The bridge removal plan shall include, but not be limited to, the following:

A. The removal sequence, including staging of removal operations.
B. Equipment locations on the structure during removal operations.
C. Temporary support shoring or temporary bracing.
D. Locations where work is to be performed over traffic, utilities, or railroad property.
E. Details, locations, and types of protective covers to be used.
F. Measures to assure that people, property, utilities, and improvements will not be endangered.
G. Details and measures for preventing material, equipment, and debris from falling onto public traffic, or railroad property.

When protective covers are required for removal of portions of a bridge or when superstructure removal work on bridges is involved, the Contractor shall submit working drawings with design calculations to the Engineer for the proposed bridge removal plan, and the bridge removal plan shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps, or columns at support locations.

Temporary support shoring, temporary bracing, and protective covers, as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

The assumed horizontal load to be resisted by the temporary support shoring and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence, or other causes and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total dead load of the structure to be removed.

The bridge removal plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings, design calculations, and unless otherwise specified in the following table, the time for reviewing bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the bridge removal plans for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Van Buren Boulevard Overhead	6
Van Buren Boulevard Overcrossing	4

For bridge removal over railroad property, approval by the Engineer of the bridge removal plans will be contingent upon the drawings being satisfactory to the railroad company involved.

Temporary support shoring, temporary bracing, and protective covers over railroad property shall conform to the latest guidelines of the railroad company involved and shall provide the minimum clearances required under "Relations with Railroad Company" of these special provisions for the passage of railroad traffic.

The following additional requirements apply to the removal of bridges or portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

A. The closure of roadways to public traffic shall conform to the provisions in "Order of Work" and "Maintaining Traffic" of these special provisions.

B. Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.

C. Bridge removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.

D. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that in the judgment of the Engineer would constitute a hazard to the public. This preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 4 feet beyond the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.

E. Temporary support shoring and temporary bracing shall be used in conjunction with preliminary work when necessary to ensure the stability of the bridge.

F. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 8 feet horizontally from the edge or 15 feet vertically above any traffic lane or shoulder that is open to public traffic.

G. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall be a 2-foot-thick earthen pad or a 1-inch-thick steel plate placed over the area where debris can fall. Prior to reopening the roadway to public traffic, all debris, protective pads, and

devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.

H. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun. For slab type bridges, removal operations within a span shall be performed along a front that roughly parallels the primary reinforcing steel.

The following additional requirements apply to the removal of bridges or portions of bridges whenever the removal work is to be performed over public traffic or railroad property:

A. A protective cover shall be constructed before beginning bridge removal work. The protective cover shall be supported by shoring, falsework, or members of the existing structure. The Contractor shall be responsible for designing and constructing safe and adequate protective covers, shoring, and falsework with sufficient strength and rigidity to support the entire load to be imposed.

B. The construction and removal of the protective cover, and the installation and removal of temporary railings shall conform to the provisions in "Order of Work," "Maintaining Traffic," "Temporary Railings" of these special provisions.

C. Bridge removal methods shall be described in the working drawings and shall be supported by calculations with sufficient details to substantiate live loads used in the protective cover design. Dead and live load values assumed for designing the protective cover shall be shown on the working drawings.

D. The protective cover shall prevent any materials, equipment, or debris from falling onto public traffic or railroad property. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 2 inches. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.

E. During the removal of bridge segments, and when portions of the bridge, such as deck slabs or box girder slabs, comply with the requirements for the protective cover, a separate protective cover need not be constructed.

F. At locations where entire girders are to be removed, the protective cover shall extend at least 10 feet beyond the outside face of the bridge railing.

G. The protective cover shall provide the openings specified under "Maintaining Traffic" of these special provisions, except that when no openings are specified for bridge removal, a vertical opening of 15 feet and a horizontal opening of 32 feet shall be provided for the passage of public traffic.

H. The construction of the protective cover as specified herein shall not relieve the Contractor of responsibilities specified in Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

I. Before removal of the protective cover, the Contractor shall clean the protective cover of all debris and fine material.

For bridge removal work that requires the Contractor's registered engineer to prepare and sign the bridge removal plan, the Contractor's registered engineer shall be present at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur or the bridge operation deviate from the approved bridge removal plan, the Contractor's registered engineer shall submit immediately to the Engineer for approval the procedure of operation proposed to correct or remedy the occurrence.

Payment

The work to be performed in Section 15-4, "Bridge Removal," of the Standard Specifications will be paid for on a lump sum basis for bridge removal, or for bridge removal (portion).

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in removing bridges or portions thereof, including excavation, backfill, and salvaging materials not to be reused in the project when salvaging is specified and not otherwise paid for, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Full compensation for removing materials that are to be reused in the project shall be considered as included in the contract prices paid for reconstructing, relocating or resetting the items involved, or in such other contract pay items that may be designated in the special provisions, and no additional compensation will be allowed therefor.

The limits of bridge removal are shown in the contract plans, and include removal of the entire footings at all support locations.

10-1.46 CLEARING AND GRUBBING:

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

Payment

The contract price per acre, paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in clearing and grubbing as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer, including the removal and disposal of the resulting material.

10-1.47 REMOVE PALM TREE:

Remove and dispose of existing palm trees shown on the plans and verified by the Engineer to be removed.

Before removing palm trees verify with the Engineer which palm trees to remove. Remove only those palm trees verified by the Engineer to be removed.

Dispose of removed palm trees under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The contract unit price paid for remove palm tree includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in remove palm tree, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.48 TRANSPLANT PALM TREES:

Transplanting palm trees shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

Palm trees to be transplanted shall be removed and either stored or transplanted at the new locations prior to performing other work within the location of the palm trees.

When the palm trees are removed and the work within the areas to which the trees are to be transplanted is not completed to the stage at which the trees can be planted, the trees shall be

stored and maintained until transplanting can be completed. In other cases, the palm trees shall be planted at the new locations the same day the palm trees are removed.

Transplanting palm trees shall be performed between March 15 and October 15 unless otherwise directed by the Engineer.

Before each palm tree is planted, dead fronds and frond stubs shall be removed from the trunk. In addition, green fronds shall be removed up to 2 rows of fronds away from the center growth. The 2 remaining rows of fronds shall be tied in an upright position with light hemp or manila rope. Fronds and frond stubs for Phoenix dactylifera (Date Palm) shall be removed approximately 4 inches from the trunk. Other fronds and frond stubs shall be removed at the trunk in a manner that will not injure the tree trunk.

The roots of each palm tree or clump of palm trees shall be balled in a manner approved by the Engineer. Approval shall be obtained before removing any palm tree to be transplanted. The diameter and depth of each root ball shall be a minimum of 8 inches larger than the trunk diameter at the ground line. Exposed root balls shall be kept covered with wet burlap or canvas until the trees are planted.

Holes resulting from the removal of transplanted palm trees shall be backfilled the same day the trees are removed. Soil from the surrounding area may be used to backfill the holes. The backfill shall be mounded slightly above the surrounding ground level.

Palm trees shall not be dragged during transplanting operations and the trunks shall be protected from injury.

Each planting hole shall conform to the details shown on the plans.

Commercial fertilizer (packet) shall be slow or controlled release and shall be in a biodegradable packet form. The packet shall gradually release nutrients over a 12-month period. Each packet shall have a weight of 10 g ± 1 g and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

Backfill material for the palm tree planting holes shall be 100 percent washed plaster sand. After the planting holes have been backfilled, water shall be applied to the full depth of the backfill soil.

Watering basins for the transplanted palm trees shall be constructed as shown on the plans.

When the palm trees are planted, a root stimulant, approved by the Engineer, shall be applied to the roots of each palm tree in conformance with the printed instructions of the root stimulant manufacturer. A copy of the printed instructions shall be furnished to the Engineer

before applying a stimulant. Root stimulant to be used shall be submitted to the Engineer not less than 2 weeks prior to the stimulant's intended use. Root stimulants not approved by the Engineer shall not be used.

Palm trees to be transplanted shall be maintained by the Contractor from the time the palm trees are removed to the time of acceptance of the contract, provided however, that the contract will not be accepted unless the trees have been satisfactorily maintained for at least 180 working days after transplanting has been completed. The palm trees shall be watered as necessary to maintain the trees in a healthy condition. Trash, debris and weeds within the basins, including the basin walls, 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. Weeds shall be removed before the weeds exceed 2 inches in length. Pesticides to be used for weed control shall be submitted to the Engineer not less than 2 weeks prior to the pesticide's intended use. Pesticides not approved by the Engineer shall not be used.

The provisions specified in Section 20-4.07, "Replacement," of the Standard Specifications for the replacement of unsuitable plants shall apply to transplanted palm trees. The replacement palm tree for each unsuitable transplanted palm tree shall be the same size and species as the palm tree being replaced. Each replacement palm tree shall be planted in the planting hole of the unsuitable palm tree which the new tree is replacing. The method for planting replacement palm trees shall be as specified in this section for transplanting palm trees. Removed unsuitable transplanted palm trees 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.

The quantity of transplant palm trees will be measured by the unit as determined from actual count in place.

The contract unit price paid for transplant palm tree shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in transplanting palm trees, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.49 WATERING:

Developing a water supply and applying watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications and these special provisions.

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions regarding availability of water.

Payment

The lump sum price paid for develop water supply shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in developing a sufficient supply of water and furnishing pipe lines or other necessary equipment to supply water to the water application equipment for all water required for the work, including work paid for as extra work.

Full compensation for the quantity of water used in the performance of the work, including work paid for as extra work, will be considered as included in the lump sum price paid for develop water supply and no separate payment will be made therefor.

No adjustment of compensation will be made for the lump sum item of develop water supply for increase or decrease in the quantity of water required, regardless of the reason for such increase or decrease. The provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of develop water supply.

Full compensation for applying water will be considered as included in the prices paid for the various contract items requiring water and no separate payment will be made therefor, except that applying water for work paid for as extra work on a force account basis, as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications will be paid for as a part of that extra work.

10-1.50 EARTHWORK:

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

When a layer of specified material is not to be placed on the basement material, the finished grading plane shall not vary more than 0.10-foot above or below the grade established by the Engineer. The requirements for obtaining a relative compaction of 95 percent, as provided in the first 2 paragraphs in Section 19-5.03, "Relative Compaction (95 Percent)," of the Standard Specifications shall not apply when a layer of specified material is not to be placed on the basement material.

When concrete pavement is to be placed on the grading plane, the grading plane shall not extend above the grade established by the Engineer.

When concrete base is to be placed on the grading plane, the grading plane shall not extend above the grade established by the Engineer.

The grading plane of embankments beneath structure approach slabs and beneath the thickened portion of sleeper slabs shall not project above the grade established by the Engineer.

Surplus excavated 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.

Where a portion of the existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 0.17-foot before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

Reinforcement or metal attached to reinforced concrete rubble placed in embankments shall not protrude above the grading plane. Prior to placement within 2 feet below the grading plane of embankments, reinforcement or metal shall be trimmed to no greater than 3/4 inch from the face of reinforced concrete rubble. Full compensation for trimming reinforcement or metal shall be considered as included in the contract prices paid per cubic yard for the types of excavation shown in the Engineer's estimate, or the contract prices paid for furnishing and placing imported borrow or embankment material, as the case may be, and no additional compensation will be allowed therefor.

Imported borrow shall be mineral material including rock, sand, gravel, or earth. The Contractor shall not use man-made refuse in imported borrow including:

A. Portland cement concrete
B. Asphalt concrete
C. Hot mix asphalt
D. Material planed from roadway surfaces
E. Residue from grooving or grinding operations
F. Metal
G. Rubber
H. Mixed debris
I. Rubble

MEASUREMENT AND PAYMENT

Pervious backfill material placed within the limits of payment for bridges will be measured and paid for as structure backfill (bridge).

Pervious backfill material placed within the limits of payment for retaining walls will be measured and paid for as structure backfill (retaining wall).

If structure excavation or structure backfill for bridges is not otherwise designated by type and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be measured and paid for as structure excavation (bridge) or structure backfill (bridge), respectively.

The following earthwork operations will be measured and paid for as roadway excavation for the quantities of material involved and no additional compensation will be allowed therefor:

Excavating the roadway prism including slope rounding, public and private road approaches, connections and driveways; excavating unsuitable material when shown on the plans or

specified in the special provisions; excavating surplus material; excavating selected material and topsoil from within the limits of the project and removing those materials from stockpiles when stockpiling is ordered; excavating channels having a bottom width of 12 feet or more as provided in Section 19-4, "Ditch Excavation;" of the Standard Specifications, and excavating local borrow as provided in Section 19-7, "Borrow Excavation" of the Standard Specifications.

Quantities of roadway excavation will be computed by means of average areas and distances between these areas, except as provided in the following paragraph.

Where due to changed conditions or the nature of a particular operation or for any other reason, it is impossible or impractical to measure quantities of roadway excavation by means of average areas, the Engineer will compute the quantities of material excavated by a method which in the Engineer's opinion is best suited to obtain an accurate determination.

When quantities of roadway excavation are computed by means of average end areas and center line distances, a correction for curvature will not be applied to quantities within the roadway prism. In computing the quantity of material outside the original roadway prism, where the roadway center line is used as a base, correction will be made for curvature if the center line radius is 1,000 feet or less.

Excavation in excess of the planned or authorized cross section will not be paid for, except as provided in Section 19-2.04, "Slides and Slipouts" of the Standard Specifications. The Contractor shall backfill and compact as directed by the Engineer unauthorized excavated areas to the original ground elevation or authorized section at the Contractor's expense.

. Quantities of earthwork to be paid for as structure excavation, structure backfill and pervious backfill material will be measured by the cubic yard.

. The quantities for payment will be determined from limits shown on the plans or specified or directed by the Engineer.

. No deduction in structure excavation or structure backfill pay quantities will be made where the Contractor does not elect to excavate material which is outside the limits of the actual structure but within the limits shown on the plans or specified or directed by the Engineer.

. No compensation will be made for the removal and use or disposal of material which may come into an excavation from outside the designated limits or for the volume of backfill occupied by the new structure or for the removal and disposal of material resulting from swell caused by the driving of piles in an excavation or for furnishing and placing backfill material in an excavation that is below or outside the designated limits, and these quantities will not be included in the quantities of structure excavation and structure backfill to be paid for.

. In the absence of plans showing pay limits for structure excavation and backfill for structures other than culverts, the quantities will be computed within the following limits:

A. The horizontal limits for computing pay quantities will be vertical planes one foot outside of the neat lines of footings or structures without footings.

B. The upper limit for payment of structure excavation shall be the ground surface as it existed prior to the start of construction operations, except where structure excavation is performed within roadway excavation or ditch excavation areas, the upper limit shall be the planes of the bottom and side slopes of those excavated areas. Also, where it is required that the structure excavation be made in new embankment, the upper limit shall be the planes of the new embankment at the elevation specified or directed for construction in advance of performing the required structure excavation, but in no case shall the upper limit be above the planes of the new embankment.

C. The upper limit for payment of structure backfill when not shown or specified, shall be the finished grading plane or the finished slope lines, as directed by the Engineer. If structure backfill is ordered to a higher limit by the Engineer the limit for payment shall be the higher limit ordered.

D. The lower limit for computing pay quantities of structure excavation or structure backfill shall be a plane at the bottom of the completed footings or structures or the lower outside surface of rods or deadmen.

If it is necessary, as determined by the Engineer, to increase the depth or width of structure excavation beyond the limits shown on the plans for structures other than culverts, excavation to a depth of 2 feet below the depth and for a width up to 3 times the outside width of the footing as determined by the Engineer will be paid for at the contract price per cubic yard for structure excavation. Excavation to depths or widths greater than above provided will be paid for at the contract price for structure excavation, unless the Engineer prior to the removal of excavation outside the above limits orders the excavation to be removed and paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications, or the Contractor, prior to removal of the excavation requests in writing that the removal of excavation outside those limits be paid for as extra work as provided in Section 4-1.03D, "Extra Work" of the Standard Specifications. When the limits of structure excavation are so increased, the pay limits for structure backfill will be similarly increased and the additional backfill within said limits will be paid for at the contract price for structure backfill.

The volume of pervious backfill material, measured and paid for within the limits of payment for structure backfill, will be deducted from the pay quantities of structure backfill.
Whenever an alternative or option, which affects earthwork quantities, is shown or noted on the plans, or permitted by these specifications or the special provisions, the quantities of earthwork will be computed on the basis of the dimensions and details shown on the plans and no change in the quantities to be paid for will be made because of the use by the Contractor of such alternatives or options.

Quantities of ditch excavation to be paid for will be computed by means of average areas and the distances between these areas.

Quantities of roadway excavation, measured as specified in Section 19-2.08, "Measurement," of the Standard Specifications, will be paid for at the contract price per cubic yard. That price shall include excavating, sloping, rounding tops and ends of excavations, loading, hauling, depositing, spreading and compacting the material complete in place, and preparing subgrade at the grading plane as specified in Section 19-1.03, "Grade Tolerance" of the Standard Specifications.

The above price and payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in performing roadway excavation work completely as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

Unless otherwise provided, quantities of earthwork, measured as specified in Section 19-3.07, "Measurement," of the Standard Specifications, will be paid for by the cubic yard for structure excavation, for structure backfill, and for pervious backfill material of the types shown in the Engineer's Estimate.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating for and backfilling structures completely, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

The quantities of structure excavation, structure backfill and culvert beddings required for the installation of culverts, will not be paid for as separate items. Full compensation for structure excavation, structure backfill and culvert beddings for culvert installations shall be considered as included in the contract prices paid per linear foot for pipe culverts or per cubic yard for the concrete involved in constructing reinforced concrete box and arch culverts, whichever applies.

The quantities of structure excavation, structure backfill, and pervious backfill material required for the construction of concrete headwalls, endwalls, and wingwalls for culverts will not be paid for as separate items. Full compensation for structure excavation, structure backfill, and pervious backfill material for concrete headwalls, endwalls and wingwalls for culverts shall be considered as included in the contract price paid per cubic yard for the concrete involved in constructing the headwalls, endwalls and wingwalls.

No adjustment in compensation will be made if the actual depth of structure excavation for a culvert is within 0.5-foot of the planned depth as calculated from the data shown on the plans. The actual depth of structure excavation shall be the vertical distance between the ground line prior to excavating for the culvert and the bottom of the culvert trench. If the increase or decrease in structure excavation depth is greater than 0.5-foot from the planned depth as calculated from the data shown on the plans, an adjustment in compensation will be made in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications, provided the Contractor requests an adjustment, in writing, due to the increased depth of structure excavation or the Engineer orders an adjustment due to the

decreased depth of structure excavation. Any increased depth of excavation due to the removal of unsuitable material, or rock or other unyielding material below the planned grade of the bottom of the culvert as provided in Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications, will not be considered in determining the actual depth of structure excavation for a culvert.

Full compensation for controlling and removing water from excavations and for furnishing and installing or constructing all cofferdams and all other facilities necessary to the operations (except concrete seal courses when shown on the plans) and their subsequent removal, if required by the Engineer, shall be considered as included in the contract price paid for structure excavation or the contract price paid for the item of work requiring the excavation when the excavation is not paid for separately.

Full compensation for hauling, placing and compacting surplus structure excavation in roadway embankments or otherwise disposing of the material along the roadway as directed by the Engineer, shall be considered as included in the contract price paid for excavating the material, or the contract price paid for the item of work requiring the excavation when the excavation is not paid for separately.

The quantities of structure excavation and structure backfill required for minor structures as provided in Section 51-1.02, "Minor Structures," of the Standard Specifications, will not be paid for as separate items and full compensation therefor will be considered as included in the contract price paid per cubic yard for minor concrete (minor structure) or for concrete (minor structure) of the class specified in the Engineer's Estimate.

Where compaction is not required, full compensation for furnishing and placing structure backfill shall be considered as included in the contract price paid per cubic yard for the type of structure excavation involved.

The excavation of ditches and channels which have a bottom width of less than 12 feet, as shown on the plans, except as hereinafter provided, will be paid for at the contract price per cubic yard for ditch excavation.

The above price and payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating ditches completely, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

The excavation of gutters within the median area of a divided highway, and gutters between the roadbed shoulder and an adjacent excavation slope, and gutters in excavation benches, and side gutters contiguous to embankment slopes, all as shown on the plans, will be paid for as roadway excavation and payment will not be made as ditch excavation for that work.

10-1.51 ROCK BLANKET:

Rock blanket shall be placed as shown on the plans and in conformance with these special provisions.

MATERIALS

Rock for the rock blanket shall be clean, smooth white river rock in overall appearance after placement and shall be obtained from a single source.

Rock shall conform to the following grading:

Screen Size (Inches)	Percentage Passing
8	100
6	50-85
4	0-50

A sample of the rock shall be submitted to the Engineer for approval prior to delivery of the rock to the project site.

Rock shall be secured in place with Class 2 concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions. Concrete aggregate size shall be 3/4 inch maximum.

SITE PREPARATION

After clearing, the areas shall be excavated to the depth shown on the plans, graded to a smooth uniform surface and compacted to a minimum relative compaction of 90 percent.

PLACEMENT

Rock shall be placed while concrete is still plastic, and spaced a maximum of 1/2 inch apart. The Contractor shall remove concrete adhering to the exposed surfaces of the rock. Loose rocks, or rock with a gap greater than 3/8 inch, measured from the edge of the rock to the surrounding concrete bedding shall be reset at the Contractor's expense by methods determined by the Engineer.

MEASUREMENT AND PAYMENT

Rock blanket will be measured by the square yard as determined from actual measurements made parallel to the ground slope.

The contract price paid per square yard for rock blanket of the types shown on the plans shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing rock blanket, complete in place, as shown on

plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.52 IRRIGATION CROSSOVERS:

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Conduits shall be placed in open trenches in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Water line crossovers shall conform to the provisions in Section 20-5.03C, "Water Line Crossovers," of the Standard Specifications.

Fittings for water line crossovers shall be Schedule 80.

Sprinkler control crossovers shall conform to the provisions in Section 20-5.027D, "Sprinkler Control Crossovers," of the Standard Specifications.

Installation of pull boxes shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduit and Pull Boxes," of the Standard Specifications. When no conductors are installed in electrical conduits, pull boxes for irrigation crossovers shall be installed on a foundation of compacted soil.

10-1.53 IRRIGATION SLEEVE:

Irrigation sleeves shall be polyvinyl chloride (PVC) plastic pipe and shall conform to the provisions in Section 20-2.15B(1), "Plastic Pipe Supply Line," of the Standard Specifications and these special provisions.

Irrigation sleeves less than 6 inches in diameter shall have a pressure rating (PR) 315.

Irrigation sleeves 6 inches or larger in diameter shall be Schedule 40.

Fittings shall be Schedule 40.

Irrigation sleeves shall be installed where shown on the plans.

Irrigation sleeves shall be installed not less than 1.5 feet below finished grade measured to the top of the sleeve. Sleeves shall extend 6 inches beyond paving. The ends of the sleeve shall be capped until use.

Quantities of irrigation sleeve to be paid will be determined from the slope length designated by the Engineer. Irrigation sleeve placed in excess of the lengths designated will not be paid for.

The contract price paid per linear foot for irrigation sleeve shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in irrigation sleeve, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.54 WATER SUPPLY LINE (BRIDGE):

Water supply lines identified on the plans as supply line (bridge) shall be of the size shown and shall conform to the details shown on the plans, the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, and these special provisions.

GENERAL

Unless otherwise shown on the plans, casings shall be installed at each abutment and shall be extended to the greater of: (1) 5 feet beyond the approach slab, (2) 5 feet beyond the end of the adjacent wingwall, or (3) 20 feet beyond the abutment.

Working Drawings

The Contractor shall submit complete working drawings for the temporary support of the casing at the abutments to the Offices of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

The working drawings shall be supplemented by the manufacturer's descriptive data, performance data, and installation instructions for the following:

A. Seismic expansion assemblies.
B. Pipe hanger assemblies and lateral restraint assemblies.

Data for the expansion assemblies for supply lines NPS 4 or greater shall include the preset dimension for each expansion assembly installation.

For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the OSD for final approval and use during construction.

MATERIALS

Pipe and Fittings for Supply Lines NPS 4 or Greater

Pipes and fittings for supply lines of NPS 4 or greater shall be ductile iron. Ductile iron pipe shall be restrained push-on joint pipe conforming to the requirements in ANSI/AWWA C151/A21.51. At expansion joint connections, ductile iron pipe shall have a factory installed flange on one end compatible with the expansion joint connection, and the

other end shall be compatible with the restrained push-on joint pipe or flange for a continuous connection. Ductile iron pipe shall be furnished in full 18-foot lengths.

Restrained push-on joints for ductile iron pipe shall conform to the requirements in ANSI/AWWA C111/A21.11. The joints shall be boltless, noncompression, nonthreaded with synthetic rubber gasket seals, and shall have a positive locking device to keep the connection from separating. The joints shall be designed for a working pressure of 350 psi and shall be capable of deflecting after assembly.

Fittings and flanges for ductile iron pipe shall conform to the requirements in ANSI/AWWA C110/A21.10, except the Contractor may use the manufacturer's proprietary design dimensions for restrained push-on joint pipe.

Ductile iron pipe and fittings shall have a mortar lining and a seal coating conforming to the requirements in ANSI/AWWA C104/A21.4. Pipe shall have a bituminous outside coating conforming to the requirements in ANSI/AWWA C151/A21.51, and fittings shall have a bituminous outside coating conforming to the requirements in ANSI/AWWA C110/A21.10.

Air Release Valve Assemblies for Supply Lines NPS 4 or Greater

Each air release valve assembly for supply lines of NPS 4 or greater shall consist of a double-strap pipe saddle, pressure rated for a minimum of 150 psi, an NPS 1 ball valve, an automatic air release valve, and a tank vent. The air release valve shall have a cast iron body with stainless steel trim and float, an NPS 1 inlet pipe connection, and a 3/16 inch orifice. The tank vent shall be the size of the air release valve outlet and shall have a double opening facing down with screen cover.

Casing Insulators for Supply Lines NPS 4 or Greater

Casing insulators for supply lines of NPS 4 or greater shall be designed for the size of casing and supply line shown on the plans. Each casing insulator shall be an 8-inch wide unit consisting of a 14-gage, painted or galvanized steel band, and a minimum of four 2-inch wide glass reinforced runners. The casing insulators shall have a nonconductive inner liner. Insulators 6 inches or larger shall have a 10-mil thick coating of heat fused polyvinyl chloride. Casing insulators shall be factory constructed to ensure the supply line is centered in the casing to avoid pipe to pipe contact and shall have at least 2 runners seated on the bottom of the casing.

Dirt Stops for Supply Lines NPS 4 or Greater

Dirt stops for supply lines NPS 4 or greater shall consist of a redwood cover and foam that fills the end void between the supply line and the end of the casing. The redwood cover shall be 2-inch thick construction grade redwood and cut to fit the supply line. The foam shall be commercially available polyurethane foam spray.

Seismic Expansion Assemblies for Supply Lines NPS 4 or Greater

Each seismic expansion assembly for supply lines NPS 4 or greater shall consist of a sleeve type expansion joint and an integral ball joint at each end with insulated flange connections to the supply line. Seismic expansion joints shall be manufactured of ductile iron and shall conform to the requirements in ANSI/AWWA C153/A21.53. Seismic expansion assemblies for pipe sizes NPS 24 and smaller shall be rated for a minimum pressure of 350 psi, and seismic expansion assemblies for pipe sizes greater than NPS 24 shall be rated for a minimum pressure of 250 psi. Seismic expansion assemblies shall be capable of deflecting and expanding simultaneously to an amount of not less than a 15-degree angular deflection at each end of the unit and a total of 12-inches axial movement at Bridge No. 56-0846 and a total of 4—inches axial movement at Bridge No. 56C-0567.

Seal gaskets for sleeve expansion shall be retained in the grooved outer casing and shall have a leak proof design capable of withstanding a working pressure of 350 psi. The expansion sleeve shall have a limiting stop collar to keep the sleeve from separating. The ball joints for the seismic expansion assembly shall be contained in flanged retainers with seal gaskets that shall conform to the specifications.

Expansion joint shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the requirements in ANSI/AWWA C213 and shall be holiday tested with a 1500 V spark test conforming to the requirements in ANSI/AWWA C213.

Insulated Flange Connections

Each insulated flange connection shall consist of a dielectric flange gasket, insulating washers, and sleeves held in place with steel bolts and nuts. The gasket shall have a minimum dielectric rating of 500 V/mil.

Casings

Casings shall be welded steel pipe and shall conform to the provisions in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications and these special provisions. Prior to shipping, exterior surfaces of welded steel pipe shall be cleaned and coated in conformance with the requirements in ANSI/AWWA C213, or at the option of the Contractor, cleaned, primed, and coated in conformance with the requirements in ANSI/AWWA C214.

Pipe Wrapping Tape

Wrapping tape for pipe in contact with the earth shall be a pressure sensitive polyvinyl chloride or polyethylene tape with a minimum thickness of 50 mils.

Pipe Hanger Assemblies

Each pipe hanger assembly shall consist of a concrete clevis plate or embedded steel welded linked eye rods, an adjustable steel yoke, a cast iron pipe roller, a steel roller rod, and hex nuts. Parts shall be galvanized. The pipe hanger assembly shall be suitable for the type and size of pipe installed and shall be as shown on the plans.

Steel hangers, anchor bolts, pipe clamps, nuts and bolts, and other fittings shall be suitable for the type and size of the supply lines or casings and shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Lateral Restraint Assemblies for Supply Lines NPS 4 or Greater

Lateral restraint assemblies for supply lines of NPS 4 or greater shall be adjustable and capable of resisting a horizontal force of 10 percent of the contributory dead load to the lateral restraint assembly. Lateral restraint assemblies shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications and shall be as shown on the plans.

Concrete Pipe Supports

Each concrete pipe support shall consist of either a precast or cast-in-place concrete pipe cradle, a galvanized steel pipe clamp, anchor bolts, and where shown on the plans, a stainless steel pipe protection shield.

Concrete pipe supports and pipe stops shall conform to the dimensions shown on the plans and shall be constructed of minor concrete and commercial quality wire mesh. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that it shall contain not less than 590 pounds of cementitious material per cubic yard. The concrete for pipe supports and pipe stops shall be moist cured for not less than 3 days.

Steel anchor bolts, nuts, pipe clamps, pipe protection shields, and other fittings shall be suitable for the type and size of the supply line or casing and shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Epoxy Adhesive

Epoxy adhesive shall conform to the provisions in Section 95, "Epoxy," of the Standard Specifications and one of the following:

A. Section 95-2.01, "Binder (Adhesive), Epoxy Resin Base," for load bearing applications.
B. Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers."
C. Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers."

INSTALLATION

Water supply lines in bridge structures shall be supported as shown on the plans and in conformance with these special provisions.

If a blockout is provided in the bridge abutment wall for casing, the space between the casing and bridge abutment wall shall be filled with mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

When the bridge superstructure is to be prestressed, the space around supply lines through abutments shall not be filled until the prestressing has been completed.

Openings for supply lines through bridge superstructure concrete shall either be formed or shall consist of pipe sleeves.

Ductile iron pipe for supply lines NPS 4 or greater shall be connected and fully extended (pulled out) at the joint before the next connection is made.

Expansion joints for supply lines NPS 4 or greater shall be factory adjusted and set at half the expansion capacity and shall be approved by the Engineer prior to installation. Expansion joints shall be connected to the supply line with insulated flange connections.

Cleaning and Closing of Pipe

The interior of the pipe shall be cleaned before installation. Openings shall be capped or plugged as soon as the pipe is installed to prevent the entrance of foreign material. The caps or plugs shall remain in place until the adjacent pipe sections are to be installed.

Wrapping and Coating Pipe

Damaged coating on supply line pipe in contact with the earth shall be wrapped with tape as follows:

A. Pipe to be wrapped shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
B. Tape shall be tightly applied with one-half uniform lap, free from wrinkles and voids to provide not less than a 100-mil thickness.
C. Field joints and fittings for wrapped pipe shall be covered by double wrapping 50-mil thick tape. Wrapping at joints shall extend a minimum of 6 inches over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 2 inches. Adequate tension shall be applied so that the tape will conform closely to the contours of the joint.

TESTING

Water supply lines of NPS 4 or greater shall be tested in conformance with the provisions in Section 20-5.03H(1), "Method A," of the Standard Specifications, except that the testing pressure shall be 175 psi of water pressure, and the testing period shall be 4 hours minimum with no leakage or pressure drop. The air relief valve shall not be subjected to water pressure due to testing.

The Contractor shall furnish pipe anchorages to resist thrust forces occurring during testing. Leaks shall be repaired and defective materials shall be replaced by the Contractor at the Contractor's expense.

Pressure testing and necessary repairing of water lines shall be completed prior to backfilling, placing deck slabs over supply lines in box girder cells, or otherwise covering the supply lines.

Each end of the supply line shall be capped prior to and after the testing.
The supply line shall be tested as one unit. The limits of the unit shall be 5 feet beyond the casing at each end of the bridge.

MEASUREMENT AND PAYMENT

Measurement and payment for supply line (bridge) for each size listed in the Engineer's Estimate shall be made in the same manner as galvanized steel pipe and plastic pipe supply

lines in Section 20-5.04, "Measurement," and Section 20-5.05, "Payment," of the Standard Specifications.

Full compensation for furnishing and installing air release valve assemblies, steel hanger assemblies, lateral restraint assemblies, steel brackets and other fittings, casings and casing insulators, dirt stops, concrete pipe supports, concrete thrust blocks, pipe wrapping tape, epoxy adhesives, and seismic expansion assemblies; for cleaning, closing, wrapping, and coating pipe; and for pressure testing, shall be considered as included in the contract prices paid per linear foot for the sizes of water supply line (bridge) involved, and no additional compensation will be allowed therefor.

10-1.55 GRAVEL (MISCELLANEOUS AREAS):

GENERAL

Summary

This work consists of installing gravel in miscellaneous areas outside the traveled way.

Submittals

Submit the following items for approval:

1. Product Data: A copy of the manufacturer's product sheet together with instructions for installation of filter fabric 5 days before installation.
2. Certificate of Compliance for the filter fabric under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.
3. Samples: Submit a 5 pound sample of gravel for approval before delivery of materials to the site.

MATERIALS

Soil Sterilant

Soil sterilant must be oxadiazon and must comply with Section 20-4.026, "Pesticides," of the Standard Specification..

Filter Fabric

Filter fabric must be Class A as specified in Section 88-1.02, "Filtration," of the Standard Specifications.

Staples

Staples for filter fabric must be 2 inches in width, 6 inches in length and 11-gauge wire.

Gravel

Gravel must consist of crushed rock and comply with the following:

Grading Requirements

Sieve Size	Percent Passing
2-inch	100
1 1/2-inch	90-100
1-inch	--
3/4-inch	50-85
No. 4	25-45
No. 30	10-25
No. 200	2-9

The color of gravel must be brown.

CONSTRUCTION

Clearing

Prior to beginning gravel work, areas to receive the gravel shall be cleared in conformance with the provisions in "Roadside Clearing" of these special provisions.

Earthwork

Earthwork must comply with Section 19, "Earthwork," of the Standard Specifications and these special provisions.

After clearing, excavate areas to receive gravel. Where gravel is to be placed adjacent to an existing curb, dike, pavement, sidewalk or soundwall excavate so that the finished gravel elevation adjacent to those items will maintain planned flow lines, slope gradient and contours of the project site. After excavation, grade areas to receive gravel to a smooth, uniform surface and compact to not less than 90 percentrelative compaction.

Treatment of Soil

After compaction, the areas shall be sterilized with oxadiazon . The soil sterilant shall be applied at the maximum label rate and shall not be applied more than 12 inches beyond the gravel limits. Soil sterilant shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications.

Filter Fabric

Surfaces to receive filter fabric, immediately prior to placing, shall be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

The fabric shall be aligned and placed in a wrinkle-free manner.

Adjacent rolls of the fabric shall be overlapped from 12 inches to 18 inches. The preceding roll shall overlap the following roll in the direction the material is being spread. Fabric shall be held in place with staples or stakes that are flush with the fabric and prevent movement of fabric during or after placement of gravel.

Should the fabric be damaged during placing, the torn or punctured section shall be either completely replaced or shall be repaired by placing a piece of fabric that is large enough to cover the damaged area and to meet the overlap requirement.

Damage to the fabric resulting from the Contractor's vehicles, equipment or operations shall be replaced or repaired by the Contractor at the Contractor's expense.

MEASUREMENT AND PAYMENT

Gravel (miscellaneous areas) will be measured by the square yard as determined from actual measurements made parallel to the ground slope.

The contract unit price paid per square yard for gravel (miscellaneous areas) includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in gravel, complete in place, including site preparation, earthwork, soil treatment, aggregate base, landscape fabric, and edging, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.56 FINISHING ROADWAY:

Finishing roadway shall conform to the provisions in Section 22, "Finishing Roadway," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Finishing roadway will be paid for on a lump sum basis.

The contract lump sum price paid for finishing roadway shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in finishing the entire project, including all ramps, connecting roads and streets, frontage roads, road approaches, and channelized intersections, whether inside or outside the highway right of way, and all other areas disturbed by the Contractor's operations, all as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

10-1.57 AGGREGATE SUBBASE:

Aggregate subbase must comply with Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

Aggregate subbase must be Class 2.

Do not store reclaimed asphalt concrete or aggregate subbase with reclaimed asphalt concrete within 100 feet measured horizontally of any culvert, watercourse, or bridge.

Payment

Quantities of aggregate subbase will be paid for at the contract price per cubic yard for the class or classes involved.

The above prices and payments shall include full compensation for furnishing all labor, materials (or processing selected materials), tools, equipment, and incidentals, and for doing all the work involved in hauling and constructing aggregate subbase, complete in place, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

10-1.58 AGGREGATE BASE:

Aggregate base must comply with Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Aggregate base must be Class 2.

Do not store reclaimed asphalt concrete or aggregate base with reclaimed asphalt concrete within 100 feet measured horizontally of any culvert, watercourse, or bridge.

PAYMENT

Quantities of aggregate base will be paid for at the contract price per cubic yard for the class or classes involved.

The above prices and payments shall include full compensation for furnishing all labor, materials (including water in the material at the time of weighing as provided in Section 26-1.06, "Measurement," of the Standard Specifications), tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base, complete in place, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

10-1.59 LEAN CONCRETE BASE:

Lean concrete base shall conform to the provisions in Section 28, "Lean Concrete Base," of the Standard Specifications and these special provisions.

The finished surface of lean concrete base shall not be above the grade established by the Engineer, or more than 0.05-foot below the grade established by the Engineer.

MEASUREMENT

The quantity of lean concrete base to be paid for will be measured by the cubic yard. The volume to be paid for will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer. No allowance will be made for lean concrete base placed outside those dimensions unless otherwise ordered by the Engineer.

PAYMENT

The contract price paid per cubic yard for lean concrete base shall include full compensation for furnishing all labor, materials (including cement in the amount of 270 pounds per cubic yard of lean concrete base), tools, equipment and incidentals, and for doing all the work involved in constructing lean concrete base as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

If the Engineer orders an increase in the specified portland cement content as provided in Section 28-1.01, "Description," of the Standard Specifications, the compensation payable to the Contractor for lean concrete base will be increased on the basis of the cost of cement per ton, f.o.b. the cement mill (including sales tax) plus the freight cost per ton for delivery of the cement to the project from the mill. In determining the cost of the cement, any cash or trade discount offered or available will be credited to the State notwithstanding the fact that the discount may not have been taken by the purchaser.

The Contractor shall furnish to the Engineer satisfactory evidence of the cost of cement used on the project during the period involved in the ordered change in cement content, and the Contractor shall maintain records in such manner as to enable a clear determination of the cost of cement used during that period. The Contractor's records pertaining to the cost of cement shall be open to inspection or audit by Departmental representatives during the life of the contract and for not less than 3 years after the completion thereof and the Contractor shall retain the records for that period.

If the price of cement as determined from the Contractor's records is, in the opinion of the Engineer, excessive, or if the Contractor does not furnish satisfactory evidence of the cost of cement, the Engineer will determine the price to be the lowest wholesale cost at which cement would be available in the quantities concerned delivered to the jobsite, less any discounts available.

The quantity of cement to be subject to increased compensation will be the difference between the specified theoretical quantity of cement and the theoretical quantity of cement ordered by the Engineer. No additional adjustment of compensation will be made for variations in the costs of any work resulting from the change in the quantity of portland cement.

10-1.60 FOG SEAL COAT:

Fog seal coat shall conform to the provisions in Section 37-1, "Seal Coats," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions regarding application of asphaltic emulsion.

Asphaltic emulsion shall be either Grade SS1h or CSS1h.

MEASUREMENT

Quantities of asphaltic emulsion (fog seal coat) to be paid for will be determined in conformance with the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications.

PAYMENT

Asphaltic emulsion (fog seal coat) will be paid for at the contract price per ton for asphaltic emulsion (fog seal coat), for whatever items are provided and involved. The price shall include preparation for asphaltic emulsion (fog seal coat) and furnishing and applying asphaltic emulsion (fog seal coat).

The above price and payment shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in applying asphaltic emulsion (fog seal coat), complete in place, including furnishing, placing, maintaining, and removing W8-7 and W13-1 signs, when required, and temporary supports or barricades for the signs, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

Water furnished and applied to tacky emulsion and for mixing with an asphaltic emulsion will not be paid for and full compensation therefor will be considered as included in the contract price paid for the asphaltic emulsion.

When there is a contract item for traffic control system, full compensation for furnishing and using pilot cars to reduce the speed of traffic and convoy or otherwise control traffic, as specified, shall be considered as included in the contract lump sum price paid for traffic control system, and no separate payment will be made therefor. When there is no contract item for traffic control system, full compensation for furnishing and using the pilot cars shall be considered as included in the contract prices paid for the various items of seal coat work, and no separate payment will be made therefor.

10-1.61 RUBBERIZED HOT MIX ASPHALT (GAP GRADED):

GENERAL

Summary

This work includes producing and placing rubberized hot mix asphalt (gap graded) (RHMA-G) using the Standard process.

Comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

Submittals

Data Cores

Three business days before starting coring, submit proposed methods and materials for backfilling data core holes.

Submit to the Engineer:

1. A summary of data cores taken
2. A photograph of each data core

For each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:

    7.1 For recovered material, 1/2 inch
    7.2 For unstabilized material, 1.0 inch

8. Location including:

    8.1. County
    8.2. Route
    8.3. Post mile
    8.4. Lane number
    8.5. Lane direction
    8.6. Station

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. The core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

After data core summary and photograph submittal, dispose of cores under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

MATERIALS

Asphalt Binder

Asphalt binder mixed with asphalt modifier and crumb rubber modifier (CRM) for asphalt rubber binder must be PG 64-16.

Aggregate

The aggregate for RHMA-G must comply with the 3/4-inch grading.

Asphalt Rubber Binder Content

Determine the amount of asphalt rubber binder to be mixed with the aggregate for RHMA-G under California Test 367 except:

1. Determine the specific gravity used in California Test 367, Section B, "Void Content of Specimen," using California Test 308, Method A.
2. California Test 367, Section C, "Optimum Bitumen Content," is revised as follows:

    2.1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
    2.2. Use California Test 309 to determine theoretical maximum specific gravity and density of the RHMA-G.
    2.3. Plot asphalt rubber binder content versus average air voids content based on California Test 309 for each set of three specimens on Form TL-306 (Figure 3), and connect adjacent points with a best-fit curve.
    2.4. Plot asphalt rubber binder content versus average Hveem stability for each set of three specimens and connect adjacent points with a best-fit curve.
    2.5. Calculate voids in mineral aggregate (VMA) and voids filled with asphalt (VFA) for each specimen, average each set, and plot the average versus asphalt rubber binder content.
    2.6. Calculate the dust proportion and plot versus asphalt rubber binder content.
    2.7. From the curve plotted in Step 2.3, select the theoretical asphalt rubber binder content that has 5.0 percent air voids.

2.8. At the selected asphalt rubber binder content, evaluate corresponding voids in mineral aggregate, voids filled with asphalt, and dust proportion to verify compliance with requirements. If necessary, develop an alternate composite aggregate gradation to conform to the RHMA-G requirements.
2.9. Record the asphalt rubber binder content in Step 2.7 as the Optimum Bitumen Content (OBC).
2.10. To establish a recommended range, use the OBC as the high value and 0.3 percent less as the low value. Notwithstanding, the recommended range must not extend below 7.0 percent. If the OBC is 7.0 percent, then there is no recommended range, and 7.0 percent is the recommended value.

3. Laboratory mixing and compaction must comply with California Test 304, except the mixing temperature of the aggregate must be between 300 °F and 325 °F. The mixing temperature of the asphalt-rubber binder must be between 375 °F and 425 °F. The compaction temperature of the combined mixture must be between 290 °F and 300 °F.

CONSTRUCTION

Vertical Joints

Do not leave a vertical joint more than 0.15 foot high between adjacent lanes open to public traffic.

Data Cores

Take data cores that include the completed HMA pavement, underlying base, and subbase material. Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

PAYMENT

The contract lump sum price paid for data core includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in data coring, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.62 HOT MIX ASPHALT Type A (Bond Breaker):

GENERAL

Summary

This work includes producing and placing hot mix asphalt Type A (Bond Breaker) (HMABB) using the Standard process.

HMA Type A (Bond Breaker) must comply with the requirements for HMA Type A of Section 39, "Hot Mix Asphalt," of the Standard Specifications.

MATERIALS

Asphalt Binder

The grade of asphalt binder mixed with aggregate for HMA Type A (Bond Breaker) must be PG 64-10.

The amount of asphalt binder mixed with aggregate for HMA Type A (Bond Breaker) shall be increased by one percent by weight of the dry aggregate over the amount of asphalt binder determined for use in HMA Type A under California Test 367.

Aggregate

The aggregate for HMA Type A (Bond Breaker) must comply with the 3/8-inch grading.

JOB MIX FORMULA AND HMA TYPE A (BOND BREAKER) EVALUATION

Prior to the addition of the additional 1 percent of asphalt binder, HMA Type A (Bond Breaker) will conform to the requirements of Hot Mix Asphalt for Job Mix Formula. The JMF for HMA Type A (Bond Breaker) will not be verified. HMA Type A (Bond Breaker) will be evaluated in the first day of production during the start up evaluation.

QUALITY CONTROL TESTING

Perform sampling and testing at the specified frequency for the following quality characteristics:

Minimum Quality Control

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Requirement
Asphalt binder content (%)	CT 379 or 382	1 per 750 tons and any remaining part	JMF ± 0.45
Aggregate gradation [a]	CT 202		JMF ± Tolerance [b]
Sand equivalent (min.) [c]	CT 217		47
HMA moisture content (max.)	CT 370	1 per 2500 tons but not less than 1 per paving day	1.0%
Percent of maximum theoretical density [d, e]	Quality control plan	2 per business day (min.)	> 98%
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants [f]	CT 226 or CT 370	2 per day during production	--
Percent of crushed particles Coarse aggregate (% min.) One fractured face Two fractured faces Fine aggregate (Passing No. 4 sieve and retained on No. 8 sieve) (% min) One fractured face	CT 205	As necessary and designated in the QCP. At least once per project	 90 75 70
Los Angeles Rattler Loss at 500 rev. (% max.)	CT 211		45

Notes:

[a] Determine combined aggregate gradation containing RAP under Laboratory Procedure LP-9.

[b] The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

[c] Report the average of 3 tests from a single split sample.

[d] Required if the total paved thickness is at least 0.15 foot.

[e] Determine maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

[f] For adjusting the plant controller at the HMA plant.

Apply white pigmented curing compound to the finished surface of the HMA Type A (Bond Breaker) prior to placement of the portland cement concrete pavement. Pigmented curing compound must conform to the requirements of ASTM Designation C 309, Type 2, Class A. Curing compound must be applied in 2 separate applications to the area to be surfaced with portland cement concrete pavement. Apply curing compound at the rate of one gallon per 150 square feet.

ENGINEER'S ACCEPTANCE

The Engineer samples for acceptance testing and tests for:

HMA Acceptance

Quality Characteristic	Test Method	Requirement
Asphalt binder content (%)	CT 379 or 382	JMF ± 0.45
Aggregate gradation [a]	CT 202	JMF ± Tolerance [b]
Sand equivalent (min.) [c]	CT 217	47
HMA moisture content (max.)	CT 370	1.0%
Percent of maximum theoretical density [d, e]	Quality control plan	> 98%
Percent of crushed particles Coarse aggregate (% min.) One fractured face Two fractured faces Fine aggregate (Passing No. 4 sieve and retained on No. 8 sieve) (% min) One fractured face	CT 205	 90 75 70
Los Angeles Rattler Loss at 500 rev. (% max.)	CT 211	 45

Notes:
[a] The Engineer determines combined aggregate gradation containing RAP under Laboratory Procedure LP-9.
[b] The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."
[c] The Engineer reports the average of 3 tests from a single split sample.
[d] Required if the total paved thickness is at least 0.15 foot.
[e] The Engineer determines maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

MEASUREMENT AND PAYMENT

HMA Type A (Bond Breaker) will be measured and paid for in the same manner specified for HMA in conformance with the requirements of Section 39-5, "Measurement and Payment," of the Standard Specifications.

Full compensation for the additional one percent of asphalt binder used in HMA Type A (Bond Breaker) and for furnishing and applying white pigmented curing compound to the surface of the HMA Type A (Bond Breaker) shall be considered as included in the contract price paid per ton for HMA Type A (Bond Breaker).

10-1.63 HOT MIX ASPHALT DIKE:

Hot mix asphalt dike of the types included on the plans and designated in the contract item shall comply with the provisions in Section 39, "Hot Mix Asphalt," of the Standard Specifications.

The contract item for placing HMA dike is measured by the linear foot along the completed length. In addition to the quantities measured on a linear foot basis, the HMA for dike is measured by weight.

The County pays for HMA dike at the contract price per linear foot for place HMA dike and by the ton for HMA. The contract prices paid per linear foot for place hot mix asphalt dike as designated in the Engineer's Estimate include full compensation for furnishing all labor, tools, equipment, and incidentals, and for doing all the work involved in placing HMA dike, complete in place, including excavation, backfill, and preparation of the area to receive the

dike, as shown on the plans, as specified in the specifications and these special provisions, and as directed by the Engineer.

10-1.64 HOT MIX ASPHALT (MISCELLANEOUS AREAS):

GENERAL

Summary

This work includes producing hot mix asphalt (HMA) and placing it on miscellaneous areas.

Comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

CONSTRUCTION

In median areas adjacent to slotted median drains, each layer of HMA must not exceed 0.25 foot maximum compacted thickness.

MEASUREMENT AND PAYMENT

If there is a contract item for place hot mix asphalt (miscellaneous area) paid for by the square yard, this item is limited to the areas listed on the plans and is in addition to the contract items for the materials involved.

10-1.65 HOT MIX ASPHALT AGGREGATE LIME TREATMENT - SLURRY METHOD:

GENERAL

Summary

This work includes treating hot mix asphalt (HMA) aggregate with lime using the slurry method and placing it in stockpiles to marinate.

Treat aggregate for HMA Type C with lime slurry.

Submittals

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed job mix formula (JMF) under Section 39, "Hot Mix Asphalt," of the Standard Specifications.

Submit the averaged aggregate quality test results to the Engineer within 24 hours of sampling.

Submit a treatment data log from the slurry proportioning device in the following order:

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. Wet aggregate flow rate collected directly from the aggregate weigh belt

5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
6. Dry aggregate flow rate calculated from the wet aggregate flow rate
7. Lime slurry flow rate measured by the slurry meter
8. Dry lime flow rate calculated from the slurry meter output
9. Approved lime ratio for each aggregate size being treated
10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
11. Calculated difference between the approved lime ratio and the actual lime ratio
12. Dry lime and water proportions at the slurry treatment time

Every day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on one line. The reported data must include data titles at least once per report.

Quality Control and Assurance

Your quality control plan (QCP) must include aggregate quality control sampling and testing during aggregate lime treatment. Perform sampling and testing in compliance with:

Aggregate Quality Control During Lime Treatment

Quality Characteristic	Test Method	Minimum sampling and testing frequency
Sand Equivalent	CT 217	Once per 1,000 tons of aggregate treated with lime
Percent of crushed particles	CT 205	As necessary and as designated in the QCP
Los Angeles Rattler	CT 211	
Fine aggregate angularity	AASHTO T 304, Method A	
Flat and elongated particles	ASTM D 4791	

Note: During lime treatment, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Run tests for aggregate quality in triplicate and report test results as the average of 3 tests.

The Engineer orders proportioning operations stopped for any of the following if you:

1. Do not submit the treatment data log.
2. Do not submit the aggregate quality control data.
3. Submit incomplete, untimely, or incorrectly formatted data.
4. Do not take corrective actions.
5. Take late or unsuccessful corrective actions.
6. Do not stop treatment when proportioning tolerances are exceeded.
7. Use malfunctioning or failed proportioning devices.

If you stop treatment, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

For the aggregate to be treated, determine the moisture content at least once during each 2 hours of treatment. Calculate moisture content under California Test 226 or California Test 370 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

MATERIALS

High-calcium hydrated lime and water must comply with Section 24-1.02, "Materials," of the Standard Specifications.

Before virgin aggregate is treated, it must comply with the aggregate quality specifications. Do not test treated aggregate for quality control except for gradation. The Engineer does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated aggregate. If reclaimed asphalt pavement (RAP) is used, the Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

Treated aggregate must not have lime balls or clods.

CONSTRUCTION

General

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Treat aggregate separate from HMA production.

Do not treat RAP.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to between 2 parts and 3 parts water by weight. The slurry must completely coat the aggregate.

Lime treat and marinate coarse and fine aggregates separately.

Immediately before mixing lime slurry with aggregate, water must not visibly separate from aggregate.

Treat aggregate and stockpile for marination only once.

The lime ratio is the pounds of dry hydrated lime per 100 pounds of dry virgin aggregate expressed as a percent. Water content of slurry or untreated aggregate must not affect the lime ratio.

Lime ratio ranges are:

Aggregate Gradation	Lime Ratio
Coarse	0.4 to 1.0
Fine	1.5 to 2.0
Combined virgin aggregate	0.8 to 1.5

You may reduce the combined aggregate lime ratio for open graded friction course to between 0.5 and 1.0 percent.

The lime ratio for fine and coarse aggregate must be within ±0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ±0.2 percent of the approved lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If 3 consecutive sets of recorded treatment data indicate deviation more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the day's total treatment in HMA.

If you stop treatment for noncompliance, you must implement corrective action and successfully treat aggregate for a 20-minute period. Notify the Engineer before beginning the 20-minute treatment period.

Lime Slurry Proportioning

Proportion lime and water with a continuous or batch operation.

The device controlling slurry proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by the data set is the amount produced 5 minutes before and 5 minutes after the capture time. For the contract's duration, collected data must be stored by the controller.

Proportioning and Mixing Lime Slurry Treated Aggregate

Treat HMA aggregate by proportioning lime slurry and aggregate by weight in a continuous operation.

Marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

MEASUREMENT AND PAYMENT

Full compensation for treating aggregates with lime slurry shall be considered as included in the contract price paid per ton for HMA as designated in the Engineer's Estimate and no separate payment will be made therefor.

10-1.66 HOT MIX ASPHALT AGGREGATE LIME TREATMENT - DRY LIME METHOD:

GENERAL

Summary

This work includes treating hot mix asphalt (HMA) aggregate with lime using the dry lime method either with marination or without.

Treat aggregate for HMA Type C with dry lime.

Marinate aggregate if the plasticity index determined under California Test 204 is from 4 to 10.

Submittals

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed job mix formula (JMF) under Section 39, "Hot Mix Asphalt," of the Standard Specifications.

If marination is required, submit in writing the averaged aggregate quality test results to the Engineer within 24 hours of sampling.

Submit in writing a treatment data log from the dry lime and aggregate proportioning device in the following order:

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. HMA type and mix aggregate size
5. Wet aggregate flow rate collected directly from the aggregate weigh belt
6. Aggregate moisture content, expressed as a percent of the dry aggregate weight
7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
8. Dry lime flow rate
9. Lime ratio from the accepted JMF for each aggregate size being treated
10. Lime ratio from the accepted JMF for the combined aggregate
11. Actual lime ratio calculated from the aggregate weigh belt output, the aggregate moisture input, and the dry lime meter output, expressed as a percent of the dry aggregate weight
12. Calculated difference between the approved lime ratio and the actual lime ratio

Every day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on one line. The reported data must include data titles at least once per report.

Quality Control and Assurance

If marination is required, the quality control plan (QCP) specified in Section 39-4, "Quality Control / Quality Assurance," must include aggregate quality control sampling and testing during lime treatment. Perform sampling and testing in compliance with:

Quality Characteristic	Test Method	Minimum sampling and testing frequency
Sand Equivalent	CT 217	Once per 1,000 tons of aggregate treated with lime
Percent of crushed particles	CT 205	As necessary and as designated in the QCP
Los Angeles Rattler	CT 211	
Fine aggregate angularity	AASHTO T 304, Method A	
Flat and elongated particles	ASTM D 4791	

Note: During lime treatment, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Run tests for aggregate quality in triplicate and report test results as the average of 3 tests.

The Engineer orders proportioning operations stopped for any of the following if you:

1. Do not submit the treatment data log
2. Do not submit the aggregate quality control data for marinated aggregate
3. Submit incomplete, untimely, or incorrectly formatted data
4. Do not take corrective actions
5. Take late or unsuccessful corrective actions
6. Do not stop treatment when proportioning tolerances are exceeded
7. Use malfunctioning or failed proportioning devices

If you stop treatment, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

MATERIALS

Lime must be high-calcium hydrated lime. Lime and water must comply with Section 24-1.02, "Materials," of the Standard Specifications.

Before virgin aggregate is treated, it must comply with the aggregate quality specifications. Do not test treated aggregate for quality control except for gradation. The Engineer does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated aggregate. If reclaimed asphalt pavement (RAP) is used, the Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

Treated aggregate must not have lime balls or clods.

CONSTRUCTION

General

Notify the Engineer in writing at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

If marination is required:

1. Treat and marinate coarse and fine aggregates separately.
2. Treat aggregate and stockpile for marination only once.
3. Treat aggregate separate from HMA production.

The lime ratio is the pounds of dry hydrated lime per 100 pounds of dry virgin aggregate expressed as a percent. Water content of untreated aggregate must not affect the lime ratio.

Lime ratio ranges are:

Aggregate Gradation	Lime Ratio
Coarse	0.4 to 1.0
Fine	1.5 to 2.0
Combined virgin aggregate	0.8 to 1.5

The lime ratio for fine and coarse aggregate must be within ±0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ±0.2 percent of the approved lime ratio when you combine the individual aggregate sizes in the JMF proportions. Determine the lime ratio before you add RAP.

Proportion dry lime by weight with a continuous operation.

The device controlling dry lime and aggregate proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by a data set is the amount produced 5 minutes before and 5 minutes after the capture time. For the duration of the contract, collected data must be stored by the controller.

If 3 consecutive sets of recorded treatment data indicate deviation more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment of lime treated aggregates.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment of lime treated aggregates and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the day's treated aggregate in HMA.

If you stop treatment for noncompliance, you must implement corrective action and successfully treat aggregate for a 20-minute period. Notify the Engineer before beginning the 20-minute treatment period.

If you use a batch-type proportioning operation for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment operation from HMA batching operations including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If using a continuous mixing operation for HMA without lime marinated aggregates, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the amount of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for the lime treatment operation in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with California Test 109.

At the time of mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water for mixing and coating aggregate to the aggregate before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from aggregate.

The HMA plant must be equipped with a bag house dust system. Material collected in the dust system must be returned to the mix.

Mixing Dry Lime and Aggregate

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from aggregate. Store dry lime in a uniform and free flowing condition. Introduce dry lime to the pugmill in a continuous operation. The introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

If marination is required, marinate treated aggregate in stockpiles between 24 hours and 60 days before using in HMA. Do not use aggregate marinated more than 60 days.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment operation is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

MEASUREMENT AND PAYMENT

Full compensation for dry lime treating HMA aggregate including marination shall be considered as included in the contract price paid per ton for HMA as designated in the Engineer's Estimate and no separate payment will be made therefor.

10-1.67 LIQUID ANTISTRIP TREATMENT:

GENERAL

Summary

This work includes treating asphalt binder with liquid antistrip (LAS) treatment to bond the asphalt binder to aggregate in hot mix asphalt (HMA).

Submittals

For LAS, submit with the proposed job mix formula (JMF) submittal under Section 39, "Hot Mix Asphalt," of the Standard Specifications:

1. Materials Safety Data Sheet (MSDS)
2. One 1-pint sample
3. Infrared analysis including copy of absorption spectra

Submit a certified copy of test results and a MSDS for each LAS lot.

Submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each LAS shipment. With each certificate also submit:

1. Your signature and printed name
2. Shipment number
3. Material type
4. Material specific gravity
5. Refinery
6. Consignee
7. Destination
8. Quantity
9. Contact or purchase order number
10. Shipment Date

Submit proportions for LAS as part of the JMF submittal specified in Section 39-1.03, "Hot Mix Asphalt Mix Design Requirements," of the Standard Specifications. If you change the brand or type of LAS, submit a new JMF.

For each job site delivery of LAS, submit one 1/2-pint sample to the Transportation Laboratory. Submit shipping documents to the Engineer. Label each LAS sampling container with:

1. LAS type
2. Application rate

3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in tab delimited format. Use line feed carriage return with one separate record per line for each production data set. Allow sufficient fields for the specified data. Include data titles at least once per report. For each mixing operation type, submit in order:

1. Batch Mixing:

    1.1. Production date
    1.2. Time of batch completion
    1.3. Mix size and type
    1.4. Each ingredient's weight
    1.5. Asphalt binder content as percentage of dry aggregate weight
    1.6. LAS content as percentage of asphalt binder weight

2. Continuous Mixing:

    2.1. Production date
    2.2. Data capture time
    2.3. Mix size and type
    2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
    2.5. Aggregate moisture content as percentage of dry aggregate weight
    2.6. Flow rate of asphalt binder collected from the asphalt binder meter
    2.7. Flow rate of LAS collected from the LAS meter
    2.8. Asphalt binder content as percentage of dry aggregate weight calculated from:

        2.8.1. Aggregate weigh belt output
        2.8.2. Aggregate moisture input
        2.8.3. Asphalt binder meter output

    2.9. LAS content as percentage of asphalt binder weight calculated from:

        2.9.1. Asphalt binder meter output
        2.9.2. LAS meter output

Quality Control and Assurance

For continuous mixing and batch mixing operations, sample asphalt binder before adding LAS. For continuous mixing operations, sample combined asphalt binder and LAS after the static mixer.

The Engineer orders proportioning operations stopped for any of the following if you:

1. Do not submit data
2. Submit incomplete, untimely, or incorrectly formatted data
3. Do not take corrective actions

4. Take late or unsuccessful corrective actions
5. Do not stop production when proportioning tolerances are exceeded
6. Use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

MATERIALS

LAS-treated asphalt binder must comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications. LAS does not substitute for asphalt binder.

LAS total amine value must be 325 minimum when tested under ASTM D 2074.

Use only 1 LAS type or brand at a time. Do not mix LAS types or brands.

Store and mix LAS under the manufacturer's recommendations.

CONSTRUCTION

LAS must be between 0.5 and 1.0 percent by weight of asphalt binder.

If 3 consecutive sets of recorded production data show actual delivered LAS weight is more than ±1 percent of the approved mix design LAS weight, stop production and take corrective action.

If a set of recorded production data shows actual delivered LAS weight is more than ±2 percent of the approved mix design LAS weight, stop production. If the LAS weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the amount produced 5 minutes before and 5 minutes after the capture time. For the duration of the contract, collected data must be stored by the plant controller or a computer's memory at the plant.

MEASUREMENT AND PAYMENT

Full compensation for LAS is included in the contract price paid per ton for HMA as designated in the Engineer's Estimate and no separate payment will be made therefor.

10-1.68 PRIME COAT:

GENERAL

Summary

This work includes applying liquid asphalt prime coat. The Engineer designates areas receiving prime coat.

Comply with Section 93, "Liquid Asphalts," of the Standard Specifications.

MATERIALS

Liquid asphalt for prime coat must be Grade SC-70.

CONSTRUCTION

Apply at least 0.20 gallon of prime coat per square yard of designated area. Do not apply more prime coat than can be absorbed completely by the aggregate base in 24 hours.

You may request in writing the Engineer's approval to modify prime coat application rates.

Before paving, prime coat must cure for 48 hours.

Close public traffic to areas receiving prime coat. Do not track prime coat onto pavement surfaces beyond the job site.

MEASUREMENT AND PAYMENT

The Engineer determines prime coat quantities under the specifications for liquid asphalt in Section 93-1.04, "Measurement," of the Standard Specifications.

The contract price paid per ton for liquid asphalt (prime coat) includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in prime coat complete in place as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.69 HOT MIX ASPHALT (TYPE C):

GENERAL

Summary

This work includes producing and placing hot mix asphalt (HMA) Type C using the Quality Control / Quality Assurance process.

Comply with the specifications for HMA Type A under Section 39, "Hot Mix Asphalt," of the Standard Specifications.

Submittals

Quality Control / Quality Assurance Projects

With the job mix formula (JMF) submittal, submit:

1. California Test 204 plasticity index results
2. California Test 371 tensile strength ratio results for untreated HMA
3. California Test 371 tensile strength ratio results for treated HMA if untreated HMA tensile strength ratio is below 70

At project start-up and once during production, submit samples split from your HMA production sample for California Test 371 to the Engineer and the Transportation Laboratory, Attention: Moisture Test.

With the JMF submittal, at project start-up, and each 5,000 tons, submit the California Test 371 test results for mix design and production to the Engineer.

Data Cores

Three business days before starting coring, submit proposed methods and materials for backfilling data core holes.

Submit to the Engineer:

1. A summary of data cores taken
2. A photograph of each data core

For each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:

    7.1 For recovered material, 1/2 inch
    7.2 For unstabilized material, 1.0 inch

8. Location including:

    8.1. County
    8.2. Route
    8.3. Post mile
    8.4. Lane number
    8.5. Lane direction
    8.6. Station

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. The core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

After data core summary and photograph submittal, dispose of cores under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Quality Control and Assurance

Quality Control / Quality Assurance Projects

For the mix design, determine the plasticity index of the aggregate blend under California Test 204. Choose an antistrip treatment and use the corresponding laboratory procedure for the mix design in compliance with:

Antistrip Treatment Lab Procedures for Mix Design

Antistrip Treatment	Lab Procedure
Plasticity index from 4 to 10 [a]	
Dry hydrated lime with marination	LP-6
Lime slurry with marination	LP-7
Plasticity index less than 4	
Liquid	LP-5
Dry hydrated lime without marination	LP-6
Dry hydrated lime with marination	LP-6
Lime slurry with marination	LP-7

Notes:

[a] If the plasticity index is greater than 10, do not use that aggregate blend.

For the mix design, determine tensile strength ratio under California Test 371 on untreated HMA. If the tensile strength ratio is less than 70:

1. Choose from the antistrip treatments specified based on plasticity index.
2. Test treated HMA under California Test 371.
3. Treat to a minimum tensile strength ratio of 70.

On the first production day and at least every 5,000 tons, sample HMA and test under California Test 371.

The Department does not use California Test 371 test results for JMF verification and production to determine specification compliance.

With the minimum quality control testing for the specified construction process, perform sampling and testing at the specified frequency for the following quality characteristics:

Minimum Quality Control

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Requirement	
Asphalt binder content (%)	CT 379 or 382	1 per 750 tons and any remaining part	JMF ± 0.40	
Stabilometer Value [a, b] (min.)	CT 366	1 per 4,000 tons or 1 per 2 business days, whichever is more	37 [c] (Modified) 35 [d]	
Air voids content (%) [a, e]	CT 367		Design ± 2	
Percent of crushed particles [f] Coarse aggregate (% min.) Two fractured faces Fine aggregate (Passing No. 4 sieve and retained on No. 8 sieve) (% min) One fractured face	CT 205	1 per 5,000 tons or 1 per 5 business days, whichever is more	95 90	
Fine aggregate angularity [f, g] (% min.)	AASHTO T 304 Method A		45	
Los Angeles Rattler [f] Loss at 100 rev. (% max.) Loss at 500 rev. (% max.)	CT 211	As necessary and designated in the QCP. At least once per project	12 40	
Flat and elongated particles [f] (% max. by weight @ 5:1)	ASTM D 4791		10	
		Design air void content	4.0	5.0
Percent of maximum theoretical density (%) [h, i, j]	CT 375	1 per 750 tons or any single location, whichever is less	92 – 97	91 – 96
Voids in mineral aggregate (% min.) 1/2" grading 3/4" grading 1" grading [k] with NMAS = 1" with NMAS = 3/4"	LP-2	1 per 4,000 tons or 1 per 2 business days, whichever is more	 14 13 12 13	 15 14 13 14
Voids filled with asphalt (%) 1/2" grading 3/4" grading 1" grading	LP-3		 65 - 75 65 - 75 65 - 75	 60 - 70 60 - 70 60 - 70
Dust proportion [l] (P200/Pbe)	LP-4	1 per 4,000 tons or 1 per 2 business days, whichever is more (Report Only)	0.6 – 1.3	0.6 – 1.3

Notes:

[a] Report the average of 3 tests from a single split sample.

[b] If the stability range is more than 12 points, prepare and test new briquettes.

[c] Follow CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply 12,600 lb. leveling load; and perform stabilometer test at 140 °F.

[d] Modify CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply additional 500 tamps at 500 psi tamping pressure and 140 °F compaction temperature; apply 12,600 lb. leveling load; and perform stabilometer test at 140 °F.

[e] Determine the bulk specific gravity of each lab-compacted briquette under CT 308, Method A. Determine theoretical maximum specific gravity under CT 309. Calculate the air voids content of each specimen using CT 309 and LP 1. Modify CT 367, Paragraph C5, to use the design air voids content specified under "Hot Mix Asphalt Type C Mixture."

[f] Aggregate must comply with the quality specifications before it is treated with lime. During lime treatment except for dry lime on damp aggregate treatment at continuous mixing plants, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Prepare and test 3 samples from a single split sample for aggregate quality at the frequency specified during lime treatment and report test results as the average of the 3 tests.

[g] Void if HMA contains less than 10 percent of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

[h] Required if the specified paved thickness is at least 0.15 foot.
[i] Determine maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.
[j] For Standard process, take and average 3 cores per 250 tons of HMA placed
[k] Minimum VMA dependent upon NMAS of JMF. NMAS is defined as one sieve size larger than the first sieve to retain more than 10 percent.
[l] Asphalt content based on dry weight of aggregate.

With the acceptance testing for the specified construction process, the Engineer samples and tests the following quality characteristics:

HMA Type C Acceptance

Quality Characteristic	Test Method	Requirement	
Asphalt binder content (%)	CT 379 or 382	JMF ± 0.40	
Stabilometer Value [a, b] (min.)	CT 366	37 [c] (Modified) 35 [d]	
Air voids content (%) [a, e]	CT 367	Design ± 2	
Percent of crushed particles [f]	CT 205		
Coarse aggregate (% min.)			
Two fractured faces		95	
Fine aggregate (Passing No. 4 sieve and retained on No. 8 sieve) (% min)			
One fractured face		90	
Fine aggregate angularity [f, g] (% min.)	AASHTO T 304 Method A	45	
Los Angeles Rattler [f]	CT 211		
Loss at 100 rev. (% max.)		12	
Loss at 500 rev. (% max.)		40	
Flat and elongated particles [f] (% max. by weight @ 5:1)	ASTM D 4791	10	
	Design air void content	4.0	5.0
Percent of maximum theoretical density (%) [h, i, j]	CT 375	92 – 97	91 – 96
Voids in mineral aggregate (% min.)	LP-2		
1/2" grading		14	15
3/4" grading		13	14
1" grading [k]			
with NMAS = 1"		12	13
with NMAS = 3/4"		13	14
Voids filled with asphalt (%)	LP-3		
1/2" grading		65 - 75	60 - 70
3/4" grading		65 - 75	60 - 70
1" grading		65 - 75	60 - 70
Dust proportion [j] (P200/Pbe)	LP-4	0.6 – 1.3 Report Only	

Notes:

[a] The Engineer reports the average of 3 tests from a single split sample.

[b] If the stability range is more than 12 points, the Engineer prepares and tests new briquettes.

[c] The Engineer follows CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply 12,600 lb. leveling load; and perform stabilometer test at 140 °F.

[d] Modify CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply additional 500 tamps at 500 psi tamping pressure and 140 °F compaction temperature; apply 12,600 lb. leveling load; and perform stabilometer test at 140 °F.

[e] The Engineer determines the bulk specific gravity of each lab-compacted briquette under CT 308, Method A. The Engineer determines theoretical maximum specific gravity under CT 309. The Engineer calculates the air voids content of each specimen using CT 309 and LP 1. The Engineer modifies CT 367, Paragraph C5, to use the design air voids content specified under "Hot Mix Asphalt Type C Mixture."

[f] Aggregate must comply with the quality specifications before it is treated with lime. During lime treatment, except for dry lime on damp aggregate treatment at continuous mixing plants; the Engineer samples coarse and fine aggregate from individual stockpiles, combines aggregate in the JMF proportions, and prepares and tests 3 samples from a single split sample for aggregate quality at the frequency specified during lime treatment and report test results as the average of the 3 tests.

[g] Void if HMA contains less than 10 percent of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

[h] Required if the specified paved thickness is at least 0.15 foot.

[i] Determine maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

[j] For Standard process, take and average 3 cores per 250 tons of HMA placed.

[k] Minimum VMA dependent upon NMAS of JMF. NMAS is defined as one sieve size larger than the first sieve to retain more than 10 percent.

[1] Asphalt content based on dry weight of aggregate.

The Engineer tests the 3 density cores you take from each 250 tons of HMA production. The Engineer determines the percent of maximum theoretical density for each density core by determining the density core's density and dividing by the maximum theoretical density. The Engineer determines the percent of maximum theoretical density for each 250 tons of HMA production by determining the average of the 3 density cores.

If the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot, the Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA.

MATERIALS

Asphalt Binder

The grade of asphalt binder mixed with aggregate for HMA Type C must be PG 64-28 PM.

Aggregate

The aggregate for HMA Type C must comply with the 1 - inch grading.

Choose a sieve size target value (TV) within each target value limit presented in the following table:

Aggregate Gradation
(Percentage Passing)
HMA Type C

1–inch HMA Type C

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	—
3/4"	88 - 93	TV ±5
1/2"	72 - 85	TV ±6
3/8"	55 - 70	TV ±6
No. 4	35 - 52	TV ±7
No. 8	22 - 40	TV ±5
No. 30	8 - 24	TV ±4
No. 50	5 - 18	TV ±4
No. 200	3 - 7	TV ±2

3/4–inch HMA Type C

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	—
3/4"	90 - 95	TV ±5
1/2"	60 - 75	TV ±6
No. 4	35 - 52	TV ±7
No. 8	22 - 36	TV ±5
No. 30	8 - 18	TV ±4
No. 200	3 - 7	TV ±2

1/2–inch HMA Type C

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/4"	100	—
1/2"	90 - 98	TV ±6
3/8"	64 - 84	TV ±6
No. 4	42 - 57	TV ±7
No. 8	29 - 39	TV ±5
No. 30	13 - 19	TV ±4
No. 200	3 - 7	TV ±2

Before the addition of asphalt binder and lime treatment, aggregate must comply with:

Aggregate Quality

Quality Characteristic	Test Method	Requirement
Percent of crushed particles [a]	CT 205	
Coarse aggregate (% min.)		
Two fractured faces		95
Fine aggregate (Passing No. 4 sieve and retained on No. 8 sieve.) (% min)		
One fractured face		90
Los Angeles Rattler (% Max.) [a]	CT 211	
Loss at 100 rev.		12
Loss at 500 rev.		40
Sand equivalent [a, b] (min.)	CT 217	47
Fine aggregate angularity (% min.) [a]	AASHTO T 304 Method A	45
Flat and elongated particles (% max. by weight @ 5:1).) [a]	ASTM D 4791	10

Note:

[a] During lime treatment except for dry lime on damp aggregate treatment at continuous mixing plants, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions.

[b] Reported value must be the average of 3 tests from a single sample.

Hot Mix Asphalt Type C Mixture

During mix design, determine the optimum binder content (OBC) at 5.0 percent air voids content.

Determine the proposed JMF from a mix design that complies with:

Hot Mix Asphalt Mix Design Requirements

Quality Characteristic	Test Method or Lab Procedure	Requirement	
Design air voids content (%)		4.0	5.0
Air voids content [a] (%)	CT 367	4.0	5.0
Voids in mineral aggregate (% min.) [b]	LP-2		
1/2" grading		14.0	15.0
3/4" grading		13.0	14.0
1" grading			
with NMAS = 1"		12	13
with NMAS = 3/4"		13	14
Voids filled with asphalt (%)	LP-3		
1/2" grading		65.0 – 75.0	60.0 – 70.0
3/4" grading		65.0 – 75.0	60.0 – 70.0
1" grading		65.0 – 75.0	60.0 – 70.0
Dust proportion [c] (P200/Pbe)	LP-4	0.6 – 1.3	0.6 – 1.3
Stabilometer value (min.) [d]	CT 366	37 [e] (Modified) 35 [f]	37 [e] (Modified) 35 [f]

Notes:

[a] Calculate the air voids content of each specimen using CT 309 and LP-1. Modify CT 367, Paragraph C5, to use the exact air voids content specified in the selection of OBC.

[b] Minimum VMA is dependent upon NMAS of JMF. NMAS is defined as one sieve size larger than the first sieve to retain more than 10 percent.

[c] Asphalt content based on dry weight of aggregate

[d] Modify CT 304, Part 2.B.2.c: "After compaction in the compactor, cool to 140 °± 5 °F by allowing the briquettes to cool at room temperature for 0.5-hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

[e] Follow CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply 12,600 lb leveling load; and perform stabilometer test at 140 °F.

[f] Modify CT 366: 150 tamps at 500 psi tamping pressure and 230 °F compaction temperature; cool specimens to 140 °F; apply additional 500 tamps at 500 psi; apply 12,600 lb leveling load; and perform stabilometer test at 140 °F.

CONSTRUCTION

Pave HMA Type C in maximum 0.45-foot thick compacted layers.

Vertical Joints

Before opening the lane to traffic, pave shoulders and median borders adjacent to a lane being paved.

Do not leave a vertical joint more than 0.15 foot high between adjacent lanes open to public traffic.

Data Cores

Take data cores that include the completed HMA pavement, underlying base, and subbase material. Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

MEASUREMENT AND PAYMENT

The contract item for HMA is measured by weight. The weight of each HMA mixture designated in the Engineer's Estimate must be the combined mixture weight.

If tack coat, asphalt binder, and asphaltic emulsion are paid with separate contract items, their contract items are measured under Section 92, "Asphalts," or Section 94, "Asphaltic Emulsions," as the case may be.

If recorded batch weights are printed automatically, the contract item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. A copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer.

The contract prices paid per ton for hot mix asphalt as designated in the Engineer's Estimate include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in constructing hot mix asphalt, complete in place, as shown on the plans, as specified in the specifications and these special provisions, and as directed by the Engineer.

If HMA is specified to comply with Section 39-4, "Quality Control / Quality Assurance," the Engineer adjusts payment under that section.

Full compensation for the Quality Control Plan and prepaving conference is included in the contract prices paid per ton for hot mix asphalt as designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for performing and submitting mix designs and for Contractor sampling, testing, inspection, testing facilities, and preparation and submittal of results is included in the

contract prices paid per ton for HMA as designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

The contract lump sum price paid for data core includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in data coring, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per ton for tack coat includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying tack coat, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The Engineer does not adjust payment for increases or decreases in the quantities for tack coat, regardless of the reason for the increase or decrease. Section 4-1.03B, "Increased or Decreased Quantities," does not apply to the items for tack coat.

Full compensation for performing smoothness testing, submitting written and electronic copies of tests, and performing corrective work including applying fog seal coat is included in the contract price paid per ton for the HMA designated in the Engineer's Estimate and no separate payment will be made therefor.

Full compensation for spreading sand on RHMA-G surfaces and for sweeping and removing excess sand is included in the contract price paid per ton for rubberized hot mix asphalt as designated in the Engineer's Estimate and no separate payment will be made therefor.

If the Engineer fails to comply with a specification within a specified time, and if, in the opinion of the Engineer, work completion is delayed because of the failure, the Engineer adjusts payment and contract time under Section 8-1.09, "Right of Way Delays."

If the dispute resolution ITP determines the Engineer's test results are correct, the Engineer deducts the ITP's testing costs from payments. If the ITP determines your test results are correct, the State pays the ITP's testing costs. If, in the Engineer's opinion, work completion is delayed because of incorrect Engineer test results, the Engineer adjusts payment and contract time under Section 8-1.09, "Right of Way Delays."

10-1.70 JOINTED PLAIN CONCRETE PAVEMENT:

GENERAL

Summary

This work includes constructing jointed plain concrete pavement.

Comply with Section 40, "Concrete Pavement," of the Standard Specifications.

Submittals

Submit AASHTO T 336 coefficient of thermal expansion test results to the Engineer.

Quality Control and Assurance

General

Perform coefficient of thermal expansion testing under AASHTO T 336 at a frequency of 1 test for each day of paving.

Prepaving Conference

Meet with the Engineer at a prepaving conference at a mutually agreed time and place. Discuss methods of performing the production and paving work.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. Quality control manager
3. Paving construction foreman
4. Subcontractor's workers including:

    4.1. Foremen
    4.2. Concrete plant manager
    4.3. Concrete plant operator
    4.4. Personnel performing saw cutting and joint sealing

Do not start paving activities until the listed personnel have attended a prepaving conference.

MATERIALS

Liquid Joint Sealant

Liquid joint sealant for weakened plane joints must be silicone.

Liquid Joint Sealant for Isolation Joints

Liquid joint sealant for isolation joints must be silicone.

Tack Coat

Tack coat must comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

CONSTRUCTION

Tie Bar Spacing On Curves

If the curvature of a concrete pavement slab prevents equal spacing of tie bars to maintain the minimum clearance from transverse joints, space them from 15 to 18 inches.

Transverse Contraction Joints

Transverse contraction joints must be Type A1. If widening existing concrete pavement, do not construct transverse contraction joints to match the existing pavement's joint spacing or skew unless specified. Transverse joints in concrete pavement on a curve must be on a single straight line through the curve's radius point.

Longitudinal Contraction Joints

Longitudinal contraction joints must be Type A2.

Transition Joints With Hot Mix Asphalt

If a joint between concrete pavement and hot mix asphalt is specified, apply tack coat between the concrete pavement and hot mix asphalt.

Concrete Pavement Removal

When removing and replacing concrete, remove it to full depth and width.

Removal and Replacement of Slabs Without Bar Reinforcement

For full depth and partial length slab removal, saw cut the full depth and width.

Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and where the Engineer orders. You may make additional saw cuts within the removal area to facilitate slab removal or to prevent binding of the saw cut at the removal area's edge. Saw cut perpendicular to the slab surface.

Use slab lifting equipment with lifting devices that attach to the slab. After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete using dowel bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bars holes from the original dowel bars by 3 inches.

Drill holes and use chemical adhesive to bond the dowel bars to the existing concrete. Use an automated dowel bar drilling machine. Holes must be at least 1/8-inch greater than the dowel bar diameter. Clean the holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry when you place chemical adhesive.

Immediately after inserting dowel bars into the chemical adhesive-filled holes, support the dowel bars and leave them undisturbed for the minimum cure time recommended by the chemical adhesive manufacturer.

Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under Section 28-1.07, "Curing," of the Standard Specifications. For partial slab replacements, place preformed sponge rubber expansion joint filler at new transverse joints in compliance with ASTM D 1752.

MEASUREMENT AND PAYMENT

If the Engineer accepts a test strip and it remains as part of the paving surface, the test strip is measured and paid for as jointed plain concrete pavement, seal pavement joint, and seal isolation joint as the case may be.

Transition panels to asphalt concrete pavement are measured and paid for as jointed plain concrete pavement.

Full compensation for providing a facility for and attending the prepaving conference is included in the contract price paid per cubic yard for jointed plain concrete pavement and no additional compensation is allowed therefor.

Full compensation for applying tack coat at transverse transition joints and end anchors is included in the contract price paid per cubic yard for jointed plain concrete pavement and no separate payment is made therefor.

If the curvature of a slab affects tie bar spacing and additional tie bars are required, they are included in the contract price paid per cubic yard for jointed plain concrete pavement and no additional compensation is allowed therefor.

10-1.71 PILING:

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Attention is directed to "Project Information," and "Welding" of these special provisions.

Difficult pile installation is anticipated due to the presence of dense soils, high ground water, cobbles and boulders, and traffic control.

When a calculated nominal driving resistance is shown on the plans for piling, that value shall be utilized in lieu of nominal resistance in Section 49, "Piling," of the Standard Specifications and these special provisions.

Jetting and Drilling

Jetting or drilling to obtain the specified penetration in conformance with the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications shall not be used for driven type piles.

In addition to conforming to the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications, should obstructions to driving be encountered, the Contractor shall provide special driving tips or heavier pile sections, or shall subexcavate below the bottom of footing, or take other measures to prevent damage to the pile during driving. Full compensation for providing special tips, heavier sections, or for subexcavating or employing other measures to prevent damage to the piles shall be considered as included in the contract price paid per unit for drive steel pile of the size shown on the plans, and no additional compensation will be allowed therefor.

CAST-IN-DRILLED-HOLE CONCRETE PILES

GENERAL

Summary

Cast-in-drilled-hole (CIDH) concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

The provisions of "Welding" of these special provisions shall not apply to temporary steel casings.

SUBMITTALS

Pile Installation Plan

The Contractor shall submit a pile installation plan to the Engineer for approval for all CIDH concrete piling. The pile installation plan shall be submitted at least 15 days before constructing CIDH concrete piling and shall include complete descriptions, details, and supporting calculations for the following:

A. Concrete mix design, certified test data, and trial batch reports.

B. Drilling or coring methods and equipment.

C. Proposed method for casing installation and removal when necessary.

D. Plan view drawing of pile showing reinforcement. Include inspection pipes on the drawing if inspection pipes are required.

E. Methods for placing, positioning, and supporting bar reinforcement.

F. Methods and equipment for determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.

G. Methods and equipment for verifying that the bottom of the drilled hole is clean before placing concrete.

H. Methods and equipment for preventing upward movement of reinforcement, including the Contractor's means of detecting and measuring upward movement during concrete placement operations.

For concrete placed under slurry, the pile installation plan shall also include complete descriptions, details, and supporting calculations for the following:

A. Concrete batching, delivery, and placing systems, including time schedules and capacities. Time schedules shall include the time required for each concrete placing operation at each pile.

B. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.

C. Suppliers' test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives, including Material Safety Data Sheet.

D. Slurry testing equipment and procedures.

E. Methods of removal and disposal of excavation, slurry, and contaminated concrete, including removal rates.

F. Methods and equipment for slurry agitating, recirculating, and cleaning.

QUALITY ASSURANCE

Concrete Test Batch

Before concrete is deposited under slurry, a concrete test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during placement of concrete in the piles. Concrete shall be placed in an excavated hole or suitable container of adequate size to allow for testing as specified herein. Depositing of concrete under slurry will not be required. In addition to meeting the specified nominal slump, the concrete test batch shall meet the following requirements:

A. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the concrete test batch shall demonstrate that the proposed concrete mix design achieves a slump of at least 7 inches after twice that time has elapsed.

B. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the concrete test batch shall demonstrate that the proposed concrete mix design achieves a slump of at least 7 inches after that time plus 2 hours has elapsed.

The time period shall begin at the start of placement. Concrete shall not be vibrated or agitated during the test period. Slump tests will be performed in conformance with the requirements in California Test 556.

Upon completion of testing, concrete 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.

MATERIALS

Concrete

Concrete deposited under slurry shall have a nominal slump equal to or greater than 7 inches, contain not less than 675 pounds of cementitious material per cubic yard, and be proportioned to prevent excessive bleed water and segregation. The nominal and maximum slump and penetration requirements in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications shall not apply.

Concrete shall conform to the requirements in "Corrosion Control for Portland Cement Concrete" of these special provisions.

Concrete for portions of CIDH concrete piling to be formed shall contain not less than 675 pounds of cementitious material per cubic yard and shall contain 6.0±1.5 percent air entrainment in the freshly mixed concrete.

Concrete shall conform to the requirements in "Mass Concrete for Cast-in-Place Concrete Piles" of these special provisions.

Aggregate Grading

The combined aggregate grading shall be either the 1-inch maximum grading, the 1/2-inch maximum grading, or the 3/8-inch maximum grading and shall conform to the requirements in Section 90-3, "Aggregate Gradings," of the Standard Specifications.

When concrete is placed under slurry, the combined aggregate grading shall be either the 1/2-inch maximum grading or the 3/8-inch maximum grading and shall conform to the requirements in Section 90-3, "Aggregate Gradings," of the Standard Specifications.

Permanent Steel Casings

Permanent steel casings shall conform to the provisions of "Steel Pipe Piling" of these special provisions.

Grout

Grout used to backfill casings shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Aggregate shall be used to extend the grout, but only to the extent that the cement content of the grout is not less than 845 pounds per cubic yard of grout. California Test 541 will not be required nor will the grout be required to pass through a sieve with a 0.07-inch maximum clear opening before being introduced into the grout pump. Aggregate shall consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight. Fine aggregate shall conform to the provisions of Section 90-2, "Materials," of the Standard Specifications. The size of pea gravel shall be such that 100 percent passes the 1/2-inch sieve, a minimum 90 percent passes the 3/8-inch sieve, and not more than 5 percent passes the No. 8 sieve.

Slurry Cement Backfill

Slurry cement backfill shall conform to Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications except that the slurry cement backfill shall contain not less than 282 pounds of cementitious material per cubic yard.

Slurry

CONSTRUCTION

General

CIDH concrete piling 24 inches in diameter or larger may be constructed by excavation and depositing concrete under slurry.

CIDH concrete piling (rock socket) shall consist of drilling or coring sockets in rock to the depths or lengths specified and filling the sockets with reinforced concrete. Cored holes shall conform to the provisions of Section 49-4.03, "Drilled Holes," of the Standard Specifications.

Disposal of drill cuttings shall conform to the provisions in of these special provisions.

Portions of CIDH concrete piling shown on the plans to be formed shall be formed and finished in conformance with the provisions for concrete structures in Section 51, "Concrete Structures," of the Standard Specifications.

Reinforcement shall extend to 3 inches clear of the bottom of the drilled hole when the hole is drilled below the specified tip elevation.

Permanent Steel Casing Installation

Permanent steel casings shall be installed by impact or vibratory hammers, oscillators, rotators, or by placing in a drilled hole. The provisions of Section 49-1.08, "Pile Driving Acceptance Criteria," of the Standard Specifications shall not apply to permanent steel casings.

Permanent steel casings placed in a drilled hole shall conform to the following requirements:

A. Casings shall be positioned with spacers to center the casing inside the drilled hole. Spacers may be welded to the outside of the casing.

B. Voids in the annular space between the casing and the soil shall be filled with grout.

C. Grout shall be placed from the bottom of the casing using grout tubes. Placement of grout shall continue until all voids have been filled and the grout reaches the top of the casing. Free fall of the grout from the top to the bottom of the casing will not be allowed.

D. Grout shall be pumped into the annular space such that the grout head is maintained uniformly around the casing and no visible evidence of water or air is ejected at the top of the grout.

E. One grout tube shall be placed every 4 feet along the circumference of the casing with a minimum of 4 grout tubes per casing.

F. Grout tubes shall extend down to no less than 1 foot from the bottom of the casing.

If a permanent steel casing tip elevation above a CIDH concrete piling (rock socket) is lowered:

A. The CIDH concrete piling, including bar reinforcing steel, shall extend to that same elevation.

B. The specified tip elevation of the CIDH concrete piling (rock socket) shall extend to maintain the length of the rock socket into rock as shown on the plans.

If the Contractor elects to construct the optional construction joint shown on the plans for CIDH concrete piling and a permanent steel casing is not shown on the plans, the Contractor shall furnish and install a casing that:

A. Remains permanently in place.

B. Is watertight and of sufficient strength to prevent damage and to withstand the loads from installation procedures, drilling and tooling equipment, lateral concrete pressures, and earth pressures.

C. Extends to an elevation at least 5 feet below the construction joint.

D. Does not extend above the top of the drilled hole or final grade which ever is lower.

E. Conforms to the requirements in Section 5-1.02A, "Excavation Safety Plans," of the Standard Specifications.

F. Does not increase the diameter of the CIDH concrete piling more than 2 feet.

G. Is installed in conformance with the installation requirements for permanent steel casings.

Placing Concrete

Concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Concrete deposited under slurry need not be vibrated. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. Concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

A. A tremie tube or tubes, each of which are at least 10 inches in diameter, fed by one or more concrete pumps.

B. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 10-inch tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a watertight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained as follows to prevent reentry of the slurry into the tube. Until at least 10 feet of concrete has been placed, the tip of the delivery tube shall be within 6 inches of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 10 feet below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 10 feet into the concrete and then reinitiating the flow of concrete.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement. The slurry level shall be maintained 10 feet above the piezometric head or within 12 inches of the top of the drilled hole, whichever is higher.

A log of concrete placement for each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include a 8-1/2" x 11" sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 5 feet of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within 1 working day of completion of placing concrete in the pile.

After placing reinforcement and before placing concrete in the drilled hole, if drill cuttings settle out of the slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If a temporary casing is used, concrete placed under slurry shall be maintained at a level at least 5 feet above the bottom of the casing. The withdrawal of the casing shall not cause contamination of the concrete with slurry. If slurry is not used, the temporary casing shall not be withdrawn until the concrete head in the casing is greater than the groundwater outside of the casing. This positive concrete head shall be maintained during the withdrawal of the casing.

Material resulting from using slurry 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.

Disposal of material resulting from using slurry shall conform to the provisions in of these special provisions.

Acceptance Testing and Mitigation

Vertical inspection pipes for acceptance testing shall be provided in all CIDH concrete piling 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing in a manner that controls ground water.

The furnishing and placing of inspection pipes shall conform to the following:

A. Inspection pipes shall be Schedule 40 PVC pipe with a nominal inside diameter of 2 inches. Watertight PVC couplers are permitted to facilitate pipe lengths in excess of those which are commercially available. The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

B. Each inspection pipe shall be capped at the bottom and shall extend from 3 feet above the pile cutoff down to the bottom of the reinforcing cage. A temporary top cap or similar means shall be provided to keep the pipes clean before testing. If pile cutoff is below the ground surface or working platform, inspection pipes shall be extended to 3 feet above the ground surface or working platform. Approved covers or railings shall be provided and inspection pipes shall be located as necessary to minimize exposure of testing personnel to potential falling hazards.

C. Inspection pipes shall be completely clean, dry, and unobstructed at the time of testing providing a 2-inch diameter clear opening.

D. The inspection pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole. The CIDH concrete piling shall be constructed so that the relative distance of inspection pipes to vertical steel reinforcement shall remain constant.

E. When any changes are made to the tip of CIDH concrete piling, the Contractor shall also extend the inspection pipes to the bottom of the reinforcing cage.

The following additional requirements apply if inspection pipes are not shown on the plans:

A. Inspection pipes shall be placed radially around the pile, inside the outermost spiral or hoop reinforcement and no more than 1 inch clear of the outermost spiral or hoop reinforcement.

B. Inspection pipes shall be placed around the pile at a uniform spacing not exceeding 33 inches measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. Inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the spacing required herein.

C. Inspection pipes shall be placed a minimum of 3 inches clear of the vertical reinforcement. When the vertical reinforcement configuration does not permit this clearance while achieving radial location requirements, distance to vertical rebar shall be maximized while still maintaining the requirement for radial location.

D. Where the dimensions of the pile reinforcement do not permit inspection pipes to be placed per these requirements, a plan for tube placement shall be submitted to the Engineer for approval in the Pile Placement Plan with a request for deviation before fabricating pile reinforcement.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 1-1/4-inch-diameter rigid cylinder 4.5 feet long through the length of pipe. If an inspection pipe fails to pass the 1-1/4-inch-diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

For each inspection pipe that does not pass the 1-1/4-inch-diameter cylinder, the Contractor shall core a nominal 2-inch diameter hole through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing and shall be no more than 5 inches clear from the reinforcement.

Coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall be in conformance with the Department's "Soil and Rock Logging, Classification, and Presentation Manual." Coring logs shall include Core Recovery (REC), Rock Quality Designation (RQD), locations of breaks, and complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and delivered to the Engineer upon completion. The Engineer will evaluate the portion of the pile represented by the cored hole based on the submitted core logs.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging conducted in conformance with California Test 233. The Contractor shall not conduct operations within 25 feet of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piles, the Contractor shall allow 20 days for the Engineer to conduct these tests and make determination of acceptance. Should the Engineer fail to complete these tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Engineer may elect to perform additional tests to further evaluate a pile. These tests may include crosshole sonic logging and other means of inspection selected by the Engineer. When the Engineer elects to perform additional tests to further evaluate anomalies for a rejected pile, no time requirement exists for performing these tests. The Contractor may progress with the mitigation plan process without waiting for these supplemental results.

Inspection pipes and cored holes shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications and California Test 233, Part 5C, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Engineer will determine whether the rejected pile requires mitigation due to structural, geotechnical, or corrosion concerns. The Engineer will consider the estimated size and location of the anomaly and potential effects upon the design. The Engineer will provide the conclusions of this analysis to the Contractor for development of a mitigation plan, if required. The Contractor shall allow 35 days for the Engineer to determine whether the pile requires mitigation and provide information to the Contractor. Day 1 of the 35 days shall be the 1st day after access has been provided to the Engineer to perform acceptance testing. If additional information is submitted to the Engineer that modifies the size, shape, or nature of the anomaly, the Contractor shall allow 15 additional days for the subsequent analysis.

If the Engineer determines that a rejected pile does not require mitigation, the Contractor may elect to (1) repair the pile per the approved mitigation plan or (2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, $300 per cubic yard for the portion of the pile affected by the anomalies. The

volume, in cubic yards, of the portion of the pile affected by the anomalies, shall be calculated as the area of the cross section of the pile affected by each anomaly, in square yards, as determined by the Engineer, multiplied by the distance, in yards, from the top of each anomaly to the specified tip of the pile. If the volume calculated for one anomaly overlaps the volume calculated for additional anomalies within the pile, the calculated volume for the overlap shall only be counted once. In no case shall the amount of the payment to the State for any such pile be less than $300. The Department may deduct the amount from any moneys due, or that may become due the Contractor under the contract.

If the Engineer determines that a rejected pile requires mitigation, the Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected CIDH concrete pile conforming to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

Pile mitigation plans shall include the following:

A. The designation and location of the pile addressed by the mitigation plan.

B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.

C. A step by step description of the mitigation work to be performed, including drawings if necessary.

D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.

E. Methods for preservation or restoration of existing earthen materials.

F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.

G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post Mile, and the Contractor's (and Subcontractor's if applicable) name on each sheet.

H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.

I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California. This requirement is waived for approved mitigation plans when either of the following conditions are present:

1. The proposed mitigation will be performed in conformance with the most recent Department approved version of "ADSC Standard Mitigation Plan 'A' - Basic Repair" without exception or modification.

2. The Engineer has determined that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and the Contractor elects to repair the pile using most recent Department approved version of "ADSC Standard Mitigation Plan 'B' - Grouting Repair" without exception or modification.

The most recent Department approved version of the "ADSC Standard Mitigation Plan" is available at:

http://www.dot.ca.gov/hq/esc/geotech/ft/adscmitplan.htm

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. An assessment of the nature and size of the anomalies in the rejected pile.
B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. The proposed location and size of additional piles.
B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piles.

All provisions for CIDH concrete piling shall apply to replacement piles.

The Contractor shall allow the Engineer 20 days to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post Mile, and the Contractor (and subcontractor if applicable) name on each sheet. The Engineer will be the sole judge as to whether a mitigation proposal is

acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Driven piling that is substituted, at the Contractor's option, for the piling shown on the plans, will be measured and paid for by the linear foot as furnish piling and by the unit as drive pile of the type or class shown in the Engineer's Estimate. No additional compensation for any additional length needed to develop the required bearing will be made. Full compensation for furnishing and placing the pile anchors, splicing piles, additional removal of materials inside cast-in-steel-shell piling, additional concrete inside cast-in-steel-shell piling, or other expenses resulting from said substitution shall be considered as included in the contract price paid per linear foot for furnish piling and the contract unit price paid for drive pile of the type or class shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversized cast-in-drilled-hole concrete piling, filling cave-ins and oversized piles with concrete, and redrilling through concrete shall be considered as included in the contract prices paid per linear foot for cast-in-drilled-hole concrete piling of the types and sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.72 PRESTRESSING CONCRETE:

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

The number of working drawings to be submitted for initial review shall be 8 sets for railroad bridges and 6 sets for other structures.

PAYMENT

No separate payment will be made for pretensioning precast concrete members. Payment for pretensioning precast concrete members shall be considered as included in the contract price paid for furnish precast members as provided for in Section 51, "Concrete Structures."

The contract lump sum price paid for prestressing cast-in-place concrete shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing, placing, and tensioning the prestressing steel in cast-in-place concrete structures, complete in place, as shown on the plans, as specified in the specifications and these special provisions, and as directed by the Engineer.

If a portion or all of the prestressing system is fabricated more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for prestressing cast-in-place concrete will be reduced $5,000 for each fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3,000 ($8,000 total) for each fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles.

Full compensation for furnishing and placing additional concrete and deformed bar reinforcing steel required by the particular system used, ducts, anchoring devices, distribution plates or assemblies and incidental parts, for furnishing samples for testing, for calibration of jacking equipment done by a private laboratory, and for pressure grouting ducts shall be considered as included in the contract unit price paid for prestressing cast-in-place concrete or in the contract price for furnish precast members, and no additional compensation will be allowed therefor.

10-1.73 CONCRETE STRUCTURES:

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Precast Concrete Quality Control" of these special provisions.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

Neoprene strip shall be furnished and installed at Bridge No. 56-0846 and Bridge No. 56C0567 abutments backwall joint protection at the approach slab in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installing neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that the protective board will not be required.

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

FALSEWORK

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Railroad Relations and Insurance" of these special provisions for additional requirements for falsework over railroads.

In addition to the provisions in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Total Review Time - Weeks
Van Buren Blvd. O.C. (Replace)	5

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module" of these special provisions, shall be installed at the approach end of temporary railings which are located less than 15 feet from the edge of a traffic lane. For 2-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 6 feet from the edge of a traffic lane.

The Contractor's engineer who signs the falsework drawings shall also certify in writing that the falsework is constructed in conformance with the approved drawings and the contract specifications prior to placing concrete. This certification shall include performing any testing necessary to verify the ability of the falsework members to sustain the stresses required by the falsework design. The engineer who signs the drawings may designate a representative to perform this certification. Where falsework contains openings for railroads, vehicular traffic, or pedestrians, the designated representative shall be qualified to perform this work, shall have at least 3 years of combined experience in falsework design or supervising falsework construction, and shall be registered as a Civil Engineer in the State of California. For other falsework, the designated representative shall be qualified to perform this work and shall have at least 3 years of combined experience in falsework design or supervising falsework construction. The Contractor shall certify the experience of the designated representative in writing and provide supporting documentation demonstrating the required experience if requested by the Engineer.

Welding and Nondestructive Testing

Welding of steel members, except for previously welded splices and except for when fillet welds are used where load demands are less than or equal to 1,000 pounds per inch for each 1/8 inch of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings. Previously welded splices for falsework members are defined as splices made prior to the member being shipped to the project site.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by

the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. This letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding certification shall (1) itemize the testing and inspection methods used, (2) include the tracking and identifying documents for previously welded members, (3) be signed by an engineer who is registered as a Civil Engineer in the State of California, (4) and shall be provided prior to erecting the members.

PERMANENT STEEL DECK FORMS

Forms for the deck slabs between girders shall be constructed and left in place at those locations shown on the plans in conformance with these special provisions.

Permanent steel deck forms and supports shall be steel conforming to the requirements in ASTM Designation: A 653/A 653M (Designation SS, Grades 33 through 80) having a coating designation G165. The forms shall be mortar-tight, true to line and grade, and of sufficient strength to support the loads applied.

Detailed working drawings for forms shall be submitted to the Engineer for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Three sets of drawings shall be submitted. These drawings shall show the grade of steel, the physical and section properties for all deck members, the method of support and grade adjustment, accommodation for skew, and methods of sealing against grout leaks.

Working drawings shall be submitted sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor of the drawings without delaying the work. Such time shall be proportional to the complexity of the work but in no case shall such time be less than 3 weeks after complete drawings and all support data are submitted.

The design of permanent steel deck forms shall be based on the combined dead load of the forms, reinforcement, and plastic concrete plus an allowance for all anticipated construction loads. The allowance for construction loads shall be not less than 50 psf. The combined dead load shall be assumed to be not less than 160 pcf for normal concrete and not less than 130 pcf for lightweight concrete.

Physical design properties shall be computed in conformance with the requirements of the AISI specification for the "Design of Cold Formed Steel Structural Members."

The maximum allowable stresses and deflections used in the design of steel forms shall be as follows:

A. Tensile stress shall not exceed 0.725 of the specified yield strength of the material furnished or 36,000 psi.

B. Deflection due to dead load shall not exceed 0.0056 of form span or 1/2 inch, whichever is less. In no case shall the dead load for deflection calculations be less than 120 psf total.

C. Form camber, used at the option of the Contractor, shall be based on the actual dead load condition. Camber shall not be used to compensate for deflection in excess of the allowable limits.

D. The design span of the form sheets shall be the clear span of the form plus 2 inches measured parallel to the form flutes.

Permanent steel deck forms shall not be used for those sections of deck slabs that contain a longitudinal expansion joint unless additional supports are placed under the joint.

Permanent steel deck forms shall not interfere with the movement at deck expansion joints.

The clearance between the surface of permanent forms and any bar reinforcement shall be not less than one inch. The configuration of the forms shall be such that the weight of deck slab is not more than 110 percent of the weight of the total deck slab as dimensioned on the plans.

Permanent steel deck forms shall be installed in conformance with the approved working drawings.

Form sheets shall not rest directly on the top of the girder flanges. Sheets shall be securely fastened to form supports and shall have a minimum bearing length of one inch at each end. Form supports shall be placed in direct contact with the flange of the girder. Attachment of supports shall be made by bolts, clips or other approved means.

Transverse deck construction joints shall be located at the bottom of a flute and 1/4-inch weep holes shall be field drilled at not less than 12 inches on center along the line of the joint.

Permanently exposed galvanized form surfaces that are abraded or damaged prior to installation shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the cleaned areas shall be painted with 2 applications

of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," of the Standard Specifications. Aerosol cans shall not be used. Minor heat discoloration in area of welds need not be repaired.

DECK CLOSURE POURS

Where a deck closure pour is shown on the plans, reinforcement protruding into the closure space and forms for the closure pour shall conform to the following:

A. During the time of placement of concrete in the deck, other than for the closure pour itself, reinforcing steel which protrudes into the closure space shall be completely free from any connection to the reinforcing steel, concrete, or other attachments of the adjacent structure, including forms. The reinforcing steel shall remain free of any connection for a period of not less than 24 hours following completion of the pour.

B. Forms for the closure pour shall be supported from the superstructure on both sides of the closure space.

The closure pour between Stage #1 and Stage #2 of the Van Buren Blvd O.H. shall not be placed sooner that 45 days after the completion of deck pour on Stage #2.

SLIDING BEARINGS

Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

A. Grease shall conform to the requirements of Society of Automotive Engineers AS 8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.
B. Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.
C. Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications.

CURING

The formed surfaces which will be exposed in the completed work, of the columns, caps, piers, bents, or abutments listed in the following table shall be cured by the forms-in-place method. Other surfaces of said units shall be cured in conformance with the provisions in Section 90-7.03, "Curing Structures," of the Standard Specifications.

Bridge Name & Number	Abutment Number	Pier or Bent Number
Van Buren Blvd O.C. (Replace)	1 & 3	2
Van Buren Blvd O.H. (Replace)	1 & 2	N/A

PRECAST CONCRETE GIRDERS

Precast reinforced concrete girders shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications.

PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS

Where precast prestressed concrete girders are used in multiple stage construction, girders shall be cast for the stage under construction, and not for future stages.

Before curing operations, the top surface of each member shall be given a coarse texture by brooming with a stiff bristled broom or by other suitable devices that will result in uniform transverse scoring.

The anticipated deflection and method of accommodation of deflection of precast prestressed concrete girders, prior to the time the deck concrete is placed, shall be shown on the working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The deflection shall include the following:

A. Anticipated upward deflection caused by the prestressing forces.

B. Downward deflection caused by the dead load of the girder.

C. Deflection caused by the creep and shrinkage of the concrete for the time interval between the stressing of the girders and the planned placement of the deck.

The deflection shall be substantiated by calculations that consider the ages of the girder concrete at the time of stressing and the Contractor's planned placement of the deck. Deflection calculations shall be based on the concrete producer's estimate of the modulus of elasticity at the applicable concrete age.

Adjustments to accommodate girder deflections that occur prior to the time the deck concrete is placed may include revisions in bearing seat elevations, but the adjustments shall be limited by the following conditions:

A. The minimum permanent vertical clearance under the structure as shown on the plans shall not be reduced.

B. The profile grade and cross slope of the deck shall not be changed.

C. A minimum of one inch of deck slab concrete between the top of the precast girders and the deck slab reinforcement shall be maintained.

Girders with unanticipated girder deflection that do not comply with conditions A, B, and C will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

Adjustments to accommodate girder deflections will not be considered a change in dimensions. Full compensation for increases in the cost of construction, including increases in the quantity of deck or bearing seat concrete, resulting from adjustments to accommodate girder deflections shall be considered as included in the contract prices paid for the various items of work involved, and no additional compensation will be allowed therefor.

The Contractor shall submit a girder erection plan to the Engineer for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The girder erection plan shall include procedures, details, and sequences for unloading, lifting, erecting, and installing temporary bracing, and shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow 20 days for the review of the girder erection plan.

Temporary lateral bracing shall be provided for girders located over the BNSF railroad. The bracing shall be installed at a minimum at each end of each girder segment and at midspan. The bracing shall be in place prior to the release of the erection equipment from the girder and shall remain in place until 48 hours after the concrete diaphragms have been placed. The bracing shall be designed to prevent overturning of the girders prior to completion of the work and to resist the following lateral pressures applied at the top of the girder in either direction:

Structure Height, H (feet above ground)	Lateral Pressure (psf)
$0 < H \leq 30$	15
$30 < H \leq 50$	20
$50 < H \leq 100$	25
$H > 100$	30

FOOTING SETTLEMENT

At the Van Buren Blvd. O.H., Stage #1 anticipates up to 2.00" of settlement at the abutments with the majority of the settlement occurring during construction. Stage #2 anticipates up to 1.30" of settlement at the abutments with the majority of the settlement occurring during construction.

The Contractor shall monitor the settlement that occurs in Stage #1 during and after construction and adjust the elevation of Stage #2 to match Stage #1 after settlements of Stage #2 are realized and prior to placing the closure pour.

MEASUREMENT AND PAYMENT

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for furnishing and installing access opening covers in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for furnishing and installing plastic pipe located at vertical drains used behind retaining walls, bridge abutments, including horizontal or sloping drains, down slopes and across sidewalk areas, including excavation and backfill involved in placing the plastic pipe, shall be considered as included in the contract price paid per cubic yard for the various items of concrete work involved and no separate payment will be made therefor.

Full compensation for furnishing and constructing permanent steel deck forms shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no additional compensation will be allowed therefor.

Full compensation for performing settlement monitoring and any grade adjustments associated with foundation settlements shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no additional compensation will be allowed therefor.

Full compensation for public notification and airborne monitoring for deck crack treatment shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge, and no additional compensation will be allowed therefor.

10-1.74 PRECAST DRAINAGE INLET:

GENERAL

Summary

This work includes furnishing and installing precast drainage inlets as an option to cast-in-place inlets.

This work includes furnishing and installing precast type G2 or G4 drainage inlets.

Precast drainage inlet must comply with Section 51, "Concrete Structures," of the Standard Specifications.

Definitions

Pipe: Any shaped sealed conduit that conveys water into a drainage inlet under this section.

Submittals

If oval or circular shape cross sections are to be provided, submit plans and calculations 10 days before installation demonstrating that inlet components comply with Bridge Design Practice-Section 6, "Underground Structures." Plans must be signed by an engineer who is registered as a civil engineer or structural engineer in the State.

If field repairs are required, submit field repair procedures and patching materials 10 days before making repairs.

Quality Control and Assurance

Tolerances

Wall and slab thicknesses must not be less than dimensions shown on the plans by more than 5 percent or 3/16 inch, whichever is greater.

Reinforcement position must not vary more than 1/2 inch from position shown on the plans.

MATERIALS

Precast drainage inlets must comply with rectangular horizontal cross sections shown on the plans. If oval or circular shape cross-sections are furnished, they must comply with ASSHTO M 199 or ASTM C 478.

Non-shrink grout must be packaged and dry. Combined materials must comply with ASTM C 1107.

Basin or inlet floors poured in the field must be minor concrete under Section 90-10, "Minor Concrete," of the Standard Specifications.

Joint sealant must comply with ASTM C 990 for butyl rubber sealants. Joint primer must be type recommended by joint seal manufacturer.

Sand bedding must comply with Section 19-3.025B, "Culvert Beddings," of the Standard Specifications.

Bonding agent must comply with ASTM C 1059, Type II (Non-redispersable).

Resilient connectors must comply with ASTM C 923.

CONSTRUCTION

Portland cement concrete must comply with "Freezing Condition Requirements" of these special provisions.

Non-shrink grout must be mixed to smooth consistency under grout manufacturer's instructions.

Precast drainage inlets must comply with reinforcement shown on the plans.

Install the type of precast drainage inlet openings shown on the plans for pipes, slotted drains, grated line drains or other sealed conduits penetrating inlet wall. Center pipe in the opening so that the gap around the outside of pipe is uniform dimension. Unless indicated otherwise on the plans, fill gap between pipe and drainage inlet wall opening with non-shrink grout. Where culverts or storm drain systems are shown on the plans to be watertight, seal gap between pipe and drainage inlet wall opening with resilient connectors.

Align precast drainage inlets as shown on the plans.

Keyed joints must be "matched fit" to ensure uniform alignment of wall sections and lids. Seal all keyed joint locations including walls, basin floor, and lid with preformed joint sealant made of butyl rubber material. Upper lid/wall joint may be sealed with grout instead of butyl rubber material. Clean joint surface before installing sealant. Use primer when moisture is present on joint surfaces. Use size and width of sealant recommended by sealant manufacturer for type of keyed joint furnished. Set joints together with sealant to create a uniform bearing surface without pressure points. Joint surfaces must be free of spalls, cracks, or fractures, and any imperfections that adversely affect joint function.

Flat precast drainage inlet floors must have field cast topping with 4:1 (horizontal:vertical) slope toward outlet pipe. Field cast topping must be 2-inch minimum thickness. Use bonding agent when placing field cast topping layer. Before applying bonding agent, clean surface of all loose debris, dust, oil, dirt, etc. Apply bonding agent under manufacturer's instructions. Key at inlet floor level is not required when floor is precast integrally with inlet wall.

Defects

Rejection Criteria: In addition to requirements of Section 6, "Control of Materials," precast drainage inlet may be rejected if it exhibits any of the following defects as determined by the Engineer:

1. Fractures or cracks passing through wall exceeding 1/16 inch in width
2. Non-repairable honeycombed or open texture (spalls) areas greater than 6 square inches in area
3. Does not comply with reinforcement tolerances or required cross sectional area
4. Wall or lid is less than minimum thickness
5. Internal dimensions that are less than design dimensions by 1 percent or 1/2 inch whichever is greater
6. Any significant defect affecting performance, structural integrity, or both

Repairs

Repair precast drainage inlet sections to correct handling damage or manufacturing imperfections. Repairs do not void requirements of these special provisions. The County does not pay for repairs.

MEASUREMENT AND PAYMENT

Precast drainage inlet units will be measured and paid for by the cubic yard in the same manner as cast in place inlet units in Section 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications.

Full compensation for grout, sand bedding, butyl rubber joint sealant, resilient connectors, and bonding agent is included in the contract unit price paid per cubic yard for precast drainage inlet and no additional compensation will be allowed therefor.

Full compensation for non-shrink grout for sealing pipe, is included in the contract unit price paid for pipe, slotted drains and grated line drain as applicable, and no additional compensation will be allowed therefor.

10-1.75 STRUCTURE APPROACH SLABS (TYPE N) AND (TYPE EQ):

GENERAL

Summary

This work includes constructing reinforced concrete approach slabs, structure approach drainage systems, and treated permeable base.

Reinforced concrete approach slabs must comply with Section 51, "Concrete Structures," of the Standard Specifications.

Submittals

Furnish a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the geocomposite drain certifying that the drain complies with these special provisions. The Certificate of Compliance must be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph must be stamped with the verification of an independent testing laboratory.

Notify the Engineer of the type of treated permeable base to be furnished at least 30 days before the start of placement. Once you have notified the Engineer of the selection, the type to be furnished must not be changed without a prior written request to do so and approval thereof by the Engineer.

MATERIALS

Concrete

Concrete for structure approach slabs must contain not less than 675 pounds of cementitious material per cubic yard and must either:

1. Cure for not less than 5 days before opening to public traffic, or
2. Comply with "Rapid Strength Concrete for Structures" of these special provisions.

Drainage Pads

Concrete for use in drainage pads must be minor concrete, except the concrete must contain not less than 505 pounds of cementitious material per cubic yard.

Geocomposite Drain

Geocomposite drain must consist of a manufactured core not less than 0.25 inch thick nor more than 2 inches thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain must produce a flow rate through the drainage void of at least 2 gallons per minute per foot of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 3,500 psf.

The manufactured core must be one of the following:

1. Preformed grid of embossed plastic
2. Mat of random shapes of plastic fibers
3. Drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels
4. System of plastic pillars and interconnections forming a semirigid mat

The core material and filter fabric must be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric must be integrally bonded to the side of the core material with the drainage void.

Filter Fabric

Filter fabric must comply with the specifications for Class A filter fabric in Section 88-1.02, "Filtration," of the Standard Specifications.

Treated Permeable Base

Treated permeable base under structure approach slabs must be an asphalt treated permeable base or a cement treated permeable base as specified in Section 29, "Treated Permeable Bases," of the Standard Specifications.

Miscellaneous Materials

Steel angles, plates, and bars at the concrete barrier joints must comply with Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Hardboard and expanded polystyrene must comply with Section 51-1.12D, "Sheet Packing, Preformed Pads, and Board Fillers," of the Standard Specifications.

Building paper must be commercial quality 30-pound asphalt felt.

CONSTRUCTION

Geocomposite Drain

Install the geocomposite drain with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side must overlap a minimum of 3 inches at all joints and wrap around the exterior edges a minimum of 3 inches beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wraparound at edges, the added fabric must overlap at least 6 inches and be attached to the fabric on the geocomposite drain.

Place core material manufactured from impermeable plastic sheeting having non-connecting corrugations with the corrugations approximately perpendicular to the drainage collection system.

If the fabric on the geocomposite drain is torn or punctured, replace the damaged section completely or repair it by placing a piece of fabric that is large enough to cover the damaged area and provide a 6-inch overlap.

If asphalt treated permeable base is placed around the slotted plastic pipe at the bottom of the geocomposite drain, it must be placed at a temperature of not less than 180 °F nor more than 230 °F.

Filter Fabric

Place filter fabric immediately after grading and compacting the subgrade to receive the filter fabric.

Align, handle, and place filter fabric in a wrinkle-free manner under the manufacturer's recommendations.

Adjacent borders of the filter fabric must be overlapped from 12 inches to 18 inches or stitched. The preceding roll must overlap the following roll in the direction the material is being spread or must be stitched. When the fabric is joined by stitching, it must be stitched with yarn of a contrasting color. The size and composition of the yarn must be as recommended by the fabric manufacturer. The number of stitches per 1 inch of seam must be 5 to 7.

Equipment or vehicles must not be operated or driven directly on the filter fabric.

Woven Tape Fabric

Woven tape fabric to be placed between the treated permeable base and the approach slab must be a fabric made of woven strips or tapes and shall conform to the following:

Property	ASTM Designation	Requirement
Weight, ounces per square yard, min.	D 3776	3
Grab Tensile Strength, pounds, min.	D 4632	50
Elongation, percent, max.	D 4632	35
Toughness, pounds, min. (Percent elongation times grab tensile strength)	----	1,200

Woven tape fabric must be treated to provide a minimum of 70 percent breaking strength retention after 500 hours exposure when tested under ASTM D 4355.

Treated Permeable Base

Construct treated permeable base under Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

Place asphalt treated permeable base at a temperature of not less than 200 °F nor more than 250 °F. Do not use material stored in excess of 2 hours in the work.

Asphalt treated permeable base may be spread in 1 layer. Compact with a vibrating shoe type compactor or a roller weighing at least 1.5 tons but not more than 5 tons. Begin compacting base as soon as the mixture has cooled sufficiently to support the weight of the equipment without undue displacement.

Cement treated permeable base may be spread in 1 layer. Compact base with a vibrating shoe type compactor or with a steel-drum roller weighing at least 1.5 tons but not more than 5 tons. Compaction must begin within one-half hour of spreading and must consist of 2 complete coverages of the cement treated permeable base.

Finishing Approach Slabs

Finish and treat the top surface of approach slabs under Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs must be edger finished.

Cure approach slabs with pigmented curing compound (1) under the specifications for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Sealing Joints

Type AL joint seals must comply with Section 51-1.12F, "Sealed Joints," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier must comply with the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications.

The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately before placing the seal, thoroughly clean the joint, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces must be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT

Structural concrete, approach slab (Type N) and structural concrete, approach slab (Type EQ) will be measured and paid for in conformance with the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the structure approach drainage system including geocomposite drain, plastic pipe, and drainage pads, treated permeable base, filter fabric, woven tape fabric, miscellaneous metal, pourable seals, epoxy-coated bar reinforcement , waterstops, and sliding joints shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab of the type shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.76 SEALING JOINTS:

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs must be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans must be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

10-1.77 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 4 INCHES):

Joint seal assemblies shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

All metal parts of the joint seal assembly and joint armor shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bolts, nuts, and washers shall conform to the requirements in ASTM Designation: A 325.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in conformance with the provisions in "Clean and Paint Joint Seal Assembly" of these special provisions.

Certification in conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for cleaning and painting joint seal assemblies.

Finish coats will not be required on joint seal assemblies.

Sheet neoprene shall conform to the provisions for neoprene in Section 51-1.14, "Waterstops," of the Standard Specifications. The sheet neoprene shall be fabricated to fit the joint seal assembly accurately.

Metal parts of the joint seal assembly shall be preassembled before installation to verify the geometry of the completed seal.

The bridge deck surface shall conform to the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications prior to placing and anchoring the joint seal assembly.

The assembly shall be placed in a blocked-out recess in the concrete deck surface. The depth and width of the recess shall permit the installation of the assembly anchorage components or anchorage bearing surface to the lines and grades shown on the plans.

Sheet neoprene shall be installed at such time and in such manner that the sheet neoprene will not be damaged by construction operations. The joint shall be cleaned of all dirt, debris and other foreign material immediately prior to installation of the sheet neoprene.

Full compensation for joint armor and additional materials or work required because of the application of the optional cleaning and painting or the use of an alternative type joint seal

assembly, shall be considered as included in the contract price paid per linear foot for the joint seal assembly involved and no additional compensation will be allowed therefor.

10-1.78 JUNCTION STRUCTURES:

This work shall consist of constructing reinforced concrete junction structures in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Concrete shall be Class 2 and conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications.

Reinforcing bars shall be low-alloy steel deformed bars conforming to the requirements in ASTM Designation: A 706/A 706M or ASTM Designation: A 615/A 615M, Grade 60.

MEASUREMENT AND PAYMENT

Class 2 concrete (minor structure) will be measured and paid for in conformance with the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions. No deduction will be made for the volume of class 2 concrete occupied by pipe collars or pipe openings.

The contract price paid per cubic yard for class 2 concrete (minor structure) shall include full compensation for all structure excavation and structure backfill and for furnishing and placing all bar reinforcing steel necessary to construct the junction structures, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, and no separate payment will be made for these included items.

10-1.79 ARCHITECTURAL SURFACE (TEXTURED CONCRETE):

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Architectural textures listed below are required at concrete surfaces shown on the plans:

A. Small fractured trapezoid
B. Fractured aggregate fin
C. Aesthetic treatment (military insignia)

The small fractured trapezoid and fractured aggregate fin textures shall be an architectural

texture simulating the appearance of straight fins of concrete with a fractured concrete texture imparted to the raised surface between the fins. Grooves between fins shall be continuous with no apparent curves or discontinuities. Variation of the groove from straightness shall not exceed 1/4 inch for each 10 feet of groove. The architectural texture shall have random shadow patterns. Broken concrete at adjoining fins and groups of fins shall have a random pattern. The architectural texture shall not have secondary patterns imparted by shadows or repetitive fractured surfaces.

The aesthetic treatment (military insignia) shall simulate a formed relief texture and areas of small fractured trapezoid and fractured aggregate fin texture constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the architectural texture.

TEST PANEL

A test panel at least 5' x 5' in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment, and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture, and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile Strength (psi)	D 412	130 to 900
Semi-elastomeric polyurethane		
Shore D Hardness	D 2240	55 to 65
Tensile Strength (psi)	D 2370	2600 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 8 ftminimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Architectural surface (textured concrete) will be measured and paid for by the square foot.

The contract price paid per square foot for architectural surface (textured concrete) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural surface (textured concrete), complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.80 ARCHITECTURAL FEATURE (PERFORATED STEEL PLATE):

Architectural feature (perforated steel plate) shall conform to the details shown on the plans and these special provisions. The architectural feature shall consist of perforated plate steel, and other required hardware as shown on the plans. Architectural feature (perforated steel plate) shall be powder coated with black finish meeting the color standards of Federal Specification 595C, 27041.
The architectural feature shall be attached to the chain link railing, as shown on the plans.

Structural steel shapes, plates, bars, bolts, nuts, and washers shall be structural steel conforming to the provisions in Section 55-2, "Material," of the Standard Specifications. Other fittings shall be commercial quality.

Required fittings and hardware shall be steel, malleable iron or wrought iron.

The hole size, stagger, open area, and thickness of perforated plate steel shall be as shown on the plans. The Contractor shall submit architectural working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. In addition, the architectural working drawings shall include layout and attachment details.

PAYMENT

The contract price paid per square foot for the architectural feature (perforated steel plate) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in fabricating and installing architectural feature (perforated steel plate), complete in place, including hardware and working drawings, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.81 REINFORCEMENT:

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The provisions in "Welding Quality Control" of these special provisions do not apply to resistance butt welding.

For bar reinforcing cages measuring 4 feet in diameter and larger:

1. At least 4 vertical bars of each cage, equally spaced around the circumference, shall be tied at all reinforcement intersections with double wire ties.
2. At least 25 percent of remaining reinforcement intersections in each cage shall be tied with single wire ties. Tied intersections shall be staggered from adjacent ties.
3. Bracing shall be provided to avoid collapse of the cage during assembly, transportation, and installation.

Successful completion of these minimum baseline requirements for reinforcement cages 4 feet in diameter and larger will in no way relieve the Contractor of full responsibility for engineering the temporary support and bracing of the cages during construction.

Reinforcement shown on the plans to be galvanized shall be galvanized in conformance with the requirements in ASTM Designation: A 767/A 767M, Class 1, except that chromating will not be required.

Within areas where galvanized reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be galvanized, plastic coated, or epoxy coated to prevent corrosion of the devices or damage to the galvanized reinforcement.

Galvanized surfaces that are abraded or damaged caused by shipping, handling, or installation shall be repaired as specified in Section 75-1.05, "Galvanizing," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Measurement and payment for reinforcement in structures shall conform to the provisions in Section 52-1.10, "Measurement," and Section 52-1.11, "Payment," of the Standard Specifications and these special provisions.

Full compensation for galvanizing steel reinforcement shall be considered as included in the prices paid for the various items of work involved and no additional compensation will be allowed therefor.

10-1.82 SIGN STRUCTURES:

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high-strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein.

Working drawings shall be 22" x 34" or 11" x 17" in size and each drawing and calculation sheet shall include the State assigned designations for the sign structure type and reference as shown on the contract plans, District-County-Route-Post Mile, and contract number.

The Engineer shall have 30 days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Steel bolts not designated on the plans as high strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Flatness of surfaces for the following shall conform to the requirements in ASTM Designation: A 6/A 6M:

1. Base plates that are to come in contact with concrete, grout, or washers and leveling nuts
2. Plates in high-strength bolted connections

No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Longitudinal seam welds shall have 60 percent minimum penetration, except that within 6 inches of circumferential welds, longitudinal seam welds shall be complete joint penetration (CJP) groove welds. In addition, longitudinal seam welds on structures having telescopic pole segment splices shall be CJP groove welds on the female end for a length on each end equal to the designated slip fit splice length plus 6 inches.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

1.

Weld Location	Weld Type	Minimum Required NDT
Splice welds around the perimeter of tubular sections, poles, and arms.	CJP groove weld with backing ring	100% UT[a] or RT[b]
Longitudinal seam welds	CJP or PJP[c] groove weld	Random 25% MT[d]
Longitudinal seam welds within 6 inches of a circumferential splice.	CJP groove weld	100% UT or RT
Welds attaching base plates, flange plates, or pole or mast arm plates, to poles or arm tubes.	CJP groove weld with backing ring and reinforcing fillet	t> 3/16 inch: 100%UT and MT t< 3/16 inch: 100% MT after root weld pass and final weld pass t = pole or arm thickness
	External (top) fillet weld for socket-type connections	100% MT

a ultrasonic testing
b radiographic testing
c partial joint penetration
d magnetic particle testing

2. The acceptance and repair criteria for UT of welded joints where any of the members are less than 5/16 inch thick or where tubular sections are less than 13 inches in diameter shall conform to the requirements in AWS D1.1, Section 6.13.3.1. A written procedure approved by the Engineer shall be used when performing this UT. These written procedures shall conform to the requirements in AWS D1.1, Annex K. The acceptance and repair criteria for other welded joints receiving UT shall conform to the requirements in AWS D1.1, Section 6, Table 6.3 for cyclically loaded nontubular connections.

3. The acceptance and repair criteria for radiographic or real time image testing shall conform to the requirements of AWS D1.1 for tensile stress welds.

4. For longitudinal seam welds, the random locations for NDT will be selected by the Engineer. The cover pass shall be ground smooth at the locations to be tested. If repairs are required in a portion of a tested weld, the repaired portion shall receive NDT, and additional NDT shall be performed on untested portions of the weld. The additional NDT shall be performed on 25 percent of that longitudinal seam weld. After this additional NDT is performed and if more repairs are required, then that entire longitudinal seam weld shall receive NDT.

Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per pound for furnish sign structure, and no additional compensation will be allowed therefor.

10-1.83 CLEAN AND PAINT SIGN STRUCTURES:

Sign structures shall be cleaned and painted in conformance with the provisions in Section 56-1.05, "Surface Finish," and Section 91, "Paint," of the Standard Specifications and these special provisions.

Prior to performing any painting or paint removal, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

A. The name of each Contractor or subcontractor to be used.

B. One copy each of all current ASTM and "SSPC: The Society for Protective Coatings" specifications or qualification procedures applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.

C. A copy of the coating manufacturer's guidelines and recommendations for surface preparation, painting, drying, curing, handling, shipping, and storage of painted structural steel, including testing methods and maximum allowable levels for soluble salts.

D. Proposed methods and equipment to be used for any paint application.

E. Proof of each of any required certifications, SSPC-QP 1, SSPC-QP 2, SSPC-QP 3. Where SSPC-QP 3 certification is required, an enclosed shop facility shall be required. Certification of AISC Sophisticated Paint Endorsement Quality Program, P-1 Enclosed endorsement, will be considered equivalent to SSPC-QP 3.

1. In lieu of certification in conformance with the requirements in SSPC-QP 1 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.

2. In lieu of certification in conformance with the requirements in SSPC-QP 2 for this project, the Contractor may submit written documentation showing conformance with the requirements in Sections 4.2 through 4.6 of SSPC-QP 2.

3. In lieu of certification in conformance with the requirements in SSPC-QP 3 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 3.

F. Proposed methods to control environmental conditions in accordance with the manufacturer's recommendations and these special provisions.

G. Proposed methods to protect the coating during curing, shipping, handling, and storage.

H. Proposed rinse water collection plan.

I. A detailed paint repair plan for the repair of damaged areas.

J. Procedures for containing blast media and water during application of coatings and coating repair of erected steel.

K. Examples of proposed daily reports for all testing to be performed, including type of testing, location, lot size, time, weather conditions, test personnel, and results.

The Engineer shall have 3 weeks to approve the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is approved by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in approving the PQWP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

It is understood that the Engineer's approval of the Contractor's PQWP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications.

CLEAN AND PAINT UNGALVANIZED SURFACES

Ungalvanized steel surfaces to be cleaned and painted shall be dry blast cleaned in conformance with the requirements of SSPC-SP 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of not less than 1.5 mils nor more than 3.5 mils as measured in conformance with the requirements in ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel surfaces shall conform to the requirements for Class A, Grade 2 to 3 abrasives contained in SSPC-AB 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material.

Steel abrasives used for blast cleaning steel surfaces shall comply with the requirements of SSPC-AB 3, "Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings." If steel abrasive is recycled through shop or field abrasive blast cleaning units, the recycled abrasive shall conform to the requirements of SSPC-AB 2, "Specification for Cleanliness of Recycled Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings."

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for steel.

The inside surfaces of bolt holes shall be cleaned in conformance with the requirements of SSPC-SP 1, "Solvent Cleaning," of the "SSPC: The Society for Protective Coatings," and visible rust shall be removed.

Abrasive blast cleaned surfaces shall be tested by the Contractor for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the coating manufacturer's written recommendations or 10 micrograms per square centimeter. Areas of abrasive blast cleaned steel shall be tested at the rate of 3 tests for the first 1,000 square feet prepared per day, and one test for each additional 1,000 square feet or portion thereof, at locations selected by the Engineer. When less than 1,000 square feet of surface area is prepared in a shift, at least 2 tests shall be performed. If levels of soluble salts exceed the maximum allowed by these special provisions, the entire area represented by the testing will be rejected. The Contractor shall perform additional cleaning and testing of rejected areas until soluble salt levels conform to these requirements.

Blast cleaned surfaces shall receive a single undercoat consisting of an inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type I or Type II, except that: (1) the first 3 sentences of Section 5.6, "Primer Field Performance Requirements," shall not apply for Type II coatings, and (2) the entire Section 5.6.1 shall not apply for either type of inorganic zinc coating.

If the Contractor proposes to use a Type I coating, the Contractor shall furnish to the Engineer for review documentation as required in Section 5.6 of AASHTO Designation: M 300. The Contractor shall allow the Engineer 4 weeks to review the proposal.

If the Contractor proposes to use a Type II coating, the coating shall be selected from the qualified products list, which may be obtained from the Transportation Laboratory.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 8 hours of the start of blast cleaning. Abrasive blast cleaned steel shall not be exposed to relative humidity exceeding 85 percent prior to application of inorganic zinc coating.

The total dry film thickness of all applications of the inorganic zinc undercoat, including the surfaces of outside existing members within the grip under bolt heads, nuts, and washers, shall be not less than 4 mils nor more than 8 mils, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between one mil and the maximum allowable dry film thickness for Class B coatings as determined by certified testing in conformance with Appendix A of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" of the Research Council on Structural Connections (RCSC Specification). Unless otherwise stated, all inorganic zinc coatings used on faying surfaces shall meet the slip coefficient requirements for a Class B coating on blast-cleaned steel, as specified in the RCSC Specification. The Contractor shall provide results of certified testing showing the maximum allowable dry film thickness for the Class B coating from the qualifying tests for the coating chosen, and shall maintain the coating thickness on actual faying surfaces of the structure at or below this maximum allowable coating thickness.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Steel surfaces coated with Type II inorganic zinc coating shall be protected from conditions that may cause the coating film to dissolve. The Contractor, at the Contractor's expense, shall repair areas where the coating has dissolved by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The Contractor shall test the inorganic zinc coating prior to application of finish coats. The locations of the tests will be determined by the Engineer. The Contractor shall determine the sequence of the testing operations. The testing for adhesion and hardness will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests.

The inorganic zinc coating shall pass the following tests:

A. The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Engineer will select 3 locations per girder or 1,000 square feet of painted surface, whichever is less, for adhesion testing. If less than 1,000 square feet of steel is painted in a work shift, the Engineer will select 3 areas painted during the work shift for testing. If 2 or more of the locations tested fail to meet adhesion requirements, the entire area represented by the tests will be rejected. If one of the

locations tested fails to meet adhesion requirements, an additional 3 locations shall be tested. Should any of the additional locations fail to meet adhesion requirements, the entire area represented by the tests will be rejected. The Contractor, at the Contractor's expense, shall repair the rejected area by blast cleaning and repainting with inorganic zinc to the specified thickness. Test locations for areas of inorganic zinc meeting adhesion testing requirements shall be repaired by application of organic zinc primer as specified in Section 91-1.04, "Materials," of the Standard Specifications to the specified minimum dry film thickness.

B. Areas of inorganic zinc coating where finish coats are to be applied shall be tested by the Contractor for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the manufacturer's written recommendations or 10 micrograms per square centimeter. Areas of inorganic zinc coating shall be tested at the rate of 3 tests for the first 1,000 square feet to be painted per day and one test for each additional 1,000 square feet or portion thereof at locations selected by the Engineer. When less than 1,000 square feet of surface area is painted in a shift, at least 2 tests shall be performed. If levels of soluble salts exceed the maximum allowed by these special provisions, the entire area represented by the testing will be rejected. The Contractor shall perform additional cleaning and testing of rejected areas until soluble salt levels conform to these requirements.

C. Prior to application of finish coats, the inorganic zinc coating shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Additional Requirements for Water Borne Inorganic Zinc Primers

A. The surface pH of the inorganic zinc primer shall be tested by wetting the surface with de-ionized water for a minimum of 15 minutes but no longer than 30 minutes and applying pH paper with a capability of measuring in increments of 0.5 pH units. At least 2 surface pH readings shall be taken for every 500 square feet or portion thereof. If less than 500 square feet of steel is coated in a single shift or day, at least 2 surface pH readings shall be taken for primer applied during that period. Application of finish coats will not be permitted until the surface pH is less than or equal to 7.

B. Dry to solvent insolubility for water borne inorganic zinc primers shall be determined in conformance with the requirements in ASTM Designation: D 4752, except that water shall be the solvent. The resistance rating shall be not less than 4. Areas of inorganic zinc coating shall be tested for solvent insolubility at the rate of one test per 500 square feet or portion thereof. Inorganic zinc coating represented by the tested area that does not meet

the solvent insolubility requirements will be rejected. The Contractor, at the Contractor's expense, shall repair rejected areas by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Additional Requirements for Solvent Borne Inorganic Zinc Primers

A. Dry to solvent insolubility for solvent borne inorganic zinc primers shall be determined in conformance with the requirements in ASTM Designation: D 4752. The resistance rating shall be not less than 4. Areas of inorganic zinc coating shall be tested for solvent insolubility at the rate of one test per 60 square yards or portion thereof. Inorganic zinc coating represented by the tested area that does not meet the solvent insolubility requirements will be rejected. The Contractor, at the Contractor's expense, shall repair rejected areas by blast cleaning and repainting with inorganic zinc coating to the specified thickness.
B. Surface hardness of solvent borne inorganic zinc shall be a minimum 2H when measured in conformance with the requirements in ASTM Designation: D 3363. Areas of inorganic zinc coating shall be tested at the rate of one test per 500 square feet or portion thereof. Inorganic zinc coating that fails to meet the surface hardness requirements shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

The Contractor, at the Contractor's expense, shall retest all rejected areas of inorganic zinc coating after repairs have been completed.

All areas of inorganic zinc coating shall be water rinsed in conformance with the requirements in Section 59-1.03, "Application," of the Standard Specifications and these special provisions. Areas of the coating removed by water rinsing shall be reapplied in conformance with the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications and these special provisions. Except as approved by the Engineer, a minimum time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

Exposed area of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The first finish coat shall be applied within 48 hours following water rinsing and passing the soluble salt testing requirements herein.

The finish coat paint shall be formulated for application to inorganic zinc coating, shall meet the requirements for SSPC-Paint 24, "Latex Semi-Gloss Exterior Topcoat," of the "SSPC: The Society for Protective Coatings," and shall conform to the following:

A. No visible color change in the finish coats shall occur when tested in conformance with the requirements of ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 140° F and 4 hours of condensate exposure at 104° F.

B. The vehicle shall be an acrylic or modified acrylic copolymer with a minimum of necessary additives.

The first finish coat shall be applied in 2 applications. The first application shall consist of a spray applied mist application. The second application shall be applied after the mist application has dried to a set to touch condition as determined by the procedure described in Section 7 of ASTM Designation: D 1640. The total dry film thickness of both applications of the first finish coat shall be not less than 2 mils.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color shall match Federal Standard 595B, No. 24491. The total dry film thickness of the applications of the second finish coat shall be not less than 2 mils.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 4 mils nor more than 8 mils.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 8 mils nor more than 14 mils.

PAYMENT

Full compensation for water rinsing shall be considered as included in the contract price paid per pound for furnish sign structure of the type involved, and no additional compensation will be allowed therefor.

Full compensation for conforming to the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" shall be considered as included in the contract price paid per pound for furnish sign structure of the type involved, and no additional compensation will be allowed therefor.

PAINT GALVANIZED SURFACES

Galvanized steel surfaces shall be prepared and painted in conformance with Section 56-1.05, "Surface Finish," and Section 59-3, "Painting Galvanized Surfaces," of the Standard Specifications and these special provisions.

Galvanized steel surfaces shall receive a minimum of 2 finish coats of paint conforming to the provisions for finish coat paint on ungalvanized surfaces in "Clean and Paint Ungalvanized Surfaces" of these special provisions.

Paint shall be applied to galvanized steel surfaces to the thicknesses and in conformance with the provisions for finish coats on ungalvanized surfaces in "Clean and Paint Ungalvanized Surfaces" of these special provisions.

The total dry film thickness of all applications on galvanized steel surfaces shall be not less than 4 mils nor more than 8 mils, except that the total dry film thickness on each contact

surface of high strength bolted connections shall be between one mil and 4 mils and may be applied in one application.

10-1.84 ROADSIDE SIGNS:

Roadside signs shall be furnished and installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

The Contractor shall furnish roadside sign panels in conformance with the provisions in "Furnish Sign" of these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications and AWPA Use Category System: UC4A, Commodity Specification A or B.Type N (CA), Type P (CA), and Type R (CA) marker panels mounted on a post with a roadside sign shall be considered to be sign panels and will not be paid for as markers.

MEASUREMENT AND PAYMENT

Roadside signs on wood posts will be measured by the unit from actual count. One or more sign panels mounted on a single post installation will be counted as a roadside sign-one post, and one or more sign panels mounted on a two post installation will be counted as a roadside sign-two post.

The installing of roadside signs on laminated wood box posts will be measured as units determined from actual count. A unit shall consist of installing 2 posts with sign panels, fastening hardware and metal caps complete in place.

The installing of roadside signs by the strap and saddle bracket method on electroliers, sign structure posts and traffic signal standards, and by the mast arm hanger method on traffic signal mast arms will be measured as units determined from actual count of the sign panels in place.

Items of work will be paid for at the contract prices per unit for roadside sign-one post and roadside sign-two post, per unit for install roadside sign (laminated wood box post), per unit for install sign (strap and saddle bracket method), and per unit for install sign (mast arm hanger method).

The above prices and payments shall include full compensation for furnishing all labor, materials (except State-furnished materials), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing roadside signs, complete in place, including the installation of sign panels, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

Frame assemblies for multiple sign installations, back braces, straps and saddle brackets, lag screws, bolts, washers and nuts as specified in Section 56-2.02D, "Sign Panel Fastening Hardware," of the Standard Specifications shall be considered as sign panel fastening hardware. Full compensation for furnishing and installing sign panel fastening hardware shall

be considered as included in the contract prices paid for the roadside signs requiring the hardware and no separate payment will be made therefor.

10-1.85 METAL (RAIL MOUNTED SIGN):

Metal (rail mounted sign) shall conform with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

Roadside signs mounted on barriers or railings will be measured as units from actual count as metal (rail mounted sign). A unit shall include installing sign panels, steel pipe posts, base plates, anchorage assemblies, and other metal parts, except sign panel fastening hardware.

The contract unit price paid for metal (rail mounted sign) shall include full compensation for furnishing all labor, materials (except State-furnished materials), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing metal (rail mounted sign), complete in place, including the installation of sign panels, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

Full compensation for furnishing and installing sign panel fastening hardware shall be considered as included in the contract prices paid for the roadside signs requiring the hardware and no separate payment will be made therefor.

10-1.86 FURNISH SIGN:

Signs shall be fabricated and furnished in accordance with details shown on the plans, the Traffic Sign Specifications, and these special provisions.

Traffic Sign Specifications for California sign codes are available for review at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Traffic Sign Specifications for signs referenced with Federal MUTCD sign codes can be found in Standard Highway Signs Book, administered by the Federal Highway Administration, which is available for review at:

http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm

Information on cross-referencing California sign codes with the Federal MUTCD sign codes is available at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Temporary or permanent signs shall be free from blemishes that may affect the serviceability and detract from the general sign color and appearance when viewing during daytime and nighttime from a distance of 25 feet. The face of each finished sign shall be uniform, flat,

smooth, and free of defects, scratches, wrinkles, gel, hard spots, streaks, extrusion marks, and air bubbles. The front, back, and edges of the sign panels shall be free of router chatter marks, burns, sharp edges, loose rivets, delaminated skins, excessive adhesive over spray and aluminum marks.

QUALITY CONTROL FOR SIGNS

The requirements of "Quality Control for Signs" in this section shall not apply to construction area signs.

No later than 14 days before sign fabrication, the Contractor shall submit a written copy of the quality control plan for signs to the Engineer for review. The Engineer will have 10 days to review the quality control plan. Sign fabrication shall not begin until the Engineer approves the Contractor's quality control plan in writing. The Contractor shall submit to the Engineer at least 3 copies of the approved quality control plan. The quality control plan shall include, but not be limited to the following requirements:

A. Identification of the party responsible for quality control of signs,

B. Basis of acceptance for incoming raw materials at the fabrication facility,

C. Type, method and frequency of quality control testing at the fabrication facility,

D. List (by manufacturer and product name) of process colors, protective overlay film, retroreflective sheeting and black non-reflective film,

E. Recommended cleaning procedure for each product, and

F. Method of packaging, transport and storage for signs.

No legend shall be installed at the project site. Legend shall include letters, numerals, tildes, bars, arrows, route shields, symbols, logos, borders, artwork, and miscellaneous characters. The style, font, size, and spacing of the legend shall conform to the Standard Alphabets published in the FHWA Standard Highway Signs Book. The legend shall be oriented in the same direction in accordance with the manufacturer's orientation marks found on the retroreflective sheeting.

On multiple panel signs, legend shall be placed across joints without affecting the size, shape, spacing, and appearance of the legend. Background and legend shall be wrapped around interior edges of formed panel signs as shown on plans to prevent delamination.

The following notation shall be placed on the lower right side of the back of each sign where the notation will not be blocked by the sign post or frame:

A. PROPERTY OF STATE OF CALIFORNIA,
B. Name of the sign manufacturer,
C. Month and year of fabrication,
D. Type of retroreflective sheeting, and
E. Manufacturer's identification and lot number of retroreflective sheeting.

The above notation shall be applied directly to the aluminum sign panels in 1/4-inch upper case letters and numerals by die-stamp and applied by similar method to the fiberglass reinforced plastic signs. Painting, screening, or engraving the notation will not be allowed. The notation shall be applied without damaging the finish of the sign.

Signs with a protective overlay film shall be marked with a dot of 3/8 inch in diameter. The dot placed on white border shall be black, while the dot placed on black border shall be white. The dot shall be placed on the lower border of the sign before application of the protective overlay film and shall not be placed over the legend and bolt holes. The application method and exact location of the dot shall be determined by the manufacturer of the signs.

For sign panels that have a minor dimension of 48 inches or less, no splice will be allowed in the retroreflective sheet except for the splice produced during the manufacturing of the retroreflective sheeting. For sign panels that have a minor dimension greater than 48 inches, only one horizontal splice will be allowed in the retroreflective sheeting.

Unless specified by the manufacturer of the retroreflective sheeting, splices in retroreflective sheeting shall overlap by a minimum of one inch. Splices shall not be placed within 2 inches from edges of the panels. Except at the horizontal borders, the splices shall overlap in the direction from top to bottom of the sign to prevent moisture penetration. The retroreflective sheeting at the overlap shall not exhibit a color difference under the incident and reflected light.

Signs exhibiting a significant color difference between daytime and nighttime shall be replaced immediately.

Repairing sign panels will not be allowed except when approved by the Engineer.

The Department will inspect signs at the Contractor's facility and delivery location, and in accordance with Section 6, "Control of Materials," of the Standard Specifications. The Engineer will inspect signs for damage and defects before and after installation.

Regardless of kind, size, type, or whether delivered by the Contractor or by a common carrier, signs shall be protected by thorough wrapping, tarping, or other methods to ensure that signs are not damaged by weather conditions and during transit. Signs shall be dry during transit and shipped on palettes, in crates, or tier racks. Padding and protective materials shall be placed between signs as appropriate. Finished sign panels shall be transported and stored by method that protects the face of signs from damage. The Contractor shall replace wet, damaged, and defective signs.

Signs shall be stored in dry environment at all times. Signs shall not rest directly on the ground or become wet during storage. Signs, whether stored indoor or outdoor, shall be free standing. In areas of high heat and humidity signs shall be stored in enclosed climate-controlled trailers or containers. Signs shall be stored indoor if duration of the storage will exceed 30 days.

Screen processed signs shall be protected, transported and stored as recommended by the manufacturer of the retroreflective sheeting.

When requested, the Contractor shall provide the Engineer test samples of signs and materials used at various stages of production. Sign samples shall be 12" x 12" in size with applied background, letter or numeral, and border strip.

The Contractor shall assume the costs and responsibilities resulting from the use of patented materials, equipment, devices, and processes for the Contractor's work.

SHEET ALUMINUM

Alloy and temper designations for sheet aluminum shall be in accordance with ASTM Designation: B 209.

The Contractor shall furnish the Engineer a Certificate of Compliance in conformance with Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the sheet aluminum.

Sheet aluminum shall be pretreated in accordance to ASTM Designation: B 449. Surface of the sheet aluminum shall be cleaned, deoxidized, and coated with a light and tightly adherent chromate conversion coating free of powdery residue. The conversion coating shall be Class 2 with a weight between 10 milligrams per square foot and 35 milligrams per square foot, and an average weight of 25 milligrams per square foot. Following the cleaning and coating process, the sheet aluminum shall be protected from exposure to grease, oils, dust, and contaminants.

Sheet aluminum shall be free of buckles, warps, dents, cockles, burrs, and defects resulting from fabrication.

Base plate for standard route marker shall be die cut.

RETROREFLECTIVE SHEETING

The Contractor shall furnish retroreflective sheeting for sign background and legend in conformance with ASTM Designation: D 4956 and "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Retroreflective sheeting shall be applied to sign panels as recommended by the retroreflective sheeting manufacturer without stretching, tearing, and damage.

Class 1, 3, or 4 adhesive backing shall be used for Type II, III, IV, VII, VIII, and IX retroreflective sheeting. Class 2 adhesive backing may also be used for Type II retroreflective sheeting. The adhesive backing shall be pressure sensitive and fungus resistant.

When the color of the retroreflective sheeting determined from instrumental testing is in dispute, the Engineer's visual test will govern.

PROCESS COLOR AND FILM

The Contractor shall furnish and apply screened process color, non-reflective opaque black film, and protective overlay film of the type, kind, and product that are approved by the manufacturer of the retroreflective sheeting.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the screened process color, non-reflective opaque black film, and protective overlay film.

The surface of the screened process color shall be flat and smooth. When the screened process colors determined from the instrumental testing in accordance to ASTM Designation: D 4956 are in dispute, the Engineer's visual test will govern.

The Contractor shall provide patterns, layouts, and set-ups necessary for the screened process.

The Contractor may use green, red, blue, and brown reverse-screened process colors for background and non-reflective opaque black film or black screened process color for legend. The coefficient of retroreflection for reverse-screened process colors on white retroreflective sheeting shall not be less than 70 percent of the coefficient of retroreflection specified in ASTM Designation: D 4956.

The screened process colors and non-reflective opaque black film shall have the same outdoor weatherability as that of the retroreflective sheeting.

After curing, screened process colors shall withstand removal when tested by applying 3M Company Scotch Brand Cellophane Tape No. 600 or equivalent tape over the color and removing with one quick motion at 90° angle.

SINGLE SHEET ALUMINUM SIGN

Single sheet aluminum signs shall be fabricated and furnished with or without frame. The Contractor shall furnish the sheet aluminum in accordance to "Sheet Aluminum" of these special provisions. Single sheet aluminum signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H38.

Single Sheet aluminum signs shall not have a vertical splice in the sheet aluminum. For signs with depth greater than 48 inches, one horizontal splice will be allowed in the sheet aluminum.

Framing for single sheet aluminum signs shall consist of aluminum channel or rectangular aluminum tubing. The framing shall have a length tolerance of ±1/8 inch. The face sheet shall be affixed to the frame with rivets of 3/16-inch diameter. Rivets shall be placed within the web of channels and shall not be placed less than 1/2 inch from edges of the sign panels. Rivets shall be made of aluminum alloy 5052 and shall be anodized or treated with conversion coating to prevent corrosion. The exposed portion of rivets on the face of signs shall be the same color as the background or legend where the rivets are placed.

Finished signs shall be flat within a tolerance of ±1/32 inch per linear foot when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within ±1/8 inch of the detailed dimensions.

Aluminum channels or rectangular aluminum tubings shall be welded together with the inert gas shielded-arc welding process using E4043 aluminum electrode filler wires as shown on the plans. Width of the filler shall be equal to wall thickness of smallest welded channel or tubing.

LAMINATED PANEL SIGN

Laminated panel signs shall consist of two sheet aluminum laminated to a honeycomb core and extruded aluminum frame to produce flat and rigid panels of one-inch or 2-1/2-inch nominal thickness.

The face of laminated panel signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H32 of 0.063-inch thickness. The back of laminated panel signs shall be fabricated from sheet aluminum alloy 3003-H14 of 0.040-inch thickness. The Contractor shall furnish sheet aluminum as provided in "Sheet Aluminum" of these special provisions.

The core material shall be phenolic impregnated kraft paper honeycomb and fungus resistant in accordance to Military Specification MIL-D-5272. The honeycomb cell size shall be 1/2 inch. Weight of the kraft paper shall be 80 pounds and impregnated minimum 18 percent by weight.

A laminating adhesive that can produce a resilient oil and water-resistant bond shall be used to adhere the extruded aluminum frame and the honeycomb core to the sheet aluminum. Edge and interior delamination occur when a 0.010-inch thick feeler gauge of 1/2 inch in length can be inserted into a depth of more than 1/2 inch between the extruded aluminum frame and the sheet aluminum. Laminated panel sign with delamination will be rejected.
Laminated panels shall be able to resist a wind load of 33 pounds per square foot for the following simple span lengths with a bending safety factor of 1.25:

Panel Type	Nominal Panel Thickness	Simple Span Length
A	one inch	9 feet 0 inch
B	one inch	9 feet 0 inch
	2-1/2 inch	14 feet 6 inches
H	2-1/2 inch	14 feet 6 inches

The tensile strength of laminated panels shall be at least 20 pounds per square inch when tested in accordance with the following modification and with ASTM Designations: C 297 and C 481, Cycle B after aging. Instead of spraying with hot water, the specimen shall be totally immersed in 158° F hot water. When requested by the Engineer or the Transportation Laboratory, at least one test sample of 12" x 12" in size shall be taken for every 2,000 square feet of the panel production cycle or of the total factory production order, whichever occurs first.
Rivets used to secure the sheet aluminum to the perimeter frame shall be fabricated from aluminum alloy 5052 and anodized or treated with a conversion coating to prevent corrosion. Size of the aluminum rivets shall be 3/16 inch in diameter and placed at the corners of the laminated panels. Color of the exposed portion of the rivets shall be the same color as the

sign background or legend on which the rivets are placed. Rivets or stainless steel screws shall be placed in holes drilled during fabrication in the perimeter frame.

On laminated multiple panel signs, a closure H-Section shall be placed in the top channel of the bottom panel. Perimeter frame of adjoining panel shall accommodate the closure H-Section in the closed position.

For signs with a depth of 5 feet 0 inch or less, the laminated panels shall be fabricated with no horizontal joints, splices or seams. For signs with a depth of greater than 5 feet 0 inch, the laminated panels may be fabricated in two panels.

The face of laminated panels shall be flat with a tolerance of ±3/32 inch per linear foot when measured across the plane of each panel in all directions. Where laminated panels adjoin, the gap between adjoining edges from one corner to the other corner shall not deviate by more than 1/32 inch. Non-adjoining edges from one corner to the other corner shall not deviate by more than 1/8 inch from a straight plane. The front and back sheet aluminum shall be flush with the perimeter frame. The panel edges shall be smooth.

Laminated panel signs shall be within +1/8 inch or -1/2 inch of the detailed dimensions. The difference in length between adjoining panels of multiple panel signs shall not be greater than 1/2 inch.

Roadside laminated panel signs shall be Type B. Type B panels shall have a nominal thickness of one inch or 2-1/2 inches.

The perimeter frame of Type B panels shall consist of extruded channel edges. The interior and exterior sides of the channels, except the sides touching the face and back sheet aluminum, shall be welded at the joint. Sealant shall be placed at the corners of the perimeter frame to prevent moisture penetration.

Each side of the vertical tube spacers of Type B panels shall be welded to the perimeter frame, except the sides touching the front and back sheet aluminum.

The Contractor shall furnish mounting hardware for roadside laminated panel signs, such as closure H-sections, lags, bolts, nuts, and washers.

Overhead laminated panel signs shall be Type A and have a nominal thickness of one inch. For overhead laminated signs with a length of 24 feet or less, the laminated panels shall be fabricated with no vertical joints, splices or seams. For signs with a length of greater than 24 feet, the length of each adjoining panel shall be as determined by the Engineer or as shown on the plans.

The perimeter frame of Type A overhead laminated panels shall be connected by self-tapping hex head stainless steel screws. Sealant shall be placed at the corners of the perimeter frame to prevent moisture penetration. The perimeter frame of Type A panels shall consist of extruded channel edges on the vertical sides and consist of modified "H" section extrusion on the horizontal sides. The modified "H" section extrusion acts as an integral retainer track for affixing the bolts to provide blind fastening of panels to the structure support.

The Contractor shall furnish mounting hardware for overhead laminated panel signs, such as closure H-sections, clamps, bolts, nuts, and washers. The clamps shall be cast aluminum alloy with a minimum tensile strength of 25 kips per square inch. Bolt torque used for installing clamps shall not exceed 100 inch-pounds.

FORMED PANEL SIGN

Formed panel signs shall be fabricated from one continuous sheet aluminum alloy 5052-H32 of 0.063-inch thickness. The Contractor shall furnish sheet aluminum as provided in "Sheet Aluminum" of these special provisions.
The aluminum frame shall be affixed to the panel with aluminum rivets through the face of the sign panels. Color of the exposed portion of the rivets shall be the same color as the sign background or legend on which the rivets are placed.
The face of finished formed panel sign shall be flat with a tolerance of 1/8 inch per linear foot when measured across the plane of each panel in all directions.
The Contractor shall furnish mounting hardware for roadside formed panel signs.

MEASUREMENT AND PAYMENT

Furnishing signs (except for construction area signs) will be measured by the square foot and the quantity to be paid for will be the total area, in square feet, of the sign panel types installed in place.

The contract price paid per square foot for furnish sign of the types specified in the Engineer's estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in fabricating and furnishing the signs, including removable sign panel frame and fastening hardware, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for furnishing and installing protective overlay on signs shall be considered as included in the contract price paid per square foot for furnish sign of the various types and no separate payment will be made therefor.

10-1.87 CLEAN AND PAINT JOINT SEAL ASSEMBLIES:

Joint seal assemblies shall be cleaned and painted with a single coat of inorganic zinc in conformance with the provisions in Sections 59-2, "Painting Structural Steel," 59-3, "Painting Galvanized Surfaces," and 91, "Paint," of the Standard Specifications and these special provisions.

Prior to performing any painting, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate Painting Quality Work Plan (PQWP) for each item of work for which painting is to be performed. As a minimum, each PQWP shall include the following:

A. The name of each Contractor or subcontractor to be used.

B. One copy each of all current ASTM and "SSPC: The Society for Protective Coatings" specifications or qualification procedures applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
C. A copy of the coating manufacturer's guidelines and recommendations for surface preparation, painting, drying, curing, handling, shipping, and storage of painted structural steel, including testing methods and maximum allowable levels for soluble salts.
D. Proposed methods and equipment to be used for paint application.
E. Proposed methods to control environmental conditions in accordance with the manufacturer's recommendations and these special provisions.
F. Proposed methods to protect the coating during curing, shipping, handling, and storage.
G. A detailed paint repair plan for the repair of damaged areas.

Certification in conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for cleaning and painting of joint seal assemblies.

The Engineer shall have 14 days to review the PQWP submittal after a complete plan has been received. No painting shall be performed until the PQWP for that work is approved by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the PQWP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Fresh, potable water with a maximum chloride content of 75 ppm and a maximum sulfate content of 200 ppm shall be used for water rinsing or pressure washing operations. No continuous recycling of rinse water will be permitted. If rinse water is collected into a tank and subsequent testing determines the collected water conforms to the specified requirements, reuse may be permitted by the Engineer if no collected water is added to the tank after sample collection for determination of conformance to specified requirements.

Metal surfaces to be painted shall be dry blast cleaned in conformance with the requirements in SSPC-SP 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of not less than 1.5 mils nor more than 3.5 mils as measured in conformance with the requirements in ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning metal surfaces shall conform to the requirements for Class A, Grade 2 to 3 abrasives contained in SSPC-AB 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material.

Steel abrasives used for blast cleaning metal surfaces shall comply with the requirements of SSPC-AB 3, "Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings." If steel abrasive is recycled through shop or field abrasive blast cleaning units, the recycled abrasive shall conform to the requirements of SSPC-AB 2, "Specification for Cleanliness of Recycled Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings."

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material.

Abrasive blast cleaned surfaces shall be tested by the Contractor for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the coating manufacturer's written recommendations or 10 micrograms per square centimeter. Each joint seal assembly shall be tested for soluble salts. If levels of soluble salts exceed the maximum allowed by these special provisions, the Contractor shall perform additional cleaning and testing of blast cleaned surfaces until soluble salt levels conform to these requirements.
Corners shall be chamfered to remove sharp edges.

Thermal cut edges (TCEs) to be painted shall be conditioned before blast cleaning by shallow grinding or other method approved by the Engineer to remove the thin, hardened layer of material resulting from resolidification during cooling.

Visually evident base metal surface irregularities and defects shall be removed in accordance with ASTM Designation: A 6 or AASHTO Designation: M 160 prior to blast cleaning steel. When material defects exposed by blast cleaning are removed, the blast profile shall be restored by either blast cleaning or by using mechanical tools in accordance with SSPC-SP 11, "Power Tool Cleaning to Bare Metal," of the "SSPC: The Society for Protective Coatings."
Blast cleaned surfaces shall receive a single undercoat, and a final coat where specified, consisting of an inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type I or Type II, except that:

1. The first 3 sentences of Section 5.6, "Primer Field Performance Requirements," shall not apply for Type II coatings, and
2. The entire Section 5.6.1 shall not apply for either type of inorganic zinc coating.

If the Contractor proposes to use a Type I coating, the Contractor shall furnish to the Engineer for review documentation as required in Section 5.6 of AASHTO Designation: M 300. The Contractor shall allow the Engineer 14 days to review the proposal.

If the Contractor proposes to use a Type II coating, the coating shall be selected from the qualified products list, which may be obtained from the Transportation Laboratory.
The color of the inorganic zinc coating shall match Federal Standard 595B, No. 36373.
Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

The single coat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 8 hours of the start of blast cleaning. Abrasive blast cleaned steel shall not be exposed to relative humidity exceeding 85 percent prior to application of inorganic zinc.

The total dry film thickness of all applications of inorganic zinc, including the surfaces of outside existing members within the grip under bolt heads, nuts, and washers, shall be not less than 4 mils nor more than 8 mils, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between one mil and the maximum allowable dry film thickness for Class B coatings as determined by certified testing in conformance with Appendix A of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" of the Research Council on Structural Connections (RCSC Specification). Unless otherwise stated, all inorganic zinc coatings used on faying surfaces shall meet the slip coefficient requirements for a Class B coating on blast-cleaned steel, as specified in the RCSC Specification. The Contractor shall provide results of certified testing showing the maximum allowable dry film thickness for the Class B coating from the qualifying tests for the coating chosen, and shall maintain the coating thickness on actual faying surfaces of the structure at or below this maximum allowable coating thickness.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Metal surfaces coated with Type II inorganic zinc coating shall be protected from conditions that may cause the coating film to dissolve. The Contractor, at the Contractor's expense, shall repair areas where the coating has dissolved by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The Contractor shall test the inorganic zinc coating at locations determined by the Engineer. The Contractor shall determine the sequence of the testing operations. The testing for adhesion and hardness shall be performed no sooner than 72 hours after application of the inorganic zinc coating. Satisfactory access shall be provided to allow the Engineer to determine the location of the tests.

The inorganic zinc coating shall pass the following tests:

A. The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Engineer shall select 2 locations per joint seal assembly for adhesion testing. If either of the locations tested fails to meet adhesion requirements, the assembly bearing restrainer unit will be rejected. The Contractor, at the Contractor's expense, shall repair the rejected item by blast cleaning and repainting with inorganic zinc to the specified thickness. Test locations for areas of inorganic zinc meeting adhesion testing requirements shall be repaired by application of organic zinc primer as specified in Section 91-1.04, "Materials," of the Standard Specifications to the specified minimum dry film thickness.
B. The inorganic zinc coating shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery,

soft, or does not exhibit a polished metal surface shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

C. Dry to solvent insolubility for inorganic zinc primers shall be determined in conformance with the requirements in ASTM Designation: D 4752, except that water shall be the solvent used for testing of water borne inorganic zinc primers. The resistance rating shall be not less than 4. Each joint seal assembly shall be tested for dry to solvent insolubility. Inorganic zinc coating that does not meet the solvent insolubility requirements shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

D. Surface hardness of inorganic zinc shall be a minimum 2H when measured in conformance with the requirements in ASTM Designation: D 3363. Each joint seal assembly shall be tested for surface hardness. Inorganic zinc coating that fails to meet the surface hardness requirements shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

The Contractor, at the Contractor's expense, shall retest all rejected areas of inorganic zinc coating after repairs have been completed.

Full compensation for cleaning and painting of joint seal assemblies shall be considered as included in the contract unit price paid for Joint Seal Assembly (MR=4"), and no separate payment will be made therefor.

10-1.88 ANTI-GRAFFITI COATING:

This work includes applying anti-graffiti coating to concrete surfaces.

Comply with Section 59-6, "Painting Concrete," of the Standard Specifications.

Submit manufacturer's application and removal instructions 7 days before starting work.

MATERIALS

Anti-graffiti coating must:

1. Be a nontoxic, sacrificial, nonflammable, water-based coating designed for protecting concrete from graffiti
2. Be compatible with the concrete surface treatment
3. Have a clear matte finish when dry
4. Be removable with a hot pressure washer

CONSTRUCTION

Cure new concrete surfaces under Section 90-7.03, "Curing Structures," of the Standard Specifications.

Test concrete surfaces for acceptance of coating under the manufacturer's recommendations before coating. Areas that resist accepting coating must be cleaned and retested.

Apply anti-graffiti coating under the manufacturer's recommendations in at least 2 even coats.

MEASUREMENT AND PAYMENT

The contract price paid per square foot for anti-graffiti coating includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and applying anti-graffiti coating to concrete surfaces, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.89 ALTERNATIVE PIPE:

Alternative pipe culverts must comply with Section 62, "Alternative Culverts," of the Standard Specifications.

MEASUREMENT

The provisions for measurement as provided in Sections 63, "Cast-In-Place Concrete Pipe," 64, "Plastic Pipe," 65, "Reinforced Concrete Pipe," 66, "Corrugated Metal Pipe," and 67, "Structural Metal Plate Pipe," shall apply to alternative culverts for the kind of pipe or pipe arch selected for installation.

Reinforced concrete box culverts and arch culverts, if selected, will be measured by the linear foot as alternative culvert. The length to be paid for will be the slope length designated by the Engineer.

PAYMENT

The contract price or prices paid per linear foot for the different sizes or sizes and types of alternative pipe or pipe arch culverts, or alternative culverts, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing or constructing alternative culverts, complete in place, including structure excavation and structure backfill, and connecting new pipe to existing or new facilities including concrete collars or concrete tees and reinforcement, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

10-1.90 REINFORCED CONCRETE PIPE:

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

GENERAL

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 4 feet or one half of the outside diameter of the pipe.

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

If reinforced concrete pipe is installed in conformance with the details shown on Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

Where solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, shown on Standard Plan A62DA, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 6 inches nor more than 12 inches. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications. The Outer Bedding shall not be compacted prior to placement of the pipe.

Timber bulkheads shall be constructed and placed across the ends of unconnected reinforced concrete pipe as shown on the plans. Wood for timber bulkheads shall be construction heart grade redwood at least 1 inch thick.

MATERIALS

The concrete for reinforced concrete pipe shall contain not less than 470 pounds of cementitious material per cubic yard and have a water–cementitious material ratio that does not exceed 0.40 by weight. Supplementary cementitious material is optional. Reinforcement shall have a minimum cover of 1 inch.

The Contractor shall use one of the options shown in the following table. Supplementary cementitious material is optional.

Minimum Cementitious Material Content in Pounds per CY

Minimum Concrete Cover	Maximum water to cementitious material ratio	
	0.35	0.40
1.00 inch		
1.25 inches		
1.50 inches		

Special reinforced concrete pipe, having concrete cover over the steel reinforcement greater than the cover specified in AASHTO Designation: M 170, shall conform to the provisions in Section 65-1.02, "Materials," and Section 65-1.02A, "Circular Reinforced Concrete Pipe," of the Standard Specifications, except the width of crack produced by the D-load test specified in AASHTO Designation: M 170 shall be the width determined by the following formula:

$$b = \frac{t - 3/8d}{t - 3/8d - C} \times 0.01 \text{ inch}$$

Where:

b = Width of crack to be produced in lieu of the 0.01-inch crack specified in AASHTO Designation: M 170

t = Wall thickness of pipe, inches

d = Effective depth of the section to be tested, feet

C = Concrete cover over steel reinforcement in excess of cover specified in AASHTO Designation: M 170

Reinforced concrete pipe that is to be hydrostatically tested shall be strength tested by the 3-edge bearing method to a maximum D-load of 10 percent greater than the 0.01-inch cracking D-load specified in AASHTO Designation: M 170 or to the actual D-load required to produce a 0.01-inch crack, whichever is the lesser.

Special oval shaped reinforced concrete pipe, having concrete cover over the steel reinforcement greater than the cover specified in AASHTO Designation: M 207, shall conform to the provisions in Section 65-1.02, "Materials," and Section 65-1.02B, "Oval Shaped Reinforced Concrete Pipe," of the Standard Specifications, except the width of crack produced by the D-load test specified in AASHTO Designation: M 207 shall be the width determined by the following formula:

$$b = \frac{t - 3/8d}{t - 3/8d - C} \times 0.01 \text{ inch}$$

Where:

b = Width of crack to be produced in lieu of the 0.01-inch crack specified in AASHTO Designation: M 207

t = Wall thickness of pipe, inches

d = Effective depth of the section to be tested, feet

C = Concrete cover over steel reinforcement in excess of cover specified in AASHTO Designation: M 207

Oval shaped reinforced concrete pipe that is to be hydrostatically tested shall be strength tested by the 3-edge bearing method to a maximum D-load of 10 percent greater than the 0.01-inch cracking D-load specified in AASHTO Designation: M 207 or to the actual D-load required to produce a 0.01-inch crack, whichever is the lesser.

MEASUREMENT AND PAYMENT

Compensation for constructing and placing timber bulkheads shall be considered as included in the contract price paid per linear foot for the reinforced concrete pipe involved and no separate payment will be made therefor.

The excavation and backfill below the planned elevation of the bottom of the bedding shown on Standard Plan A62DA will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The Department does not pay any additional cost for use of optional supplementary cementitious material.

The Department does not pay any additional cost for excess concrete cover over steel reinforcement.

10-1.91 3" PLASTIC PIPE (EDGE DRAIN OUTLET):

Plastic Pipe (Edge Drain Outlet) shall conform to the provisions in Section 68-3, "Edge Drains," of the Standard Specifications and these special provisions.

MEASUREMENT

The various sizes of edge drains and edge drain outlets, vents and cleanouts will be measured by the linear foot along the line of the pipe. The length to be paid for will be the slope length of the pipe designated by the Engineer. Pipe placed in excess of the length designated by the Engineer will not be paid for. Outlet pipe, vent pipe and cleanout pipe will be measured and paid for as plastic pipe (edge drain outlet).

No deduction in the length of plastic pipe (edge drain) will be made for gaps in edge drain pipe at locations of dual outlet, dual vent or dual outlet and vent connections to the edge drain.

The "Y" fitting at cleanout pipes and at intermediate outlet connections will be measured and paid for as plastic pipe (edge drain outlet) between the couplings at each end of the curved section of the "Y" fitting, and as plastic pipe (edge drain) between the couplings at each end of the straight section of the "Y" fitting.

Cross drain interceptors at structure approaches, at end anchors or pressure relief joints, and at pavement terminals joining existing pavements as shown on the plans will be measured and paid for as plastic pipe (edge drain).

PAYMENT

The contract price paid per linear foot for plastic pipe (edge drain) of the size or sizes shown in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in installing edge drains complete in place, including excavation (and removal of any concrete deposits that may occur along the lower edge of the concrete pavement in Type 1 installations) and hot mix asphalt backfill for Type 1 edge drain installation, tack coat, filter fabric, and treated permeable material, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract price paid per linear foot for plastic pipe (edge drain outlet) of the size or sizes shown in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in installing edge drain outlets, vents and cleanouts complete in place, including outlet and vent covers,

expansion plugs, pavement markers, concrete splash pads, connecting outlets and vents to drainage facilities, and excavation and backfill [aggregate base, hot mix asphalt, tack coat, and native material] for outlets, vents, and cleanouts to be installed in embankments and existing shoulders, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

10-1.92 OVERSIDE DRAIN:

Hot mix asphalt overside drains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications.

MEASUREMENT

. Entrance tapers, tapered inlets, reducers, slip joints and anchor assemblies will be measured as units.

. An entrance taper shall include the length of the tapered section and the length of tail pipe shown on the plans, and the length of tail pipe will not be measured as downdrain pipe.

. A tapered inlet shall include the length of tapered section and flume stub as shown on the plans. The flume stub will not be measured as flume downdrain.

. An anchor assembly shall consist of pipe stakes, bars or coupling bands, and hardware for fastening downdrain pipe or flume downdrain as shown on the plans. For payment purposes, a downdrain anchor assembly shall include 2 pipe stakes with necessary hardware.

. Alternative pipe downdrains and corrugated aluminum or steel pipe downdrains will be measured by the linear foot for the actual length ordered by the Engineer and placed, exclusive of the length of a slip joint if installed, and exclusive of the length of tail pipe attached to the entrance taper as provided above for entrance tapers. Pipe placed in excess of the length designated will not be paid for, unless pipes are cut to fit a structure or slope. When pipes are cut to fit a structure or slope, the quantity to be paid for will be the length of pipe necessary to be placed before cutting, measured in 2-foot increments.

. Elbows, wyes, tees and other branches will be measured by the linear foot for the size and type of pipe involved. Elbows will be measured along center lines. Wyes, tees and other branches will be measured along center lines to the point of intersection.

Corrugated aluminum or steel flume downdrain will be measured by the linear foot for the actual length ordered by the Engineer and placed.

PAYMENT

The quantities of overside drains, measured as specified in Section 69-1.05, "Measurement," of the Standard Specifications,will be paid for by the linear foot for the various sizes, types, thicknesses, coatings and pavings of downdrains, and by units for entrance tapers, tapered

inlets, reducers, and downdrain slip joints; aluminum entrance tapers, tapered inlets, reducers, and downdrain slip joints; and anchor assemblies for the type of work involved.
Quantities of hot mix asphalt placed for overside drains will be paid for as provided in Section 39-5, "Measurement and Payment," of the Standard Specifications, for hot mix asphalt placed in miscellaneous areas.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing and installing the different sizes, types, thicknesses, coatings and pavings of overside drains, complete in place, including any necessary excavation and backfill as shown on the plans, and as specified in the specifications, and these special provisions, and as directed by the Engineer.

10-1.93 MISCELLANEOUS FACILITIES:

Steel flared end sections, pipe manholes and RCP risers shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

MEASUREMENT

. Pipe placed in excess of the length designated will not be paid for.

. Quantities of pipe manholes and pipe risers will be measured by the linear foot to the nearest 0.1-foot of pipe.

. Pipe reducers and flared end sections will be measured as units. The limits of payment for flared end sections shall be as shown on the plans. Metal toe plates, when required, and concrete cutoff walls will be considered as part of the flared end section and no separate payment will be made therefor. Metal flared end sections substituted for precast concrete flared end sections or plastic flared end sections will be measured and paid for as the types of flared end sections designated.

. Concrete foundations, bases, basin floors or other concrete structures in connection with miscellaneous facilities will be measured by the cubic yard for the quantity of concrete placed or by the cubic yard of class 2 concrete (minor structure) for junction structures.

. Reinforcement will be measured by the pound as provided in Section 52, "Reinforcement," of the Standard Specifications, except when structures are identified on the plans or in these special provisions as minor structures, as provided in Section 51-1.02, "Minor Structures" of the Standard Specifications.

. Structure excavation and structure backfill will be measured as provided in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications,except as provided in Section 70-1.05, "Payment." Of the Standard Specifications.

Metal frames, covers, grates, trash racks and debris rack cages will be measured as provided in Section 75, "Miscellaneous Metal" of the Standard Specifications.

PAYMENT

Unless otherwise provided in this Section, items of work, measured as provided in Section 70-1.04, "Measurement," of the Standard Specifications, will be paid for at the contract price or prices per linear foot for the various sizes and wall thicknesses of welded steel pipe or coated and wrapped or lined welded steel pipe; per linear foot for the various sizes, types and coatings of corrugated aluminum or steel or precast concrete pipe energy dissipators, pipe inlets, pipe manholes, and pipe risers; the contract unit price or prices for pipe reducers and flared end sections for the various sizes, types, coatings or pavings of pipes; the contract unit price or prices for the various sizes, types and coatings of automatic drainage gates or slide headgates; the contract price per pound for bar reinforcing steel; the contract price per cubic yard for the various classes of concrete (minor structure) or concrete (structure); the contract prices per cubic yard for structure excavation and structure backfill; and the contract price paid per pound for miscellaneous iron and steel or the contract unit price paid for frames and covers or frames and grates.

Full compensation for structure excavation and structure backfill involved in installing flared end sections, pipe energy dissipators, pipe inlets, pipe manholes, pipe risers and pipe reducers will be considered as included in the contract unit prices paid for pipe reducers and flared end sections and per linear foot for pipe energy dissipators, pipe inlets, pipe manholes and pipe risers and no separate payment will be made therefor.

Full compensation for miscellaneous iron and steel (except frames, covers, grates, trash racks, and debris rack cages) required for pipe energy dissipators, pipe inlets, pipe risers, and pipe manholes will be considered as included in the contract prices paid per linear foot for pipe energy dissipators, pipe inlets, pipe risers and pipe manholes and no additional compensation will be allowed therefor.

Full compensation for pipe stubs will be considered as included in the contract prices paid per linear foot for corrugated aluminum or steel pipe inlets and manholes and no separate payment will be made therefor.

Full compensation for making pipe riser connections and constructing bar reinforcing steel riser safety cages will be considered as included in the contract price paid per linear foot for the pipe riser involved and no additional compensation will be allowed therefor.

When concrete foundations, bases, basin floors or other concrete structures in connection with miscellaneous facilities are identified on the plans or in the special provisions as minor structures, and those structures are paid for at the contract price per cubic yard for concrete (minor structure), full compensation for bar reinforcing steel, steps, structure excavation, and structure backfill will be considered as included in the contract price paid per cubic yard for concrete (minor structure) and no separate payment will be made therefor.

Redwood covers will be considered as part of the structure upon which they are to be placed and no separate payment will be made therefor.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing or installing the different sizes, thicknesses, coatings, linings, pavings and wrappings of the miscellaneous facilities, complete in place, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

10-1.94 DRAINAGE INLET MARKER:

GENERAL

Summary

This work includes installing drainage inlet markers.

Use only the type of drainage inlet marker shown on the project plans. If the project plans do not show a specific type, choose one type from the following list:

1. Thermoplastic
2. Metal medallion
3. Plastic medallion
4. Stamped concrete

Submittals

If you are using a prefabricated drainage inlet marker such as thermoplastic, metal medallion, or medallion, submit a sample of marker at least 5 business days before installation.

If you are using a concrete stamp for the drainage inlet marker, submit a sample of the stamp at least 5 business before concrete activities start.

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for prefabricated drainage inlet marker.

MATERIALS

Thermoplastic drainage inlet marker must:

1. Be free of lead and chromium
2. Comply with the following:

Property	Specifications	Requirements
Thickness, inches	Measured	0.080-0.160
Legend color (non-reflective)	Observed	Blue or Green
Background color (non-reflective)	AASHTO M 249	White
Skid Resistance	ASTM E 303	60 BPN

Metal drainage inlet marker must:

1. Be commercial grade stainless steel, aluminum, brass, or bronze
2. Be stamped from sheet metal or cast
3. Comply with the following:

Property	Specifications	Requirements
Thickness of metal, inches	Measured	0.055-0.138
Height of marker, inches	Measured	0.055-0.138
Skid Resistance	ASTM E 303	60 BPN

4. If metal marker is colored, it must comply with the following:

Property	Specifications	Requirements
Legend color (non-reflective)	Observed	Blue or Green
Background color (non-reflective)	Observed	White or bare metal

Plastic drainage inlet marker must:

1. Contain ultraviolet inhibitors
2. Comply with the following:

Property	Specifications	Requirements
Thickness, inches	Measured	0.025-0.060
Thickness (with dome), inches	Measured	0.055-0.120
Legend color (non-reflective)	Observed	Blue or Green
Background color (non-reflective)	Observed	White
Weathering Resistance	ASTM D1435	1 year without yellowing, fogging, or pitting

CONSTRUCTION

Install prefabricated drainage inlet markers by:

1. Mechanically cleaning and preparing the surface
2. Attaching the prefabricated drainage inlet markers to the surface with adhesives, fasteners, or heat as recommended by the manufacturer

Install stamped concrete drainage inlet markers by:

1. Imprinting uncured concrete with an approved drainage inlet marker concrete stamp
2. Producing stamped concrete surfaces that are free from blemishes

MEASUREMENT AND PAYMENT

Drainage inlet is measured as units determined from actual count in place.

The contract price paid for drainage inlet marker includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing drainage inlet markers, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.