighting shall include full compensation for furnishing all labor, materials, tools, equipment, foundations, pole and mast arm mounted regulatory signs, documents, programming, testing, potholing required for utility verification prior to all conduit installation and incidents and for doing all the work specified herein, elsewhere in these Special Provisions, and plans including the complete installation of an operational traffic signal and lighting system and no additional compensation shall be allowed therefor.

Appendix A

AQMD Recommendations

Dust Abatement Attachments

Table of Contents

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Best Available Control Measures (from Rule 403 Implementation Handbook)	DA16
Best [Reasonably] Available Control Measures for High Winds Conditions (from Rule 403 Implementation Handbook)	DA22
Track Out Control Options (from Rule 403 Implementation Handbook)	DA26

AQMD SIGNAGE RECOMMENDATIONS**November, 2001**

Plan holder shall post signage at specified locations on the subject property in accordance with the standards specified below. The exception to the standards is that all letters shall be 4 inches high, with the names and telephone numbers of appropriate contacts and services in bold print, as indicated in the standards. These signs shall also include the SCAQMD toll free complaint line 1-800-CUT-SMOG (1-800-288-7664) and the telephone number for the Environmental Observer. These signs shall be posted within 50 feet of the curb on all four (4) corners of the subject property.

For each Dust Control Plan aggregating less than, or equal to, ten (10) acres:

1. The applicant shall install a sign on such property which is visible to the public that meets the following requirements:
 - (a) Such sign shall measure at least four (4) feet wide by four (4) feet high and conform to the specifications in 1 (a) below.

For each Dust Control Plan aggregating over ten (10) acres:

2. The applicant shall install a sign on such property which is visible to the public that meets the following requirements:
 - (a) Such sign shall measure at least eight (8) feet wide by four (4) feet high and conform to the specifications in 1 (b) below.

THE SIGN SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:**1. The sign boards shall be constructed with materials capable of withstanding the environment in which they are placed.**

(a) For 4' x 4' signs, the District recommends the following:

- I. 3/4" A/C laminated plywood board
- II. Two 4" x 4" posts
- III. The posts should be attached to the edges of the plywood board with at least 2 carriage bolts on each post.
- IV. The front surface of the sign board should be painted in the contrasting color of a white background with black lettering.

(b) For 4' x 8' signs, the District recommends the following:

- I. 1" A/C laminated plywood board
- II. Two 5" x 6" posts
- III. The posts should be attached to the 4' edges of the plywood board with at least 2 carriage bolts on each post.
- IV. The front surface of the sign board should be painted in the contrasting color of a white background with black lettering.

2. The sign board shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times until the expiration date of the Dust Control plan.

(a) For 4' x 4' signs, the District recommends the following:

- I. The lower edge of the sign board should be mounted at least 2' above the existing ground surface to facilitate ease of viewing.
- II. The posts should be set in a hole at least 3' deep with concrete footings to preclude downing by high winds.
- III. On the construction site, the sign should be positioned such that nothing obstructs the public's view from the primary street access point.
- IV. For construction projects that are developed in phases, the sign should be moved to the area that is under active construction.
- V. In situations where all phases of the construction project are completed on a property prior to expiration of the Dust Control Plan, a written request for cancellation of the Dust Control Plan must be submitted to the Engineer.

(b) For 4' x 8' signs, the District recommends the following:

- I. The lower edge of the sign board should be mounted at least 2' above the existing ground surface to facilitate ease of viewing.
- II. The posts should be set in a hole at least 4' deep with concrete footings to preclude downing by high winds.
- III. On the construction site, the sign should be positioned such that nothing obstructs the public's view from the primary street access point.
- IV. For construction projects that are developed in phases, the sign should be moved to the area that is under active construction.
- V. In situations where all phases of the construction project are completed on a property prior to expiration of the Dust Control Plan, a written request for cancellation of the Dust Control Plan must be submitted to the Engineer.

3. The sign board shall contain the following information:

- (a) Project Name
- (b) Name of Prime Contractor
- (c) Phone Number of Contractor's Employee Responsible for Dust Control Matters
- (d) County designated phone number (to be provided by the Engineer)
- (e) South Coast Air Quality Management District Phone Number

4. The sign board shall be designed to the following alpha and numeric text dimensions (sign boards written in longhand are unacceptable).

(a) For a permittee subject to the 4' x 4' sign requirement, the District provides the following example: (as modified by the County of Riverside for use on County Public Works projects)

1" UPPERCASE Letters →	PROJECT NAME:		3 ½" Title Case Bold Letters ←
1" UPPERCASE Letters →	CONTRACTOR		3 ½" Title Case Bold Letters ←
1" Title Case Letters →	Contractor's Dust Control Phone #		3" Bold Numbers ←
1" Title Case Letters →	County of Riverside Phone #		3" Bold Numbers ←
1" Title Case Letters →	Phone Number:	SCAQMD 1-800-CUT-SMOG	3 ½" Bold Numbers ←

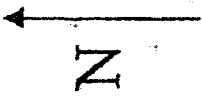
"Title Case" means the first letter of a word is capitalized and subsequent letters are lower case.

AQMD Recommendations

(b) For a permittee subject to the 4' x 8' sign requirement, the District provides the following example: (as modified by the County of Riverside)

2" UPPERCASE Letters	PROJECT NAME:	4" Title Case Bold Letters
2" UPPERCASE Letters	CONTRACTOR	4" Title Case Bold Letters
2" Title Case Letters	Contractor's Dust Control Phone #	4" Bold Numbers
2" Title Case Letters	County of Riverside Phone #	4" Bold Numbers
2" Title Case Letters	Phone Number:	4 ½" Bold Numbers
2" Title Case Letters	SCAQMD 1-800-CUT-SMOG	
	COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT	

APQMD Recommendations



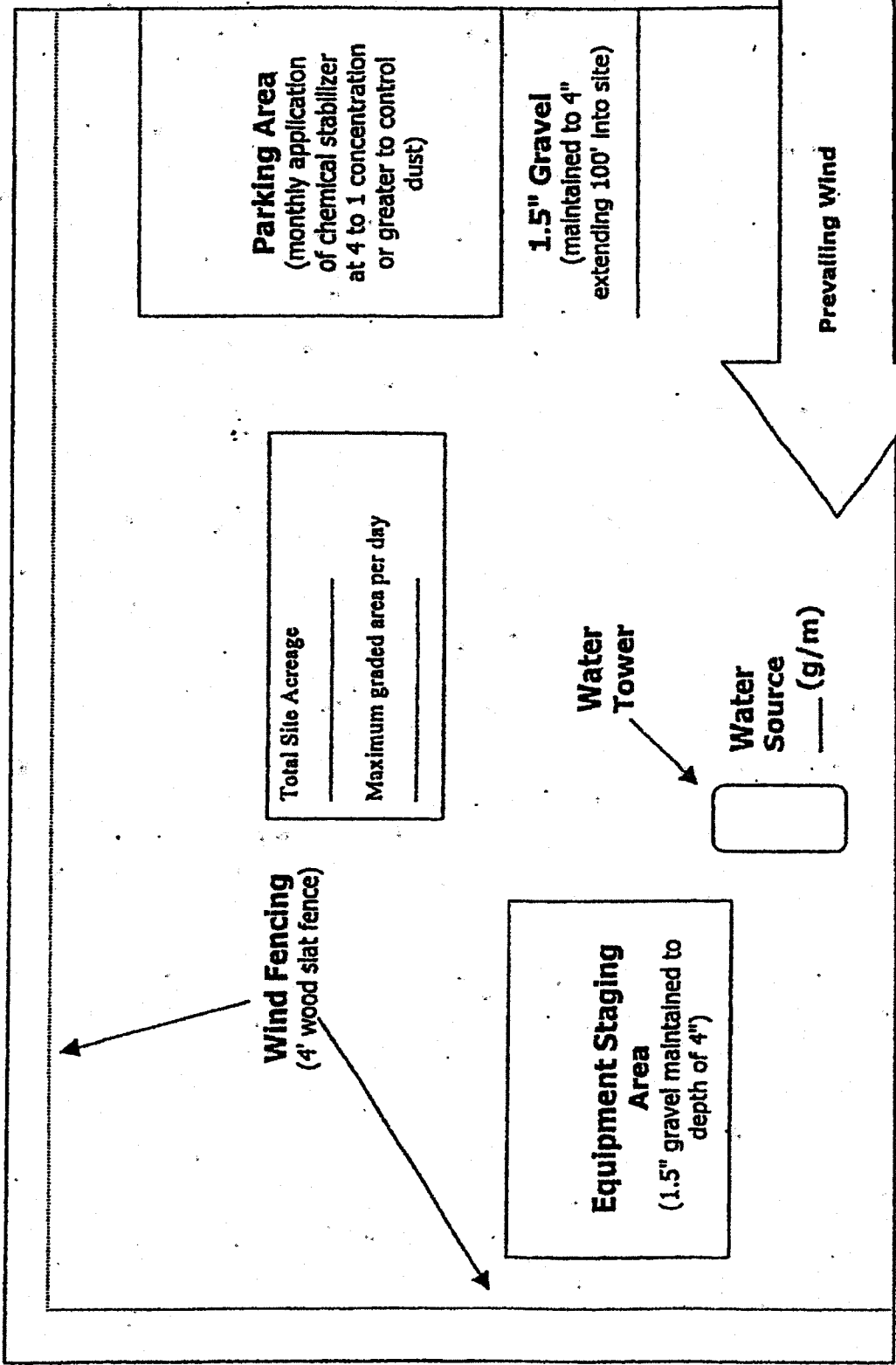
Distance and location of nearest:

Residence _____

Business _____

Section I
Simplified Sample Site Plan

Existing Residential



Existing Residential

Existing Residential

Vacant Land

Remember...
DUST CONTROL IS REQUIRED 24 HOURS A DAY, 7 DAYS A WEEK, REGARDLESS OF CONSTRUCTION STATUS

Plan Review Checklist Clearing/Grubbing/Mass Grading Phase

If feasible, use grading permit conditions to break the project into phases so that only a portion of the site is disturbed at any given time to ensure control of fugitive dust. This technique is critical for project sites with greater than 100 acres.

Prior to initiating activity, pre-water site through use of portable irrigation lines. At least 72 hours of pre-watering is recommended for each area prior to initiating earth-movement. Require the Applicant to specify water source and available flow rate (g/m).

Water applied continuously to all disturbed portions of the site by means of water truck/water pull as necessary to maintain sufficient visible moisture on the soil surface. For reference, one 2,000 gallon water truck can treat approximately 4 acres of active construction per hour. Also, for cut and fill activities, one 10,000 gallon water pull is estimated to be necessary for each 7,000 cubic yards of daily earth-movement. Multiple 4,000-gallon water trucks may be used in place of one 10,000-gallon water pull. Touch and visual contrast are reasonably good indicators of soil moisture. Surface areas that are dry to the touch and appear lighter-colored require the application of additional water to prevent visible or fugitive dust. Require the Applicant to specify the number of watering vehicles available for dust control during mass grading and during off-hours as well as availability of back-up water trucks if the site experiences dust control problems.

Water towers are necessary for projects with more than 10 acres of active construction. Without a water tower, it can take up to 30 minutes to fill a 2,000 gallon water truck. Also, multiple water towers are necessary for projects that use water pulls as filling one 10,000 gallon water pull can drain a water tower which takes up to 40 minutes to refill.

Wind fencing is necessary between the site and nearby residences or businesses. Off-site upwind fencing and on-site wind fencing for larger projects can also keep blowsand from being deposited onto the site or traveling through the site.

A perimeter watering system consisting of portable irrigation equipment may be an effective mitigation system to protect surrounding residences and businesses. The portable watering system may be used in place of or in conjunction with watering trucks. The local jurisdiction may also be provided access to this equipment.

Remember...

**DUST CONTROL IS REQUIRED 24 HOURS A DAY, 7 DAYS A WEEK,
REGARDLESS OF CONSTRUCTION STATUS**

Construction site accesses are to be improved with 1.5" gravel maintained to a depth of 4" , at least 20' wide, and extending 100 feet into the site. If the project site is not balanced, a wheel washing system and/or ribbed steel plates should be placed in the roadway before the vehicle enters the graveled area to clean the tires and prevent trackout.

Equipment staging areas are to be treated with 1.5" gravel maintained to a depth of 4".

Employee parking areas are to be covered with 1.5" gravel maintained to a depth of 4" or treated with chemical dust suppressants at a 4 to 1 ratio on at least a monthly basis to prevent fugitive dust.

Chemical dust suppressants are to be mixed at a ratio of 20 to 1 and applied to all disturbed surfaces that are proposed to remain inactive for a period of at least 10 consecutive days. These products are effective in preventing and controlling dust. Recordkeeping is necessary to demonstrate compliance.

All project sites greater than 100 acres shall monitor daily wind speeds and AQMD forecasted wind events (call 1.800.CUT.SMOG; press one for air quality information, and then press five for Coachella Valley wind forecasts). Operators shall maintain these records for review by any local code enforcement officer or AQMD inspector.

An environmental observer whose primary duty is to oversee dust control at the site is to be used for construction projects greater than 100 acres and/or sites with more than 50 acres of active construction. The environmental observer is tasked with monitoring dust abatement measures and authorized to deploy additional water trucks and other dust control actions (i.e., wind fencing, street sweepers, chemical dust suppressants, etc.) as necessary to prevent or control fugitive dust.

Other (specify): _____

Remember...
DUST CONTROL IS REQUIRED 24 HOURS A DAY, 7 DAYS A WEEK,
REGARDLESS OF CONSTRUCTION STATUS

**Plan Review Checklist
Finish Grading Phase**

- Water applied continuously to all disturbed portions of the site by means of water truck/water pull as necessary to maintain sufficient visible moisture on the soil surface. For reference, one 2,000 gallon water truck can treat approximately 4 acres of active construction per hour. Also, for cut and fill activities, one 10,000 gallon water pull is estimated to be necessary for each 7,000 cubic yards of daily earth-movement. Multiple 4,000-gallon water trucks may be used in place of a 10,000-gallon water pull. Touch and visual contrast are reasonably good indicators of soil moisture. Surface areas that are dry to the touch and appear lighter-colored require the application of additional water to prevent visible or fugitive dust. Require the Applicant to specify the number of watering vehicles available for dust control during finish grading and during off-hours as well as availability of back-up water trucks if the site experiences dust control problems.
- Water towers are necessary for projects with more than 10 acres of active construction. Without a water tower, it can take up to 30 minutes to fill a 2,000 gallon water truck. Also, multiple water towers are necessary for projects that use water pulls as filling one 10,000 gallon water pull can drain a water tower which takes up to 40 minutes to refill.
- Wind fencing is necessary between the site and nearby residences or businesses to reduce fugitive dust. Off-site upwind fencing and on-site wind fencing for larger projects can also keep blowsand from being deposited onto the site or traveling through a site.
- Chemical dust suppressants are to be applied at a concentration of at least 10 to 1 to finish graded areas once final elevations have been reached. For areas that will remain inactive for longer periods, vegetation can be a cost-effective alternative to chemical stabilization. Wind fencing or other obstructions can keep the stabilized area free from future disturbances.
- Construction site access(es) are to be improved with 1.5" gravel maintained to a depth of at least 4" with a minimum width of at least 20', extending 100 feet into the project site.
- Equipment staging areas are to be treated with 1.5" gravel maintained to a depth of 4".
- Internal roadway networks are to be treated with chemical dust suppressants at a minimum rate of at least 4 to 1 and retreated on a monthly basis once final roadway elevations have been reached.
- Employee parking areas are to be treated with chemical dust suppressants at a mix ratio of at least 4 to 1 and retreated on at least a monthly basis or covered with 1.5" gravel maintained to a depth of 4" to prevent fugitive dust.
- Other (specify): _____

**Remember...
DUST CONTROL IS REQUIRED 24 HOURS A DAY, 7 DAYS A WEEK,
REGARDLESS OF CONSTRUCTION STATUS**

Plan Review Checklist Construction Phase

- Water applied continuously to all disturbed portions of the site by means of water truck/water pull is necessary to maintain sufficient visible moisture on the soil surface. For reference, one 2,000 gallon water truck can treat approximately 4 acres of active construction per hour. Touch and visual contrast are reasonably good indicators of soil moisture. Surface areas that are dry to the touch and appear lighter-colored require the application of additional water to prevent visible or fugitive dust. Require the Applicant to specify the number of watering vehicles available for dust control during the construction phase and during off-hours as well as availability of back-up water trucks if the site experiences dust control problems.
- Wind fencing is necessary between the site and nearby residences or businesses. Off-site upwind fencing and on-site wind fencing for larger projects can also keep blowsand from being deposited onto the site or traveling through the site. Block walls, if part of the final project, can replace wind fencing during the construction phase.
- Chemical dust suppressants are to be applied at a concentration of at least 20 to 1 to finish graded areas once final elevations have been reached. For areas that will remain inactive for longer periods, vegetation can be a cost-effective alternative to chemical stabilization. Wind fencing or other obstructions can keep the stabilized area free from future disturbances.
- Construction site accesses are to be improved with 1.5" gravel, maintained to a depth of 4", with a width of at least 20', extending 100' into the project site. Paving internal roadways can substitute for gravel.
- Internal roadway networks are to be paved as early as feasible in the construction phase. Street sweeping of internal and/or external access roads will likely be required to control entrained road dust.
- Employee parking areas are to be treated with chemical dust suppressants at a mix ratio of no less than 4 to 1 and retreated on a monthly basis, or more frequently if fugitive dust is observed. If internal roadway is complete, employees are to be instructed to park on paved roads.
- Other (specify): _____

Remember...
DUST CONTROL IS REQUIRED 24 HOURS A DAY, 7 DAYS A WEEK,
REGARDLESS OF CONSTRUCTION STATUS

RULE 403 IMPLEMENTATION HANDBOOK

REASONABLY AVAILABLE CONTROL MEASURES

Paragraph (d)(3) of Rule 403 allows activities outside the South Coast Air Basin (see Figure 2-1) to implement reasonably available control measures in lieu of best available control measures. Additionally, as specified by subparagraph (f)(3)(D) of Rule 403, any person seeking approval of a fugitive dust emissions control plan for projects outside the South Coast Air Basin must demonstrate to the satisfaction of the District that the given activity is employing all reasonably available fugitive dust control measures.

The District has prepared the attached listing of reasonably available fugitive dust control measures for a variety of source categories. This list is based on the U.S. Environmental Protection Agency's reference document entitled, "Control of Open Fugitive Dust Sources," Midwest Research Institute, September 1988.

The District encourages the use of those dust control measures that minimize the use of potable water. When water is needed, reclaimed water should be utilized to the greatest extent feasible.

REASONABLY AVAILABLE CONTROL MEASURES

The left column contains a listing of the sources of fugitive dust which are intended for emission control under District Rule 403 and a listing of control measures and high-wind measures. The right column contains a description of the reasonably available fugitive dust control measures for each of the sources.

Source: (1) Land Clearing/Earth-Moving

CONTROL MEASURES

DESCRIPTION

- | | |
|--------------------------------|---|
| (A) Watering | (1) Application of water by means of trucks, hoses and/or sprinklers prior to conducting any land clearing. This will increase the moisture content of the soils; thereby increasing its stability.
(2) Pre-application of water to depths of proposed cuts.
(3) Once the land clearing/earth moving activities are complete, a second application of water can generate a thin crust that stabilizes the disturbed surface area provided that it is not disturbed. (Security fencing can be used to prevent unwanted future disturbances of sites where a surface crust has been created). |
| (B) Chemical stabilizers | (1) Only effective in areas which are not subject to daily disturbances.
(2) Vendors can supply information on product application and required concentrations to meet the specifications established by the Rule. |
| (C) Wind fencing | (1) Three- to five-foot barriers with 50% or less porosity located adjacent to roadways or urban areas can be effective in reducing the amount of windblown material leaving a site.
(2) Would likely be used in conjunction with other measures (e.g., watering, chemical stabilization, etc.) to ensure that visible emissions do not cross a property line. |
| (D) Cover haul vehicles | (1) Entire surface area of hauled earth should be covered once vehicle is full. |
| (E) Bedliners in haul vehicles | (1) When feasible, use in bottom-dumping haul vehicles. |

HIGH WIND MEASURE

- (a) Cease all active operations; or
(b) Apply water within 15 minutes to any soil surface which is being moved or otherwise disturbed.

Source: (2) Unpaved Roads

CONTROL MEASURES

DESCRIPTION

- | | |
|----------------------------|---|
| (F) Paving | (1) Requires street sweeping/cleaning if subject to material accumulation. |
| (G) Chemical stabilization | (1) Vendors can supply information as to application methods and concentrations to meet the specifications established by the Rule
(2) Not recommended for high volume or heavy equipment traffic use. |
| (H) Watering | (1) In sufficient quantities to keep surface moist.
(2) Required application frequency will vary according to soil type, weather conditions, and vehicular use. |
| (I) Reduce speed limits | (1) 15 mile per hour maximum. May need to be used in conjunction with watering or chemical stabilization to prevent visible emissions from crossing the property line. |
| (J) Reduce vehicular trips | (1) Access restriction or redirecting traffic to reduce vehicle trips by a minimum of 60 percent. |
| (K) Gravel | (1) Gravel maintained to a depth of four inches can be an effective measure.
(2) Should only be used in areas where paving, chemical stabilization or frequent watering is not feasible. |

HIGH WIND MEASURE

- (c) Apply a chemical stabilizer (to meet the specifications established by the Rule) prior to wind events; or
(d) Apply water once each hour; or
(e) Stop all vehicular traffic.

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Source: (3) Storage Piles

CONTROL MEASURES

DESCRIPTION

- (L) Wind sheltering
 - (1) Enclose in silos.
 - (2) Install three-sided barriers equal to height of material, with no more than 50 percent porosity.
- (M) Watering
 - (1) Application methods include: spray bars, hoses and water trucks.
 - (2) Frequency of application will vary on site-specific conditions.
- (N) Chemical stabilizers
 - (1) Best for use on storage piles subject to infrequent disturbances.
- (O) Altering load-in/load-out procedures
 - (1) Confine load-in/load-out procedures to leeward (downwind) side of the material.
 - (2) May need to be used in conjunction with wind sheltering to prevent visible emissions from crossing the property line.
- (P) Coverings
 - (1) Tarps, plastic, or other material can be used as a temporary covering.
 - (2) When used, these should be anchored to prevent wind from removing coverings.

HIGH WIND MEASURE

- (f) Apply chemical stabilizers (to meet the specifications established by the Rule) prior to wind events; or
- (g) Apply water once per hour; or
- (h) Install temporary covers.

Source: (4) Paved Road Track-Out

CONTROL MEASURES

DESCRIPTION

- | | |
|--------------------------------|--|
| (Q) Chemical stabilization | (1) Most effective when used on areas where active operations have ceased. |
| | (2) Vendors can supply information on methods for application and required concentrations. |
| (R) Sweep/clean roadways | (1) Either sweeping or water flushing may be used. |
| (S) Cover haul vehicles | (1) Entire surface area should be covered once vehicle is full. |
| (T) Bedliners in haul vehicles | (1) When feasible, use in bottom dumping vehicles. |
| (U) Site access improvement | (1) Pave internal roadway system. |
| | (2) Most important segment, last 100 yards from the connection with paved public roads |

HIGH WIND MEASURE

- (i) Cover all haul vehicles; and
(j) Clean streets with water flushing, unless prohibited by the Regional Water Quality Control Board.

January 1999

RULE 403 IMPLEMENTATION HANDBOOK

Source: (5) Disturbed Surface Areas/ Inactive Construction Sites

CONTROL MEASURES

DESCRIPTION

- (Q) Chemical stabilization
- (1) Most effective when used on areas where active operations have ceased.
 - (2) Vendors can supply information on methods for application and required concentrations.
- (R) Watering
- (1) Requires frequent applications unless a surface crust can be developed.
- (S) Wind fencing
- (1) Three- to five-foot barriers with 50% or less porosity adjacent to roadways or urban areas can be effective in reducing the amount of wind blown material leaving a site.
- (T) Vegetation
- (1) Establish as quickly as possible when active operations have ceased.
 - (2) Use of drought tolerant, native vegetation is encouraged.

HIGH WIND MEASURES

- (k) Apply chemical stabilizers (to meet the specifications established by the Rule); or
- (l) Apply water to all disturbed surface areas 3 times per day.

RULE 403 IMPLEMENTATION HANDBOOK

BEST AVAILABLE CONTROL MEASURES

Rule 403, paragraph (d)(2) requires active operations [defined in Rule 403, paragraph (c)(1)] within the South Coast Air Basin (see Figure 2-1) to implement at least one best available control measure for each fugitive dust source type on site. Additionally, as specified by subparagraph (f)(3)(D) of Rule 403, any person seeking approval of a fugitive dust emissions control plan for projects within the South Coast Air Basin must demonstrate to the satisfaction of the AQMD that the given activity is employing all best available fugitive dust control measures.

The AQMD has prepared the attached listing of best available fugitive dust control measures for a variety of source categories. This list is based on the U.S. Environmental Protection Agency's reference document entitled, "Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures," Office of Air and Radiation, September 1992.

The AQMD encourages the use of those dust control measures that minimize the use of potable water. When water is needed, reclaimed water should be utilized to the greatest extent feasible.

RULE 403 IMPLEMENTATION HANDBOOK

BEST AVAILABLE CONTROL MEASURES

The left column contains a listing of the sources of fugitive dust which are intended for emission control under District Rule 403 and a listing of control measures and high-wind measures. The right column contains a description of the best available fugitive dust control measures for each of the sources.

Source: (1) Land Clearing/Earth-Moving

CONTROL MEASURES

DESCRIPTION

- (A) Watering (pre-grading)
 - (1) Application of water by means of trucks, hoses and/or sprinklers prior to conducting any land clearing. This will increase the moisture content of the soils; thereby increasing its stability.
 - (2) Pre-application of water to depths of proposed cuts.
- (A-1) Watering (post-grading)
 - (1) In active earth-moving areas water should be applied at sufficient frequency and quantity to prevent visible emissions from extending more than 100 feet from the point of origin.
- (A-2) Pre-grading planning
 - (1) Grade each phase separately, timed to coincide with construction phase; or
 - (2) Grade entire project, but apply chemical stabilizers or ground cover to graded areas where construction phase begins more than 60 days after grading phase ends.
- (B) Chemical stabilizers
 - (1) Only effective in areas which are not subject to daily disturbances.
 - (2) Vendors can supply information on product application and required concentrations to meet the specifications established by the Rule.
- (C) Wind fencing
 - (1) Three- to five-foot barriers with 50% or less porosity located adjacent to roadways or urban areas can be effective in reducing the amount of windblown material leaving a site. Must be implemented in conjunction with either measure (A-1) or (B).
- (D) Cover haul vehicles
 - (1) Entire surface area of hauled earth should be covered once vehicle is full.
- (E) Bedliners in haul vehicles
 - (1) When feasible, use in bottom-dumping haul vehicles.

HIGH WIND MEASURE

- (a) Cease all active operations; or
- (b) Apply water within 15 minutes to any soil surface which is being moved or otherwise disturbed.

RULE 403 IMPLEMENTATION HANDBOOK

Source: (2) Unpaved Roads

CONTROL MEASURES

DESCRIPTION

- | | |
|----------------------------|---|
| (F) Paving | (1) Requires street sweeping/cleaning if subject to material accumulation. |
| (G) Chemical stabilization | (1) Vendors can supply information as to application methods and concentrations to meet the specifications established by the Rule
(2) Not recommended for high volume or heavy equipment traffic use. |
| (H) Watering | (1) In sufficient quantities to keep surface moist.
(2) Required application frequency will vary according to soil type, weather conditions, and vehicular use. |
| (I) Reduce speed limits | (1) 15 mile per hour maximum. May need to be used in conjunction with watering or chemical stabilization to prevent visible emissions from crossing the property line. |
| (J) Reduce vehicular trips | (1) Access restriction or redirecting traffic to reduce vehicle trips by a minimum of 60 percent. |
| (K) Gravel | (1) Gravel maintained to a depth of four inches can be an effective measure.
(2) Should only be used in areas where paving, chemical stabilization or frequent watering is not feasible. |

HIGH WIND MEASURE

- (a) Apply a chemical stabilizer (to meet the specifications established by the Rule) prior to wind events; or
- (b) Apply water once each hour; or
- (c) Stop all vehicular traffic.

RULE 403 IMPLEMENTATION HANDBOOK

Source: (3) Storage Piles

CONTROL MEASURES

DESCRIPTION

- (L) Wind sheltering
 - (1) Enclose in silos.
 - (2) Install three-sided barriers equal to height of material, with no more than 50 percent porosity.
- (M) Watering
 - (1) Application methods include: spray bars, hoses and water trucks.
 - (2) Frequency of application will vary on site-specific conditions.
- (N) Chemical stabilizers
 - (1) Best for use on storage piles subject to infrequent disturbances.
- (O) Altering load-in/load-out procedures
 - (1) Confine load-in/load-out procedures to leeward (downwind) side of the material.
Must be used in conjunction with either measure (L), (M), (N), or (P).
- (P) Coverings
 - (1) Tarps, plastic, or other material can be used as a temporary covering.
 - (2) When used, these should be anchored to prevent wind from removing coverings.

HIGH WIND MEASURE

- (a) Apply chemical stabilizers (to meet the specifications established by the Rule) prior to wind events; or
- (b) Apply water once per hour; or
- (c) Install temporary covers.

RULE 403 IMPLEMENTATION HANDBOOK

Source: (4) Paved Road Track-Out

CONTROL MEASURES

DESCRIPTION

Compliance with District Rule 403.

Paragraph (d)(5).

January 1999

RULE 403 IMPLEMENTATION HANDBOOK

Source: (S) Disturbed Surface Areas/ Inactive Construction Sites

CONTROL MEASURES

DESCRIPTION

- | | |
|----------------------------|---|
| (Q) Chemical stabilization | (1) Most effective when used on areas where active operations have ceased. |
| | (2) Vendors can supply information on methods for application and required concentrations. |
| (R) Watering | (1) Requires frequent applications unless a surface crust can be developed. |
| (S) Wind fencing | (1) Three- to five-foot barriers with 50% or less porosity adjacent to roadways or urban areas can be effective in reducing the amount of wind blown material leaving a site. Must be used in conjunction with either measure (Q), (R), or (T). |
| (T) Vegetation | (1) Establish as quickly as possible when active operations have ceased.* |

HIGH WIND MEASURES

- (a) Apply chemical stabilizers (to meet the specifications established by the Rule); or
- (b) Apply water to all disturbed surface areas 3 times per day.

* Use of drought tolerant, native vegetation is encouraged.

TABLE 1

BEST [REASONABLY] AVAILABLE CONTROL MEASURES FOR HIGH WIND CONDITIONS

FUGITIVE DUST SOURCE CATEGORY	<u>CONTROL MEASURES</u>
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice [once] per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice [once] per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 1 may be used.

* Measures in [brackets] are reasonably available control measures and only apply to sources not within the South Coast Air Basin.

TABLE 2
DUST CONTROL ACTIONS FOR EXEMPTION FROM PARAGRAPH (d)(4)*

<u>FUGITIVE DUST SOURCE CATEGORY</u>	<u>CONTROL ACTIONS</u>
Earth-moving (except construction cutting and filling areas, and mining operations)	<p>(1a) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR</p> <p>(1a-1) For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.</p>
Earth-moving: Construction fill areas:	<p>(1b) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.</p>

* Measures in [brackets] are reasonably available control measures and only apply to sources not within the South Coast Air Basin.

TABLE 2 (Continued)*

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Earth-moving: Construction cut areas and mining operations:	(1c) Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b) Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 [70] percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c) Apply chemical stabilizers within five working days of grading completion; OR (2d) Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a) Apply water to at least 80 [70] percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR (3b) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (3c) Establish a vegetative ground cover within 21 [30] days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR (3d) Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

* Measures in [brackets] are reasonably available control measures and only apply to sources not within the South Coast Air Basin.

January 1999

TABLE 2 (Continued)*

<u>FUGITIVE DUST SOURCE CATEGORY</u>	<u>CONTROL ACTIONS</u>
Unpaved Roads	(4a) Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR (4b) Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per-hour; OR (4c) Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
Open storage piles	(5a) Apply chemical stabilizers; OR (5b) Apply water to at least 80 [70] percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR (5c) Install temporary coverings; OR (5d) Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile.
<u>All Categories</u>	(6a) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.

* Measures in [brackets] are reasonably available control measures and only apply to sources not within the South Coast Air Basin.

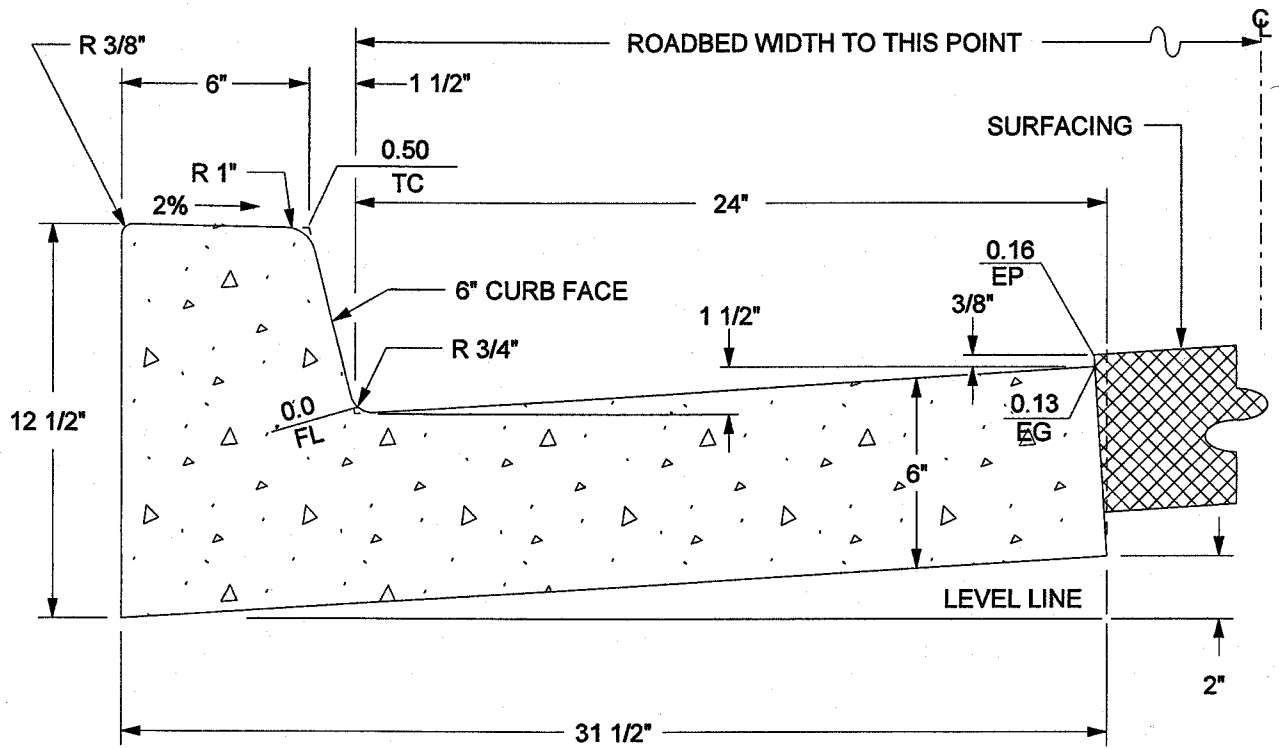
January 1999

TABLE 3**TRACK-OUT CONTROL OPTIONS****PARAGRAPH (d)(5)(B)****CONTROL OPTIONS**

(1)	Pave or apply chemical stabilization at sufficient concentration and frequency to maintain a stabilized surface starting from the point of intersection with the public paved surface, and extending for a centerline distance of at least 100 feet and a width of at least 20 feet.
(2)	Pave from the point of intersection with the public paved road surface, and extending for a centerline distance of at least 25 feet and a width of at least 20 feet, and install a track-out control device immediately adjacent to the paved surface such that exiting vehicles do not travel on any unpaved road surface after passing through the track-out control device.
(3)	Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

Appendix B

Reference Drawings



CLASS "B" CONCRETE

1.601 CU. FT. / L.F.

1 CU. YD. = 16.86 L.F.

ABBREVIATIONS:

TC = TOP OF CURB

FL = FLOWLINE

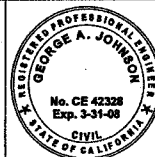
EG = EDGE OF GUTTER

EP = EDGE OF PAVEMENT

APPROVED BY:

George A. Johnson
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

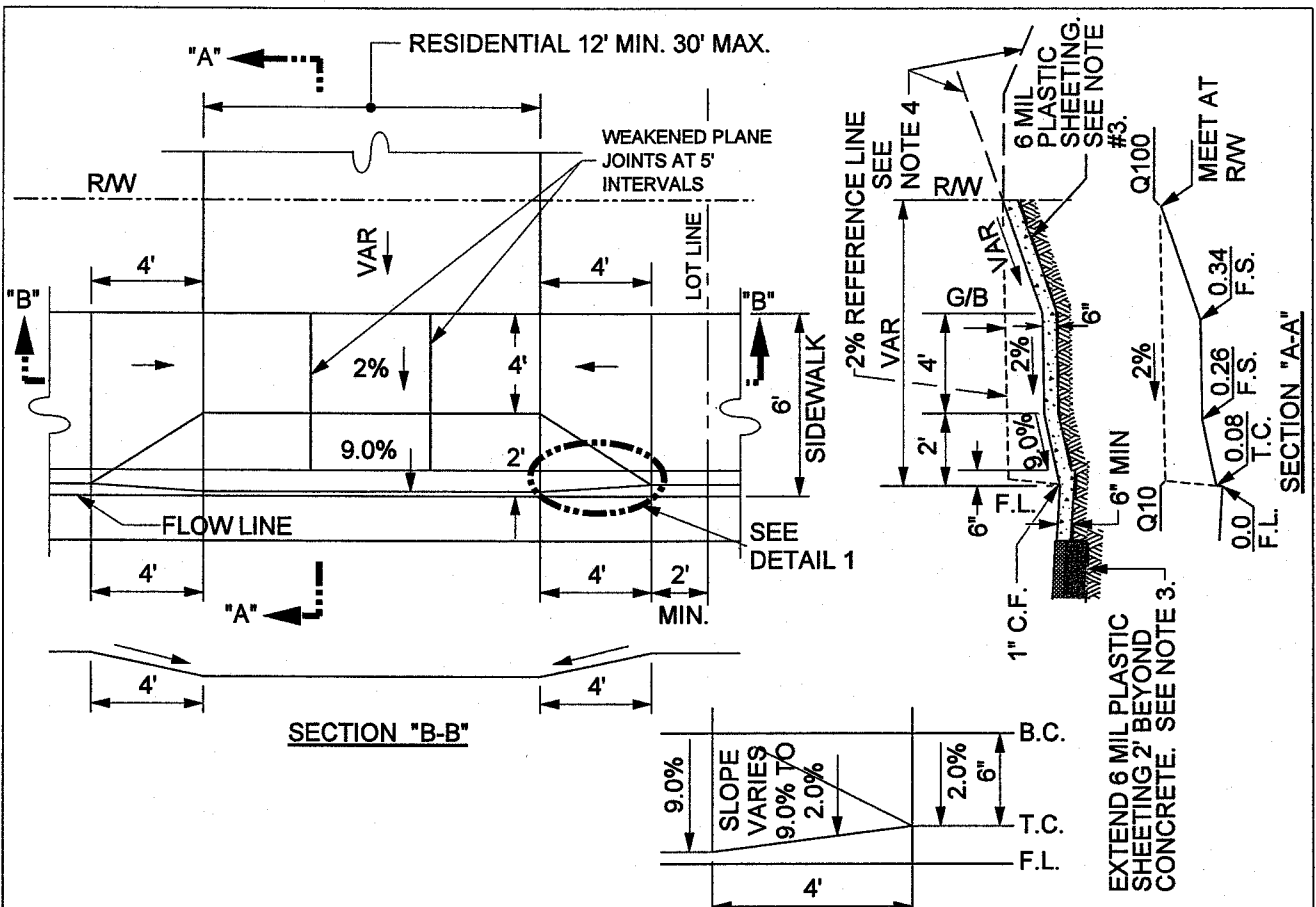


COUNTY OF RIVERSIDE

TYPE A-6 CURB

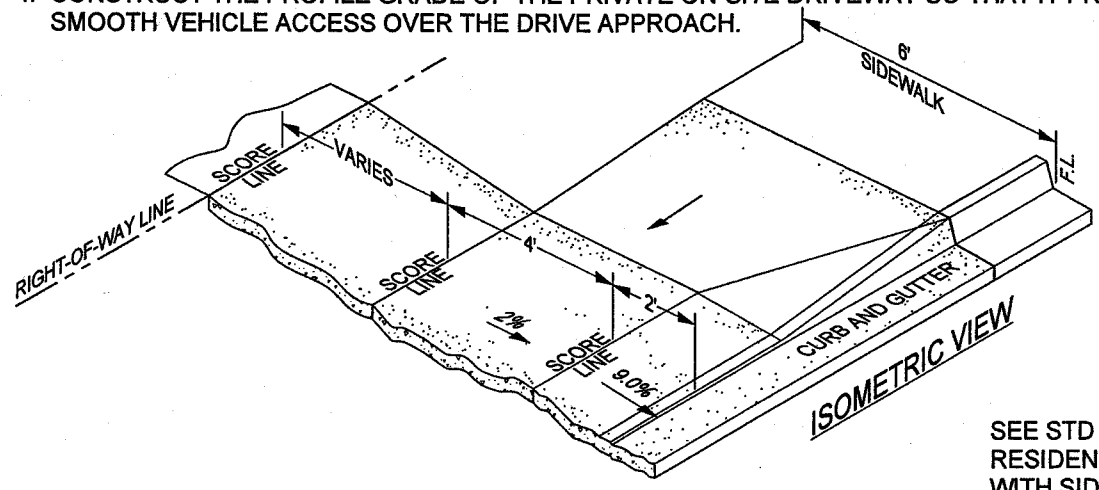
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2-90, 11-04	2				5			
	3				6			

STANDARD NO. 200



NOTES:

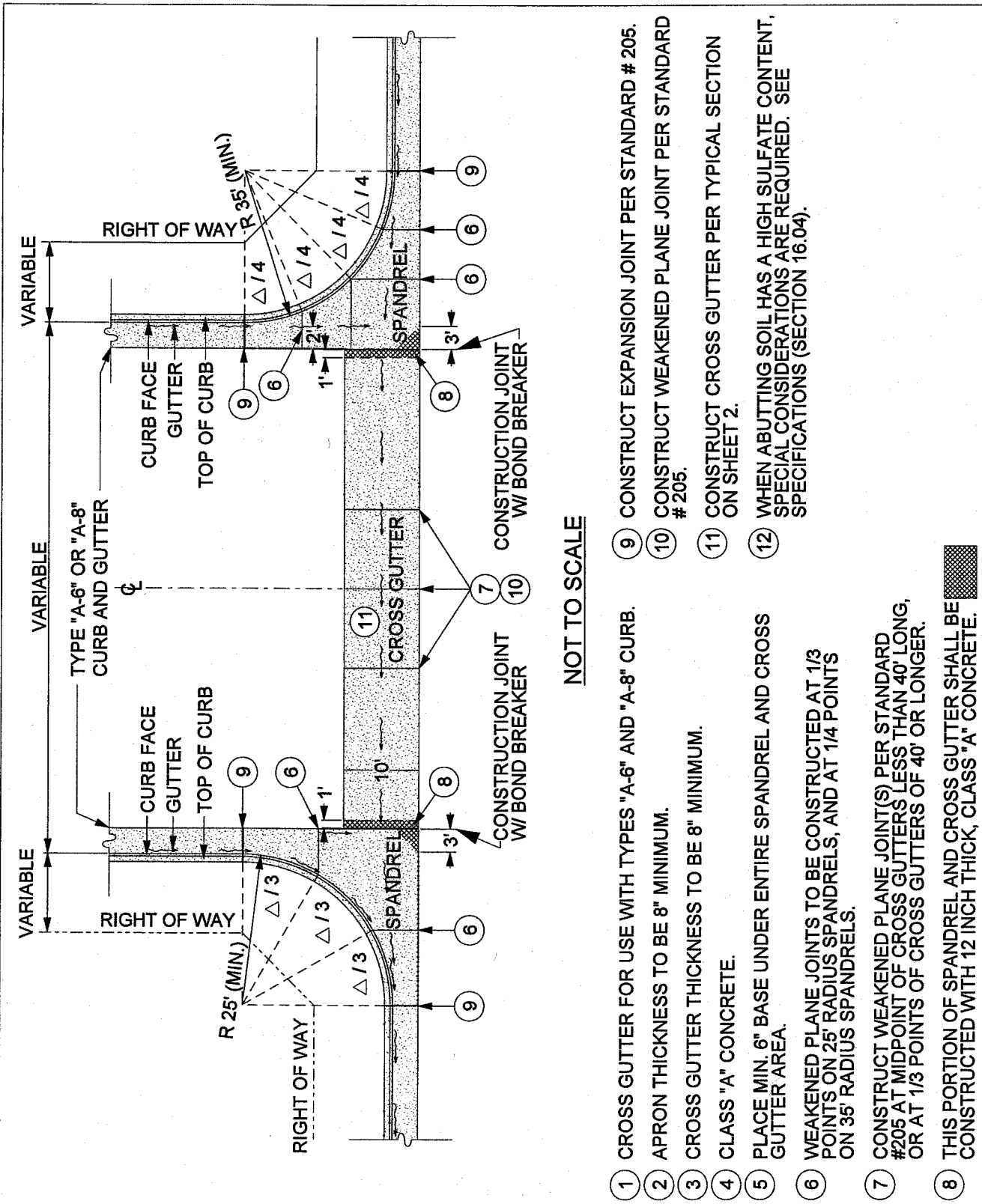
1. ALL CONSTRUCTION SHALL BE CLASS "3" CONCRETE.
2. 20' OF FULL-HEIGHT CURB REQUIRED BETWEEN DRIVEWAYS WITHIN ANY ONE PROPERTY FRONTAGE.
3. USE 6 MIL PLASTIC SHEETING WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
4. CONSTRUCT THE PROFILE GRADE OF THE PRIVATE ON-SITE DRIVEWAY SO THAT IT PROVIDES SMOOTH VEHICLE ACCESS OVER THE DRIVE APPROACH.



NOT TO SCALE

SEE STD NO. 213 FOR RESIDENTIAL DRIVEWAY WITH SIDEWALK AT RW

APPROVED BY:								COUNTY OF RIVERSIDE					
								DATE: 11/15/04				RESIDENTIAL DRIVEWAY WITH SIDEWALK AT CURB	
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE	STANDARD NO. 207			
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5-80, 2-82		2				5							
2-90, 12-97		3				6							

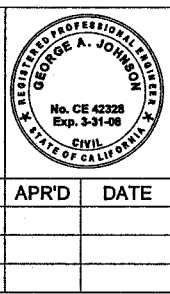


NOT TO SCALE

- 1 CROSS GUTTER FOR USE WITH TYPES "A-6" AND "A-8" CURB.
- 2 APRON THICKNESS TO BE 8" MINIMUM.
- 3 CROSS GUTTER THICKNESS TO BE 8" MINIMUM.
- 4 CLASS "A" CONCRETE.
- 5 PLACE MIN. 6" BASE UNDER ENTIRE SPANDREL AND CROSS GUTTER AREA.
- 6 WEAKENED PLANE JOINTS TO BE CONSTRUCTED AT 1/3 POINTS ON 25' RADIUS SPANDRELS, AND AT 1/4 POINTS ON 35' RADIUS SPANDRELS.
- 7 CONSTRUCT WEAKENED PLANE JOINT(S) PER STANDARD #205 AT MIDPOINT OF CROSS GUTTERS LESS THAN 40' LONG, OR AT 1/3 POINTS OF CROSS GUTTERS OF 40' OR LONGER.
- 8 THIS PORTION OF SPANDREL AND CROSS GUTTER SHALL BE CONSTRUCTED WITH 12 INCH THICK, CLASS "A" CONCRETE.
- 9 CONSTRUCT EXPANSION JOINT PER STANDARD # 205.
- 10 CONSTRUCT WEAKENED PLANE JOINT PER STANDARD # 205.
- 11 CONSTRUCT CROSS GUTTER PER TYPICAL SECTION ON SHEET 2.
- 12 WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY: *George A. Johnson* DATE: 05/01/07
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328

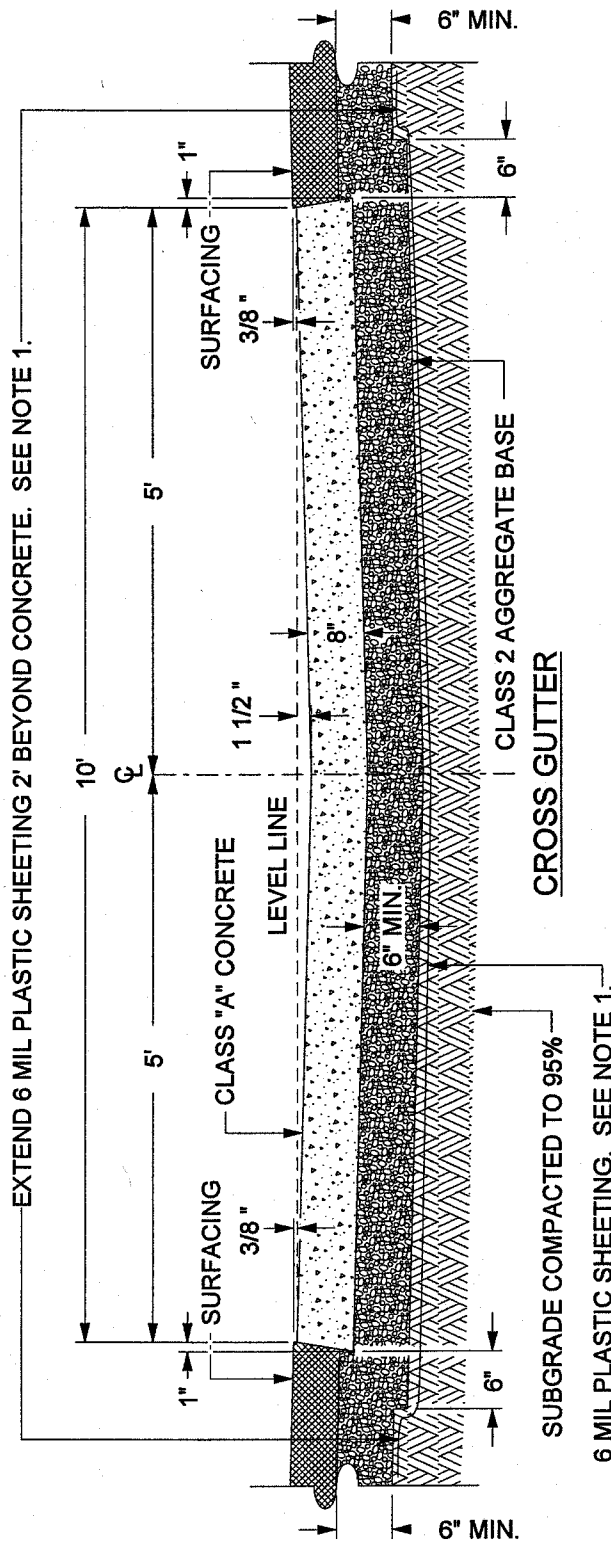
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11-77, 8-82		1				4			
9-88, 2-90		2				5			
11-04		3				6			



COUNTY OF RIVERSIDE

CROSS GUTTER (LAYOUT)

STANDARD NO. 209 (1 OF 2)



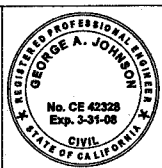
NOT TO SCALE

NOTE
 1. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

George A. Johnson
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

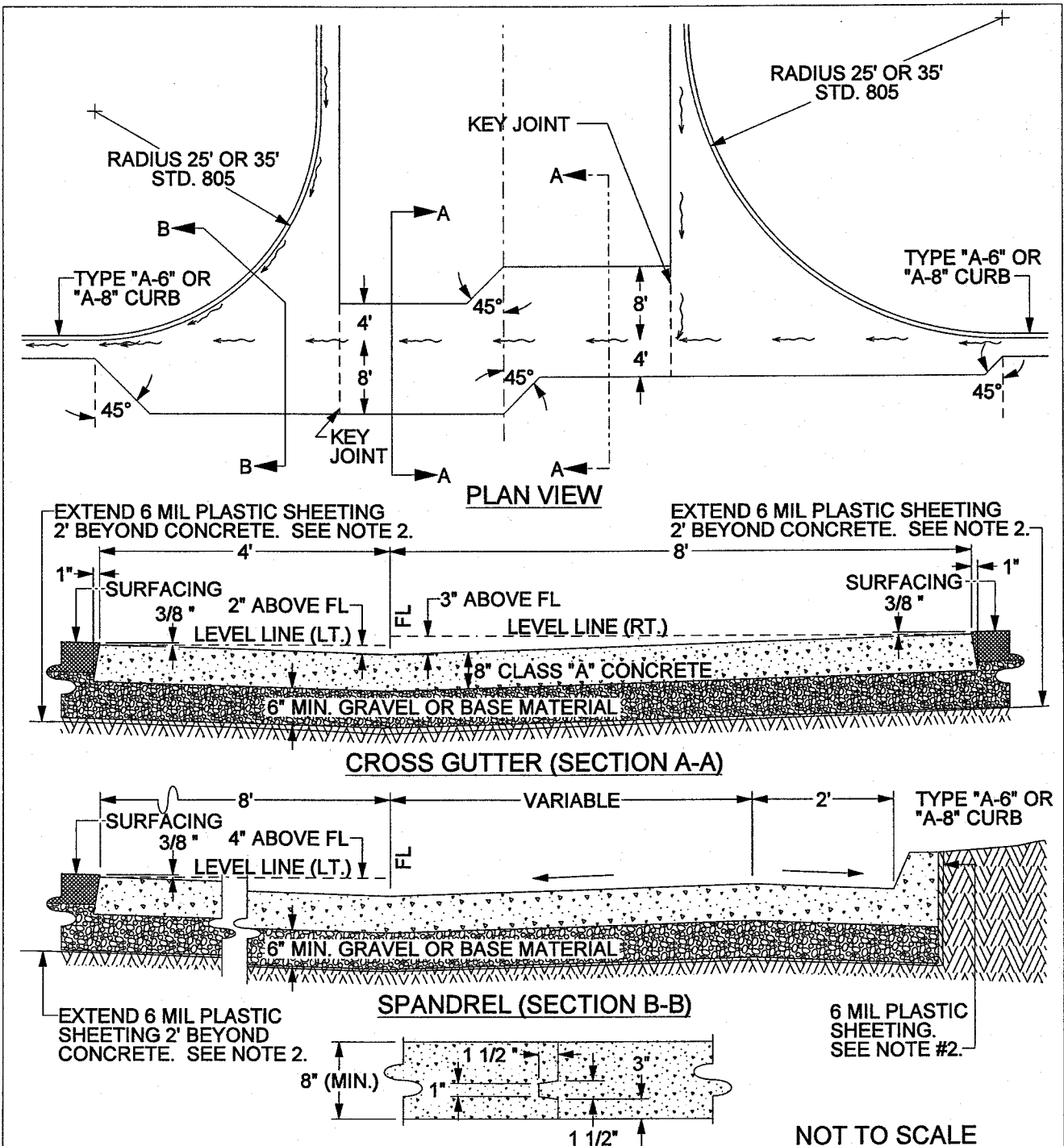


COUNTY OF RIVERSIDE

**CROSS GUTTER
 (TYPICAL SECTION)**

REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
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2-90, 12-97		2				5			
11-04		3				6			

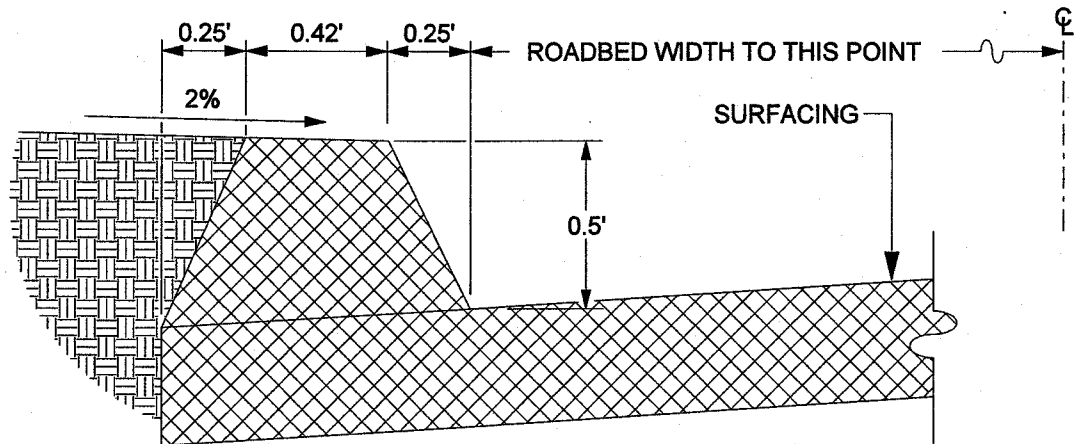
STANDARD NO. 209 (2 OF 2)



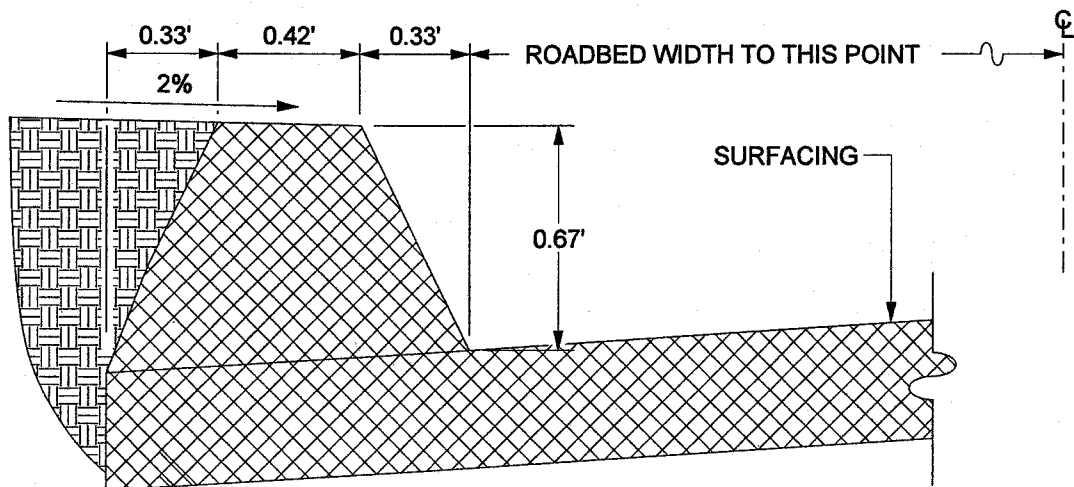
NOTE:

1. THIS CROSS GUTTER STANDARD TO BE CONSTRUCTED IN AREAS WHERE STREET GUTTERS HAVE CONSTANT OR FREQUENT FLOWS FROM LANDSCAPED PARKWAYS AND MEDIANS, GOLF COURSE, AND AGRICULTURAL RUNOFF OR WHEN GRADIENT IS LESS THAN 0.8%.
2. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:								COUNTY OF RIVERSIDE	
								DATE: 05/01/07	
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
11-04		1				4			
		2				5			
		3				6			
								STANDARD NO. 210	



6" A.C. DIKE



8" A.C. DIKE

NOT TO SCALE

NOTE: A.C. DIKE REQUIRED WHERE FILL SLOPES ARE STEEPER THAN 4:1, MATERIAL IS SUSCEPTIBLE TO EROSION, OR WHERE ROADWAY GRADIENT EXCEEDS 3%.

APPROVED BY:

George A. Johnson
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

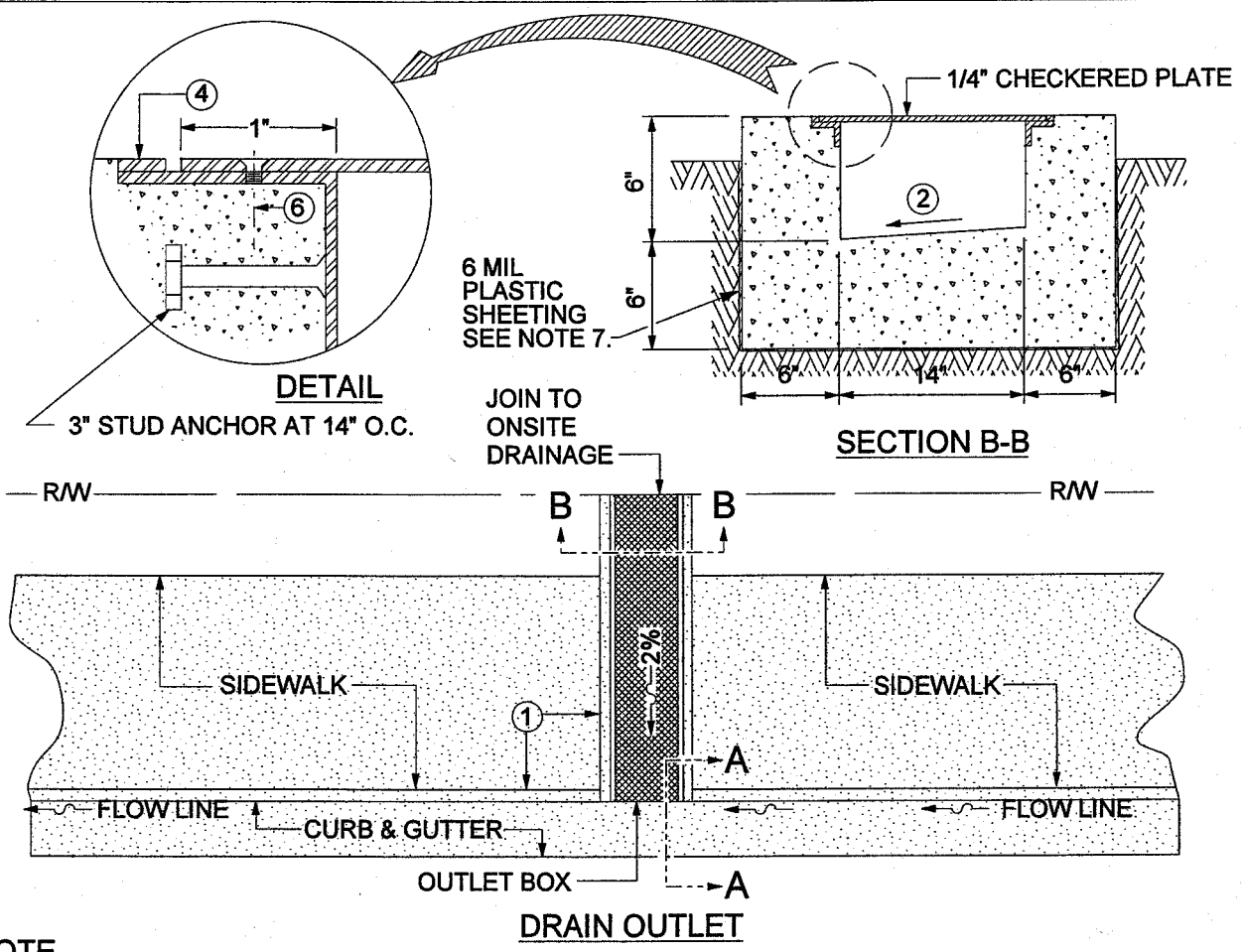


COUNTY OF RIVERSIDE

**ASPHALT CONCRETE
 DIKES**

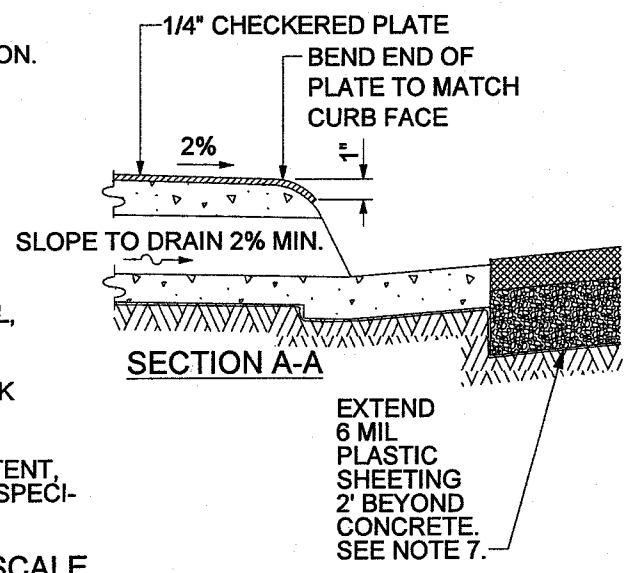
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STANDARD NO. 212



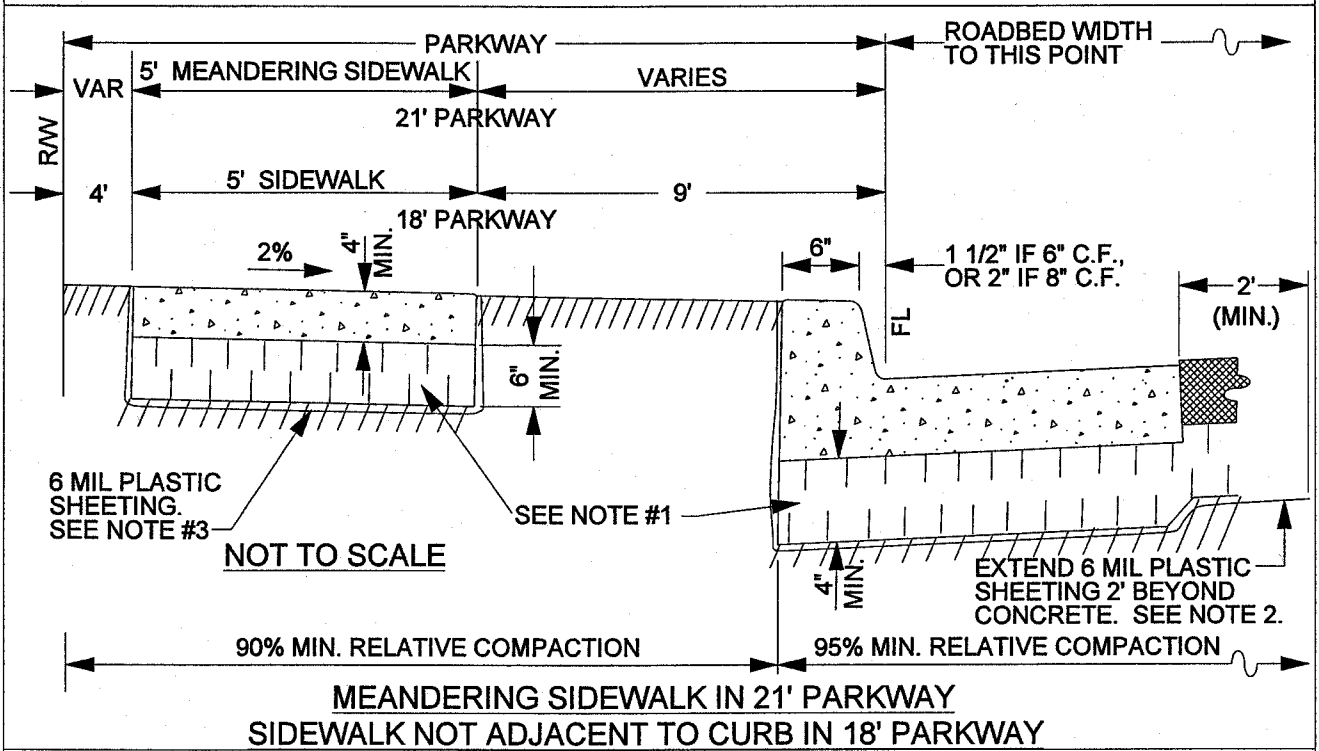
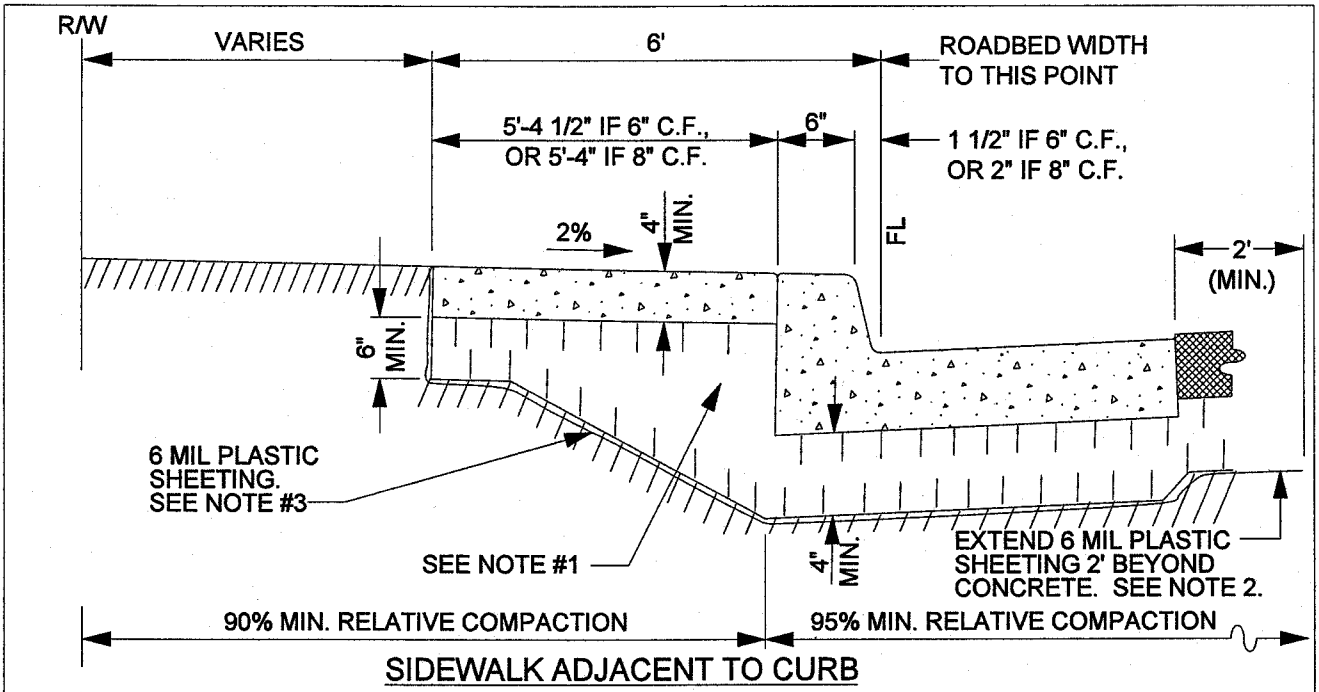
NOTE

- ① UNDER SIDEWALK DRAIN TO BE CONSTRUCTED AT 90°. VARIATIONS FROM 90° REQUIRE THE APPROVAL OF THE DIRECTOR OF TRANSPORTATION.
- ② SLOPE TO DRAIN TO ONE SIDE.
- ③ ALL EXPOSED METAL PARTS TO BE GALVANIZED AFTER FABRICATION.
- ④ 1 1/2" X 1 1/2" X 1/4" "L" FRAME WITH 3/8" X 1/4" STEEL STRIP WELDED TO FRAME.
- ⑤ CHECKERED PLATE SHALL BE GALVANIZED STEEL, MAXIMUM WIDTH 36".
- ⑥ FASTEN WITH 1/4" COARSE-THREAD COUNTERSINK METAL SCREWS AT 12" O.C..
- ⑦ WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).



NOT TO SCALE

APPROVED BY: DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328				DATE: 05/01/07 		COUNTY OF RIVERSIDE UNDER SIDEWALK DRAIN CAST IN PLACE STANDARD NO. 309			
REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE	
11-04	1				4				
	2				5				
	3				6				



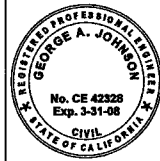
NOTE:

1. AGGREGATE BASE OR APPROVED SELECT MATERIAL WHEN SOILS REPORT INDICATES PRESENCE OF EXPANSIVE SOIL CONDITIONS.
2. ALL CONSTRUCTION SHALL BE CLASS "B" CONCRETE.
3. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

George A. Johnson
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07



COUNTY OF RIVERSIDE

SIDEWALK AND CURB

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
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8-82, 9-88	2				5			
4-90, 11-04	3				6			

STANDARD NO. 401

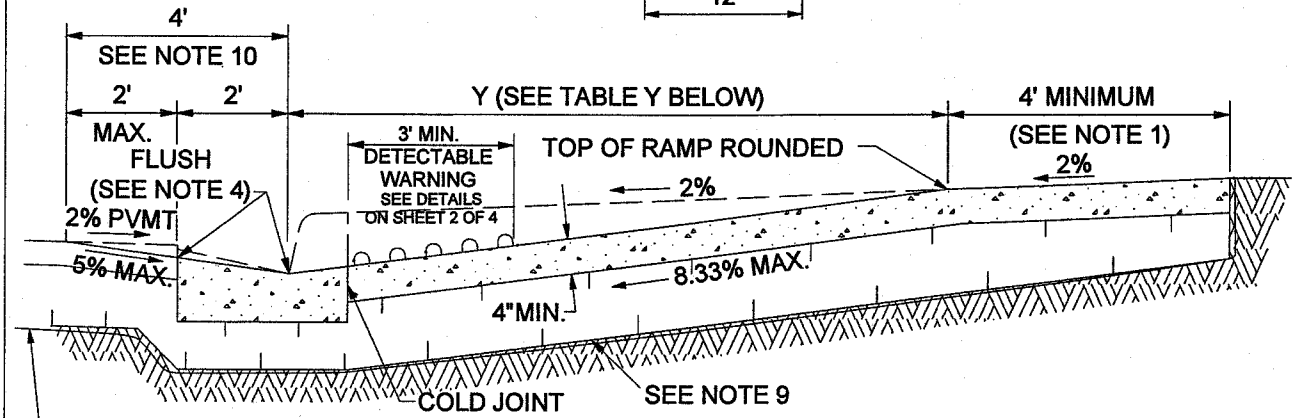
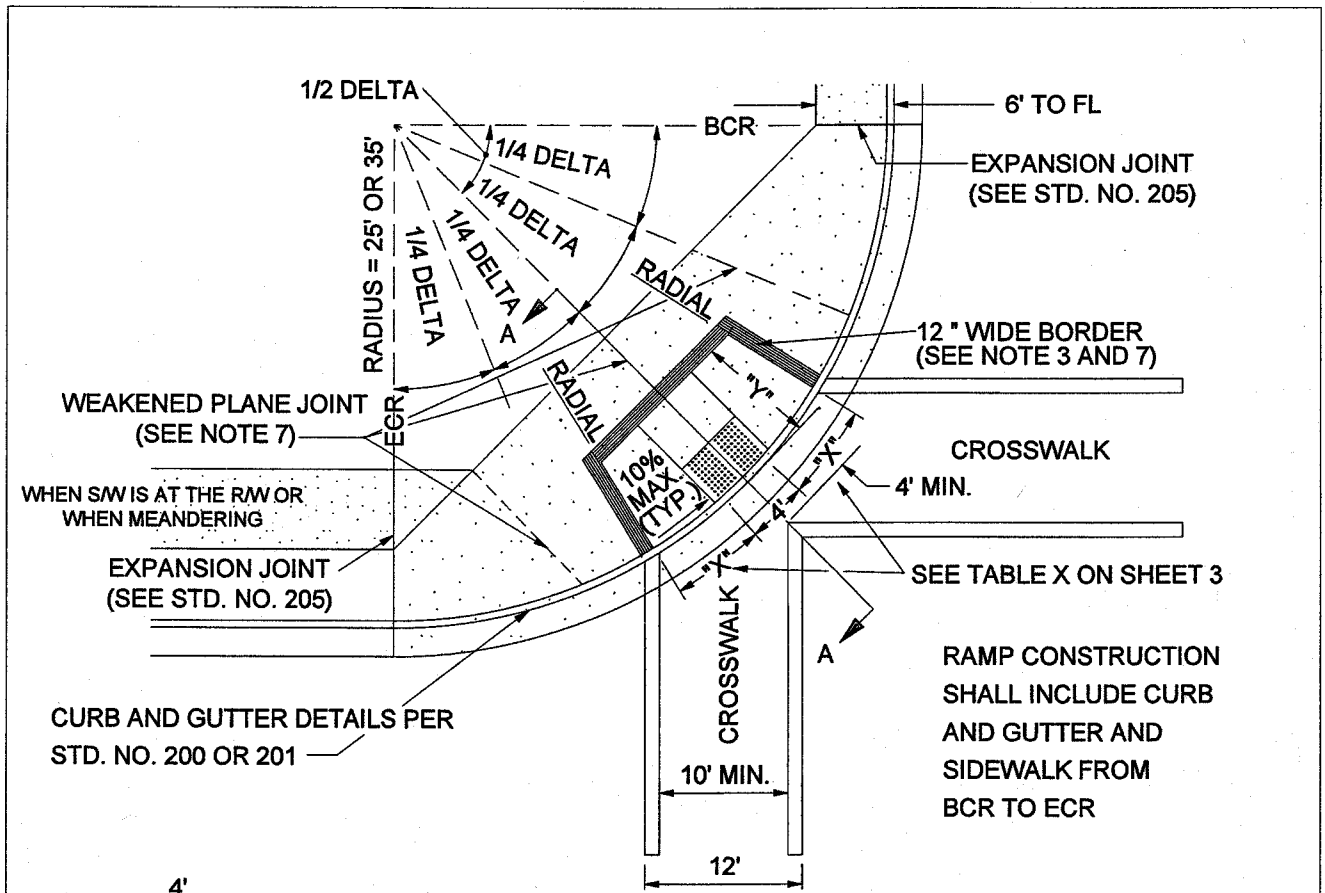


TABLE Y

CF	Y
6"	7.90'
8"	10.53'

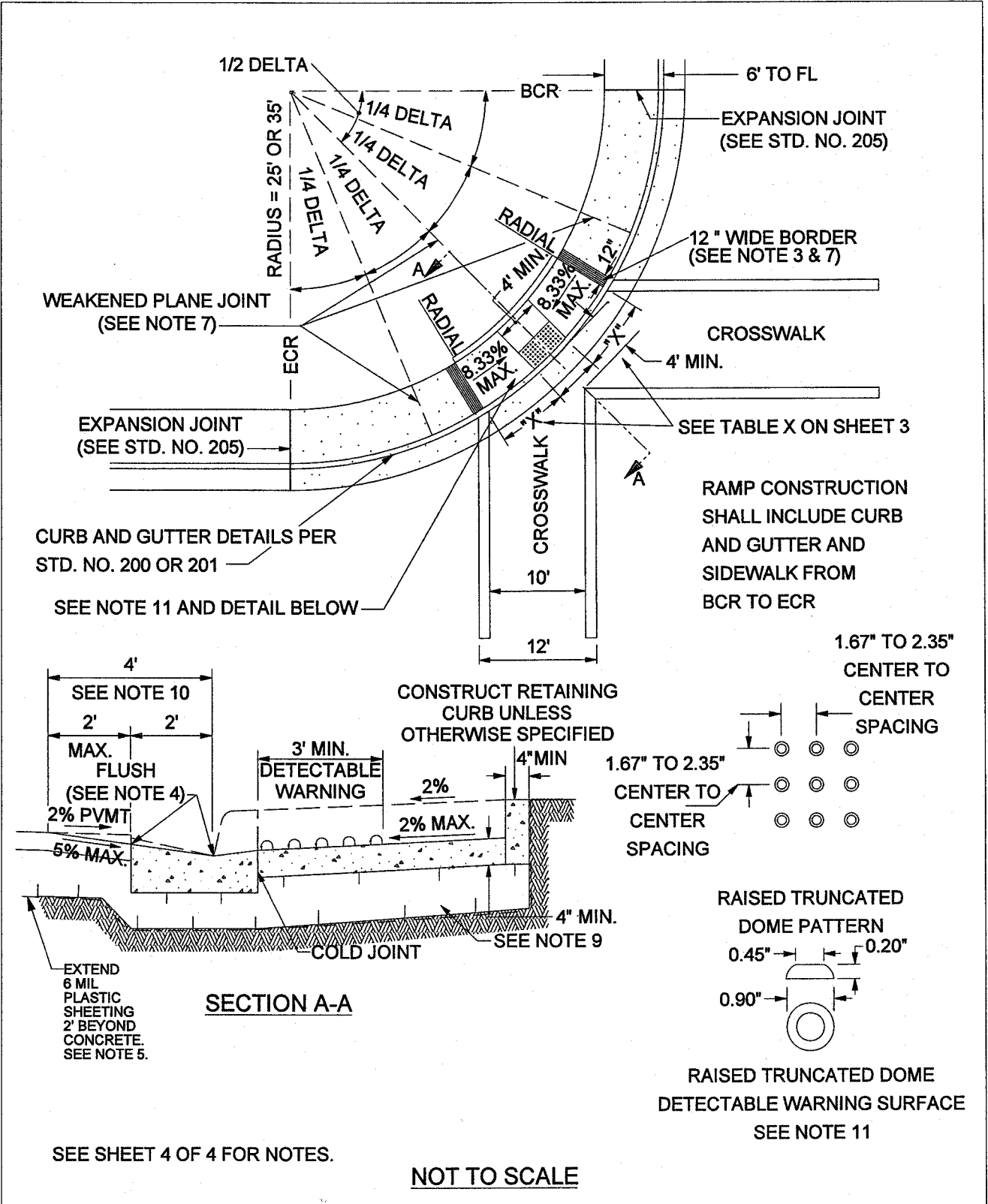
$$Y = \frac{\text{CURB FACE (FT.)}}{6.33\%}$$

SECTION A-A

NOT TO SCALE



SEE SHEET 4 OF 4 FOR NOTES.

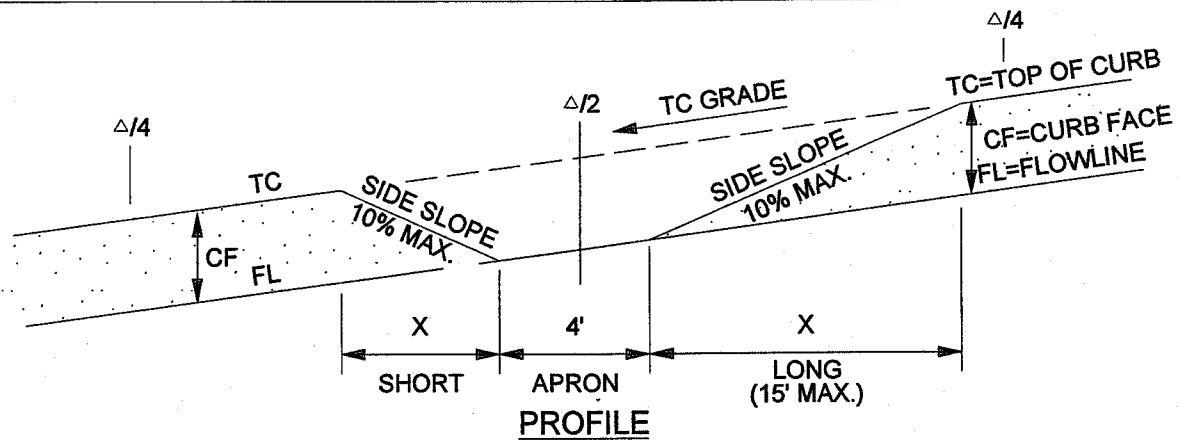
APPROVED BY: DATE: 11/15/04						COUNTY OF RIVERSIDE			
DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328				CURB RAMP CASE A		STANDARD NO. 403 (1 OF 4)			
REVISIONS		REV.	BY:	APR'D	DATE			REV.	BY:
8-77, 5-80	11-04	1						4	
10-81, 6-82		2				5			
9-88, 2-90		3				6			



SEE SHEET 4 OF 4 FOR NOTES.

NOT TO SCALE

APPROVED BY:  DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328				DATE: 11/15/04								COUNTY OF RIVERSIDE																																			
<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>REV.</th> <th>BY:</th> <th>APR'D</th> <th>DATE</th> <th>REV.</th> <th>BY:</th> <th>APR'D</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>8-77, 5-80</td> <td>11-04</td> <td>1</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10-81, 6-82</td> <td></td> <td>2</td> <td></td> <td></td> <td>5</td> <td></td> <td></td> <td></td> </tr> <tr> <td>9-88, 2-90</td> <td></td> <td>3</td> <td></td> <td></td> <td>6</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE	8-77, 5-80	11-04	1			4				10-81, 6-82		2			5				9-88, 2-90		3			6				CURB RAMP CASE B				STANDARD NO. 403 (2 OF 4)			
REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE																																							
8-77, 5-80	11-04	1			4																																										
10-81, 6-82		2			5																																										
9-88, 2-90		3			6																																										
								12-97																																							



PROFILE
TABLE X

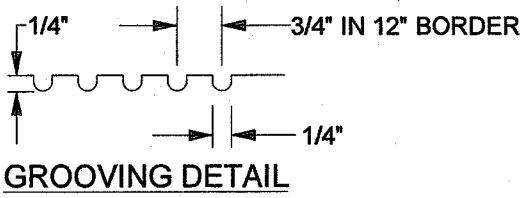
CF (IN)	RADIUS (FT)	SIDE SLOPE	X	TC GRADE (ALONG CURB RETURN)					
				1%	2%	3%	4%	5%	6%
6"	35'	10%	X _S	4.6	4.2	3.9	3.6	3.4	3.2
			X _L	5.6	6.3	7.2	8.4	10.0	12.5
8"	35'	10%	X _S	6.1	5.6	5.2	4.8	4.5	4.2
			X _L	7.5	8.4	9.6	11.2	13.4	15.0

TO CALCULATE "X" DIMENSION:

SHORT SIDE (DOWN SLOPE): $X_S (FT) = \frac{\text{CURB FACE (FT)}}{\text{SIDE SLOPE} + \text{TC GRADE}}$

LONG SIDE (UP SLOPE): $X_L (FT) = \frac{\text{CURB FACE (FT)}}{\text{SIDE SLOPE} - \text{TC GRADE}}$

ENGINEER TO SHOW X_S AND X_L ON IMPROVEMENT PLANS



APPROVED BY: *George A. Johnson* DATE: 05/05/07
 DIRECTOR OF TRANSPORTATION
 GEORGE A. JOHNSON, RCE 42328



COUNTY OF RIVERSIDE

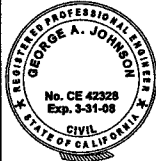

CURB RAMP

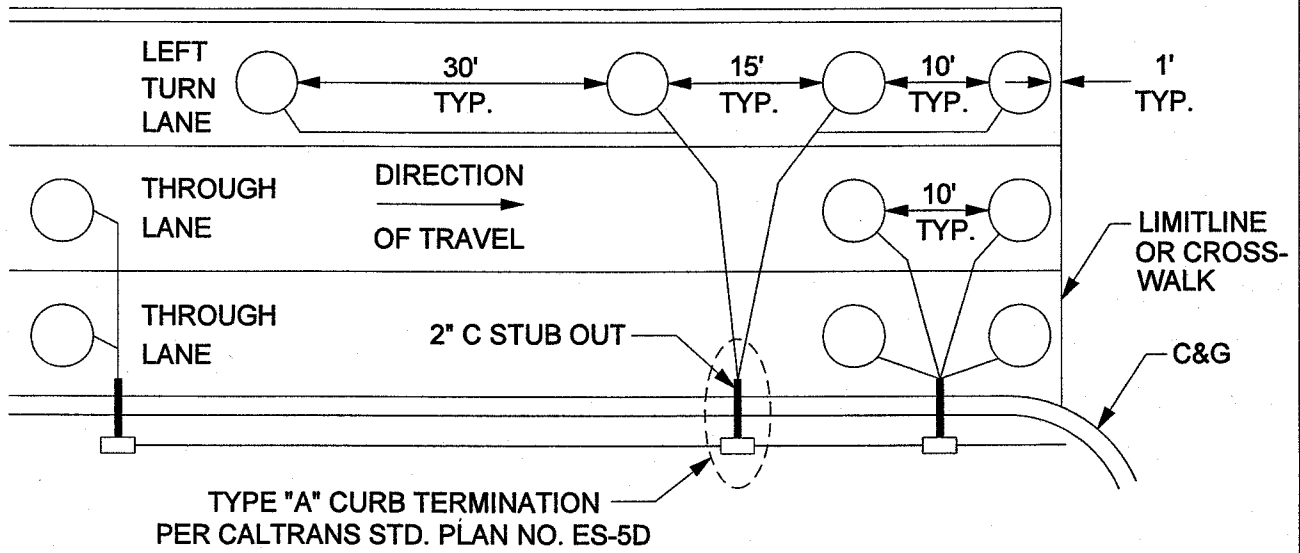
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8-77, 5-80	11-04	1				4			
10-81, 6-82		2				5			
9-88, 2-90		3				6			

STANDARD NO. 403 (3 OF 4)

CONSTRUCTION NOTES:

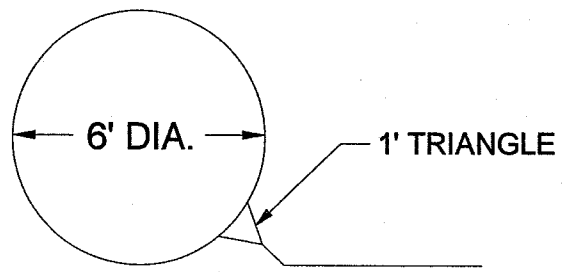
1. IF DISTANCE FROM CURB TO BACK OF SIDEWALK IS TOO SHORT TO ACCOMODATE RAMP AND 4' LANDING, THEN USE THE CASE "B" RAMP.
2. IF SIDEWALK IS LESS THAN 6' WIDE, THE FULL WIDTH OF THE SIDEWALK SHALL BE DEPRESSED AS SHOWN IN CASE B. MINIMUM SIDEWALK WIDTH IS 4' FROM BACK OF CURB.
3. THE RAMP SHALL HAVE A 12" WIDE BORDER WITH GROOVES 1/4" WIDE AND 1/4" DEEP APPROXIMATELY 3/4" ON CENTER. SEE GROOVING DETAIL.
4. TRANSITIONS FROM RAMPS TO WALKS, GUTTERS, OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT CHANGES.
5. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
6. RAMP SIDE SLOPE VARIES UNIFORMLY FROM A MAXIMUM OF UP TO 10% AT CURB TO CONFORM WITH LONGITUDINAL SIDEWALK SLOPE ADJACENT TO TOP OF THE RAMP (EXCEPT IN CASE B).
7. CONSTRUCT WEAKENED PLANE JOINTS AT 1/4 DELTAS WHEN RADIUS EQUALS 35' AND AT INSIDE EDGE OF GROOVED BORDER WHEN RADIUS EQUALS 25'.
8. IF EXPANSIVE SOIL IS ENCOUNTERED, THEN RAMP SHALL BE CONSTRUCTED OVER CLASS 2 AGGREGATE MATERIAL.
9. CONCRETE SHALL BE CLASS B.
10. MAXIMUM SLOPES OF ADJOINING GUTTERS: THE ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP AND CONTINUOUS PASSAGE TO THE CURB RAMP SHALL NOT EXCEED 5% WITHIN 4' OF THE BOTTOM OF THE CURB RAMP.
11. DETECTABLE WARNING SURFACES ARE REQUIRED ON ALL CURB RAMPS THAT ENTER INTO A VEHICULAR TRAVEL WAY.

APPROVED BY:								COUNTY OF RIVERSIDE			
 DATE: 11/15/04 DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328								CURB RAMP CONSTRUCTION NOTES			
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE		
8-77, 5-80	11-04	1				4					
10-81, 6-82		2				5					
9-88, 2-90		3				6					
						STANDARD NO. 403 (4 OF 4)					
						12-97					



TYPE "A" CURB TERMINATION
PER CALTRANS STD. PLAN NO. ES-5D

LOOP DETECTOR PLACEMENT DETAIL
NOT TO SCALE



LOOP DETECTOR SAWCUT DETAIL
NOT TO SCALE

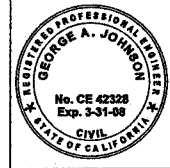
**MINIMUM ADVANCED DETECTOR
SETBACK FROM LIMIT LINE**
(MUTCD 2003 CA SUPPLEMENT)

SETBACK	SPEED
100'	25
140'	30
185'	35
230'	40
285'	45
345'	50
405'	55
475'	60

APPROVED BY:

George A. Johnson
DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07



COUNTY OF RIVERSIDE

**TYPE E LOOP DETECTOR
SAWCUT & PLACEMENT
DETAIL**

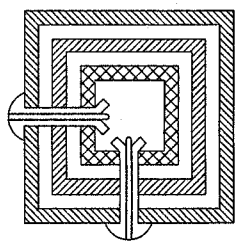
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	1				4			
	2				5			
	3				6			

STANDARD NO. 1201

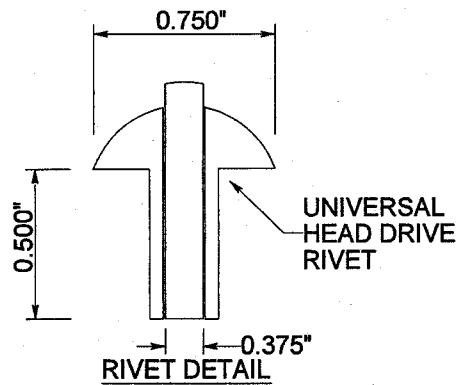
RIVET LOCATIONS
SEE NOTE 6 ON
SHEET 2 OF 2

DIRECTION OF
TRAFFIC FLOW

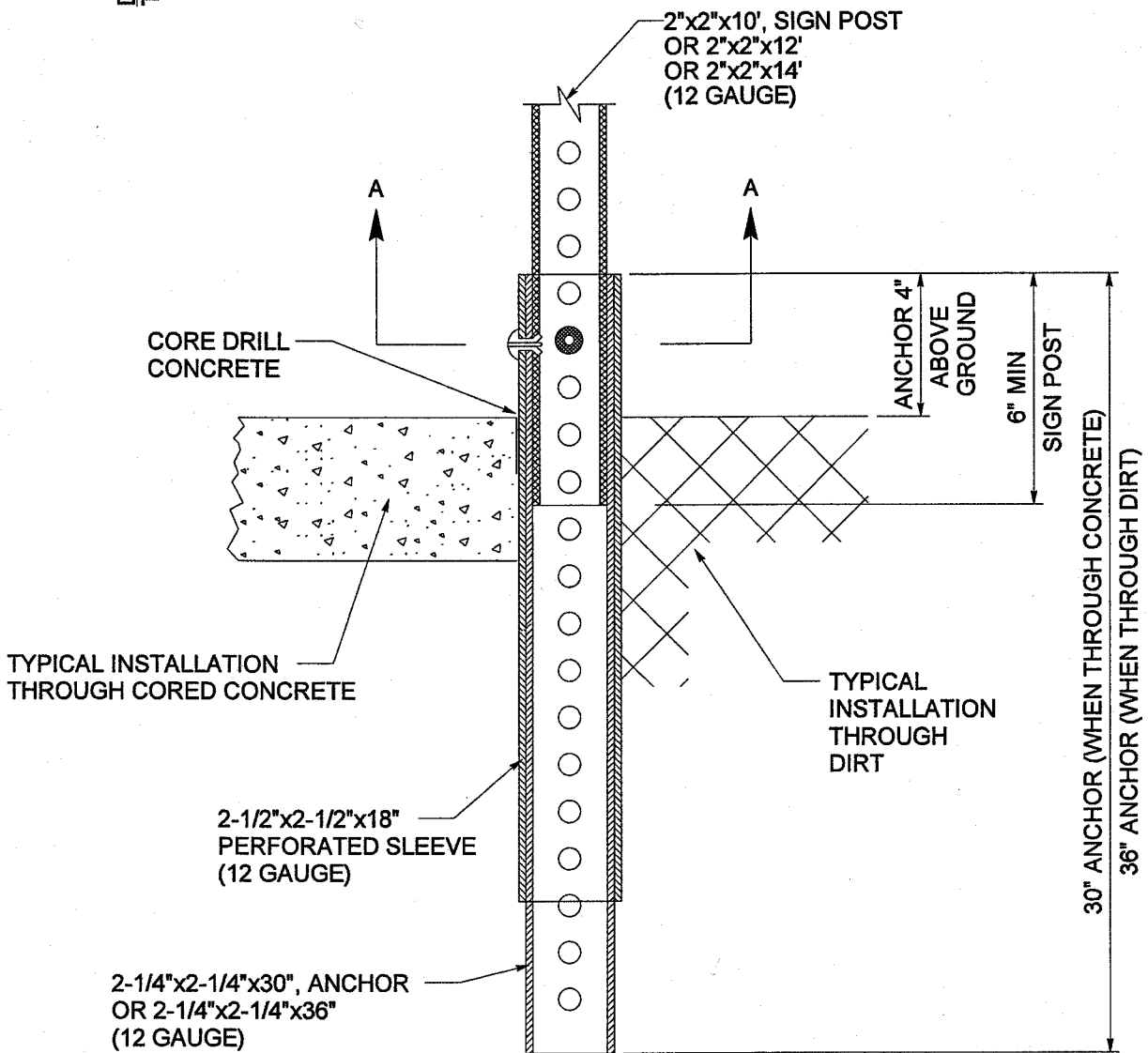
STREET SIDE
OF POST



SECTION "A-A"



RIVET DETAIL



APPROVED BY:

DIRECTOR OF TRANSPORTATION
JUAN C. PEREZ, RCE 49568

DATE



COUNTY OF RIVERSIDE

**SIGN POST
INSTALLATION**

REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
		1	JK	JP	08-05-10	4			
		2				5			
		3				6			

STANDARD No. 1222 (1 of 2)

NOTES:

1. SQUARE PERFORATED STEEL TUBE POST WITH TWO PIECE ANCHOR AND SLEEVE, "TELESPAR", SHALL BE USED FOR ALL TRAFFIC CONTROL AND INFORMATIONAL SIGNS WITHIN ROAD RIGHT-OF-WAY.
2. THE NUMBER OF POSTS REQUIRED FOR SIGN INSTALLATION SHALL BE DETERMINED BY THE AREA OF THE SIGN OR COMBINATION OF SIGNS TO BE INSTALLED. A SINGLE POST SHALL BE USED WHERE BOTH THE LENGTH AND WIDTH ARE 48" OR LESS. DOUBLE POSTS SHALL BE USED WHERE EITHER THE LENGTH OR WIDTH EXCEEDS 48".
3. THE 2 PIECE ANCHOR AND SLEEVE ASSEMBLY SHALL CONSIST OF A 2 1/4" SQUARE BY 30" (THROUGH SIDEWALK) OR 36" (THROUGH SOIL) ANCHOR WITH A 2 1/2" SQUARE BY 18" SLEEVE. ALL SLEEVES AND ANCHORS SHALL BE 12 GAUGE.
4. THE ANCHOR AND SLEEVE ASSEMBLIES SHALL BE DRIVEN SIMULTANEOUSLY UNTIL ONLY 4" REMAINS ABOVE GROUND LEVEL.
5. ALL DIRT SHALL BE REMOVED FROM THE INSIDE TOP 6" MINIMUM OF THE ANCHOR ASSEMBLY TO ALLOW FOR THE INSTALLATION OF THE SIGN POST.
6. INSTALL 2" SQUARE SIGN POST MINIMUM 6" INTO THE ANCHOR ASSEMBLY AND SECURE IN PLACE WITH TWO 3/8" DRIVE RIVETS AS SHOWN. THE RIVETS SHALL BE INSTALLED ON THE SIDE FACING TRAFFIC FLOW AND THE SIDE OF APPROACHING TRAFFIC AS SHOWN IN ORDER TO ACHIEVE THE MAXIMUM BREAK-AWAY EFFECT.
7. INSTALLATION ACCORDING TO THESE REQUIREMENTS IS ESSENTIAL TO MAINTAIN BREAK-AWAY CHARACTERISTICS OF THE POST SYSTEM.
8. SEE STANDARD No's. 815 AND 816 FOR PLACEMENT OF SIGN POST.
9. ALL ANCHOR ASSEMBLIES SHALL BE CORE DRILLED THROUGH CONCRETE AND ASPHALT.
10. ALL SIGNS ATTACHED TO PERFORATED POSTS SHALL HAVE ZINC COATED OR S.S. WASHERS BEHIND THE RIVET THAT ARE LARGER THAN THE HEAD OF THE RIVET.
11. ALL REGULATORY, WARNING AND GUIDE SIGNS INSTALLED SHALL BE 0.080 INCHES IN THICKNESS.
12. ALL SIGNS 36" OR LARGER SHALL BE INSTALLED WITH BACK BRACES SPECIFICALLY DESIGNED FOR 2" SQUARE PERFORATED POSTS. (2" RISE)
13. IN SOME INSTANCES CONCRETE FOUNDATION MAY BE REQUIRED TO ENSURE PROPER STABILITY, THIS OPTION IS TO BE USED AT THE DISCRETION OF THE ENGINEER OR ONSITE INSPECTOR.

APPROVED BY:

DIRECTOR OF TRANSPORTATION
JUAN C. PEREZ, RCE 49568

DATE



COUNTY OF RIVERSIDE

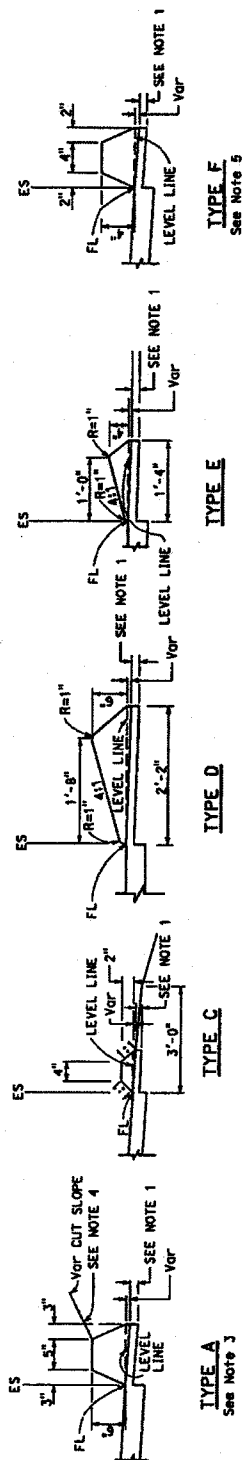
**SIGN POST
INSTALLATION NOTES**

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
	1	JK	JP	08-05-10	4			
	2				5			
	3				6			

STANDARD No. 1222 (2 of 2)

CITY	COUNTY	ROUTE	POST MILES	SHEET NO.	NO. SHEETS
			TOTAL PROJECT		

REGISTERED CIVIL ENGINEER
 MAY 20, 2011
 PLANS APPROVAL DATE
 THE STATE OF CALIFORNIA OR ITS OFFICERS
 AND AGENCIES ACCEPT THESE PLANS AS THE BASIS OF THE PROJECT OF WHICH
 THE PROJECT IS THE SUBJECT OF THESE PLANS.



TYPE A
See Note 3

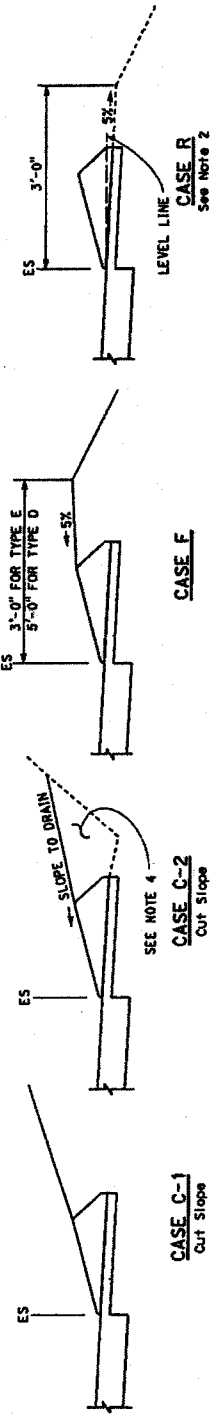
TYPE C
SEE NOTE 1

TYPE D
SEE NOTE 1

TYPE E
SEE NOTE 1

TYPE F
See Note 5

DIKES



CASE C-1
Cut Slope

CASE C-2
Cut Slope

CASE F
SEE NOTE 4

CASE R
See Note 2

TYPE D AND E BACKFILL DETAILS

DIKE QUANTITIES

TYPE	PER LINEAR FOOT	CUBIC YARDS
A	0.0135	
C	0.0038	
D	0.0293	
E	0.0130	
F	0.0065	

Quantities based on 5% cross slope.

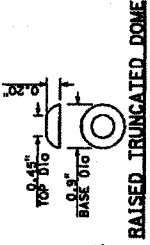
- NOTES:**
- For HMA shoulders only, extend top layer of HMA placed on the shoulder under dike with no joint of the ES. For projects with OGFC shoulders, do not extend OGFC under dike. See project plans for modified dike detail.
 - Case R applies to retrofit only projects where restrictive conditions do not provide enough width for Case F backfill.
 - Type A dike only to be used where restrictive slope conditions do not provide enough width to use Type D or Type E dike.
 - Fill and compact with excavated material to top of dike.
 - Use Type F dike, where dike is required with guard railing installations. See Standard Plan AT7C4 for dike positioning details.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
HOT MIX ASPHALT DIKES
NO SCALE

A87B

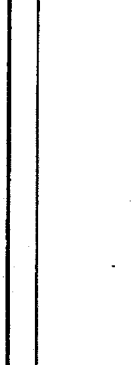
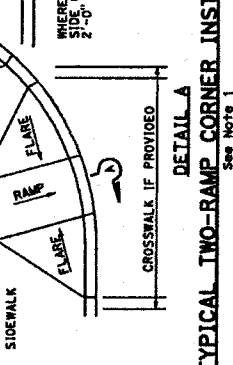
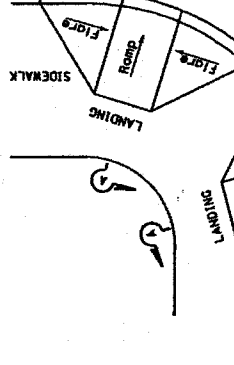
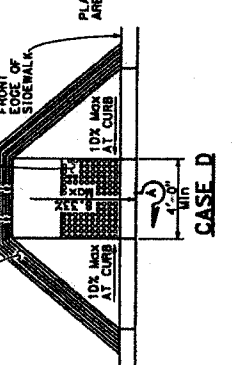
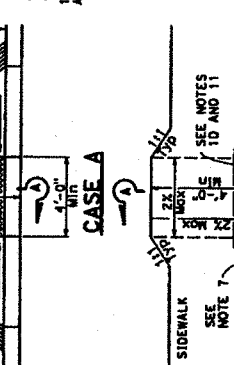
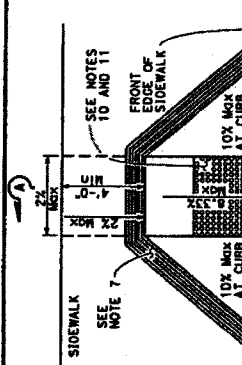
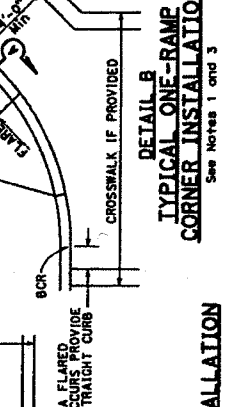
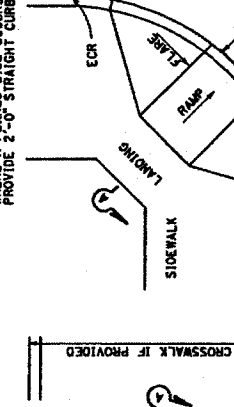
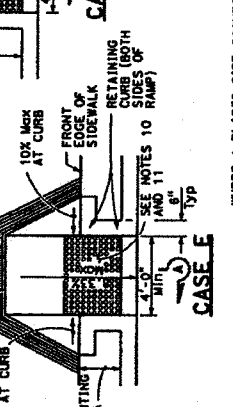
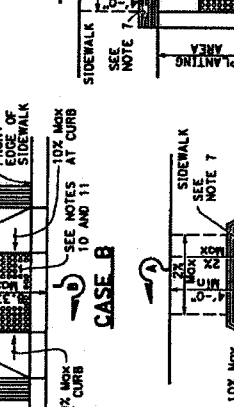
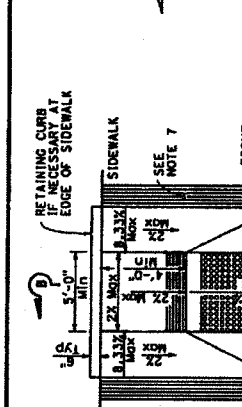
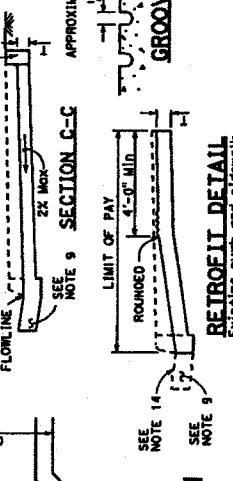
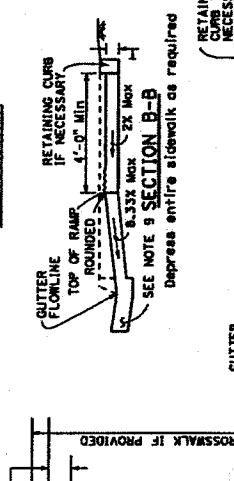
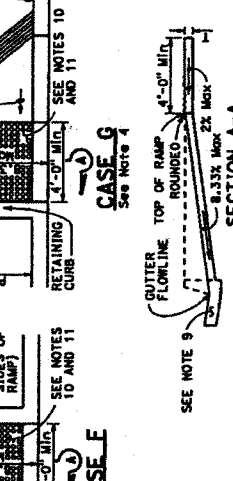
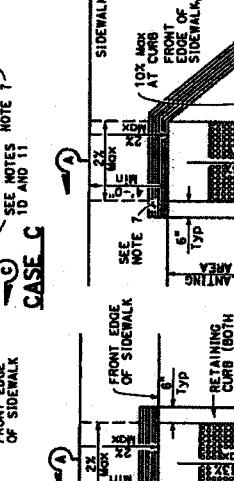
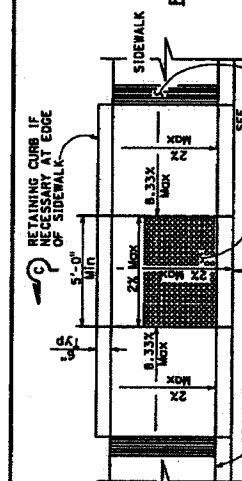
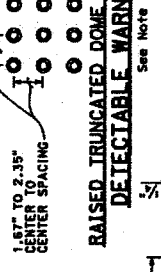
Return to Table of Contents

DIST.	COUNTY	ROUTE	TOTAL SHEETS	SHEET NO.
				108
REGISTERED CIVIL ENGINEER Daniel B. Cook License No. 51197 State of California May 20, 2011 EXPIRES: MAY 20, 2014 THE SEAL IS VALID FOR THE STATE OF CALIFORNIA ONLY AND IS NOT VALID FOR ANY OTHER JURISDICTION. THIS SEAL IS NOT TO BE REPRODUCED, COPIED, OR USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF THE PE IN CHARGE.				



NOTES:

- As site conditions dictate, Case A through Case G curb ramps may be used for corner installations similar to those shown in Detail A and Detail B. In the case of curb ramps used in Detail A do not have to be installed in the center of the curb. In the case of curb ramps used in mid block locations, as site conditions dictate.
- If located on a curve, the sides of the ramp shall be parallel, but the minimum width of the ramp shall be 4'-0".
- Side slope of ramp flares vary uniformly from a maximum of 10% of curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case F.
- The curb ramp shall be outlined, as shown, with a 1'-0" wide grooving detail.
- Transitions from ramps and landing to walks, gutters or streets shall be flush and free of abrupt changes.
- Minimum slopes of adjoining gutters, the road surface immediately adjacent to the curb ramp, and the gutter flange shall be a minimum of 5 percent within 4'-0" of the top and bottom of the curb ramp.
- Curb ramps shall have a detectable warning surface that extends the full width and length of the ramp. Detectable warning surfaces shall conform with the requirements in the Special Provisions.
- The edge of the detectable warning surface nearest the street shall be between 6" and 8" from the gutter flange.
- Sidewalk and ramp thickness, "T", shall be 3/2" minimum.
- Utility pull boxes, manholes, vaults and all other utility facilities shall be located and installed in accordance with the Special Provisions, adjusted to grade by the contractor prior to, or in conjunction with, curb ramp construction.
- For retrofit conditions, removal and replacement of curb apron shall be the contractor's option, unless otherwise shown on project plans.



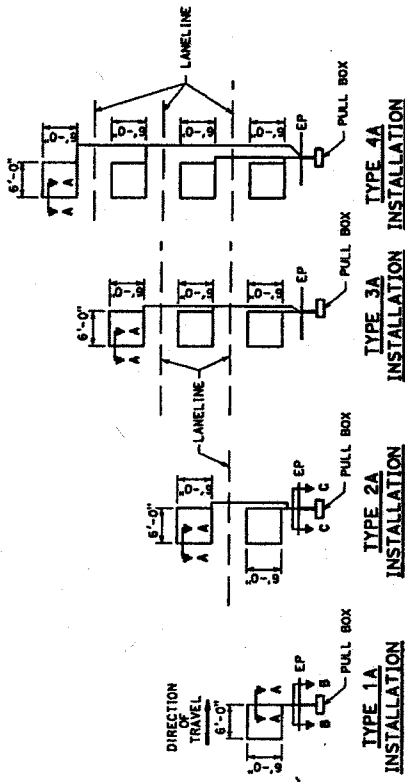
STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
CURB RAMP DETAILS
 NO SCALE

A88A

Return to Table of Contents

DIST.	COUNTY	ROUTE	PROJECT NO.	SHEET NO.

REGISTERED ELECTRICAL ENGINEER
 MAY 20, 2011
 PLUS APPROVAL DATE
 FOR ANY CHANGES TO THIS PLAN
 THE SEAL IS VOID IF NOT PLACED HEREIN

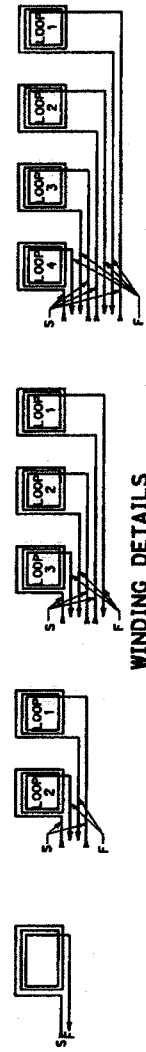


SAWCUT DETAILS

- Type A loop detector configurations illustrated
1. A thru 4E = 1 Type A loop configuration in each lane.
 2. 1C = 1 Type B loop configuration in each lane.
 3. 1D = 1 Type C loop configuration in each lane.
 4. 1E = 1 Type D loop configuration in each lane.
 5. 1F = 1 Type E loop configuration in each lane.
 6. 1G = 1 Type G loop configuration in each lane.
- Other detector configurations only when specified or shown on plans.

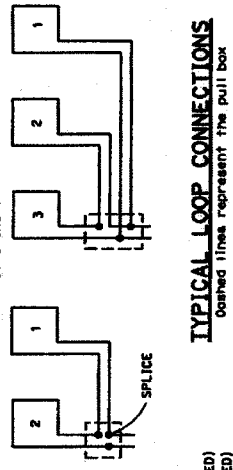
LOOP INSTALLATION PROCEDURE

1. Loops shall be centered in lanes.
2. Saw slots in pavement for loop conductors as shown in details.
3. Distances between side of loop and a lead-in saw cut from adjacent detectors shall be 2'-0" minimum. Distance between lead-in saw cuts shall be 6" minimum.
4. Bottom of saw slot shall be smooth with no sharp edges.
5. Slots shall be washed until clean, blown out and thoroughly dried before installing loop conductors.
6. Adjacent loops on the same sensor unit channel shall be wound in opposite directions.
7. Identify and tag loop circuit pairs in the pull box with loop number, start (S) and finish (F) of conductor.
8. Identify and tag lead-in-cable with sensor number and phase.
9. Install loop conductor in slot using a 3/8" to 1/2" thick wood paddle. Hold loop conductors with wood paddles (at the bottom of the sawed slot) during adjacent placement.
10. No more than 2 twisted pairs shall be installed in one sawed slot.
11. Allow additional 5'-0" of slack length of conductor for the lead-in run to pull box.
12. The additional length of each conductor for each loop shall be twisted together into a pair (2 turns per foot minimum) before being placed in the slot and conduit leading to the pull box.
13. Test each loop circuit for continuity, circuit resistance and insulation resistance at the pull box before filling slots.
14. Fill slots as shown in details.
15. Splice loop conductors to lead-in-cable. Splices shall be soldered.
16. End of lead-in-cable and Type 2 loop conductor shall be waterproofed prior to installing in conduit to prevent moisture from entering the cable.
17. Lead-in-cable shall not be spliced between the pull box and the controller cabinet terminals.
18. Test each loop circuit for continuity, circuit resistance and insulation resistance at the controller cabinet location.
19. Where loop conductors are not to be spliced to a lead-in-cable, the ends of the conductors shall be taped and waterproofed with electrical insulating coating.



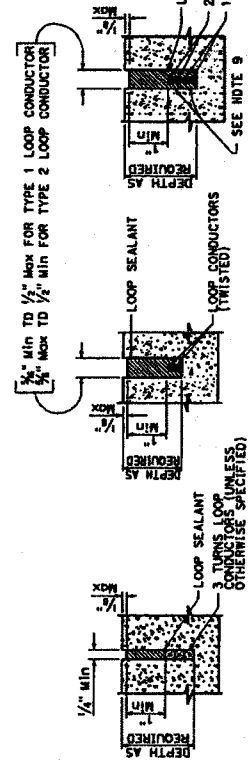
WINDING DETAILS

See Notes 6 and 7



TYPICAL LOOP CONNECTIONS

Dashed lines represent the pull box



SECTION A-A

SECTION B-B

SECTION C-C

SLOT DETAILS - TYPE 1 AND TYPE 2 LOOP CONDUCTOR

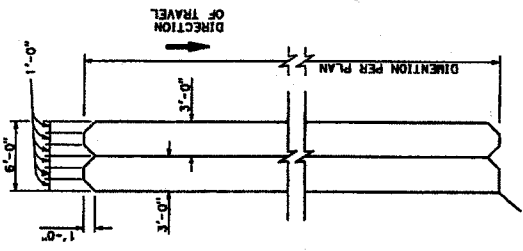
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**ELECTRICAL SYSTEMS
(DETECTORS)**

NO SCALE

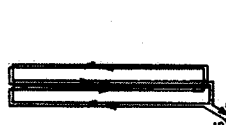
ES-5A

DIST*	COUNTY	ROUTE	POST MILEAGE	SHEET NO.	TOTAL SHEETS

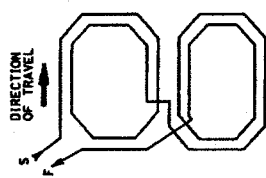
California
 REGISTERED ELECTRICAL ENGINEER
 No. 10142
 DATE: MAY 20, 2011
 THIS IS A PROFESSIONAL SERVICE AND THE ENGINEER SHALL BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE WORK SHOWN ON THIS PLAN SHEET.
 STATE OF CALIFORNIA
 DEPARTMENT OF INDUSTRIAL RELATIONS



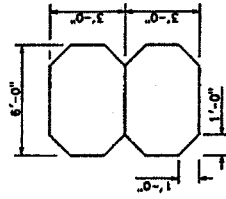
SAWCUT DETAIL
TYPE C LOOP DETECTOR CONFIGURATION



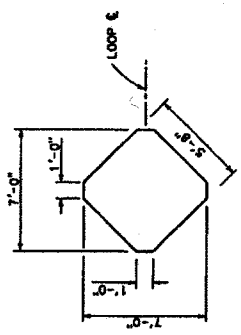
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TYPE C LOOP DETECTOR CONFIGURATION



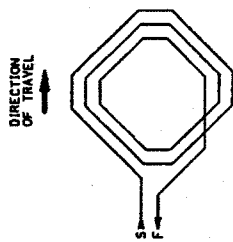
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TYPE Q LOOP DETECTOR CONFIGURATION



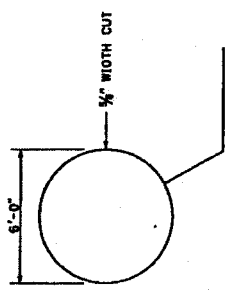
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TYPE Q LOOP DETECTOR CONFIGURATION



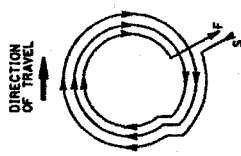
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TYPE B LOOP DETECTOR CONFIGURATION



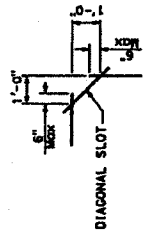
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TYPE B LOOP DETECTOR CONFIGURATION



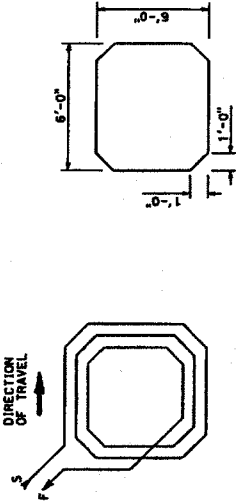
SAWCUT DETAIL
TYPE E LOOP DETECTOR CONFIGURATION



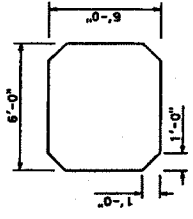
WINDING DETAIL
TYPE E LOOP DETECTOR CONFIGURATION



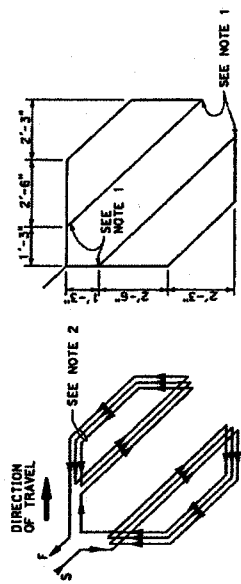
PLAN VIEW OF
DIAGONAL SLOT
AT CORNERS



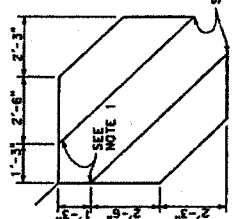
WINDING DETAIL
TYPE A LOOP DETECTOR CONFIGURATION



SAWCUT DETAIL
TYPE A LOOP DETECTOR CONFIGURATION



WINDING DETAIL
TYPE D LOOP DETECTOR CONFIGURATION



SAWCUT DETAIL
TYPE D LOOP DETECTOR CONFIGURATION

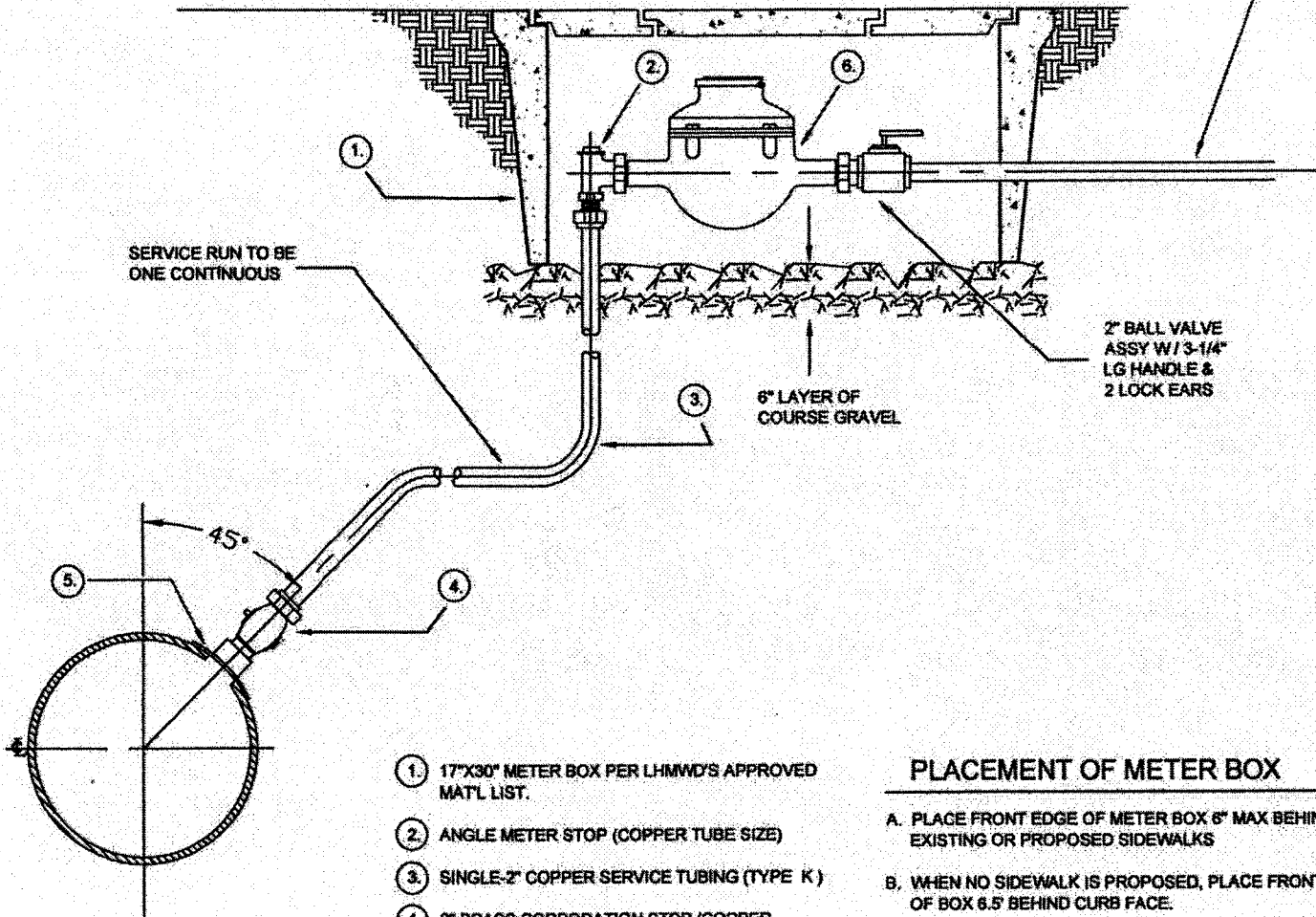
- NOTES:**
1. Round corners of acute angle sawcuts to prevent damage to conductors.
 2. Install 3 turns when only one Type B loop is on a sensor unit channel. 6'-0" x 6'-0" loops on a sensor unit.
 3. Typical distance separating loops from edge is 10' for Type A, B and E installation in single lane.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**ELECTRICAL SYSTEMS
(DETECTORS)**

NO SCALE

ES-5B

BACKFLOW DEVICE MAY BE REQUIRED W/ COMMERCIAL BLDG. OR IF SECOND SOURCE OF WATER IS ON-SITE OR METER IS REMOTE.



SERVICE RUN TO BE ONE CONTINUOUS

2" BALL VALVE ASSY W/ 3-1/4" LG HANDLE & 2 LOCK EARS

6" LAYER OF COURSE GRAVEL

PLACEMENT OF METER BOX

- A. PLACE FRONT EDGE OF METER BOX 6" MAX BEHIND EXISTING OR PROPOSED SIDEWALKS
- B. WHEN NO SIDEWALK IS PROPOSED, PLACE FRONT EDGE OF BOX 6.5" BEHIND CURB FACE.
- C. WHEN NO CURBS ARE EXISTING OR TO BE INSTALLED UPON COMPLETION OF THE WATER SYSTEM, PLACE BACK EDGE OF METER BOX ON PROPERTY LINE.

- 1. 17"x30" METER BOX PER LHMWD'S APPROVED MAT'L LIST.
- 2. ANGLE METER STOP (COPPER TUBE SIZE)
- 3. SINGLE-2" COPPER SERVICE TUBING (TYPE K)
- 4. 2" BRASS CORPORATION STOP (COPPER TUBE SIZE)
- 5. 2 1/2" WELDED SADDLE WITH 2 1/2"x 2" DIELECTRIC BUSHING FOR STEEL PIPE OR SMITH-BLAIR # 315 SINGLE STRAP SERVICE OR APPROVED EQUAL FOR PVC OR D.I.P.
- 6. 2" MULTI-JET METER PER LHMWD'S APPROVED MAT'L LIST.

GENERAL NOTES

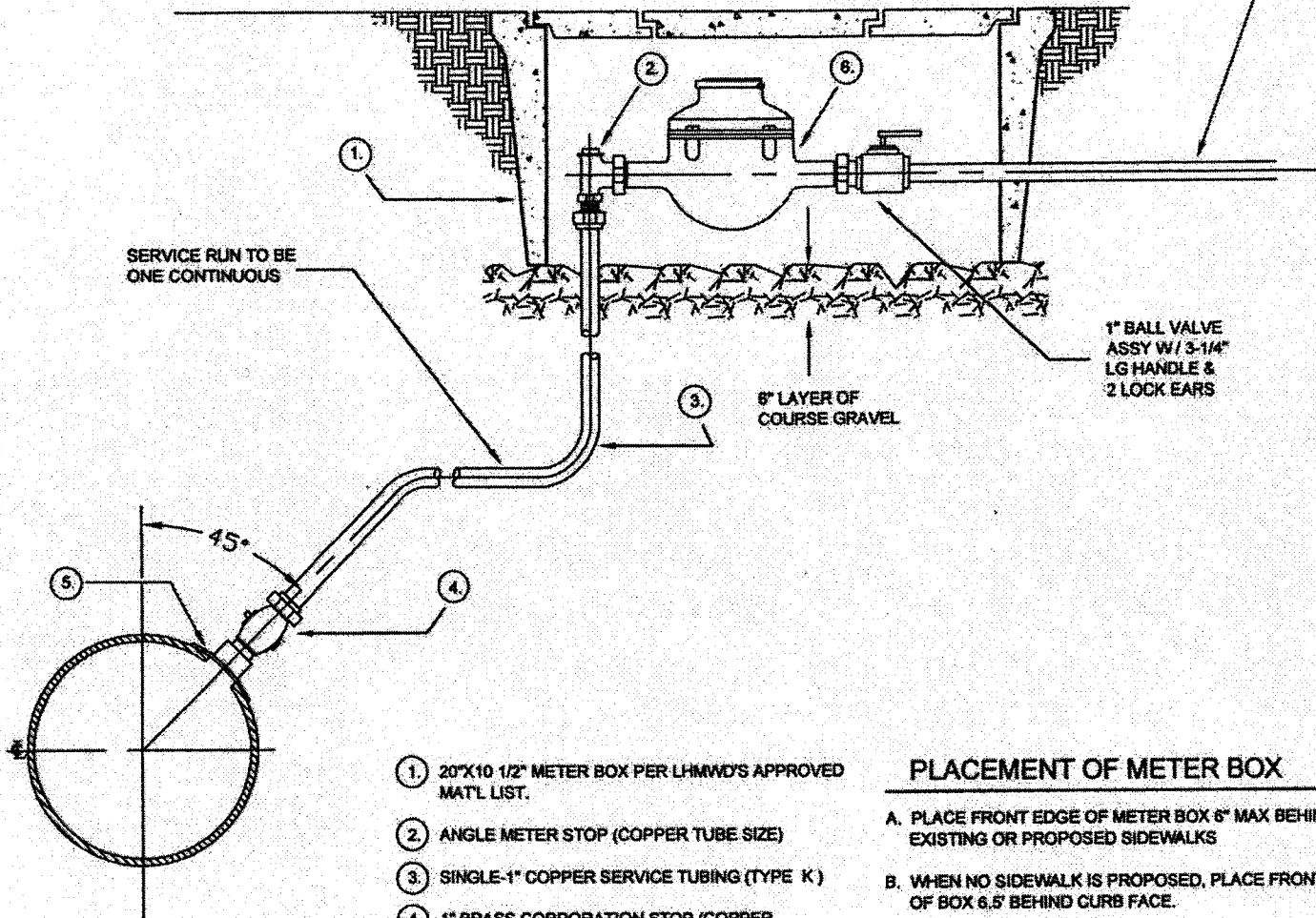
- 1. ALL FITTINGS BETWEEN AND INCLUDING CORPORATION STOP AND BALL VALVE SHALL:
 - A. BE MADE OF BRASS OR BRONZE.
 - B. BE OF THE BANDED PATTERN.
 - C. BE DESIGNED FOR A MIN OF 175 PSI (COLD WATER) WORKING PRESSURE.
- 2. PRESSURE TEST PRIOR TO WRAPPING OR BACKFILLING.
- 3. CORPORATION STOP & FITTINGS AT PIPELINE SHALL BE PRIMED AND WRAPPED WITH APPROVED COAL TAR RESIN TAPE.
- 4. ALL SERVICE PIPE & TUBING SHALL BE LAID ON A CONSTANT SLOPE UP FROM WATER MAIN TO METER. NO DIPS OR POCKETS WILL BE PERMITTED. PROVIDE 36" MIN. COVER AT GAS MAIN CROSSING.

DATE:	REVISION	BY

APPROVED BY Thomas W. Wagner 10/7/2010
 GENERAL MANAGER DATE:
M. [Signature] 10/7/10
 CHIEF ENGINEER DATE:

SCALE: NONE | DRAWN BY: S.R.W.
LAKE HEMET MUNICIPAL WATER DIST.
WATER IMPROVEMENT
2" SERVICE CONNECTION
STANDARD H-4

BACKFLOW DEVICE MAY BE REQUIRED W/ COMMERCIAL BLDG. OR IF SECOND SOURCE OF WATER IS ON-SITE OR METER IS REMOTE.



- 1. 20"X10 1/2" METER BOX PER LHMWD'S APPROVED MAT'L LIST.
- 2. ANGLE METER STOP (COPPER TUBE SIZE)
- 3. SINGLE-1" COPPER SERVICE TUBING (TYPE K)
- 4. 1" BRASS CORPORATION STOP (COPPER TUBE SIZE)
- 5. 1 1/4" WELDED SADDLE WITH 1 1/4"X 1" DIELECTRIC BUSHING FOR STEEL PIPE OR SMITH-BLAIR # 315 SINGLE STRAP SERVICE OR APPROVED EQUAL FOR PVC OR D.I.P.
- 6. 5/8" OR 3/4" MULTI-JET METER PER LHMWD'S APPROVED MAT'L LIST.

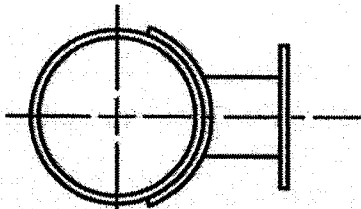
PLACEMENT OF METER BOX

- A. PLACE FRONT EDGE OF METER BOX 6" MAX BEHIND EXISTING OR PROPOSED SIDEWALKS
- B. WHEN NO SIDEWALK IS PROPOSED, PLACE FRONT EDGE OF BOX 6.5" BEHIND CURB FACE.
- C. WHEN NO CURBS ARE EXISTING OR TO BE INSTALLED UPON COMPLETION OF THE WATER SYSTEM, PLACE BACK EDGE OF METER BOX ON PROPERTY LINE.

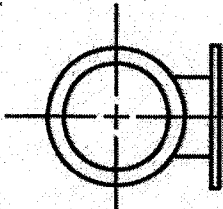
GENERAL NOTES

- 1. ALL FITTINGS BETWEEN AND INCLUDING CORPORATION STOP AND BALL VALVE SHALL:
 - A. BE MADE OF BRASS OR BRONZE.
 - B. BE OF THE BANDED PATTERN.
 - C. BE DESIGNED FOR A MIN OF 175 PSI (COLD WATER) WORKING PRESSURE.
- 2. PRESSURE TEST PRIOR TO WRAPPING OR BACKFILLING.
- 3. CORPORATION STOP & FITTINGS AT PIPELINE SHALL BE PRIMED AND WRAPPED WITH APPROVED COAL TAR RESIN TAPE.
- 4. ALL SERVICE PIPE & TUBING SHALL BE LAID ON A CONSTANT SLOPE UP FROM WATER MAIN TO METER. NO DIPS OR POCKETS WILL BE PERMITTED. PROVIDE 36" MIN. COVER AT GAS MAIN CROSSING.

DATE:	REVISION	BY
APPROVED BY <i>Thomas W. Weymer</i> 10/7/2010		
GENERAL MANAGER		DATE:
<i>M. O'Donoghue</i>		10/7/10
CHIEF ENGINEER		DATE:
SCALE: NONE DRAWN BY: S.R.W.		
LAKE HEMET MUNICIPAL WATER DIST.		
WATER IMPROVEMENT		
1" SERVICE CONNECTION		
STANDARD H-5		



USE 6" FLANGED SADDLED OUTLET FOR INSTALLATION ON 12" OR LARGER PIPE



USE C.I. TEE FOR INSTALLATION ON 6" OR 8" PIPELINE

PIPELINE INSTALLATION

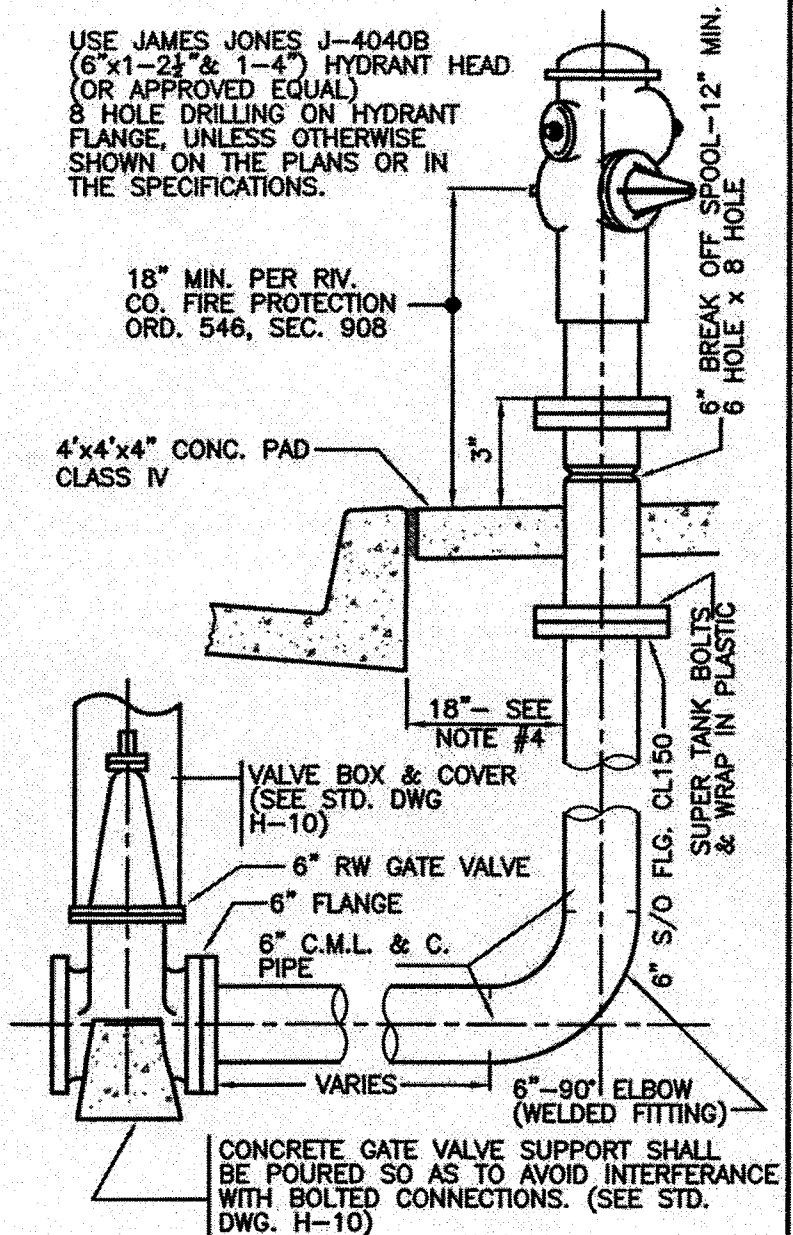
NOTES:

1. HYDRANT TO BE PAINTED WITH RUSTOLEUM 7644 SAFETY YELLOW OR APPROVED EQUAL.
2. ALL FLANGES SHALL BE FULL WELD (DOUBLE PASS) AND COATED IN THE FIELD AS DIRECTED BY THE ENGINEER PER NOTE #6.
3. ALTERNATE MATERIALS MAY BE USED WHEN AUTHORIZED.
4. FIRE HYDRANT PLACEMENT:
 - A.) CURB & SIDEWALK SEPARATED: HYDRANT TO BE 18" BEHIND CURB AS SHOWN.
 - B.) CURB & SIDEWALK ADJACENT: HYDRANT TO BE 18" BEHIND SIDEWALK BUT NOT LESS THAN 8" WITHIN THE ROAD RIGHT-OF-WAY.
 - C.) NO CURBS OR SIDEWALKS PROPOSED: HYDRANT TO BE 18" WITHIN THE ROAD RIGHT-OF-WAY.
5. FIRE HYDRANT LOCATION:
 - A.) STREET LOCATIONS: HYDRANT TO BE AT CURB RETURN
 - B.) OTHER THAN ST. INTERSECTIONS: HYDRANT TO BE ON LOT LINE AS SHOWN ON PLANS.
6. FIELD COATING SHALL BE EITHER:
 - A.) PROTECTO WRAP #1170 PRIMER AND #200 COAL-TAR-RESIN
 - B.) CEMENT MORTAR.
7. DIRECTION OF OUTLETS AT 45° PER RIV. CO. FIRE PROTECTION ORD. 546, SEC. 901-F

USE JAMES JONES J-4040B (6"x1-2 1/2" & 1-4") HYDRANT HEAD (OR APPROVED EQUAL) 8 HOLE DRILLING ON HYDRANT FLANGE, UNLESS OTHERWISE SHOWN ON THE PLANS OR IN THE SPECIFICATIONS.

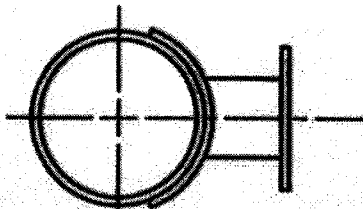
18" MIN. PER RIV. CO. FIRE PROTECTION ORD. 546, SEC. 908

4'x4'x4" CONC. PAD CLASS IV

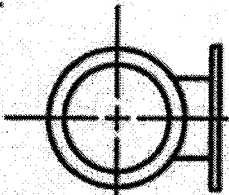


FIRE HYDRANT ASSEMBLY WITH C.I. BREAK-AWAY SPOOL

DATE	REVISION	BY
APPROVED BY <i>Robert V. Lindquist</i> 12/17/97		
	GENERAL MANAGER	DATE
	<i>John M. Brudin</i>	12/12/97
	DISTRICT ENGINEER	DATE
LAKE HEMET MUNICIPAL WATER DISTRICT WATER IMPROVEMENT		
FIRE HYDRANT INSTALLATION (6"x1-2 1/2" & 1-4") STANDARD FIRE HYDRANT		
STANDARD H-2A		



USE 6" FLANGED SADDLED OUTLET FOR INSTALLATION ON 12" OR LARGER PIPE



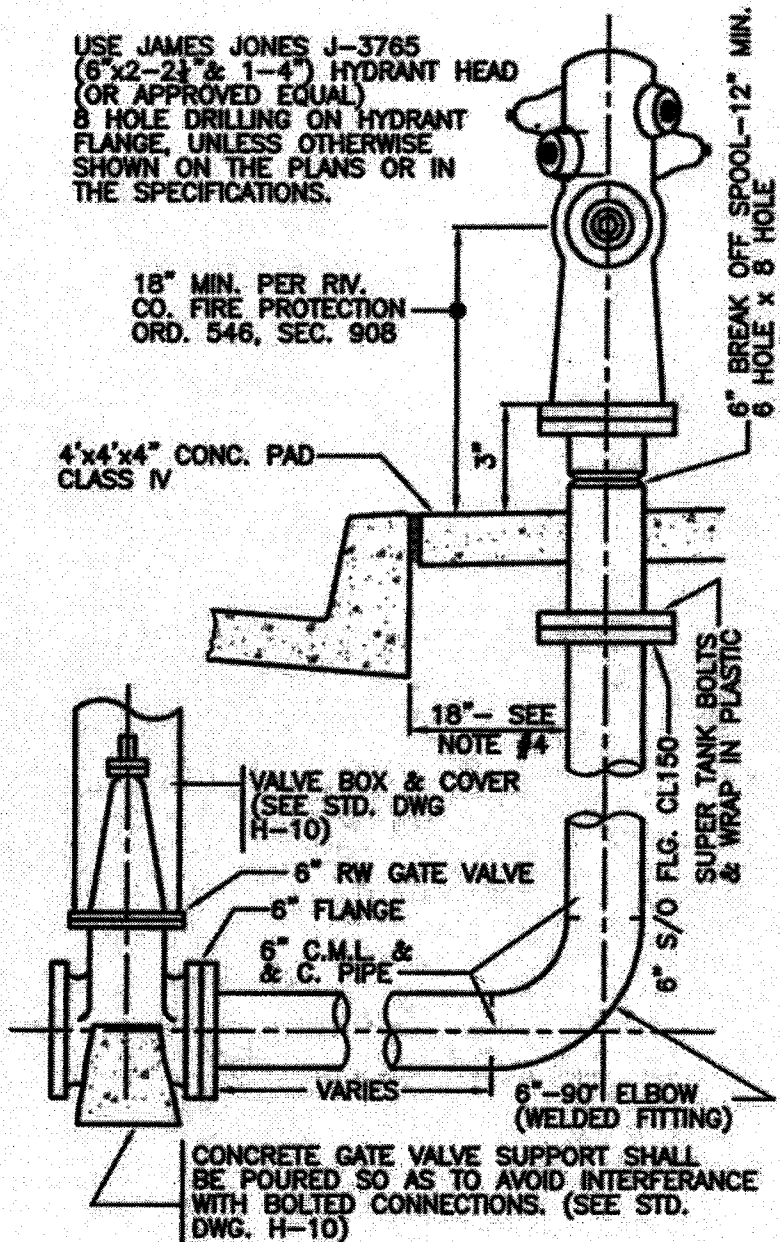
USE C.I. TEE FOR INSTALLATION ON 6" OR 8" PIPELINE

PIPELINE INSTALLATION

NOTES:

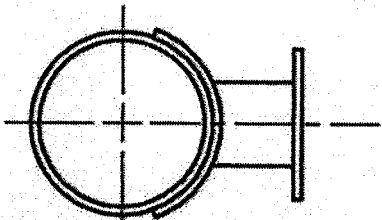
1. HYDRANT TO BE PAINTED WITH RUSTOLEUM 7644 YELLOW OR APPROVED EQUAL.
2. ALL FLANGES SHALL BE FULL WELD (DOUBLE PASS) AND COATED IN THE FIELD AS DIRECTED BY THE ENGINEER PER NOTE #6.
3. ALTERNATE MATERIALS MAY BE USED WHEN AUTHORIZED.
4. FIRE HYDRANT PLACEMENT:
 - A.) CURB & SIDEWALK SEPARATED: HYDRANT TO BE 18" BEHIND CURB AS SHOWN.
 - B.) CURB & SIDEWALK ADJACENT: HYDRANT TO BE 18" BEHIND SIDEWALK BUT NOT LESS THAN 8" WITHIN THE ROAD RIGHT-OF-WAY.
 - C.) NO CURBS OR SIDEWALKS PROPOSED: HYDRANT TO BE 18" WITHIN THE ROAD RIGHT-OF-WAY.
5. FIRE HYDRANT LOCATION:
 - A.) STREET LOCATIONS: HYDRANT TO BE AT CURB RETURN
 - B.) OTHER THAN ST. INTERSECTIONS: HYDRANT TO BE ON LOT LINE AS SHOWN ON PLANS.
6. FIELD COATING SHALL BE EITHER:
 - A.) PROTECTO WRAP #1170 PRIMER AND #200 COAL-TAR-RESIN
 - B.) CEMENT MORTAR.
7. LARGE OUTLET TO BE POINTED TOWARDS THE STREET PER RIV. CO. FIRE PROTECTION ORD. 546 SEC. 901-H.

USE JAMES JONES J-3765 (6"x2-2 1/2" & 1-4") HYDRANT HEAD (OR APPROVED EQUAL) 8 HOLE DRILLING ON HYDRANT FLANGE, UNLESS OTHERWISE SHOWN ON THE PLANS OR IN THE SPECIFICATIONS.

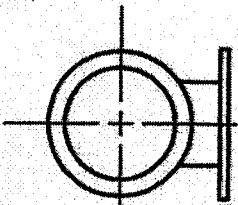


FIRE HYDRANT ASSEMBLY WITH C.I. BREAK-AWAY SPOOL

DATE	REVISION	BY
APPROVED BY <i>Robert V. Lindquist</i> 12/17/97		
	GENERAL MANAGER	DATE
<i>John M. Brudner</i> 12/12/97		
	DISTRICT ENGINEER	DATE
LAKE HEMET MUNICIPAL WATER DISTRICT WATER IMPROVEMENT		
FIRE HYDRANT INSTALLATION (6"x2-2 1/2" & 1-4") SUPER FIRE HYDRANT		
STANDARD H-2B		



USE 6" FLANGED SADDLED OUTLET FOR INSTALLATION ON 12" OR LARGER PIPE



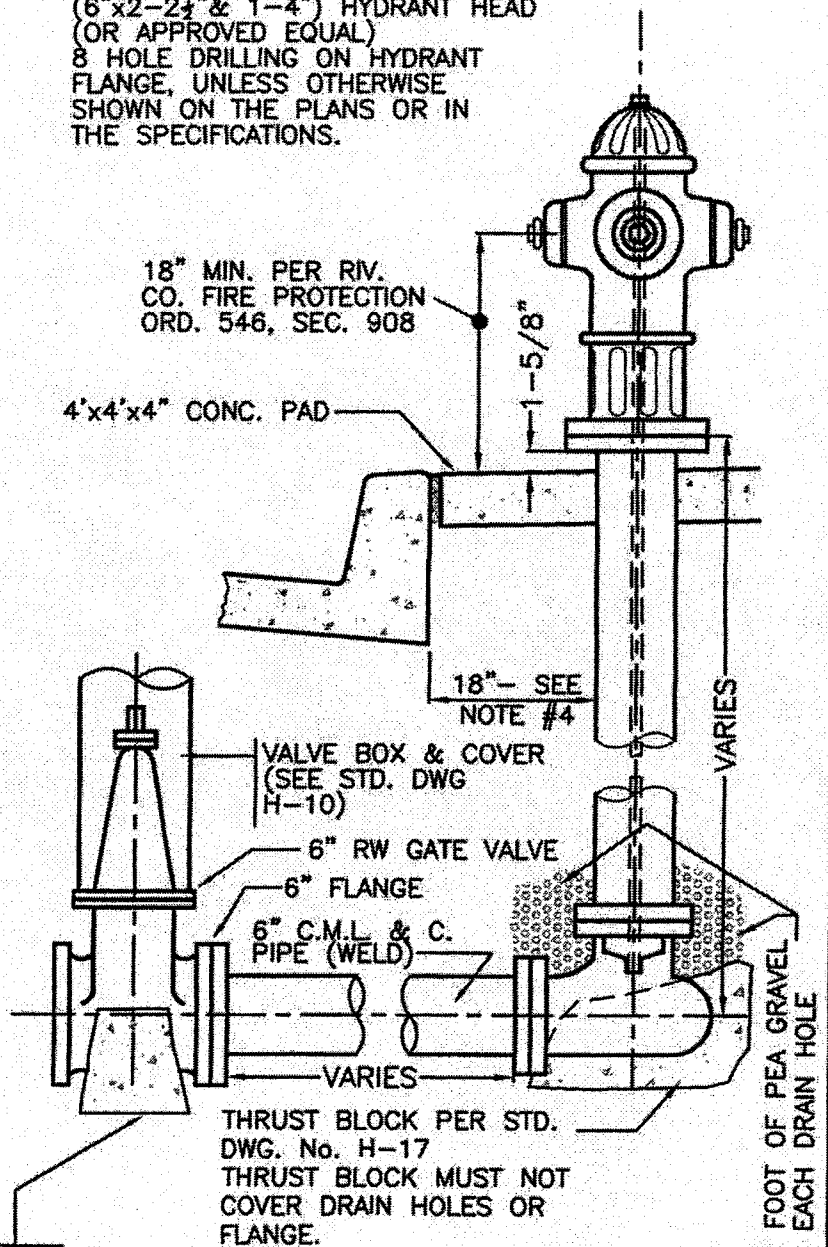
USE C.I. TEE FOR INSTALLATION ON 6" OR 8" PIPELINE

PIPELINE INSTALLATION

NOTES:

1. HYDRANT TO BE PAINTED WITH RUSTOLEUM 7644 YELLOW OR APPROVED EQUAL.
2. ALL FLANGES SHALL BE FULL WELD (DOUBLE PASS) AND COATED IN THE FIELD AS DIRECTED BY THE ENGINEER PER NOTE #6.
3. ALTERNATE MATERIALS MAY BE USED WHEN AUTHORIZED.
4. FIRE HYDRANT PLACEMENT:
 - A.) CURB & SIDEWALK SEPARATED: HYDRANT TO BE 18" BEHIND CURB AS SHOWN.
 - B.) CURB & SIDEWALK ADJACENT: HYDRANT TO BE 18" BEHIND SIDEWALK BUT NOT LESS THAN 8" WITHIN THE ROAD RIGHT-OF-WAY.
 - C.) NO CURBS OR SIDEWALKS PROPOSED: HYDRANT TO BE 18" WITHIN THE ROAD RIGHT-OF-WAY.
5. FIRE HYDRANT LOCATION:
 - A.) STREET LOCATIONS: HYDRANT TO BE AT CURB RETURN
 - B.) OTHER THAN ST. INTERSECTIONS: HYDRANT TO BE ON LOT LINE AS SHOWN ON PLANS.
6. FIELD COATING SHALL BE EITHER:
 - A.) PROTECTO WRAP #1170 PRIMER AND #200 COAL-TAR-RESIN
 - B.) CEMENT MORTAR.
7. LARGE OUTLET TO BE POINTED TOWARDS THE STREET PER RIV. CO. FIRE PROTECTION ORD. 546 SEC. 901-H.

USE MUELLER A-423 (6"x2-2½" & 1-4") HYDRANT HEAD (OR APPROVED EQUAL) 8 HOLE DRILLING ON HYDRANT FLANGE, UNLESS OTHERWISE SHOWN ON THE PLANS OR IN THE SPECIFICATIONS.

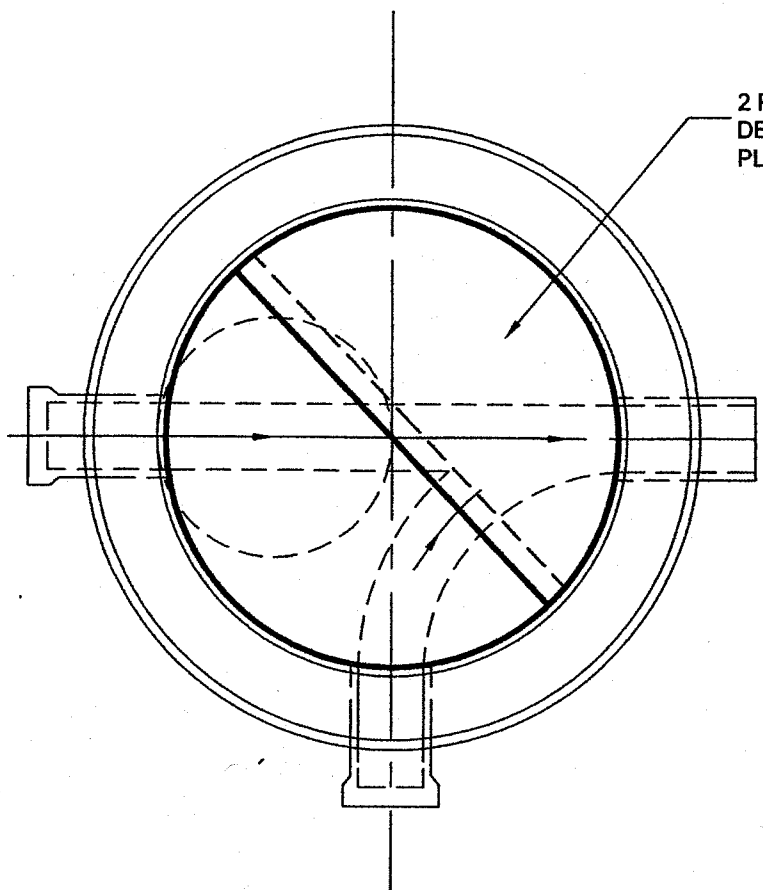


FIRE HYDRANT ASSEMBLY WITH SAFETY FLANGE

DATE	REVISION	BY
APPROVED BY		
GENERAL MANAGER		DATE
DISTRICT ENGINEER		DATE
LAKE HEMET MUNICIPAL WATER DISTRICT WATER IMPROVEMENT		
FIRE HYDRANT INSTALLATION (6"x2-2½" & 1-4") SUPER FIRE HYDRANT (DRY BARREL)		
STANDARD H-2C		

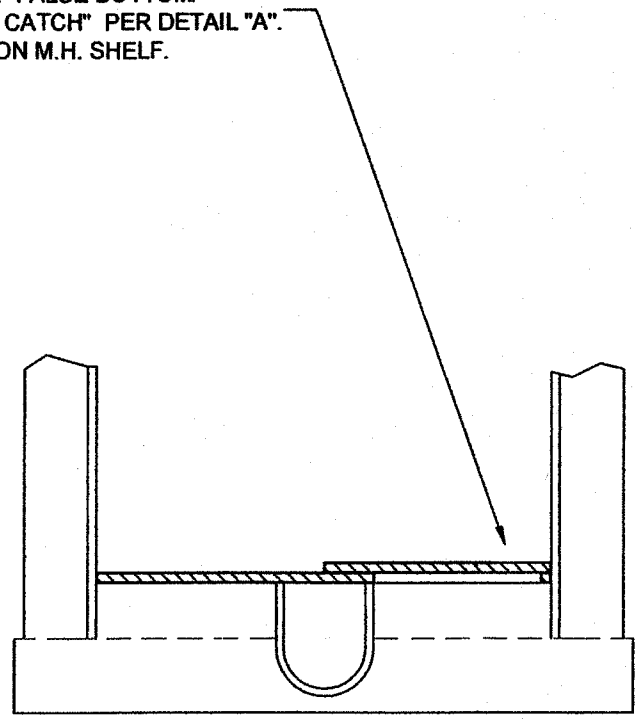
CONCRETE GATE VALVE SUPPORT SHALL BE POURED SO AS TO AVOID INTERFERENCE WITH BOLTED CONNECTIONS. (SEE STANDARD DWG. H-10)

1 CUBIC FOOT OF PEA GRAVEL AROUND EACH DRAIN HOLE

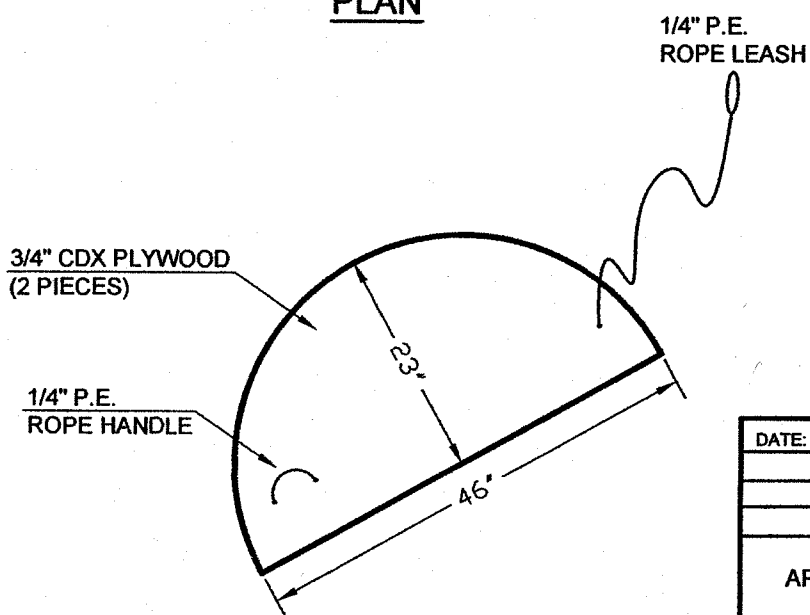


PLAN

2 PIECE "FALSE BOTTOM/
DEBRIS CATCH" PER DETAIL "A".
PLACE ON M.H. SHELF.



SECTION



DETAIL "A"

DATE:	REVISION	BY
APPROVED BY _____ GENERAL MANAGER DATE: _____ <i>D. D. Wall</i> 6/5/09 CHIEF ENGINEER DATE: _____		
SCALE: NONE	DRAWN BY: S.R.W.	
LAKE HEMET MUNICIPAL WATER DIST. WATER IMPROVEMENT TEMPORARY FALSE BOTTOM / DEBRIS CATCH FOR STANDARD SEWER MANHOLE STANDARD NO.11		



Riverside Office: 2300 Market St., Ste. 150, Riverside, CA 92501 Ph. (951) 955-4777 Fax (951) 955-4886
 Palm Desert Office: 77-933 Las Montañas Rd., # 201 Palm Desert, CA 92211-4131 Ph. (760) 863-8886 (760) 863-7072

Fire Prevention Standard

Title: Blue Reflective Pavement Markers			
Standard:# 06-11	Effective Date: 02/09/2007	Revised Date: 06/30/2011	
Code References: 2010 CFC, Sec. 501			
Note: <i>This standard is a summary of Fire Department clarifications of County and State Codes. Information contained herein applies to typical circumstances and may not address all situations.</i>			
Author: Committee	Date:	Approved: T. Hobday, FM	Date:
Sign:		Sign: On File	02-09-07

Scope

This standard has been developed to assist development applicants, architects, and contractors in determining the minimum requirements for the proper placement of blue reflective pavement markers for indicating the location and identification of fire hydrants and water supply locations for fire fighting purposes only. Blue markers used for any other purpose should be removed.

The applicant must obtain approval from Caltrans where blue markers are to be placed on roadways/highways regulated and maintained by Caltrans prior to installation. Encroachment permits may be required.

Codes and Standards

This standard has been based upon the 2010 California Fire Code (CFC), Chapter 5.

Plans Required

The location of blue reflective markers shall be indicated on the appropriate water plans that are required to be submitted to the Riverside County Fire Department for the installation of all fire hydrants and water supply locations used for the fire fighting purposes.

Specific Requirements

- 1) Two-Way Streets and Roads: Markers are to be placed six inches from the edge of the painted centerline on the side nearest the fire hydrant. If the street has no centerline, the marker should be place six inches from the approximate center of the roadway on the side nearest the hydrant. (Ref. Fig. 1 through 3)
- 2) Streets With Left Turn Lane at Intersection: Markers are to be place six inches from the edge of the painted white channelizing line on the side nearest the hydrant. (Ref. Fig. 4)
- 3) Streets With Continuous Two-Way Left Turn Lane: Markers are to be placed six inches from the edge of the painted yellow barrier line on the side nearest the fire hydrant. (Ref. Fig. 5)
- 4) Freeways and Expressways: Because of higher maintenance at these locations, if placed on the roadway, markers are to be placed on the shoulder on-foot to the right of the painted edgeline opposite the off-right of way from the fire hydrant location. (Ref. Fig. 6)

TYPICAL HYDRANT MARKER LOCATION

⊙ = Fire Hydrant

◆ = Blue Pavement Marker

Figure 1
Two Lane Streets

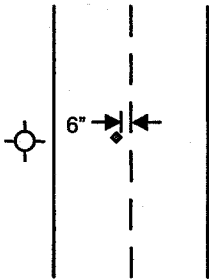


Figure 2
Multi-Lane Streets

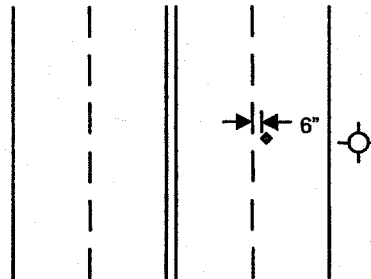


Figure 3
An Intersection

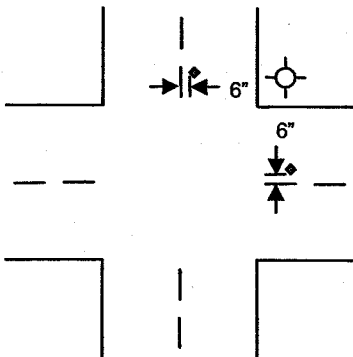


Figure 4
Four Lane Streets with
Turn Lane at Intersection

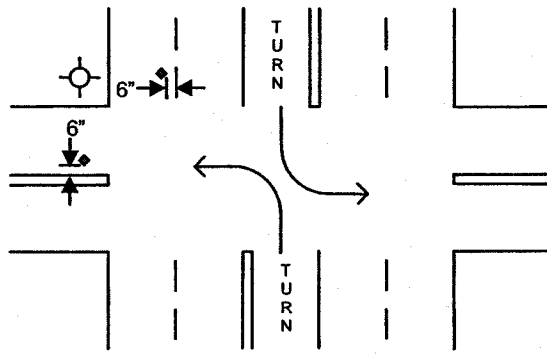


Figure 5
Multi-Lane Streets
With Turn Lane

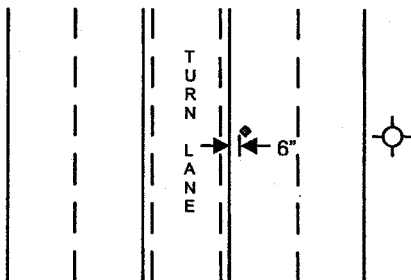


Figure 6
Freeways and Expressways

