

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

MEASUREMENT AND PAYMENT

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

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

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

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

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

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

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

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

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

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

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

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

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

FINISHING ROADWAY:

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

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

MINOR CONCRETE COLORED STAMPED CONCRETE MAINTENANCE WALK AND SPLITTER ISLANDS:

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

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

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

Pattern and Finish for the Colored Stamped Concrete Maintenance Walk and Colored Stamped Splitter Island:

The color and pattern of colored stamped concrete shall be:

Color:

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

Pattern:

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

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

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

The Contractor shall provide the Engineer with Certificates of Compliance for all materials used in the imprinting, texturing, coloring, curing, and sealing of decorative colored stamped concrete

crossing paving installation, including: Product Name, Supplier, Product Type, and Date of Delivery.

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

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

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

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

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

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

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

- 1) Removal and disposal of existing soil, asphalt and aggregate as required;
- 2) Establishing grades, and assuring that all grades are met;
- 3) Performing all grading and compaction
- 4) Construction of new stamped colored concrete maintenance walk and stamped colored splitter island;
- 5) All scoring/grooving and required saw cutting;
- 6) Installing 1/2" wide expansion joints;
- 7) Reinforcing steel for maintenance walk
- 8) Construction of the colored stamped concrete maintenance walk and colored stamped splitter island, including furnishing and incorporating color admixtures,

furnishing and applying color hardeners, furnishing and placement of clear seal and other work as required herein,

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article and plans, including furnishing all labor, materials including the steel reinforcement, tools, equipments, incidentals, furnishing and disposing 4-foot x 4-foot x 4-inch thick colored stamp concrete samples for the maintenance walk and the splitter island for the approval of the Resident Engineer and doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per square foot , for the following Bid Items and no additional compensation will be allowed therefor:

- Minor Concrete (Colored Stamped Concrete Maintenance Walk)
- Minor Concrete (Colored Stamped Concrete Splitter Islands)

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

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

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

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

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

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

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

- 1) Establishing grades, and assuring that all grades are met;
- 2) Performing all grading and compaction – including all required aggregate import, as directed by the Engineer and in accordance with the details in the plans;

- 3) Construction of new curb, curb and gutter, concrete headers, and curb ramps with sidewalk approach, bike ramps and concrete ramps, splitter island ramps;
- 4) All scoring/grooving and required saw cutting;
- 5) Repair of existing asphalt and PCC surfacing;
- 6) Installing 1/2" wide expansion joints;
- 7) Furnishing and installing detectable warning surface in the curb ramps and splitter island ramps.
- 8) Reinforcing steel for concrete header and curbs

METHOD OF PAYMENT

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

THERMOPLASTIC STRIPE, CROSSWALK AND PAVEMENT MARKING:

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

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

METHOD OF PAYMENT

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

PAVEMENT MARKER:

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

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

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

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

METHOD OF PAYMENT

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

TEMPORARY ASPHALT CONCRETE:

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

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

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

METHOD OF PAYMENT

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

6-INCH CORRUGATED HIGH DENSITY POLYETHYLENE (CHDPE) PIPE:

Conduit shall be installed as shown on the plans and as directed by the Resident Engineer.

Conduit shall be Corrugated High Density Polyethylene (CHDPE) pipe.

Minimum Corrugated High Density Polyethylene (CHDPE) Pipe size shall be 6-inch diameter unless otherwise specified.

The 6-inch Corrugated High Density Polyethylene (CHDPE) Pipe depth shall be between 36 inches to 60 inches below finish grade.

If ordered by the Engineer, all pavements shall be cut to a depth of 3 inches with an abrasive type saw or with a rock cutting excavator specifically designed for this purpose. Cuts shall be neat and true with no shatter surface outside the removal area.

The 6-inch Corrugated High Density Polyethylene (CHDPE) Pipe shall be placed in the bottom of the trench and the trench shall be backfilled with two sack slurry to the bottom of the structural section. The slurry shall be allowed to cure a minimum of two days.

The 6-inch Corrugated High Density Polyethylene (CHDPE) Pipe shall be capped on each on end.

Slurry cement backfill shall conform to Section 19-3.062 of the Standard Specifications, and full compensation shall be paid in the contract unit prices paid per linear foot for the 6-inch Corrugated High Density Polyethylene (CHDPE) Pipe and no additional compensation will be allowed therefor.

METHOD OF PAYMENT

The contract unit bid prices paid per linear foot for 6-inch Corrugated High Density Polyethylene (CHDPE) Pipe shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work necessary including structures excavation, backfill, and slurry cement backfill, accessories as specified in the Standard Specifications and these Special Provisions, as directed by the Engineer and no additional compensation will be allowed.

PULL BOXES:

Pull boxes shall be installed as shown on the plans and as directed by the Resident Engineer.

Pull boxes shall be traffic bearing pull boxes.

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

Pull boxes shall be installed two feet from the bottom of slope. The exact locations shall be determined by the Engineer.

METHOD OF PAYMENT

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

ROADSIDE SIGN- ONE POST:

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

All roadway signs shall have retroreflective sheeting. Except as stated below, the retro-reflectivity for all roadway signs, both temporary and permanent installations, shall meet or exceed ASTM Standard D 4956 Type III (3M Co. High Intensity Grade or approved equal). The retroreflectivity for R1-1 ("STOP") signs and W3-1 (Stop Ahead) signs shall meet ASTM Standard D 4956 Type IX (3M Co. Diamond Grade or approved equal).

METHOD OF PAYMENT

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

3-INCH PVC LIGHTING CONDUIT

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

Conduits shall be Type 3, Schedule 40 Polyvinyl Chloride (PVC) conforming to requirements in UL Publication 651 for Rigid Non-Metallic Conduit, for underground installation only.

Conduit depth shall not exceed 60 inches below finish grade.

Conduit size shall be 3 inches minimum unless otherwise specified on the plans or in the Special Provisions. New conduit shall not pass through foundations or standards.

All conduit bends shall be factory bends. Conduit bend radius shall be 3 feet minimum.

A pull rope shall be installed in conduits.

Bell bushings are required for all conduit ends.

The Contractor may request permission, on a case by case basis, to install conduit by trenching where conduit cannot be installed by jacking or drilling as provided in Section 86-2.05C, "Installation", of the Standard Specifications. Jacking/Drilling shall be attempted a minimum of three times prior to requesting trenching installation.

If ordered by the Engineer, all pavements shall be cut to a depth of 3 inches with an abrasive type saw or with a rock cutting excavator specifically designed for this purpose. Cuts shall be neat and true with no shatter surface outside the removal area.

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

The conduit shall be placed in the bottom of the trench and the trench shall be backfilled with two sack slurry to finish grade. Prior to paving, the slurry backfill shall be excavated to a depth of 0.30 feet below the final pavement surface.

If so directed by the Engineer, the two sack slurry backfill shall be installed to a depth of 0.30 feet below the final pavement surface. The slurry shall be allowed to cure a minimum of two days prior to paving with asphalt concrete.

Prior to paving, the contractor shall grind the existing pavement a minimum of 0.10 feet deep at a width of 3 feet minimum, centered along the full length of the trench.

METHOD OF PAYMENT

The contract unit bid prices paid per linear foot for 3-inch PVC Lighting Conduit shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work necessary including excavation, backfill, and slurry cement backfill, accessories as specified in the Standard Specifications and these Special Provisions, as directed by the Engineer and no additional compensation will be allowed.

STREET LIGHTING SYSTEM:

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

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

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

and private facilities in-place. Additionally, conduit sweeps to street lighting locations shall be placed so as to protect all existing utility, road and privately owned facilities in-place.

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

1. The Contractor shall furnish and install all conduits with pull-ropes, including the sweeps and risers to service poles, trenching, trench backfilling and compaction. The first 10' of riser conduit shall be Schedule 80, for risers and sweeps, unless specified otherwise on the Edison Company's street lighting plans. Conduit in trench shall be Schedule 40. All other facilities shown on the Edison Company's street lighting plans shall be installed, if shown to be installed by the "customer" or the County of Riverside, including but not limited to pads for transformers, pull boxes, etc. The Contractor shall coordinate with the Edison Company's inspector in all matters pertaining to the installation of street lighting.
2. The Edison plans should be carefully reviewed prior to bidding to ensure that the bidding contractor and specialty sub-contractor, if utilized, understands the Contractor's responsibilities.
3. Edison's contractor to install pole foundations, and will furnish and install the electroliers.
4. Edison crews to pull cable, install transformers as required, and energize.

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

1. 30 inches of cover (top of conduit to finish grade) shall be maintained.
2. For crossings of street light conduit and other utilities and facilities: 6 inches of separation shall be maintained.
3. For street lighting conduit that is installed parallel to other utilities, pipes or culverts, 12 inches of separation shall be maintained.

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

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

METHOD OF PAYMENT

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

GROUND PREPARATION AND LANDSCAPING:

PART 1 - GENERAL

1.01 SUMMARY:

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

1.02 RELATED REQUIREMENTS:

- A. Irrigation System
- B. Landscape Maintenance

1.03 SUBMITTALS:

- A. Submit certificates of compliance and invoices for soil amendments, fertilizers, and plant materials, with quantities of each.
- B. Tree Samples: Deliver to the site, a minimum of one sample of each tree variety and size indicated, 15 gallons in size and larger, a minimum of 15 days before planting operations. At the Contractor's option and expense, he may retain the services of the Resident Engineer to review trees 15 gallon and larger tagged at the nursery or at its place of growth, or as otherwise indicated.
- C. Shrub and Tree Samples: Submit 3 samples of each variety and size of plant materials at the site a minimum of 15 days before planting operations. Accepted samples shall remain on the site and shall be maintained as standards of comparison for plant materials to be furnished. Samples may be incorporated into the work.
- D. A sample of the soil amendments and proposed mulch material(s), including manufacturer or supplier certificate or invoice, shall be delivered to the Resident Engineer within thirty-five (35) days after recording of the Contract.

1.04 GUARANTEES AND REPLACEMENTS:

- A. Shrubs, vines and groundcovers shall be guaranteed to remain healthy and vigorously growing for a period of ninety (90) days from date of final acceptance of Maintenance Period of project.
- B. Trees shall be guaranteed to live in a healthy condition for a period of one (1) year from date of final acceptance of Maintenance Period of project.
- C. Plants found to be dead or not in a vigorous condition within the Maintenance and Guarantee Periods shall be replaced within fourteen (14) days at Contractor's expense.
- D. Plants used for replacement shall be the same kind and size as specified in the plant list. They shall be furnished, planted and fertilized as originally specified. The expense of all repair work on existing improvements damaged during replacement shall be borne by the Contractor.

1.05 QUALITY ASSURANCE:

- A. Reviews herein specified shall be made by the Resident Engineer or Landscape Inspector. The Contractor shall request review in writing a minimum of 48 hours in advance, for the following parts of work:
1. Pre-job meeting to introduce Resident Engineer, Landscape Inspector, Contractor, job project manager and job superintendent and to discuss the particular requirements of the job.
 2. Incorporation of soil conditioning and fertilizing into the soil. Observation shall begin prior to amendments being rototilled into the soil. Amendment materials shall be distributed in piles around the site in quantities corresponding to the soils analysis recommendations "per 1,000 sq. ft.". Invoices showing materials and quantities purchased shall be available for review.
 3. Upon completion of grading prior to planting. Review of plant materials is to coincide with this review.
 4. When trees, shrubs and vines are spotted in place for planting, but before planting holes are excavated.
 5. Upon completion of finish grades and planting. Application of pre-emergent herbicide is to coincide with this review.
 6. When planting, and all other indicated and specified work, except the Maintenance Period, has been completed. Acceptance, in writing, shall establish beginning of the Maintenance Period.
 7. Final review at the completion of the Maintenance Period. Contingent on acceptance, this review shall establish the beginning date for the Guarantee Period.

1.06 MAINTENANCE:

- A. The Contractor shall continuously maintain all involved areas during the progress of the work and during the maintenance period until the final acceptance of the work.
- B. The Maintenance Period begins on the first day after written acceptance of planting operations is received from the Resident Engineer, and shall continue thereafter for no less than ninety (90) continuous calendar days.
- C. The contract completion date of the contract maintenance period will be extended, when in the opinion of the Resident Engineer, improper maintenance or possible poor or unhealthy condition of planted material or poorly established non-covering turf areas are evident at the termination of the scheduled maintenance period. The Contractor shall be responsible for additional maintenance of the work until work is completed and acceptable.
- D. See Section 320533 for specific Maintenance Requirements.

1.07 GENERAL REQUIREMENTS:

- A. The term "Planting Area" shall mean all areas to be planted with trees, shrubs, groundcovers, sod and seed.
- B. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.
- C. All rock and other growth or debris accumulated during the duration of the project shall be removed from the site.
- D. Prior to excavation for planting or placing of plant materials, locate all underground improvements, utility lines, etc. and take proper precautions to avoid damage. In the event of a conflict between such lines and plant locations, notify Resident Engineer and receive direction prior to proceeding. The Contractor assumes responsibility for making repairs for damages resulting from work as herein specified.
- E. Grading and soil preparation work shall be performed only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, spreading and grading operations shall be suspended until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.
- F. Scaled dimensions are approximate. Before proceeding with work, carefully check and verify dimensions and immediately inform the Resident Engineer of discrepancies between the drawings and specifications and actual conditions.
- G. Quantities for plant materials are shown for convenience only, and not guaranteed. Check and verify count and supply sufficient number to fulfill intent of drawings.
- H. Adequately stake, barricade, and protect irrigation equipment, manholes, utility lines, and other existing property during all phases of the soil amending and grading operations.
- I. Rejection and Substitution: Plants not conforming to the requirements herein specified shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and be immediately removed from the site of the work and replaced with acceptable plant materials. The plant materials shall meet all applicable inspections required by law. Plants shall be of the species, variety, size, age, flower color and condition as specified herein and/or as indicated on the drawings. Under no condition will there be any substitution of plant species, variety, or reduced sizes for those listed on the accompanying drawings, except with the expressed written consent of the Resident Engineer.
- J. All utilities (water and electricity) used during the installation and maintenance of the landscaping and irrigation systems for this project shall be paid for by the Owner.

1.08 FINAL SOIL AMENDMENT QUANTITIES:

- A. Upon completion of all backfill and/or rough grading of planted areas, a minimum of six (6) representative samples of existing soil found in the planting areas shall be taken by the Contractor and at his/her expense sent to an independent soil testing laboratory for an agricultural suitability

analysis and recommendations for quantity and application rate of amendments and include any corrective measures required to adjust pH or salt to acceptable levels. These recommendations shall then be compared with those listed in Paragraphs 2.02 and 3.01 and the contract modified accordingly.

1.09 SOIL PREPARATION CONFORMANCE

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

1.10 PLANT MATERIAL QUANTITY CONFORMANCE

- A. After installation of plant materials, and coinciding with the pre-maintenance observation, the Resident Engineer, with the heretofore specified signed copies of the required certificates, trip slips and invoices for the plant materials and related items, will inventory such material, comparing the total area and/or the amounts specified. If the minimum amounts have not been furnished, the Resident Engineer may require the installation of additional materials to fulfill the minimum requirements specified or require that the Contractor provide credit(s) to the Owner.

PART 2 - PRODUCTS

2.01 SOIL AMENDMENT AND FERTILIZER:

- A. Provide singly or in combination as required to meet specified requirements for topsoil. Soil conditioners shall be nontoxic to plants.
1. Composted Derivatives: Ground bark, nitrolized sawdust, humus, or other wood green waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:
 2. Particle Size: Minimum percent by weight passing:
 - a. No. 4 mesh screen 95
 - b. No. 8 mesh screen 80
 3. Nitrogen Content: Minimum percent based on dry weight:
 - a. Fir Sawdust 0.7
 - b. Fir or Pine Bark 1.0
- B. Gypsum shall be a commercially processed and packaged gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) with minimum 80% grade containing 14% minimum combined sulfur.
- C. Iron Sulphate: Ferric or ferrous sulphate in pelleted or granular form containing not less than 18 percent metallic iron. Material shall conform to the Agricultural Code of the State of California.

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

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

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

Nitrogen	12% minimum
Phosphoric acid	8% minimum
Potash	8% minimum
Sulphur	7%
Iron	2%
Manganese	.05%
Zinc	.05%
Humic Acids (derived from compost)	5%

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

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

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

2.02 PLANTING BACKFILL:

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

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

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

2.03 PLANT MATERIALS:

- A. Nomenclature: The scientific and common names of plants herein specified conform with the approved names given in "Sunset Western Garden Book ", published by Lane Publishing Company, Menlo Park, California, latest edition. See list of plant material on drawings.
- B. Quality and size of all plants shall be No. 1, of Pinto Tag stock. They shall be vigorous, of normal growth, free from disease, insects, insect eggs, and/or exceed the measurements specified or the American standards for nursery stock. Pinto Tags shall be submitted to the Resident Engineer.
- C. Container stock (1 gal., 5 gal., and 15 gal.) shall have grown in containers for at least six months, but not over two years. No container plants that have cracked or broken balls of earth, when taken from the container, shall be planted, except upon special approval. No trees with damaged roots or broken balls shall be planted and no shrubs, vines or groundcovers shall be planted that are "pot-bound" or that have damaged roots.
- D. Pruning shall not be done, prior to delivery, except by written approval.
- E. Observation of Plant Materials, required by County authorities, shall be a responsibility of the contractor, and where necessary, the contractor shall have secured permits or certificates prior to delivery of plants to site.
- F. Plants shall be subject to observation and approval or rejection, at the project site at any time before or during progress of work, for size, variety, condition, latent defects and injuries. Rejected plants shall be removed from the project site immediately.
- G. Substitutions will not be permitted except that if proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size, variety and cost.
- H. Quantities shall be furnished as needed to complete work as shown on drawings.
- I. The Resident Engineer reserves the right to observe root condition of any species, particularly those grown from seed, and if found defective, to reject the plants represented by the defective sample.
- J. Identify plant species or varieties correctly on legible, weather-proof labels attached securely at the job site. There shall be a minimum of one labeled plant for each 5 plants in a lot.
- K. Groundcover plants shall be healthy vigorous rooted cuttings grown in flats until transplanting.

2.04 HERBICIDE:

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

2.05 RODENT REPELLENT:

- A. Rodent Repellent: Repellent X or approved equal.

2.06 MULCHING MATERIAL:

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

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

- A. Guy wires shall be of pliable, zinc-coated steel of No. 12 gauge.
- B. Anchors (deadman) for holding guy wires shall be of 4 inch by 4 inch (4" x 4") solid lumber, 1'-6" in length, or "duckbill" style anchor materials as shown on the details on the drawings.
- C. Hose for covering wire shall be of 2-ply reinforced rubber, used or new, garden hose type of at least 1/2 inch in diameter.
- D. Warning indicators, to be attached to guys, shall be of 1/2" PVC pipe and four feet long.

2.08 ROOT BARRIERS FOR TREES:

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

PART 3 - EXECUTION

3.01 LEACHING, SOIL CONDITIONING, ROTOTILLING AND FERTILIZING:

A. Deep Water Leaching:

1. After complete installation and testing of the irrigation system, all areas shall be deep water leached and compacted and settled by continuous application of irrigation water or other means of watering if irrigation system is insufficient until the soil has received a minimum of 12" of water.
2. After leaching operation, soil samples shall be taken by contractor per Resident Engineer's direction and given to the Owner's soil laboratory for testing. Soil test shall meet the following requirements:

ECe	- Maximum 3.0
pH	- Maximum 7.50
	- Minimum 6.00
3. Deep water leaching shall be done prior to the application of the commercial fertilizer.
4. Care shall be taken that the rate of application of water does not cause erosion or sluffing of soils. Do not undertake leaching operations in expansive soils.

5. All depressions, voids, erosion scars and settled trenches generated by the deep watering shall be filled with conditioned topsoil and brought to finish grade prior to digging planting pits.
- B. After leaching operations and after the areas have been graded, follow the Soil Preparation Conformance procedures per section 1.09. After approval by the Resident Engineer of the requirements in section 1.09, the soil conditioning and amendment materials shall be evenly spread over all planting areas and shall be thoroughly scarified to an average depth of six (6) inches by rototilling a minimum of two (2) alternating passes:

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

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

1. Fertilizer shall be incorporated into the top six (6) inches of finish grade. Fertilizer shall be applied after leaching operation.
2. The thoroughness and completeness of the rototilling and incorporation of the soil conditioners/amendments shall be accepted by the Resident Engineer in writing, prior to digging planting pits. For slopes 2:1 and steeper, or as per the drawings, omit soil conditioner application and rototilling.

3.02 FINISH GRADING:

- A. Finish grades shall be as indicated on landscape and civil drawings. Contractor shall notify Resident Engineer for a decision should any discrepancies exist between the drawings and site conditions.
- B. Finish grades shall be measured as the final water compacted and settled surface grades and shall be within ± 0.1 foot of the spot elevations and grade lines indicated. Grades adjacent to hardscape shall be within ± 0.01 feet of the grades indicated on the drawings.
- C. Molding and rounding of the grades shall be provided at all changes in slope.
- D. All undulations and irregularities in the planting surfaces resulting from tillage, rototilling and all other operations shall be leveled and floated out before planting operations are initiated.
- E. Take every precaution to protect and avoid damage to erosion control materials, sprinkler heads, irrigation lines, and other underground utilities during grading and conditioning operations.
- F. Final finish grades shall insure positive drainage of the site with all surface drainage away from buildings, walls, and toward roadways, drains and catch basins.

- G. Final grades shall be accepted by the Resident Engineer in writing on company letterhead prior to digging planting pits and/or before planting operations will be allowed to begin.
- H. Planting surfaces shall be graded with no less than 2 percent surface slope for positive drainage.

3.03 PLANTING:

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

B. Planting Trees and Shrubs:

1. All excavated holes shall have vertical sides with roughened surfaces and shall be of the minimum sizes indicated on drawings. Holes shall be, in all cases, large enough to permit handling and planting without injury or breakage of root balls or roots.
2. Excavation shall include the stripping and stacking of all acceptable soil encountered within the areas to be excavated for plant pits and planting beds. Protect all areas that are to be trucked over and upon which soil is to be temporarily stacked pending its re-use for the filling of holes, pits and beds.
3. Excess soil, generated from the planting holes shall be spread evenly on the site within the tolerances indicated in section 3.02, or as directed by the Resident Engineer.
4. The plants shall be planted at approved locations with the heretofore specified plant pit fertilizer and soil planting backfill. Place plant pit fertilizer after two thirds of backfill material is installed at the rates specified by the manufacturer and soils report.
5. The plants shall be placed in the planting pits, which have been hand-tamped, and water settled to the rootball base levels prior to the placement of the plants. After setting the plants, the remaining backfill material shall be carefully tamped and settled around each rootball to fill all voids.
6. Each tree and shrub shall be placed in the center of the hole and shall be set plumb and held rigidly in position until the planting backfill has been tamped around each rootball.
7. All plants shall be set at such a level that after settling they bear the same relationship to the surrounding finish grade as they bore to the soil line grade in the container, unless otherwise noted.
8. No plant will be accepted if the rootball is broken or cracked, either before, during, or after the process of installation.

9. Plants shall be thoroughly watered into the full depth of each planting hole immediately after planting.
10. Install shrubs as shown on the drawings.
11. For trees 48" Box size and greater guy all trees with the materials specified and as shown on the drawings.
12. The guying shall be accomplished in such a manner as to insure the proper and healthy growth and the safety of the plants, property, and the public.
13. The contractor shall be responsible for all the surface and subsurface drainage required which may affect his guarantee of the trees, shrubs, and vines.
14. Pruning after planting shall be required on all trees and shrubs when necessary to provide the specified or approved standard shapes, form and/or sizes characteristic to each plant. Pruning may include thinning, and/or cutting and shall be under the direction of the Resident Engineer or certified arborist.

C. Planting Groundcovers:

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

3.04 HERBICIDE APPLICATION:

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

3.05 RODENT REPELLENT:

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

3.06 MULCHING:

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

3.07 CLEAN-UP:

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

3.08 SITE OBSERVATION & WALK-THROUGHS FOR SUBSTANTIAL COMPLETION:

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

- B. Walk Through For Substantial Completion (Punch List #1):

- 1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:
 - a. The entire planting area is completely installed, and when letters of acceptance as described above have been obtained from the Resident Engineer and/or owner's representative. If the contractor failed to notify the Resident Engineer for any of the above items as listed above than the contractor assumes full responsibility for any design modifications directed by the Resident Engineer during the walk through for substantial completion any of these issues at no additional cost to the owner.
 - b. All invoices, pinto tags and receipts have been delivered to the Resident Engineer and/or owner's representative.
- 2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 - b. A visual walk through of the entire site will take place consisting of an examination of planting areas as compared to the drawings, and installation procedures as shown on the details and specifications. A punch list will be established of deficiencies in the construction and workmanship of the landscaped area as compared to the construction drawings, details, and specifications.
- 3. Once the Walk Through for Substantial Completion has been completed the Resident Engineer will provide a copy of all punch list items to the owner for review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

- C. Final Walk Through:

1. Before commencement of a final walk through is requested, each item on the walk through for substantial completion (punch list #1) must be thoroughly satisfied, addressed, and resolved by the contractor.
2. Once the above requirement has been met a final walk through may be requested. The following procedures will be used:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 - b. Unless new issues arise between walk throughs, only those items as indicated on the walk through for substantial completion punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the walk through for substantial completion, and examining outstanding items. Any remaining deficiencies in the construction and workmanship of the landscape as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.
3. Once the Final Walk Through is completed and all items created on the final punch list have been addressed, the Maintenance Period may begin. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

3.09 MAINTENANCE PERIOD:

- A. The Maintenance Period shall last for ninety (90) days after notification from the Resident Engineer of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the Resident Engineer to the owner.
 1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.
 2. Once the contractor has fulfilled all maintenance agreement obligations the maintenance period will end see section "Landscape Maintenance" of these Special Provisions, for maintenance responsibilities.

METHOD OF PAYMENT

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

doing all the work involved including but not limited to Guying (36"-48" Box Tree), 4" PERF PVC Tree Drain Tubes With Drain Cap, and Root Barriers (Plastic-24" Deep), in accordance with the contract documents shall be included in the unit price bid, per each, for the following Bid Items and no additional compensation will be allowed therefor:

- 48" BOX TREES
- 1 GALLON SHRUBS/ GROUND COVER
- 5 GALLON SHRUBS/ GROUND COVER

LANDSCAPE MAINTENANCE:

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 RELATED REQUIREMENTS:

- A. Irrigation System
- B. Landscaping

1.03 DEFINITIONS:

A. Pesticide: Includes any of the following:

- 1. Fumigant
- 2. Herbicide
- 3. Insecticide
- 4. Fungicide
- 5. Rodent repellents.

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

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

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

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

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

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

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

1.06 HANDLING FOR PERMANENTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:

A. Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.01 pH ADJUSTERS:

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

2.02 Soil Conditioners:

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

2.03 PLANTING BACKFILL:

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

2.04 FERTILIZERS:

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

2.05 WATER:

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

2.06 PESTICIDES:

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

PART 3 - EXECUTION

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

A. Shrubs:

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

2. Planting beds shall be cultivated, pruned, trimmed, weeded, irrigated, fertilized, mulched, and otherwise maintained in a manner that presents a professionally landscaped appearance at all times. Plant beds shall be kept weed, gopher, squirrel, rabbit and pest free. Ground cover shall not be allowed to grow into flowers, shrubs or trees. Planting beds shall be maintained in a manner that provides balance between the various types of vegetation, and prevents dominance of any one species. The contractor shall provide and maintain a minimum of three-inch layer of mulch in all planting beds with a slope gradient of 3:1 or less. The contractor shall provide for the special needs of various species. Diseased or dead vegetation shall be removed and replaced with healthy plants of the same species.
3. The contractor shall not use steel bow type rakes or equipment of similar design to clean plant beds. Lightweight fan rakes or vacuum equipment may be used. The contractor shall maintain the soil level in the plant beds, and ensure all surface root systems and irrigation piping are covered as required. The contractor shall be responsible for damage caused by contractor operations at no additional cost to the owner.
4. Shrubs shall be trimmed pruned, irrigated, fertilized to present a healthy and manicured appearance. Shrubs will not be allowed to encroach into grass areas. A definite break shall be maintained between grass and shrub areas. In such areas the contractor shall maintain a healthy and well-balanced landscape.
5. All shrubs and other cultivated plants shall be trimmed and pruned according to their natural growth characteristics for proper health and attractive appearance. All clippings shall be removed and disposed of by the end of each day. Pruning shall be accomplished as necessary in accordance with conditions (a) through (d) specified below. Shrubs shall be trimmed to shape for aesthetic appearance and health at the frequency specified in this section.
 - a. Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections. Shrubs around perimeter of buildings shall be trimmed to maintain natural growth characteristics.
 - b. Remove dead, damaged or diseased branches or limbs and crossing, rubbing and interfering branches.
 - c. Evenly form and balance the shrub to natural growth characteristics. Hedges are to be trimmed to maintain their natural growth characteristics and not allowed to obstruct pedestrian walkways. Shrubs shall be allowed to completely fill planter beds. Shrubs and hedges shall not be trimmed into round, square and or geometric shapes. Side growth shall be allowed to grow unless growth is in front of windows, over entrance ways, streets, driveways, parking area or walks, and/or any growth which will obstruct vision at street intersections.
 - d. Remove growth against or over structures and into any type of electrical or telephone lines (leave growth on block walls).
6. Shrubs shall be pruned to evenly form and balance plant to natural growth characteristics. Shoots, suckers, and branches of shrubs not conforming to desired shape and size shall be

removed. Retain typical growth habit of individual plants with as much height and spread as is practical. Shrubs shall be allowed to completely fill planter beds.

7. Any depression or mound around the base of shrubs intended to retain water in place for proper irrigation shall be maintained in good condition to permit the most efficient application of water and reduce waste.
8. Do not fertilize native plant material as shown on the planting legend during the maintenance period.

B. Trees:

1. Tree maintenance and care is considered routine on going maintenance and shall be accomplished as specified or as often as necessary during the maintenance period. Tree maintenance and care includes, staking trees, adjustment of ties and supports, removal of stakes, watering, fertilization, pest control, pruning, turf clearance, mulch clearance, removal of broken limbs and branches, tree removal/replacement, and fall cleanup.
2. The contractor shall maintain and/or replace tree staking and guying as necessary as specified in section 329300 Landscaping for the duration of the maintenance period. Stakes, ties and supports shall be inspected and adjusted monthly to prevent girdling and rubbing, and to promote natural development of trees. Stakes, ties, and supports shall be removed when the tree becomes capable of supporting itself.
3. Trees shall be pruned according to their natural growth characteristics to evenly form and balance the tree and to promote proper health and growth in accordance with accepted standards and horticultural practices of the National Arboriculture Society, of the Western Chapter. All tree maintenance must be performed in compliance with ANSI Z133.1 Safety Standards. Tree pruning shall include all areas of the project, which are permanently and/or temporarily irrigated for the duration of the maintenance period. All sucker growth shall be removed from and around the trees. All trees are to be inspected monthly to identify pruning needs. Pruning or trimming shall be accomplished at any time during the maintenance period as required in accordance with conditions (a) through (h) below:
 - a. Remove dead, damaged or diseased wood or structurally weak limbs that may cause a safety hazard. Remove interfering branches, crossing and rubbing branches.
 - b. Remove branches which endanger roofs, eaves, and windows or hang within eight feet of sidewalks, parking lot driveways, and which obstruct traffic signs or streetlights. This includes removal of dead or broken branches on the ground or still hanging in the tree.
 - c. Provide clearance for buses, moving vans and similar vehicles along streets.
 - d. Eliminate and prevent growth into electrical or telephone transmission lines. Anticipate the effects of wind on branches, which might fall on transmission lines. Shape the entire tree rather than notch the top.

- e. Prevent growth of trees in front of windows, over entranceways and walkways and which will obstruct vision at street intersections.
- f. Remove partially attached broken limbs and branches from trees regardless of diameter or length. Provide stakes or braces as required for future protection.
- g. "Skirting-Up" and "pollarding" a tree is prohibited.
- h. Topping of trees is prohibited.

C. Weeds, Rodent and Pest Control:

1. Weed and pest control shall be performed to prevent encroachment of undesirable vegetation and noxious weeds, and infestation of pest (rodent, insect and fungus) into established landscapes, including lawns and around trees, shrubs, flower beds, etc. Noxious weeds in landscaped and natural growth areas, plant beds and landscaped areas shall not be allowed to establish themselves and be maintained weed free. Additionally, weed control is to be performed to eliminate grass and weeds in cracks and joints on all paved and concreted areas. Weed control is to be performed to prevent the encroachment of vegetation into perimeter fences and fire breaks. Rodent control shall be performed as required to maintain healthy vigorous plant growth. Live or dead rodents shall be removed within 24 hours from the project property and properly disposed of. Trees, shrubs, turf and vegetation shall be protected from all varieties of insect and rodent damage. Pesticides may be used to control pests. Pesticides and herbicides shall be used in a manner, which will not affect landscape plants health.
2. All pesticides, including herbicides, insecticides, fungicides, etc., shall be applied only by persons holding a valid state license for each category of pest control work involved. Any required state, county, or local permits for possession, procurement, or use of any pesticide shall be obtained and complied with at no additional expense to the owner.
3. All pesticides shall be procured, transported, stored, handled, and applied in strict accordance with the manufacturer's label, which shall be registered with the Environmental Protection Agency and the State of California. The contractor shall comply with the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act, 40 CFR 170-171, CCR Title 3, and CCR Title 8. All pesticide containers shall be managed in accordance with the requirements of CCR Title 3, Section 6684 and disposed of in accordance with CCR Title 22. Each pesticide formulation shall be registered for use under the particular environmental conditions under which it was applied. The contractor shall exercise extreme care to prevent any damage or illegal contamination by pesticides to vegetation, water, fish, animals, and humans. The contractor shall be held responsible and liable for all damage, contamination, and effects resulting from contractor's pesticide use.
4. Pesticide spraying shall be performed only on still days and will be stopped when unfavorable weather or other conditions exist which would unduly increase the hazard to personnel or desirable vegetation by drift, runoff, or leaching through the soil. Any project property or desirable vegetation damaged by the contractor due to pesticide applications shall be repaired or replaced at no additional cost to the owner.

5. Pesticide rinse water or excess pesticides from contractor operations shall be collected by the contractor in an appropriate receptacle and disposed of at an approved disposal site; or shall be applied to a similar target area to which the original application was made and in the same manner of application if allowed by the EPA registered label.
6. Job site pesticide applications shall be made by personnel capable of identifying the pest species to be controlled, knowledgeable of control techniques, and able to apply pesticide active ingredients at prescribed dosages and rates of application, as required by the label to achieve the required control under job site conditions, without danger to people, pets or other non-target animals, plants, or property.
7. The contractor shall be responsible for having a spill kit on service vehicles and for reporting and cleaning pesticide spills as required by state laws and regulations. The contractor shall submit a written report of spills on or in project property, within 8 hours of incident to the owner on company letterhead.

D. Irrigation and Irrigation System Maintenance:

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

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

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

manual irrigation, the contractor shall provide hoses and irrigation equipment to adequately irrigate this plant material for the duration of the maintenance period. In the event that an area has no water supply due to a system failure, the contractor shall provide a supply by either hose or truck. All valves and valve box covers shall be kept closed at all times except when in actual use.

4. Irrigation equipment shall be kept clear of any obstructions including plant material. Dirt or other debris surrounding emitter on risers and/or sprinkler heads, which prevents proper operation, shall be removed. The contractor shall be held responsible for any damage to project property caused by careless handling of irrigation equipment including slope failure at no additional cost to the owner.
5. The contractor is responsible for the maintenance and repair of all components of the irrigation system for the duration of the maintenance period. This includes irrigation equipment items as shown on the original irrigation drawings. Maintenance and repairs of irrigation equipment during the maintenance period shall be done at no additional cost to the owner. Maintenance shall include but not be limited to the following:
 - a. Repair or replace broken, missing, or inoperative emitter on risers, pop-up spray heads and pop-up rotors.
 - b. Repair or replace defective emitter on risers, sprinkler head risers, rotors on risers, fittings, swing arms and breaks in piping. Adjust and align risers. Repairs shall include all fittings as specified in the original irrigation drawings.
 - c. Clean and adjust pop-up emitter on risers, sprayheads, pop-up rotors, sprinkler head risers and rotors on risers and their gears and/or mechanisms, check and adjust for proper coverage.
 - d. Remove dirt and debris from around emitter on risers, pop-up spray heads and pop-up rotors.
 - e. Repair or replace defective or malfunctioning control valves (Electric and/or Manual) flow sensors and master valves. Clean and service valves. The contractor shall replace any damaged or missing valve boxes or valve lids. Valve box lids shall be kept in place at all times. Barricades shall be placed over any valve boxes with missing lids until replaced. Valve boxes shall be kept level with existing grade as shown on the drawings.
 - f. Maintain, service, repair or replace controller systems as specified by the product manufacturer.
 - g. System repairs and replacement shall be accomplished with new parts and equipment that are identical to existing.
 - h. The contractor is responsible for required irrigation by any means during the periods of system breakdown.

E. Fertilizer Application During the Maintenance Period:

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

F. Fallen Vegetation and Debris Removal:

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

G. Removal of Dead Animals:

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

H. Erosion Control:

1. The contractor is responsible for daily visual inspection of slopes and immediately reporting areas experiencing erosion to the Resident Engineer and/or owner's representative on the same day noticed. If the contractor fails to notify the Resident Engineer and/or owner's representative of areas experiencing erosion on the same day noticed, then the contractor assumes full responsibility for any erosion control measures and/or repairs as directed by the Resident Engineer and/or owner's representative at no additional cost to the owner.
2. Upon notification and agreement of the applicable erosion control measure by the Resident Engineer, the owner and the contractor, the contractor is responsible for immediately repairing and correcting any progressive rilling that may occur.
3. Erosion control measures may include but not be limited to:
 - a. Filling
 - b. Raking
 - c. Redirecting runoff
 - d. Properly programming irrigation operations
 - e. Replanting
 - f. Providing additional erosion control materials such as:
 1. jute matting
 2. filter fabric
 3. hay bales
 4. hay rolls
 5. silt fencing

- 6. sand bags
- 7. and/or other erosion control items as required to maintain healthy plant material and stable slopes.

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

I. Frequency of Maintenance Operations:

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

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

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

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

- 1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
- 2. A visual walk through of the entire landscape area will take place consisting of an examination of planting areas and noting any remaining maintenance items to be completed.
- 3. Once the preliminary post maintenance walk through has been completed, the Resident Engineer shall prepare a punch list of outstanding items to be completed and will provide a copy of this list to the owner and contractor for review and use. It is the contractor's responsibility to repair, replace, and adjust all items on the punch list prior to requesting a final post maintenance walk through.

- L. Final Post Maintenance Walk Through: Before commencement of a final post maintenance walk through, each item on the preliminary post maintenance walk through punch list must be thoroughly satisfied, addressed, and resolved by the contractor. Once the above requirement has been met a final post maintenance walk through may be requested. At the final post maintenance walk through, the following procedures will be used:
1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 2. Only those items as indicated on the preliminary post maintenance walk through punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the preliminary post maintenance walk through, and examining outstanding items. Any remaining deficiencies in the maintenance of the wetlands mitigation will be noted.
 3. Once the final post maintenance walk through is completed and any outstanding items created on the final punch list have been addressed the maintenance period may end. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

METHOD OF PAYMENT

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

CONSTRUCT TRAIL (DECOMPOSED GRANITE):

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work included in this section:

Decomposed granite paving including subgrade preparation, weed barrier fabric, and concrete or metal edge per details and as specified herein.

1.02 SUBMITTALS

- A. Five (5) lb. sample and sieve analysis of decomposed granite.
- B. Manufacturer's sample and product data for weed barrier fabric.
- C. Manufacturer's product data and analysis for "Stabilizer".
- D. Manufacturer's product data and analysis for Synthetic Fiber Reinforcement.

1.03 TESTS

A. Perform gradation of decomposed granite material in accordance with ASTM C 136 – Method for Sieve Analysis for Fine and Course.

1.04 MOCK-UPS

A. Install 4ft. wide x minimum 10ft. long mock-up of decomposed granite paving with concrete header curb at location as directed by Resident Engineer.

1.05 ENVIRONMENTAL CONDITIONS

A. Do not install decomposed granite paving during rainy conditions, or conditions detrimental to integrity of the installation.

1.06 QUALITY ASSURANCE

A. Installer – provide evidence to indicate successful experience in providing decomposed granite paving containing Stabilizer binder additive.

1.07 EXCESS MATERIALS

A. Provide owner’s authorized representative with the following excess materials for use in future decomposed granite paving repair:

1. Two (2) 40 -50 lb. bags of the specified aggregate material.
2. One (1) 40 - 50 lb. bag of the Stabilizer additive.

PART 2 - PRODUCTS

2.01 DECOMPOSED GRANITE (3/8” OR ¼” MINUS) CRUSHED AGGREGATE SCREENINGS

A. Crushed Stone Sieve Analysis Percentage of Weight Passing a Square Mesh Sieve AASHTO T11-82 and T27-82.

¼” MINUS AGGREGATE GRADATION

<i>Sieve Designation</i>	<i>% Passing</i>
3/8”	100
No. 4	95-100
No. 8	75-80
No. 16	55-85
No. 30	40-50
No. 80	25-35
No. 100	20-25
No. 200	5-15

B. Acceptable local products and suppliers:

1. “Temescal Gold” decomposed granite by Gail Materials (909) 279-1095
2. “Autumn Gold” decomposed granite by Southwest Boulder & Stone (760) 451-3333
3. “Coyote Gold” or “New California Gold” decomposed granite by KRC Rock (760) 744-4882

2.02 STABILIZER BINDER

- A. Patented, non-toxic, organic binder that is a colorless and odorless concentrated powder that binds decomposed granite or crushed 3/8" or 1/4" minus aggregate together to produce a firm surface.
- B. Provided by Stabilizer Solutions, Inc., 1-800-336-2468. No known equivalent product.

2.03 WEED BARRIER FABRIC

- A. Reemay / Typar Landscape Products Professional Grade Style 3201 Fabric: 100% spunbonded polypropylene with UV inhibitors, porous, nonwoven, breathable, or approved equal.

2.04 CONCRETE HEADER CURB

- A. As specified in Section "Minor Concrete- Concrete Header" of these Special Provisions.

PART 3 – EXECUTION

3.01 BLENDING THE STABILIZER

- B. It is critical that Stabilizer be thoroughly and uniformly mixed throughout the decomposed granite. Stabilizer shall be incorporated into the decomposed granite by the use of a pug mill that includes a weight belt feeder to insure the proper ratio of Stabilizer to decomposed granite. Blending with a bucket loader or similar equipment or method is not acceptable.
- C. For pathways, blend 12 lbs. of Stabilizer per ton of decomposed granite or crushed 3/8" or 1/4" minus aggregate screenings.

3.02 PLACEMENT OF DECOMPOSED GRANITE

- A. Obtain approval of layout (staking) of edging materials prior to final placement. After approval of layout, prepare subgrade, edging materials and weed barrier fabric as indicated on drawings, prior to placement of decomposed granite. Recompact subgrade to 95% relative compaction.
- B. For each 2" to 3" lift of decomposed granite material, evenly spread the material in the designated areas. Grade and smooth to proper condition. Apply water lightly and evenly, but thoroughly enough to provide moisture penetration to the entire depth of the decomposed granite material.
- C. After the final lift is watered in, compact the aggregate screenings to 95% relative compaction with appropriate equipment. For pathways, a 1000-3000 pound roller is acceptable. For driveways and vehicular areas, a double drum roller (2-4 ton) is acceptable. A vibratory plate tamper may be required if roller compaction is insufficient. Compaction / rolling shall be completed within 48 hours of placement.
- D. Take care in compacting decomposed granite so as not to damage adjacent edging materials, paving, planting and irrigation systems, or other improvements.
- E. Allow finished decomposed granite areas to dry before allowing traffic onto finished surfaces.

3.03 REPAIRS AND PROTECTION

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

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article, including furnishing all labor, materials, tools, equipments, incidentals and for doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per square foot, for Construct Trail (Decomposed Granite) and no additional compensation will be allowed therefor.

PVC FENCING:

PART 1 - GENERAL

1.01 SUMMARY:

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

1.02 GENERAL REQUIREMENTS:

- A. Provide white vinyl rail theme fencing as approved by Riverside Transportation Department and CSA where shown on the drawings, as specified herein and as needed for a complete and proper installation.
- B. Provide vinyl fencing components as required and as shown on the drawings, as specified herein and as needed for a complete and proper installation.

1.03 SUBMITTALS:

Submit six (6) sets of manufacturer's brochures; product cut sheets and guarantees to the Resident Engineer prior to beginning work. Submittals should be in a bound form complete with table of contents. The contractor shall not proceed with work in the field until this submittal is approved in its entirety by the Resident Engineer.

1.04 DELIVERY STORAGE AND HANDLING:

- A. Deliver the materials to the job site in good condition and properly protected against damage to finished surfaces.
- B. Store material in a location and in a manner to avoid damage. Stacking shall be done in a way, which will prevent breaking.

- C. Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin or polypropylene sheeting in a manner that will permit circulation of air inside the covering.
- D. Keep handling on-site to a minimum. Exercise particular care to avoid damaged finishes of material.

PART 2 - PRODUCTS

2.01 RAIL FENCING:

A. Vinyl Fencing:

1. Description: Single rail vinyl fencing
2. Manufacturer: Gardner Fence System - www.gardnerfence.com
3. Color: White

- 2.02 CONCRETE FOOTING: Install Vinyl Fencing post in concrete footing as indicated on drawings and per Concrete Specifications. Concrete for the footing for the PVC fencing shall be Class 3.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Prior to installing fencing mark with powdered lime the location of fencing and the beginning and end points of each fence. The Resident Engineer shall review staking and direct any necessary changes with the contractor prior to proceeding with installation of fencing. This review does not in any way alleviate the contractor from the responsibilities associated with proper fence placement and/or installation.
- B. Once reviewed and coordinated with the Resident Engineer, install fencing at the locations shown on the drawings as shown on the details and per manufacturer's specifications.
- C. Install fence post plumb in the concrete footing as indicated on drawings.

3.02 QUALITY CONTROL:

- A. Preconstruction Meeting: The contractor is responsible for contacting the Resident Engineer prior to beginning construction and/or ordering materials to establish a meeting to review and discuss project objectives, concerns and to review the construction documents to ensure a complete understanding of required installation procedures.
- B. General Observation: The Resident Engineer will visit the construction site at interim times during the construction process to assess construction progress regarding installation of walls and fences to be in compliance with the drawings, details, specifications and site conditions. The Resident Engineer will prepare a site report after each visit noting progress of installation,

verbal communication with the contractor and identifying any field adjustments necessary, which require modifications to the designed fencing system. A copy of this site report will be delivered to both the County and the contractor. The contractor is responsible for immediately addressing each item on the site report before proceeding with further construction.

C. Walk Through for Substantial Completion:

1. Before requesting a walk through for substantial completion, the following requirements must be entirely satisfied:
 - a. The entire pilaster and fencing system is completely installed.
2. Once the above requirements have been met, a walk through for substantial completion may be requested. The following procedures will be used during the walk through:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
3. Visual walk through: This will consist of walking through the fencing system. A punch list will be established of deficiencies in the construction and workmanship of the wall and fencing system as compared to the construction drawings, details, and specifications.
4. Once the walk through for substantial completion has been completed, the Resident Engineer will provide a copy of all punch list items to the County for review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch list prior to requesting a final walk through.

D. Final walk through:

1. Before commencement of a final walk through is requested, the following requirements must be entirely satisfied:
 - a. Each item on the walk through for substantial completion has been thoroughly addressed and resolved by the contractor.
2. Once the above requirements have been met, a final walk through may be requested. The following procedures will be used:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 - b. Only those items as indicated on the walk through for substantial completion punch list will be reviewed.
3. Visual Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion, and examining all the components of the wall and fencing system noted on the punch list. Any remaining deficiencies in the construction and workmanship of the fencing system as compared to the punch list

generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.

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

3.03 MAINTENANCE PERIOD:

- A. The Maintenance Period shall be for ninety (90) days after notification from the Resident Engineer of a successful Final Walk Through and will commence and end simultaneously with the Landscape Maintenance period. During this time the contractor is responsible for maintaining and repairing any damaged fencing at no additional cost to the County.
- B. Once the contractor has fulfilled all maintenance agreement obligations, the maintenance period will end.
- C. Groundcover and shrubs, unless otherwise specified, shall not be allowed to touch or grow onto or into railings and shall be removed from both sides of fences within 1" of railing.

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article and the plans, including furnishing all labor, materials, tools, equipments, incidentals and for doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per linear foot, for PVC Fencing including furnishing and furnishing and placement of the concrete footing and no additional compensation will be allowed therefor.

IRRIGATION SYSTEM:

PART 1 - GENERAL

1.01 SUMMARY:

- A. This section covers the furnishings of all materials and performing all operations to provide a complete operable landscape irrigation system as shown on the drawings including the following:
 1. Trenching, stockpiling excavated materials and refilling trenches.
 2. Irrigation system components including but not limited to: piping, backflow prevention devices and enclosures, valves, fittings, rotors, spray heads, central control system controllers, wiring and final adjustments as determined by the Resident Engineer to insure efficient and uniform distribution.
 3. Pipe connections to irrigation pump stations, water meters and backflow prevention devices.
 4. Testing and inspection of irrigation system.

5. Clean-up and maintenance

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

1.02 GENERAL REQUIREMENTS:

- A. Code Requirements shall be those of State and Municipal Codes and Regulations locally governing this work, providing that any requirements of the Drawings and Specifications, not conflicting therewith but exceeding the Code Requirements shall govern, unless written permission to the contrary is granted by the Resident Engineer.
- B. Conform to the requirements of the reference information listed below except where more stringent requirements are shown or specified in the most current set of construction documents:
1. American Society for Testing Material (ASTM), for test methods specifically referenced in this section.
 2. Underwriter's Laboratories (UL), for UL wires and cables.
- C. Work involving substantial plumbing for installation of brass piping, backflow prevention devices and other related work shall be executed by a licensed and bonded plumbing contractor. Any necessary permits shall be obtained prior to beginning work.
- D. Specified depths of pressure supply lines, laterals and pitch of pipes as stated in this section are minimums. Settlement of trenches lower than grades specified on the final grading plans is cause for removal of finish grade treatment, refilling trenches, recompacting and repairing of finish grade treatment.
- E. Follow current printed manufacturer's specifications and drawings for items or information not specified or graphically indicated in the most current set of construction drawings.
- F. Scaled dimensions are approximate and at times it is not possible to indicate offsets, fittings and other related equipment graphically on the construction drawings. Contractor shall be responsible for minor changes caused by actual site conditions. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions of related architectural elements, utilities and landscaping and furnish and install required fittings.
- G. Do not install the irrigation system as shown on the construction drawings when it is obvious that actual field conditions such as physical obstructions, grading discrepancies and field dimensions vary from those recorded on the construction drawings. Immediately bring any such discrepancies to the attention of the Resident Engineer prior to proceeding with work. If immediate notification is not given and such discrepancies exist, the contractor shall assume full responsibility for necessary revisions, as determined by the Resident Engineer.

1.03 EXISTING FIELD CONDITIONS:

- A. Unless otherwise noted preserve and protect all existing trees, plants, monuments, structures, hardscape and architectural elements from damage due to work in this section. In the event that damage does occur to inanimate object and structures, the contractor will repair or replace such damage to the satisfaction of the owner or owner's representative. Damage or injury to living plant material will be replaced by the contractor at the contractor's expense.
- B. Trenching or other work required in this section under the limb spread of existing trees shall be done by hand or by other methods so as to prevent damage or harm to limbs, branches and roots.
- C. Trenching in areas where root diameter exceeds 2 inches shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in proximity to roots that are less than 2 inches, the wall of the trench shall be hand trimmed , making clean cuts through roots.
- D. Trenches adjacent to or under existing trees shall be closed within 24 hours, and when this is not possible, the side of trench closest to the tree or trees affected shall be covered with moistened burlap.
- E. Protect, maintain and coordinate work with other contracts, specifications, trades, and utilities. Extreme care shall be exercised in excavating and working in the area due to existing utilities. Contractor shall be responsible for damages caused by their operations. In the event that damage does occur, the costs of such repairs shall be paid by the contractor unless other arrangements have been made with the owner.
- F. Use caution where trenches and piping cross existing roadways, sidewalks, hardscape, paths or curbs. In the event that damage does occur, the contractor will repair such damage at the contractor's expense.

1.04 REQUIRED DOCUMENTS:

A. Submittals

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

B. Service Manuals

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

C. Record Drawings/As-builts

1. Prior to beginning work in the field the contractor shall secure a complete set of irrigation plans at the original scale complete with details and specifications. The contractor shall be responsible for making a set of blue-line prints for every week on the project. At the end of each working day, the contractor shall record all work accomplished for that day on the set of blue-line prints in red ink. These record drawings shall be brought up to date at the end of each work week by a qualified draftsman. The drawings should indicate the following:
 - a. Any zoning changes.
 - b. Dimension from two permanent points of reference (building corners, fixed hardscape corners, road intersections, and permanent existing utilities) the location of the following items:
 - 1 Connection to existing water lines.
 - 2 Routing of pressure supply lines at every 100' along routing.
 - 3 Isolation Ball Valves
 - 4 Quick Coupling Valves
 - 5 Electric Control Valves
 - 6 Drip Valve Assemblies
 - 7 Flush Valve Assemblies
 - 8 Irrigation System Controllers
 - 16 Grounding rods.
 - 10 Control wire routing (if routed separately from pressure supply line).
 - 11 Control wire splices that are outside of the controller.
 - 12 Weather Station Equipment
 - 13 Communication Equipment for Irrigation Control System
 - 14 Other equipment as directed by the Resident Engineer.
2. Prior to scheduling a walk through for substantial completion, provide a record set of field as-built drawings as described above to the Resident Engineer for review. After review, the Resident Engineer will return the as-built set to the field foreman requesting further information or will notify the owner that the record set of field as-builts drawings are complete. After approval from the owner, a walk through for substantial completion may be scheduled.
3. Prior to scheduling the final walk through, the final set of irrigation as-built drawings shall be professionally drafted in auto-cadd.
4. The Resident Engineer and the contractor shall verify the final as-builts at the time of the final walk through and once successful the Resident Engineer shall deliver the final set of as-built drawings to the owner or owner's representative prior to initiating the maintenance period for the contractor.

D. Controller Charts

1. Prior to scheduling a walk through for substantial completion, provide a record set of field controller charts which have color coded each station within each controller to the Resident Engineer for review. After review, the Resident Engineer will return the controller charts to the field foreman requesting further information or will notify the owner that the record set of controller charts are complete. After approval from the owner, a walk through for substantial completion may be scheduled.
2. Prior to scheduling a final walk through, one set of controller charts shall be professionally drafted in auto-cadd for each controller unit installed on the project. The controller drawings shall be an actual auto-cadd reduction of the area covered by that controller unit and shall be at the maximum allowable scale that will fit inside the controller door without folding the drawing.
3. The Resident Engineer and the contractor shall verify each controller chart at the time of the final walk through and once successful the Resident Engineer shall deliver the final set of controller charts to the owner or owner's representative prior to initiating the maintenance period for the contractor. The controller chart sent to the owner shall be hermetically sealed between two (2) pieces of minimum 20 mils thick plastic.

PART 2 - PRODUCTS

2.01 PIPING

A. General Piping:

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

B. Solvent Weld Pressure Supply Line:

1. Solvent Weld Pressure Supply Line: (downstream of Backflow prevention device) PVC CL315BE (1" - 3")
 - a. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B.
 - b. Type 1, Grade 1.
2. Fittings: Standard weight, Schedule 80, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.
 - a. Threads- Injection molded type (where required)
 - b. Tees and Ells- side gated
3. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

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

C. Non-Pressure Lines Below Grade:

1. Non-Pressure Lines: (downstream of electric remote control valve) PVC SCH 40.
2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.
 - a. Threads- Injection molded type (where required)
 - b. Tees and Ells- side gated
 - c. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.
3. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

D. Sleeving and Conduit:

1. All PVC sleeving for pressure supply line and non- pressure supply line shall be twice the nominal size of the pipe within and used for sleeves below grade as indicated in the following sleeve and conduit schedule:
2. Sleeving and Conduit Material Under Hardscape:
 - a. PVC SCH 40 for 1"-2 1/2" pressure supply line.
 - b. PVC SCH40 for 3" and larger pressure supply line.
 - c. PVC SCH 40 for non- pressure lines.
 - d. (1) one 3/4" PVC SCH. 40 conduit for up to 5 wires.
 - e. (1) one 1" PVC SCH. 40 conduit for up to 8 wires.
 - f. (1) one 1 1/4" PVC SCH. 40 conduit for up to 15 wires.
 - g. (1) one 1 1/2" PVC SCH. 40 conduit for up to 20 wires
 - h. (1) one 2" PVC SCH 40 conduit for up to 30 wires.
 - i. (1) one 2 1/2" PVC SCH 40 conduit for up to 35 wires.
3. Sleeving and Conduit Material Over Concrete V-Ditches:
 - a. Galvanized SCH. 40 for 1"-2 1/2" pressure supply line.
 - b. Galvanized SCH.40 for 3" and larger pressure supply line.
 - c. Galvanized SCH. 40 for non- pressure lines.
 - d. (1) one 3/4" Galvanized SCH. 40 conduit for up to 5 wires.
 - e. (1) one 1" Galvanized SCH. 40 conduit for up to 8 wires.
 - f. (1) one 1 1/4" Galvanized SCH. 40 conduit for up to 15 wires.
 - g. (1) one 1 1/2" Galvanized SCH. 40 conduit for up to 20 wires
 - h. (1) one 2" Galvanized SCH. 40 conduit for up to 30 wires.
 - i. (1) one 2 1/2" Galvanized SCH. 40 conduit for up to 35 wires.
 - j. (1) one 3/4" Galvanized SCH. 40 wire conduit for flow sensing cable.
 - k. (1) one 3/4" Galvanized SCH. 40 wire conduit for master valve wire.

E. Brass Pipe and Fittings:

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

2.02 ISOLATION VALVES

- A. Isolation Ball PVC Valves: Industrial grade sealed unit socket weld schedule 80 PVC ball valve (Use for mainline pipe 1-1/2" and smaller) as manufactured by Spears model 2122 or approved equal.
- B. Isolation Gate Valve: Bronze, screw-in-bonnet, non-rising stem, cross handle, solid wedge, threaded valve (Use on mainline pipe 2" and 2-1/2" in size) as manufactured by Nibco model T-113-K, or approved equal.

2.03 QUICK COUPLING VALVES

- A. Quick coupler valves shall have a body constructed of red brass with a wall thickness guaranteed to withstand normal working pressure of 150 P.S.I. without leakage with female threads (penning at base). Quick coupler valve shall have a hinge cover constructed of red brass with leather like vinyl cover bonded to it on such a manner that it becomes permanent type of cover. Quick couplers used with potable water shall have vinyl covers yellow in color. Quick coupler valves used for reclaimed water shall have vinyl covers purple in color with the appropriate reclaimed water warnings in English and Spanish as well as the international "Do Not Drink" symbol.
- B. All quick coupler valves must have a schedule 80 ball valve to isolate mainline from quick coupler valve. Mainline shall be the size of quick coupler valve from mainline tee to quick coupler.

2.04 ELECTRIC CONTROL VALVES

- A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.
- B. Isolation Ball Valve at Manifold and/or Electric Control Valve: Industrial grade sealed unit socket weld schedule 80 PVC ball valve as manufactured by Spears model 2122 or approved equal.

2.05 DRIP VALVE ASSEMBLIES:

- A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.
- B. Wye Strainer: 150 mesh screen for point to point drip and sub surface
- C. Isolation Ball Valve: Ball Socket Ball Valve with thermoplastic molded one piece construction and teflon seat with EDPM cushions.

2.06 HARD PIPED POINT TO POINT DRIP IRRIGATION:

A. Riser Assembly for Hard Piped Point to Point Drip Irrigation:

1. 12" Long, ½" IPS flexible PVC tubing with factory attached ½" schedule 40 PVC MIPT adapters on both ends.

B. Emitters for Hard Piped Point to Point Drip Irrigation:

1. Pressure compensating single outlet emitter with ½" FIPT base and 20 mesh screen. ½ GPH, 1 GPH or 2GPH. Mulch Camo Brown in color.

2.07 FLUSH VALVE ASSEMBLIES:

- A. Schedule 80 Ball Valve, threaded schedule 80 nipples and fittings with polyethylene tubing for flush hose.

2.08 VALVE BOXES:

- A. Jumbo rectangular valve boxes shall be 14-7/8 inch wide by 21-3/8 inch long and 12 inch high. Rectangular valve boxes shall be 11-3/4 inch wide by 17 inch long and 12 inch high. Round valve boxes shall be 10-inch diameter and 10 1/2 inch high. All valve boxes shall be constructed of rigid polyolefin.

- B. Valve boxes shall have locking covers secure with a 3/8-inch stainless steel bolt and washer.

- C. Jumbo rectangular valve boxes shall be used for master control valves.

- D. Rectangle valve boxes shall be used for control valves, pressure regulators, flow sensors, wye strainers, filtration devices, ball valves and pull boxes.

- E. Round valve boxes shall be used for gate valves quick coupler valves, flush valve assemblies and spare wires.

- F. All valve boxes to be green in color unless otherwise specified for use of reclaimed water.

- G. Heat brand all box lids with the appropriate two-inch high identification letters and/or numbers.

- H. All valve boxes shall receive landscape fabric. Landscape fabric shall be constructed of 5.0 oz. weight proven polypropylene weed barrier with burst strength of 225 P.S.I. and capable of 12 gallons per minute of water flow and puncture strength of 60 lbs. Dewitt Pro, Mirify or approved equal.

- I. All valve boxes shall receive 2 cubic feet of 3/4-inch gravel.

- J. Valve Tag: Manufactured from UV stabilized plastic with 180lbs pull out resistance and hot stamped for maximum visibility. Top hole shall be designed to pass a 16 gauge or smaller solenoid pigtail or attach with a nylon tie.

2.09 BUBBLERS:

- A. Bubblers shall be constructed of heavy duty plastic and be pressure compensation full circle. The bubbler shall have a 20 mesh screen to protect it from clogging.
- B. Bubblers shall be from .25 - 1.0 GPM and operate between 20-90 PSI.

2.10 IRRIGATION CONTROL SYSTEM CONTROLLER

All controllers shall have the following specifications and capabilities:

- A. The controller shall be of a modular design with a standard 6-station model. There shall be 6-station modules that enable the controller to be customized from 6 stations up to 30 stations in the plastic cabinet and up to 42 stations in the metal cabinet and plastic pedestal. The removable station modules shall allow servicing of, and removing of the module(s) without removing field wires from the controller.
- B. The controller shall have four independent programs (A, B, C, and D) with 8 start times per program for programs A, B, and C; and 16 start times for program D for a total of up to 40 daily start times. Any two programs shall have the capability of running concurrently. Watering times shall be available from 1 minute to 12 hours in 1-minute increments per station. There shall be a programmable delay between stations available of up to 9 hours. The controller shall have 4 weekly schedule options to choose from: 7-day calendar, 31-day calendar, odd day programming and even day programming. It shall also have a 365-day calendar clock to accommodate true odd-even watering. Operation shall be available in automatic, semi-automatic and manual modes. All programming shall be accomplished by use of a programming dial and selection buttons with user feedback provided by a backlit LCD display. The front panel of the controller shall be removable and capable of being programmed when not attached to the controller cabinet.
- C. The controller shall be equipped with a rain sensor on-off switch that allows the user to override a sensor that has suspended watering. The controller shall have a programmable rain delay that turns off the controller for a predetermined period of time, from 1 to 180 days.
- D. The controller shall have a cycle and soak scheduling capability by station that allows a cycle to be programmed for up to 60 minutes and a soak period to be programmed for up to 120 minutes.
- E. The controller shall have a seasonal adjustment feature with 3 different modes that allows station run times to be altered from 0% to 300% by program to compensate for weather changes. The modes shall include a Global Adjust, Monthly Adjust, and a Solar Sync Adjust. The Global Adjust shall increase the station run times in a given program by a fixed percentage. The Monthly Adjust shall allow all the seasonal adjustment values for the full year to be programmed into the controller, for each program.

- F. The controller shall be capable of monitoring up to two Clik-type sensors or flow sensors in the plastic configuration, and up to 3 Clik-type sensors or flow sensors in the metal configuration.
- G. The controller shall permit connection of a flow meter which is calibrated by the operator for the pipe diameter in which it is installed. The flow meter shall measure actual flow in gallons or liters. The controller shall have a learning mode in which the controller operates each single station for a short period, learns the actual flow for each station, and stores the information internally by station.
- H. When the learned flow is exceeded during normal operations the controller shall record a flow alarm event, cease irrigating the station or stations contributing to the high or low flow readings, and resume irrigation with any stations which do not cause alarms. The controller shall have the ability to determine high or low flow conditions when multiple stations are operating, and shall perform diagnostics to identify stations which contribute to the problem flow. Allowable limits and duration of incorrect flow shall be preset, but reprogrammable by the operator for unique local conditions. It shall also be possible to except certain stations from flow monitoring devices. The controller shall also be equipped with a flow-totalizing function that will provide a running total of all the gallons or liters of water used between two reference dates.
- I. Automatic programs shall also permit the designation of non-water days, even when Odd/Even or Interval Day patterns have been set. Non-water window violations shall be detected and the operator shall be alerted when an irrigation program would have run during a non-water window.
- J. The controller shall have a Quick Check test program, permitting all stations to run sequentially for a user-entered period of time, programmable in one-second increments up to 10 minutes each, for system startup and diagnostics.
- K. The controller shall also save an Easy Retrieve Program which stores all original programming settings. The installing contractor shall be able to restore the system to this saved state at any time after initial installation. The stored Easy Retrieve settings may also be updated at any time by the operator.
- L. The controller shall have a one-button manual station advance in Test mode for quick diagnostics checks.
- M. The controller shall be equipped with a programmable pump start/master valve circuit that can activate the pump start relay by zone. It shall also have a programmable delay between valve stations. Delays between stations shall be programmable up to a maximum of 10 hours.
- N. Transformer input shall be 120/240 VAC, 50/60Hz. Transformer output shall be 24 VAC, 1.5A (40VA). All AC power wiring connections shall be made in an internal junction box. Maximum output per station shall be 24 VAC, 0.56A. Program backup shall be provided by a non-volatile memory circuit that will hold the program information indefinitely. The controller shall have Metal Oxide Varistors (MOVs) on the AC power input portion and the secondary output portion to help protect the micro-circuitry from power surges. The secondary

MOVs shall be enclosed in the station modules for easy servicing. There shall be self-diagnostic, electronic short circuit protection that detects a faulty circuit, continues watering the remainder of the program, and reports the faulty station on the display. The diagnostic procedure shall also be capable of being initiated by the user manually. The controller shall provide backup timekeeping in the event of a power outage with the use of an internal long-life lithium battery.

- O. The controller shall have a diagnostic feature that provides a visual indication via LED lights that show the current status of sensor activity, station activity and flow activity. Any station or flow alarms shall be reported on the LCD display.
- P. The controller shall have a multi-language capability that allows programming of the display in 6 different languages: English, French, Spanish, German, Italian, and Portuguese. It shall also be capable of setting the units of measure to either English (GPM) or Metric (LPM)
- Q. The controller shall be installed in accordance with the manufacturer's published instructions. The controller shall carry a conditional five year exchange warranty. The automatic controller(s) shall be the IC series controller as manufactured for Hunter Industries Incorporated, San Marcos, California or approved equal.

2.11 ELECTRIC CONTROL VALVE WIRE

A. Low Voltage:

- 1. AWG UF UL approved No. 14 direct burial copper wire for all control wires and No. 12 direct burial copper wire for all common wires.
- 2. Wire Colors:
 - a. Control Wires- As specified on drawings
 - b. Common Wires- As specified on drawings.
 - c. Spare Wires- Green (labeled at termination)
- 3. Wire Splice Connectors: 3M DBY Direct Bury Splice Kits.

B. High Voltage:

- 1. Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

2.12 SAND BEDDING

- A. Sand bedding shall be construction grade.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine field conditions prior to beginning work described in this section. Grading operations shall be completed and approved prior to beginning work.

- B. Verify all sleeve locations below future hardscape and/or across concrete v-ditches prior to beginning work in this section. Flag all existing sleeves and conduits installed by other trades. Report any conflicts and discrepancies to the Resident Engineer immediately.
- C. Irrigation system shall be constructed to the sizes and grades at the locations shown on the drawings. Mark with powdered lime or marking paint routing of pressure supply line and stake the location of each emitter, electric control valve and other related equipment for the first three zones. Resident Engineer shall review staking and direct any necessary changes with the contractor prior to proceeding to other zones. This review does not in any way alleviate the contractor from the responsibilities associated with proper uniformity and distribution of head placement after staking.
- D. Install sleeves, to accommodate pipes and wires, under paving, hardscape areas, sidewalks, and paths prior to asphalt and concrete operations. Compact backfill around sleeves to 95% Modified Proctor Density within 2% of optimum moisture content in accordance with ASTM D1557.

3.02 EXCAVATION AND BACKFILLING OF TRENCHES

- A. Trench excavation shall as much as possible follow the layout shown on the drawings. Trenches shall be straight in alignment and support pipe continuously on bottom of trench. Remove rocks and debris greater than 1" in diameter. Over excavate as required for bedding material.

- B. Depth of Trench (in landscape areas):

Pressure Supply Line (3" and smaller): 18" from top of pipe to finish grade.

Non-Pressure Line (12" pop-up Rotors): 18" from top of pipe to finish grade.

Non-Pressure Line (6" and smaller pop-up Rotors): 12" from top of pipe to finish grade.

Non-Pressure Line (12" pop-up Spray Heads): 18" from top of pipe to finish grade.

Non-Pressure Line (6" and smaller pop-up Spray Heads): 12" from top of pipe to finish grade

Non-Pressure Line (Emitters) 12" from top of pipe to finish grade.

Control Wiring: directly at side and bottom of pressure supply line.

Pressure Supply line Locator Tape: 6" above top of pipe.

- C. Depth of Trench (under asphalt paving or concrete):

Pressure Supply Line (3" and smaller): 24" from top of pipe to aggregate base.

Non-Pressure Line: 24" from top of pipe to aggregate base.

Control Wiring: directly at side and bottom of pressure supply line.

Pressure Supply line Locator Tape: 6" above top of pipe.

1. Piping located under asphalt paving or concrete shall be installed with the appropriate sized sleeve and backfilled with sand bedding (6" below pipe and 6" above pipe).
2. Compact backfill material in 6" lifts at 90% maximum density determined in accordance with ASTM D1557 using manual or mechanical tamping device.

3. Set in place, cap, and pressure test piping in the presence of the owner or owner's representative prior to backfilling.

D. Width of Trench:

Pipe Greater than 3": 14" minimum.

Pipe Less than 3": 7" minimum.

E. Width between Trenches:

Irrigation Trench to Irrigation Trench: 6" minimum.

Irrigation Trench and other Trade Trenches: 12" minimum.

- F. Boring: Boring will only be permitted where pipe must pass under an obstruction that cannot be avoided or removed. Backfill shall match surrounding soil density and grain. Boring under existing paving, sidewalks, or hardscape may be permitted at contractor's own risk. Contractor is responsible for any repairs or damage to such items at their own expense.

- G. Backfilling: Backfilling of trenches may not be done until all required testing for the irrigation system has been completed.

1. Material: Excavated material is generally considered to be adequate for backfilling operations. Before beginning the backfilling operation, insure that backfill material is free from debris and rocks greater than 1" in diameter, and is not mixed with topsoil. These materials after separated from backfill, shall be legally disposed of at contractor's expense.
2. Bedding: Bed pressure supply line with construction grade sand 6" above and 6" below pipe as shown on details. Remaining backfill may be as described above.
3. Bed all electrical control wire trenched separate from pressure supply line, with construction grade sand 6" above and 6" below wires.
4. When backfilling, slightly mound filled trenches for settlement after backfilling is compacted. Compact backfill to a 90% maximum density in accordance with ASTM D1557 with a mechanical tamper. Do not leave trenches open for a period greater than 48 hours. Open trenches shall be protected in accordance with current OSHA regulations.
5. Smooth trenches to finish grade prior to requesting a walk through for substantial completion with the Resident Engineer.

3.03 POINT OF CONNECTION(S)

- A. Point of connection shall be approximately as shown on drawings. Connect new underground piping and valves and provide all flanges, adapters, or other necessary fittings.

3.04 INSTALLATION OF SOLVENT WELD POLYVINYL CHLORIDE PIPE (PVC)

- A. Polyvinyl chloride pipe shall be cut with an approved PVC pipe cutter designed only for that purpose.

- B. All plastic-to-plastic solvent weld joints shall use only the solvent recommended by the pipe manufacturer. Do not install solvent weld pipe when temperature is below 40° F.
- C. Pipe ends and fittings shall be wiped with MEK, or approved equal, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.
- D. Pipe shall be snaked from side-to-side on trench bottom to allow for expansion and contractions.
- E. All changes of direction over 15 degrees shall be made with appropriate fittings.
- F. When pipe laying is not in progress at the end of each working day, close pipe ends with tight plug or cap.
- G. Install pressure supply line locating tape along the entire length of pressure supply line.
- H. Coordinate pressure supply line with sand bedding operations.
- I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.
- J. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

3.05 INSTALLATION OF BRASS PIPE:

- A. Brass piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. All pipes shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.
- B. Eccentric reducing fittings shall be used where any change in pipe size occurs. Bushings shall not be used unless specifically authorized by the Resident Engineer.
- C. Joint compound shall be carefully and smoothly placed on the male thread only. All screwed joints must be tightened with tongs or wrenches. Caulking of any kind will not be permitted.
- D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot (10') intervals in black lettering, 3/4" minimum high.

3.06 ISOLATION BALL VALVES

- A. Install isolation ball valves in separate valve boxes as specified on the drawings.

3.07 QUICK COUPLING VALVES

- A. Install quick coupling valves in separate valve box as specified on the detail drawings.

- B. Angled nipple relative to pressure supply line shall be no greater than 45° and no less than 10°.

3.08 ELECTRIC CONTROL VALVES

- A. Install each electric control valve in a separate valve box so that cross handle is 3" min. below valve box cover as specified on the detail drawings.
- B. Group electric control valves together as specified on the drawings allowing a maximum of 12" between each valve box. Install valve boxes in the same direction and parallel with one another and perpendicular to paving, hardscape, sidewalks and paths.
- C. Install electric control valves on slopes within two feet from toe of slope. Use same trench as toe of slope non-pressure lateral line for pressure supply line and wire routing see section 3.02 B and C for pipe and wire depths.

3.09 CHECK VALVES

- A. Install swing check valves as specified on drawings.
- B. Install spring check valves as specified on drawings.

3.10 VALVE BOXES

- A. Install valve boxes with each type of irrigation equipment so that top of valve box is above finish grade as specified on the detail drawings. Valve box extensions are not acceptable.
- B. Place gravel sump below and around each valve box prior to installing valve box as specified on the drawings. Place remaining portion of gravel inside valve box allowing full access in and around all fittings. Valve box shall be fully supported by gravel sump. No brick or wood supports are allowed.
- C. Brand valve box lid of associated equipment as follows:

Electric control valve box lid with "Controller Letter and Station Number".

Quick coupling valve box lid with the letters "QC".

Isolation ball valve box lid with the letters "BV".

Air relief valve box lid with the letters "AR".

Spare Wire box lids with the letters "SW".

Wire Splice box lid with the letters "WS".

Letter and number size of brand shall be no less than 1" and no greater than 1 1/2" in height and shall be 1/8" maximum in depth. Provide sample branding to the owner or owner's representative prior to commencement of work.

- D. Walk through for substantial completion will not be allowed until all branding is complete.

3.11 AUTOMATIC CONTROLLER UNIT

- A. Verify electrical power at location of automatic controller unit prior to installation of automatic controller unit. Notify Resident Engineer immediately if power source is not available.
- ~~B. Hardwire controller to the on/off switch and existing power source. Controller shall not be plugged into socket provided for other equipment.~~
- C. Install automatic controller unit where shown on drawings per manufacturer's specifications. Controller shall be tested with complete electrical connections. The Contractor shall be responsible for temporary power to the Controller for operation and testing purposes.
- D. Connect electric control valve wiring to controller unit in the same numerical sequence as indicated on the drawings and label within 1" of the terminal strip. Label all spare wires as "spare".
- E. Connect flow sensing and master valve wiring to controller unit and label within 1" of the terminal strip if applicable.
- F. Install a separate ground rod and wire for each controller unit as specified on the drawings and per manufacturer's specifications.
- G. Above ground conduit shall be rigid galvanized pipe with the appropriate fittings. Below ground conduit shall be PVC SCH 40 pipe with appropriate fittings.
- H. Label each automatic controller unit with the letter or number designated on the drawings. Letter or number shall be located in a visible location on the inside panel cover with 3" high vinyl letters.
- I. Each automatic controller unit shall be completely operable prior to scheduling a walk through for substantial completion.

3.12 ELECTRICAL WIRE

A. Low Voltage Wiring:

1. Bury control wiring in same trench as pressure supply line as specified.
2. Bundle all 24 volt wires at 20' intervals with electrical tape.
3. Provide expansion loops at every pressure supply line angle fitting and at 250' length intervals along routing. Form expansion loop by wrapping wire a minimum of 10 times around a 3/4" pipe and withdrawing pipe as specified on the drawings.
4. Limit splicing of electrical wiring. Provide each splice made at intervals or in electric control valve and drip valve assembly valve boxes with 3M DBY Direct Bury Splice Kits.

5. Wire splices occurring at intervals outside electric control valve boxes shall be installed in a separate valve box.
6. Provide (1) one electrical control wire for every electric control valve. Piggy backing like zones on the same electrical control wire is not allowed.
7. Install (2) two spare #14-1 electrical control wires from the automatic controller unit pedestal to the last electric control valve on each leg of pressure supply line. Locate the spare wires in their own valve box as specified on the drawings. In addition to these spare wires, check the drawings for any additional wires that may be required and locate them in the same valve box as the spare wires.

B. High Voltage Wiring:

1. Install 120 volt power from power source to automatic controller unit following local governing codes and ordinances.

3.13 QUALITY CONTROL

- A. Preconstruction Meeting: The contractor is responsible for contacting the Resident Engineer prior to beginning construction and/or ordering materials to establish a meeting to review and discuss project objectives, concerns and to review the construction documents to insure a complete understanding of required installation procedures.
- B. General Observation: The Resident Engineer will visit the construction site at interim times during the construction process to assess construction progress regarding installation of irrigation equipment to be in compliance with the drawings, details, specifications and site conditions. The Resident Engineer will prepare a site report after each visit noting progress of installation, verbal communication with the contractor and identifying any field adjustments necessary which require modifications to the designed irrigation system. A copy of this site report will be delivered to both the owner and the contractor. The contractor is responsible to immediately address each item on the site report before proceeding with further construction.
- C. Pressure Testing the Pressure Supply Line: After backfilling, flushing, and prior to the installation of each electric control valve, isolation ball valve and quick coupling valve the irrigation system shall be pressure tested.
 1. Pressure testing shall be performed in the presence of the Resident Engineer and owner or owner's representative utilizing the following procedure:
 - a. Pressurize the irrigation system to 40 psi greater than the designated static pressure or 150 psi whichever is greater for a period of no less than 2 hours. The pressure gauge used for the pressure test shall not exceed readings greater than 300psi. Pressure pump and other equipment necessary for the test shall be furnished by the contractor.
 - b. Test is acceptable if no leakage occurs within the system for the duration of the testing period.
 - c. If leaks occur, repair said leaks and begin pressure test again. Repeat this operation until no leaks occur in the irrigation system.

- d. Before requesting a walk through for substantial completion, the entire irrigation system shall remain under pressure for a period of no less than 48 hours.
2. The contractor is responsible for notifying the Resident Engineer one day in advance of the pressure test.
-
- D. Flushing: Center load all piping prior to flushing. After all new irrigation piping and risers are in place and connected and all necessary diversion work has been completed and prior to the installation of sprinkler heads, rotors and quick coupling valves, thoroughly flush piping system under full head of pressure. After the furthestmost riser from the point of connection begins to flush, continue flushing for the duration of five minutes. After the system is thoroughly flushed, cap all risers.
- E. Walk Through For Substantial Completion:
1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:
 - a. The entire irrigation system is completely installed, flushed and satisfactorily pressure tested. If the contractor failed to notify the Resident Engineer for the pressure test and flushing procedures stated above than the contractor assumes full responsibility for any design modifications directed by the Resident Engineer during the walk through for substantial completion regarding pressure and flushing issues.
 - b. All valve boxes have been branded.
 - c. All automatic controllers are fully operable and have been certified in writing and checked at by the control system manufacturer on their letter head.
 - d. Record as-built drawings have been submitted to the Resident Engineer for review as to completeness.
 - e. (4) Four Services manuals have been delivered to the owner or owner's representative.
 2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 - b. All valve box lids shall be removed from valve boxes and placed face up adjacent to the valve box prior to beginning the walk through.
 - c. The walk through will be divided into (2) two sections and proceed as follows:
 - 1 Visual Walk Through: This will consist of walking through the entire irrigation system and examining all components of the system without turning on zones. A punch list will be established of deficiencies in the construction and workmanship of the irrigation system as compared to the construction drawings, details, and specifications.
 - 2 Operational Walk Through: This will consist of walking through the entire irrigation system observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric

control valves will not be acceptable). A punch list will be established of deficiencies in the operation of each zone in the irrigation system evaluating but not limited to head spacing, row spacing, nozzle sizing, and correct radius of throw, correct stationing, as compared to the construction drawings, details, and specifications.

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

F. Final Walk Through:

1. Before commencement of a final walk through is requested, the following requirements must be entirely satisfied:
 - a. Each item on the walk through for substantial completion has been thoroughly addressed and resolved by the contractor.
 - b. All final record as-built drawings and controller charts have been produced by the Resident Engineer for review by the Resident Engineer and contractor at the final walk through.
2. Once the above requirements have been met a final walk through may be requested. The following procedures will be used:
 - a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
 - b. Only those valve box lids shall be removed from valve boxes as indicated on the walk through for substantial completion punch list. The valve box lids shall be placed faced up adjacent to the valve box prior to beginning the final walk through.
 - c. The final walk through will be divided into (2) two sections and proceed as follows:
 - 1 Visual Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion, examining all components of the system without turning on zones. Any remaining deficiencies in the construction and workmanship of the irrigation system as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.
 - 2 Operational Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion and observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric control valves will not be acceptable). Any remaining deficiencies in the operation of each zone in the irrigation system including but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing as compared to the punch list generated at the time of the walk through for substantial completion construction drawings, details, and specifications.

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

3.14 MAINTENANCE PERIOD

- A. The Maintenance Period shall be for ninety (90) days after notification from the Resident Engineer of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the Resident Engineer to the owner.
 1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.
 2. At the end of the maintenance period and prior to turning the project over to the owner, the contractor shall deliver the following to the owner:
 - a. Five (5) emitters on risers of each type used, for every 100 emitters installed on the project.
 3. Once the contractor has fulfilled all maintenance agreement obligations and has provided the above items to the owner, the maintenance period will end see section "Landscape Maintenance" of these Special Provisions, for maintenance responsibilities.

METHOD OF PAYMENT

Full compensation, except as otherwise provided herein, for conforming to the requirements of this article and plans, including furnishing all labor, materials including but not limited to the following:

- BOWSMITH SL200SERIES EMITTER W/ SALCO SLV-PVD-ACLXX FLEX RISER,
- HUNTER RZWS-36-50-CV DEEP TUBE BUBBLER,
- HUNTER IC-3600-M 36 STATION CONTROLLER,
- NIBCO T-113-K GATE VALVE - 1 1/2" / FITTINGS,
- NIBCO T-113-K GATE VALVE - 2" / FITTINGS,
- TRUE UNION BALL VALVE AT ECV - 1 1/2",
- TRUE UNION BALL VALVE AT ECV - 2",
- ELECTRIC CONTROL VALVE W/ PRESSREG/FITTINGS - 1",
- DRIP VALVE ASSEMBLY - BALL VALVE, DC SOLENOID, FILTER, FITTINGS,
- QUICK COUPLING VALVE,
- MANUAL FLUSH VALVE ASSEMBLY,
- GREEN PLASTIC STANDARD 10" ROUND VALVE BOX W/ SUMP/FILTER FAB,
- GREEN PLASTIC STANDARD RECTILINEAR VALVE BOX W/ SUMP/FILTER FAB,
- MANUAL FLUSH VALVE ASSEMBLY,
- NON- PRESSURE LATERAL LINE- SCH 40 - 3/4",

- NON- PRESSURE LATERAL LINE- SCH 40 - 1",
- PRESSURE SUPPLY LINE - SCH 40 - 1 1/2",
- PRESSURE SUPPLY LINE - SCH 40 - 2",
- PVC SLEEVING - SCH40 - 2",
- PVC SLEEVING - SCH40 - 4",
- PVC SCH 40 CONDUIT - 1 1/2",
- 14 GAUGE DIRECT BURIAL WIRE, and
- MISCELLANEOUS FITTINGS, LATERALS, tools, equipments, incidentals and for doing all the work involved in accordance with the contract documents shall be included in the unit price bid, per lump sum, for Irrigation Systems and no additional compensation will be allowed therefor.

SOLAR POWERED EQUESTRIAN CROSSWALK, FLASHING BEACON SYSTEM WITH EQUESTRIAN AND PEDESTRIAN PUSH BUTTONS:

Furnishing and installing solar powered equestrian crosswalk flashing beacons and payment shall conform to the provisions in Section 86, "Signals and Lighting" of the Standard Specifications and these Special Provisions.

Attention is directed to Exhibit "A"- "Proposed Traffic Control for Equestrian Crossing on Rancho California Road" attached to these Special Provisions, for construction of equestrian crossing.

This specification is for the Carmanah R820 Dual Beacon Solar Crosswalk Flashing Beacon or approved equal.

Each unit shall consist of a self-contained solar engine, dual LED signal modules and signal housing, mounting hardware such that the entire assembly mounts to the top of the pole. The solar engine shall contain all electronics, batteries and solar panels. No additional cabinet is required. The system shall conform to all provisions of the MUTCD, Chapter 4K, Flashing Beacons.

Mechanical Specifications

The enclosure shall be constructed from powder coated aluminum, with dimensions not exceeding 4.75 x 15 x 32 in. The enclosure shall be vented to provide cooling of the batteries during charging. Venting will be covered by nylon or metal mesh to prevent the intrusion of insects and debris.

The solar engine will integrate solar panel, batteries, and electronics. No external cabinet is required for components or batteries.

The overall weight of the assembly, including mounting hardware, signal housing, LED module, and solar engine shall not exceed 75 lbs.

Mounting

The entire assembly, including solar engine, signal housing and LED module, and bracket shall be provided with hardware for mounting on to the top of 4 1/2" diameter round pole. Mounting hardware shall be standard traffic signal mounting hardware manufactured by Pelco Products Inc.

The solar engine shall have the provision to be tilted and oriented south with additional mounting hardware, or mounted completely parallel to the ground such that mounting in any orientation will keep the solar engine level.

Signal Housing

The signal housing shall meet the equipment standard of the Institute of Transportation Engineers (ITE) Vehicle Traffic Control Signal Heads (VTC SH) Chapter 2.

The signal head shall be mounted directly below the solar engine. The solar engine shall not overhang the signal head, so as not to restrict mounting a signal head back plate. The signal head shall be easily removable from the assembly. The bracket assembly shall be constructed such that the signal head can be removed easily in the field without removing the solar engine. The bracket assembly shall be designed to take the torsion and bending load of the solar engine. The signal head shall not be subjected to the torsion or bending load of the solar engine.

The signal housing must be able to rotate independent from the bracket to allow for lens alignment. The dual flashing beacons shall be mounted horizontally and the signal housing shall be black in color.

LED Signal Module

The LED signal module shall conform to the mandatory specifications of: ITE Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement as required by the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1.

Solar Panel (PV)

The solar engine shall include a minimum of 20W solar panel no larger than the footprint of the housing. It will be attached to the main housing with aluminum flashing.

Solar panel and battery system shall be 12 Volt DC.

The solar panel shall meet the design qualification and type approval of photovoltaic modules in accordance with IEC 61215. This specification includes radiation testing, thermal testing, and mechanical testing for environmental conditions such as UV-exposure, thermal cycling, as well as degradation of maximum power output.

Battery

The solar engine shall house a single or dual, field replaceable sealed lead acid battery exceeding 17AH.

Battery shall be mechanically secured into the housing.

Battery should be sealed to allow for mounting in any orientation.

Auxiliary Supply

System shall have an auxiliary 12 VDC power output to power third party devices such as wireless radios or sensing equipment.

Radio Control Module

The solar engine shall have the provision to mount an external device for remote activation. System must have capability to power such device.

The radio module must be integrated inside a sealed enclosure within the main solar engine.

The solar engine will include mounting locations for externally located antenna. The antenna will have an adjustment to ensure vertical alignment with a tilted solar engine.

Operational Specifications

The system shall conform to all standards for flashing beacons, as required in the Manual of Uniform Traffic Control Devices 2003 Edition Revision 1 or current version.

The beacon shall be flash at a rate of not less than 50 or more than 60 times per minute. The illuminated period of each flash shall not be less than one-half and not more than two-thirds of the total cycle.

The system shall have a night dimming feature.

The system shall have a typical operating autonomy of 30 days.

The system shall also have the ability to modify its energy use based on solar conditions in the form of automatic light control (ALC). ALC shall modify light brightness by utilizing pulse width modulation (PWM) of the constant current drivers so that the system always attempts to maintain energy equilibrium.

Activation

The beacon shall be activated by a pedestrian push button or by the wireless activation signal from another R820 unit. The beacon shall operate for a set flash duration upon activation. System shall reset flash duration upon activations that occur mid-cycle. The flash duration shall be user configurable in the field from 5 – 60 seconds, at 5 second increments.

Each unit shall be able to transmit a wireless activation signal to the other beacons in the system. The wireless technology shall maintain a coordinated flash pattern (either alternating or unison) with all the beacons in the system throughout the duration of the activation.

System coordination must be repeatable upon testing for at least 50 activations. Both sides must be activated, flash, and stop flashing at the same time consistently.

System must be able to power and be activated by a third party device such as a passive pedestrian detector.

System must have the capability to be also activated by either a calendar schedule or third party time switch device.

In addition to pedestrian activation, the system shall also be able to be activated by an integrated, programmable microcontroller. The software must allow for a minimum of seven distinct usage programs to allow for different usage variations from that of a standard school day. The activation schedule shall be uploaded by a customer provided laptop running MS Windows 98, 2000, or XP.

The beacon shall store 500 days of flash data to provide a log of system activations.

Environmental Specifications

The system shall be able to withstand and operate at temperature extremes of -40 deg F to +122 deg F.

The system shall be designed and constructed to withstand 178 Km/h (110 mph) wind loads in conformance with the requirements of the AASHTO publication, "Standard Specifications for Structural Supports of Highway Signs, Luminaries and Traffic Signals", 4th Edition 2001.

The LED Module shall meet the following environmental tests as specified in the ITE Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement:

Mechanical vibration: MIL-STD-883

Temperature cycling: MIL-STD-883

Moisture resistance: MIL-STD-810F.

Electrical Standards

Integrated solar charger shall be approved to CSA and UL standards.

Quality Assurance

The product must be FCC certified to comply with all 47 CFR FCC Part 15 Subpart B Emission requirements.

The system, including battery pack, solar panel, LED module and all components, shall be guaranteed for a minimum of one year.

Manufacturer must be ISO 9001 certified.

Pedestrian, Bicycle and Equestrian Push Buttons

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

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

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

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

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

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

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

METHOD OF PAYMENT

The contract unit bid price paid per each for Solar Powered Pedestrian Crosswalk Flashing Beacon System With Equestrian and Pedestrian Push Buttons shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work necessary as specified in the Standard Specifications and these Special Provisions, as directed by the Engineer, and no additional compensation will be allowed therefor.

MISCELLANEOUS DIRECTED WORK:

Miscellaneous directed work shall consist of necessary work that is not included in other contract bid items, as determined by the Engineer. Miscellaneous directed work shall be performed as directed by the Engineer and in accordance with the applicable standards and specifications.

METHOD OF PAYMENT

Payment for implementing miscellaneous directed work will be paid for on a force account basis, in accordance with Section 9-1.03 of the Standard Specifications, up to the fixed bid price, for the work performed.

RANCHO CALIFORNIA MUNICIPAL WATER DISTRICT:

Relocate hydrants, relocate CP test station, relocate water meter, relocate water test station to grade, adjust water valves covers to grade, and furnish and install box culvert and manhole/catch

basin lining shall conform to the latest Rancho California Municipal Water District Standard Plans, the plans, these Special Provisions, and as directed by the Resident Engineer.

METHOD OF PAYMENT

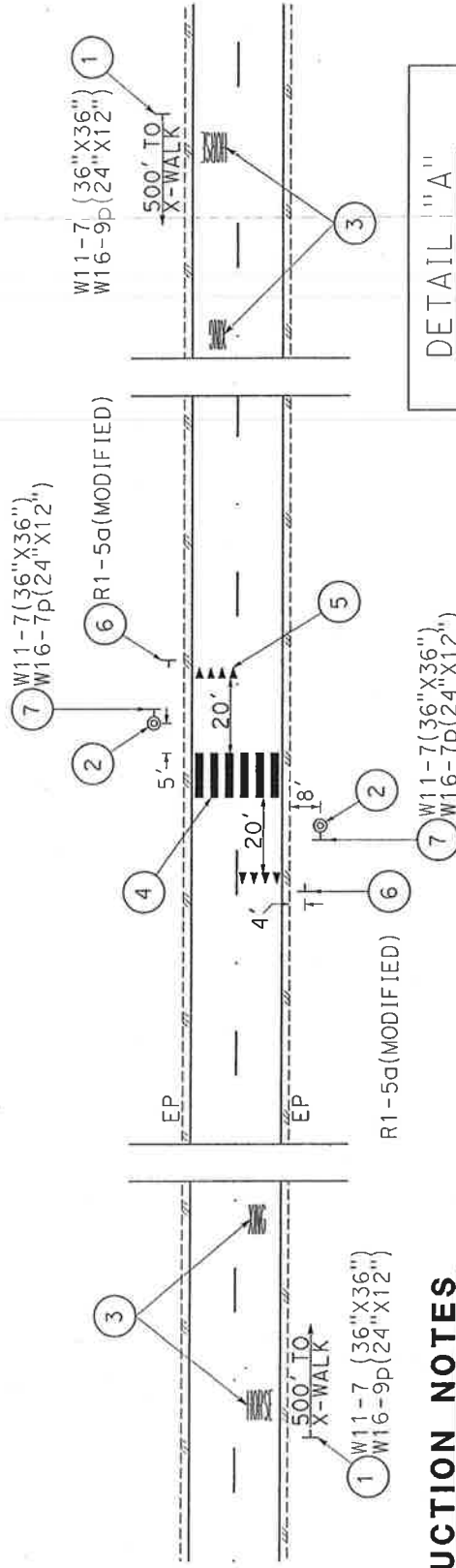
The contract unit bid prices paid per each for Relocate Hydrant, Relocate CP Test Station, Relocate Water Meter, Relocate Water Test Station to Grade, and Adjust Water Valve Cover to Grade; per linear foot for Furnish and Install Box Culvert Lining; and per square foot for Furnish and Install Manhole/ Catch Basin Lining, shall include full compensation for all labor, materials, tools, equipment, and incidentals, and for doing all the work involved and no additional compensation will be allowed therefor.

ATTACHMENTS

PROPOSED TRAFFIC CONTROL FOR EQUESTRIAN CROSSING ON RANCHO CALIFORNIA ROAD

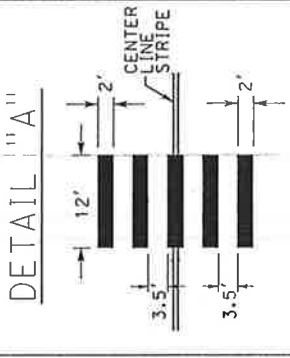


NO SCALE



CONSTRUCTION NOTES

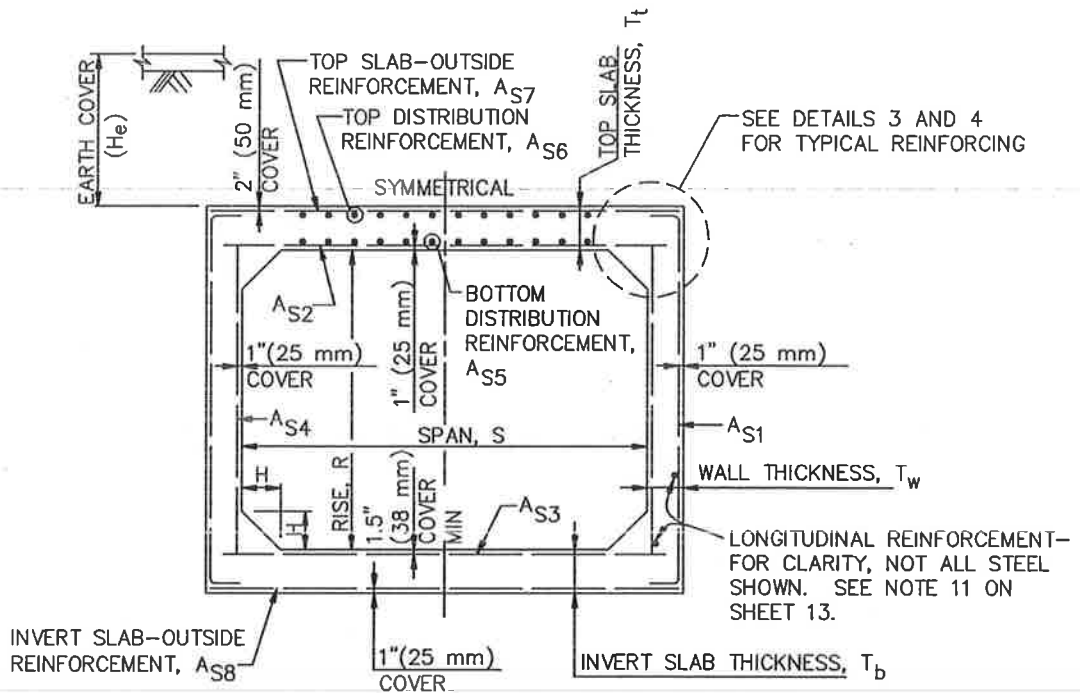
- 1 FURNISH AND INSTALL FLOURESCENT GREEN SIGN ON 2" SQUARE PERFORATED STEEL TUBE POST.
- 2 FURNISH AND INSTALL TYPE 1-A (14' ALUMINUM) POLE WITH EQUESTRIAN AND PEDESTRIAN PUSH BUTTONS LINKED TO SOLAR POWERED FLASHING BEACONS.
- 3 APPLY THERMOPLASTIC MARKINGS PER CALTRANS STD PLANS, A24D.
- 4 APPLY THERMOPLASTIC CROSSWALK PER DETAIL "A".
- 5 APPLY 4 EACH THERMOPLASTIC YIELD LINE MARKERS PER CALTRANS STD PLANS, A24E.
- 6 FURNISH AND INSTALL MODIFIED R1-5a (30" X 42") SIGN ON 2" SQUARE PERFORATED STEEL TUBE POST TO READ "YIELD HERE TO EQUESTRIANS".
- 7 FURNISH AND INSTALL FLOURESCENT GREEN SIGN ON POLE PER CALTRANS STD PLAN RS4.



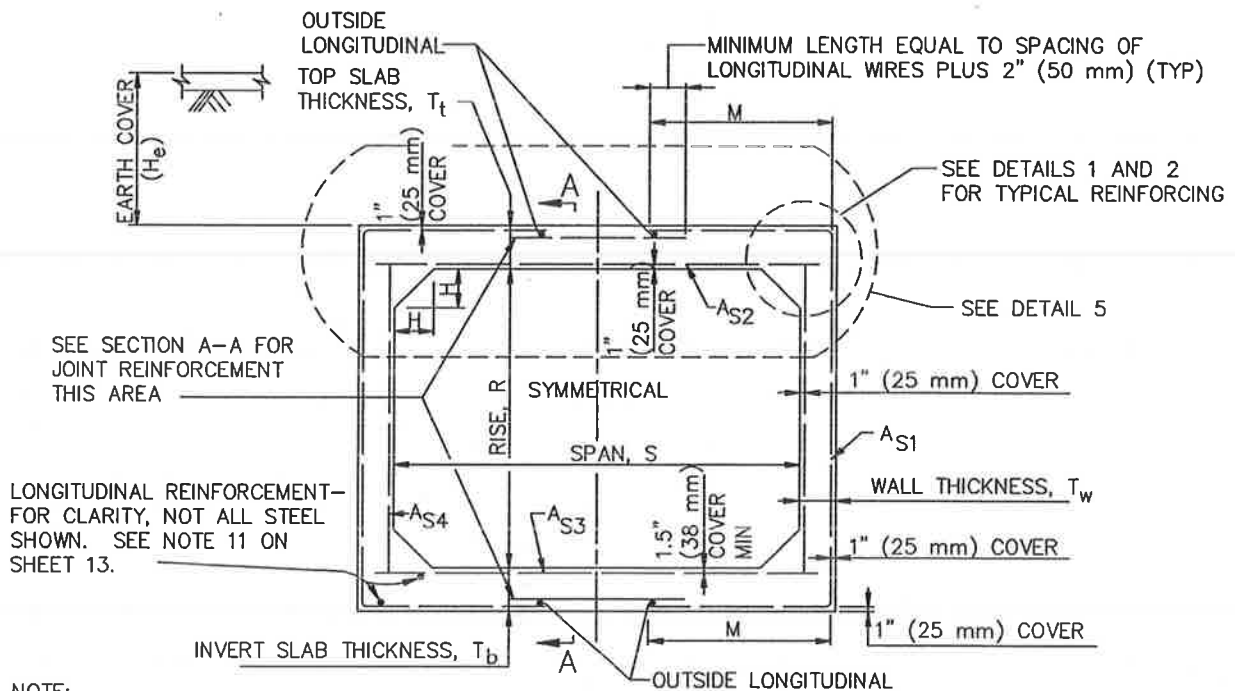
NOTE: MOUNT PEDESTRIAN PUSH BUTTON AT 3'-4" AND EQUESTRIAN PUSH BUTTON AT 7'.

NOTE: APPROXIMATE LOCATION IS 3200' EAST OF ANZA ROAD. THE FINAL LOCATION OF THE CROSSWALK IS TO BE DETERMINED AND APPROVED BY THE ENGINEER IN THE FIELD.

EXHIBIT "A"



EARTH COVER LESS THAN 24" (600 mm)



EARTH COVER 24" (610 mm) AND GREATER

TYPICAL BOX SECTIONS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS INC.
GREENBOOK COMMITTEE
ADOPTED 2008

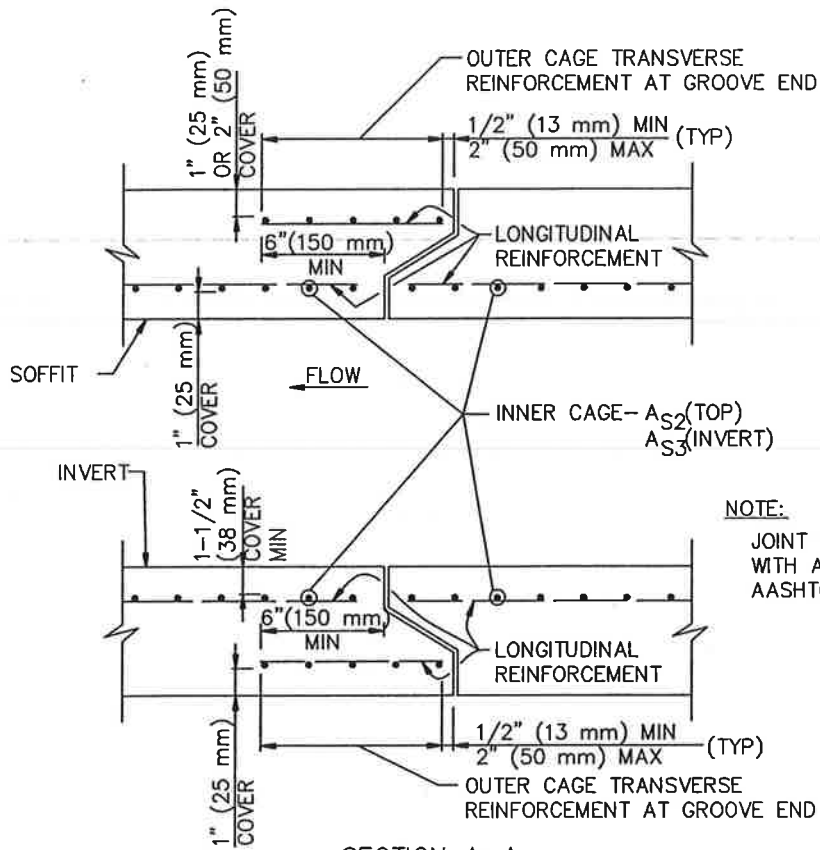
PRECAST REINFORCED CONCRETE BOX

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

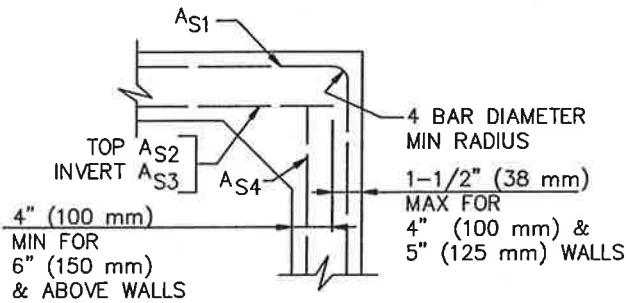
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SHEET 1 OF 42

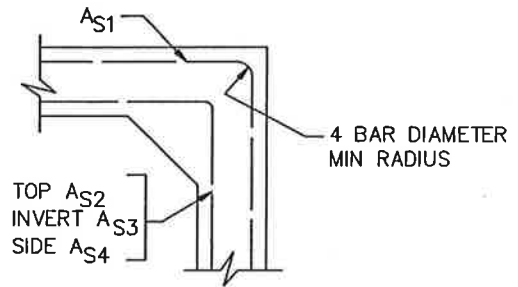


NOTE:
 JOINT SHALL CONFORM
 WITH ASTM C990 OR
 AASHTO M-198

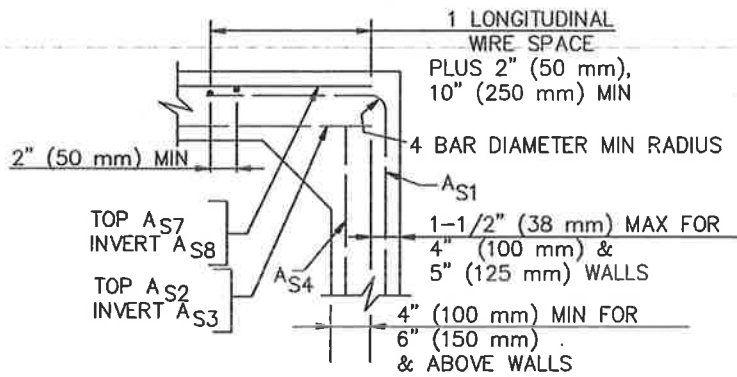
SECTION A-A
 TOP AND INVERT SLAB JOINT REINFORCEMENT



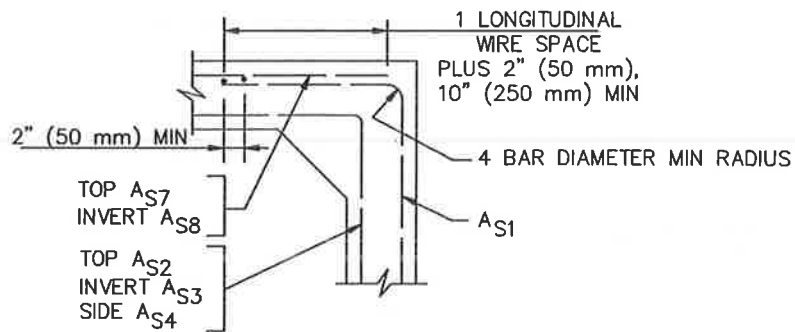
DETAIL 1
 INNER REINFORCEMENT



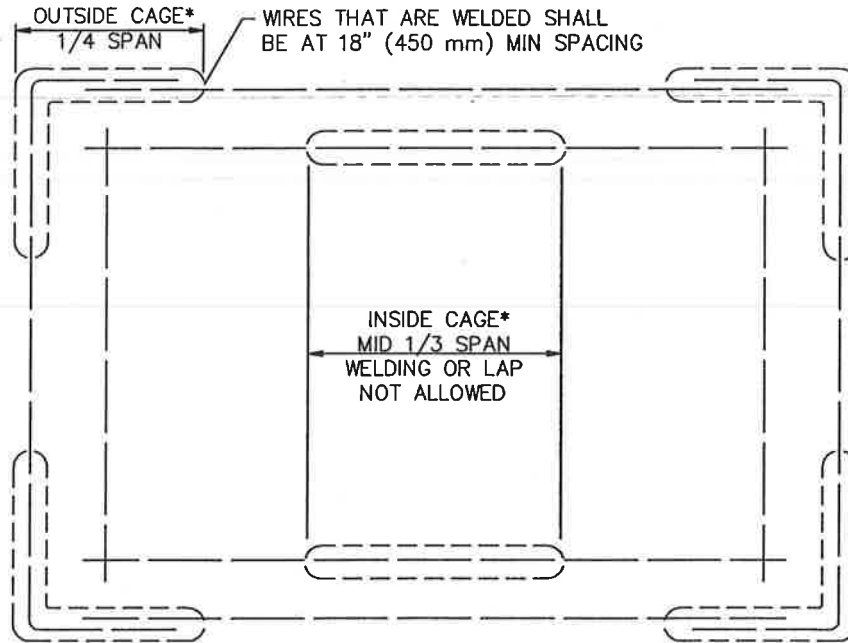
DETAIL 2
 OPTION



DETAIL 3
REINFORCEMENT ARRANGEMENT



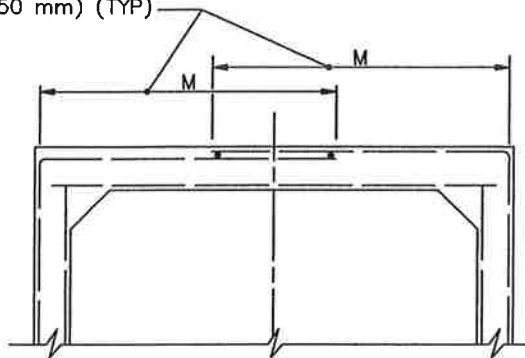
DETAIL 4
OPTION



CRITICAL ZONES OF HIGH STRESS
WHERE WELDING IS RESTRICTED

*INDICATES NO-SPLICE ZONES

MINIMUM LENGTH EQUAL TO
SPACING OF LONGITUDINAL
WIRES PLUS 2" (50 mm) (TYP)



DETAIL 5
OPTION

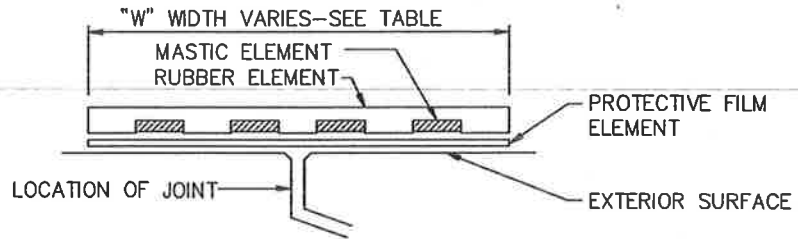
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 4 OF 42

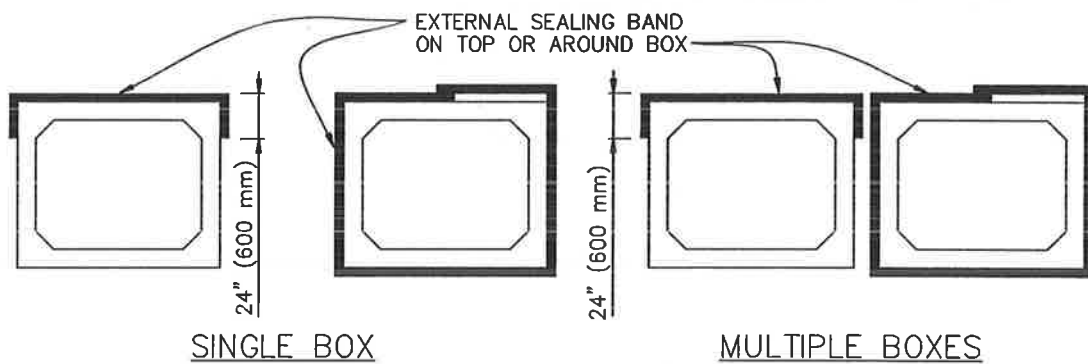


EXTERNAL SEALING BAND SCHEMATIC

TABLE			
SPAN, S		"W" EXTERNAL SEALING BAND WIDTH	
FT	(mm)	INCHES	(mm)
4-6	1200-1800	9	225
7-8	2100-2400	11	275
10-12	3000-3600	14	350

NOTES:

1. THE INSIDE SURFACE OF THE PRCB SOFFIT SHALL BE MARKED "TOP".
2. "W" MINIMUM SHALL EQUAL THE WALL THICKNESS.
"W" MAXIMUM SHALL BE 8" (200 mm) FOR SPANS THROUGH 8' (2400 mm) AND 14" (350 mm) FOR SPANS OVER 8' (2500 mm).
3. FOR EXTERNAL SEALING BAND APPLICATIONS SEE BELOW.



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

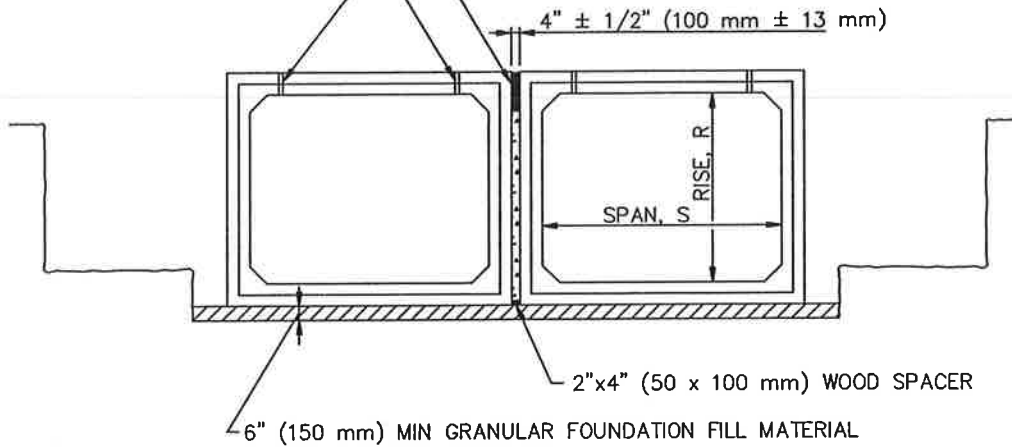
STANDARD PLAN

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SHEET 5 OF 42

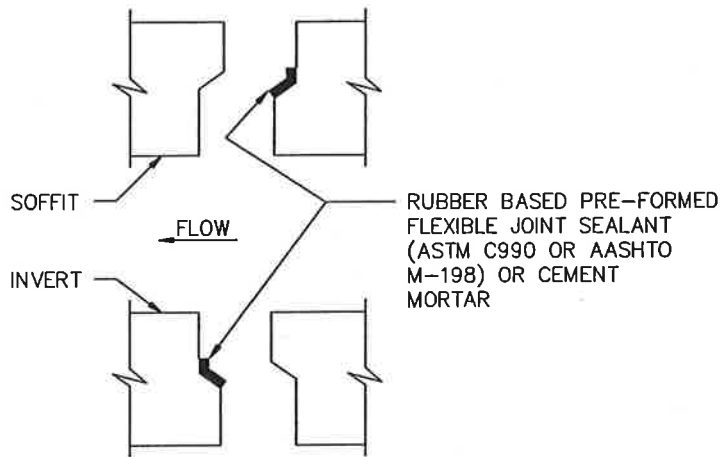
LIFTING HOLES, SIZE & LOCATION TO BE DETERMINED BY FABRICATOR

AT MULTIPLE CELL INSTALLATIONS, FILL GAP BETWEEN SECTIONS WITH EITHER FLOWABLE FILL GROUT OR SAND WITH AT LEAST THE TOP 2'- (600 mm) FILLED WITH FLOWABLE FILL GROUT



TYPICAL SECTION

SHOWS INSTALLATION OF MULTI-CELL LOCATIONS. SINGLE CELL INSTALLATION IS SIMILAR.



TYPICAL JOINT DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION









PRECAST REINFORCED CONCRETE BOX

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SHEET 6 OF 42

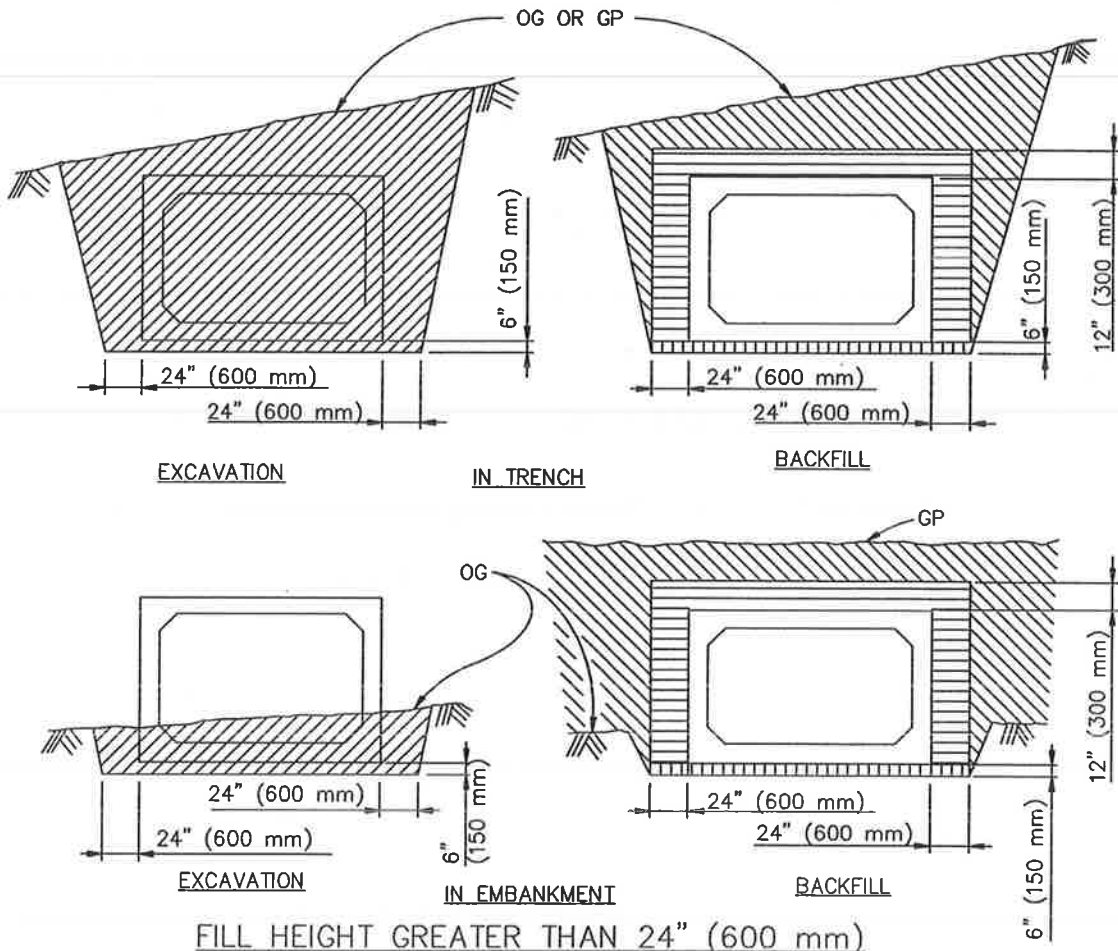
LEGEND

- | | |
|---|---|
|  STRUCTURE EXCAVATION |  LEVELING BED MATERIAL |
|  STRUCTURE BACKFILL
95% RELATIVE COMPACTION |  ROADWAY STRUCTURAL SECTION |
|  ROADWAY EMBANKMENT |  ORIGINAL GROUND |
|  SLURRY CEMENT BACKFILL |  FLOWABLE FILL GROUT
(SEE TYPICAL SECTION ON SHEET 6) |

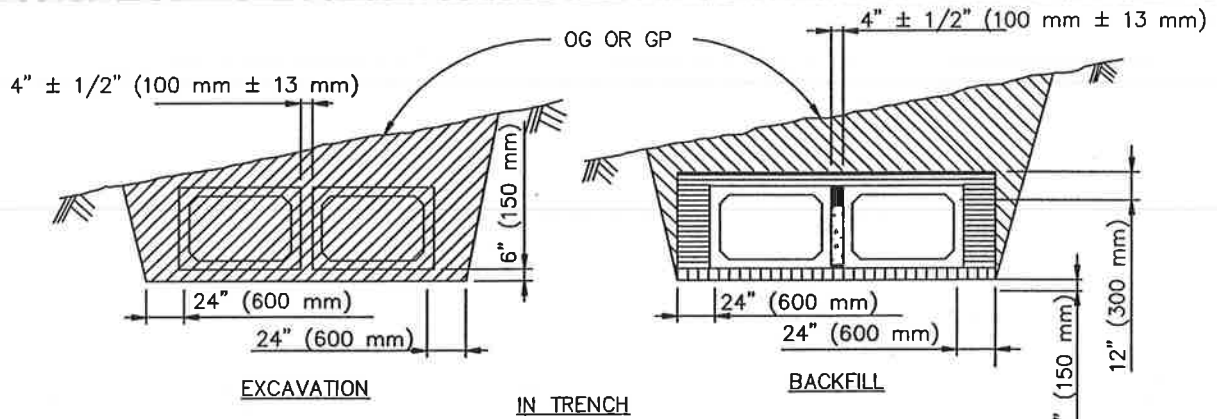
TYPICAL NOTES:

1. SLOPE OR SHORE EXCAVATION SIDES AS DETERMINED BY THE ENGINEER
2. DIMENSIONS SHOWN ARE MINIMUM.
3. CONSTRUCTION OF ROADWAY STRUCTURAL SECTION SHALL NOT DISTURB THE SEALING BAND INSTALLATION.

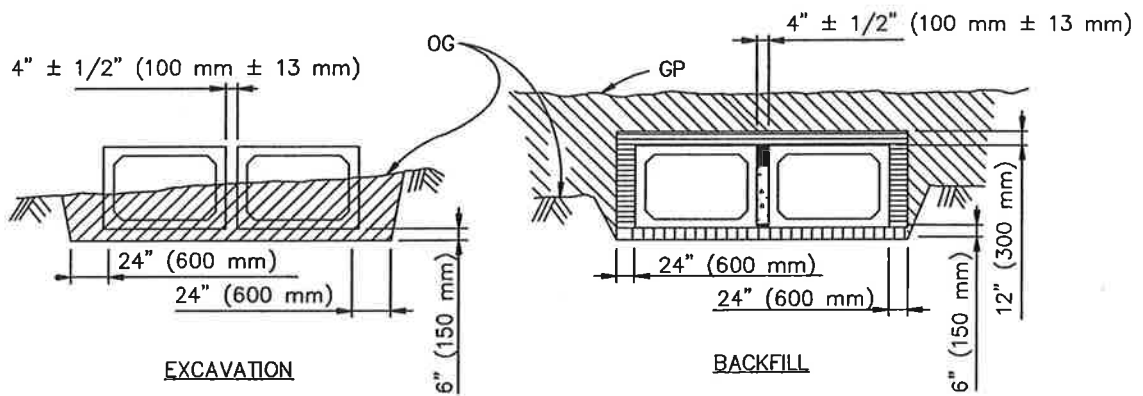
OG = ORIGINAL GROUND GP = GROUND PROFILE



EXCAVATION AND BACKFILL DETAILS 1



IN TRENCH



IN EMBANKMENT

FILL HEIGHT GREATER THAN 24" (600 mm)

EXCAVATION AND BACKFILL DETAILS 2

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7

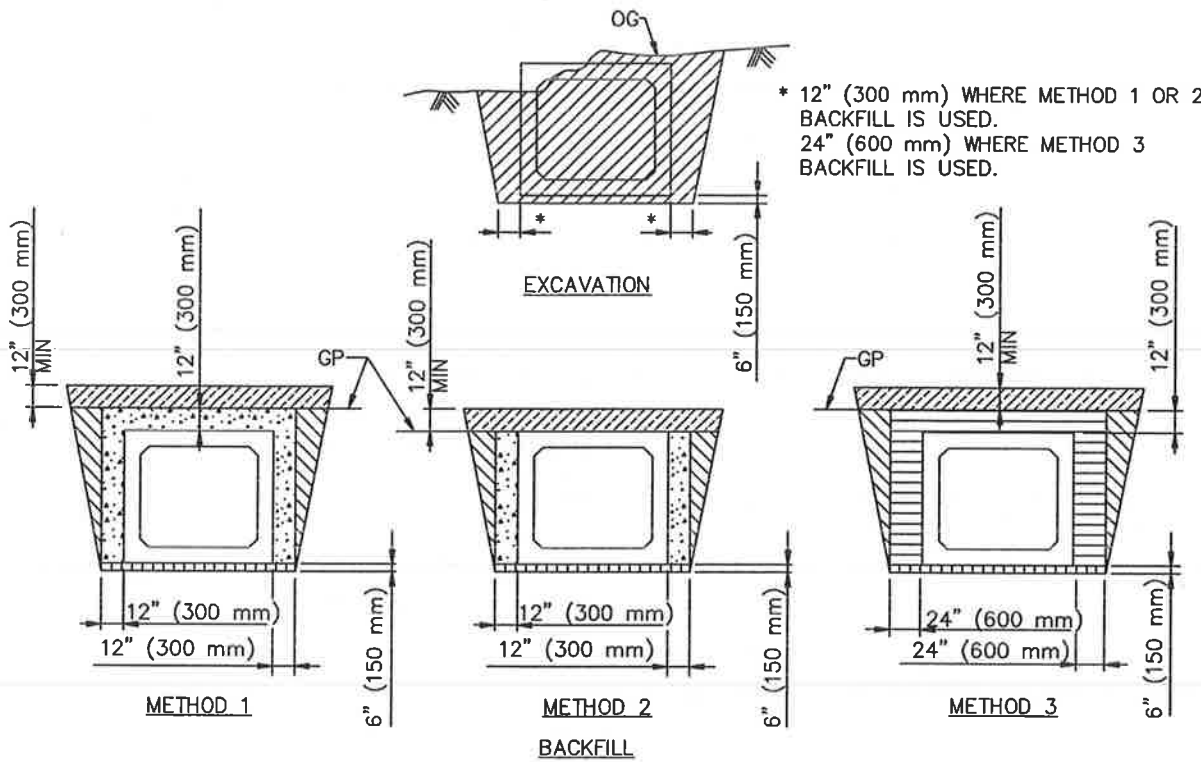
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

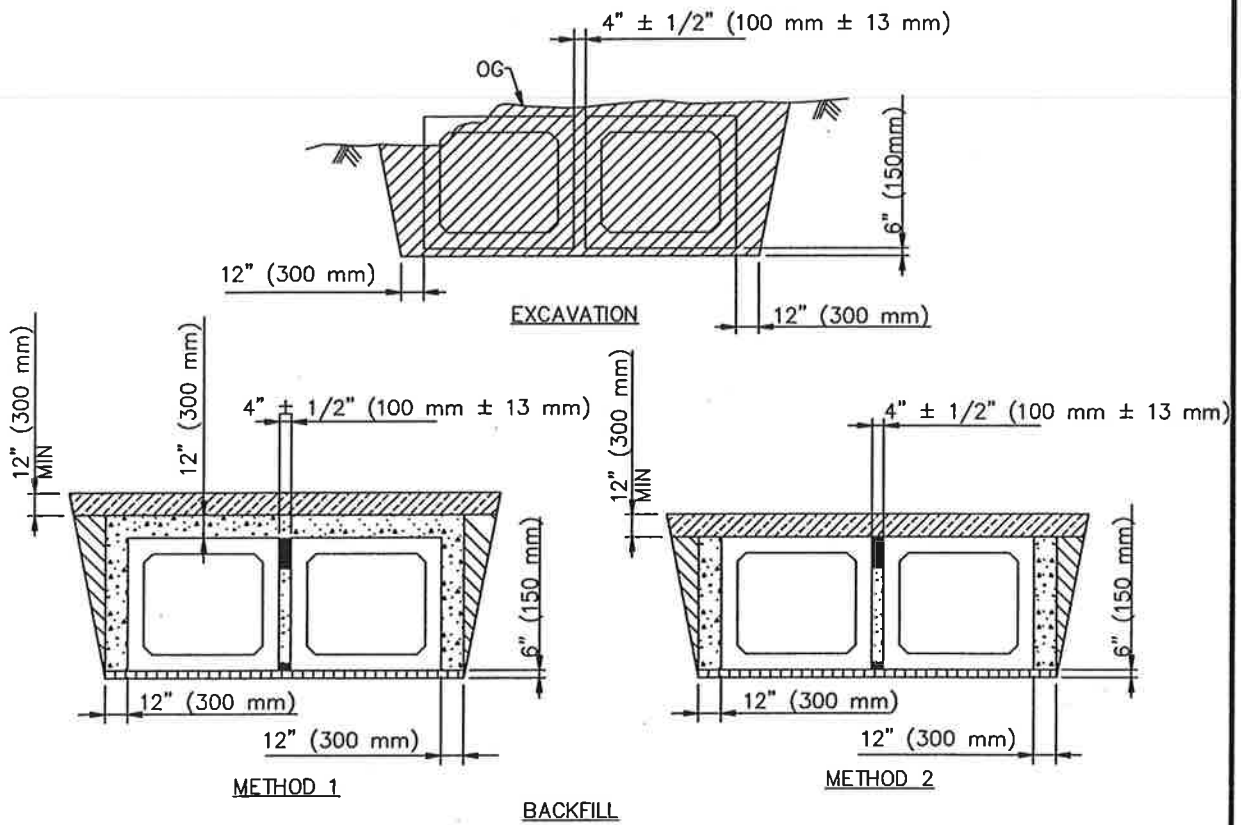
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SHEET 8 OF 42



FILL HEIGHT 24" (600 mm) OR LESS
EXCAVATION AND BACKFILL DETAILS 3

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7



FILL HEIGHT 24" (600 mm) OR LESS
EXCAVATION AND BACKFILL DETAILS 4

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7

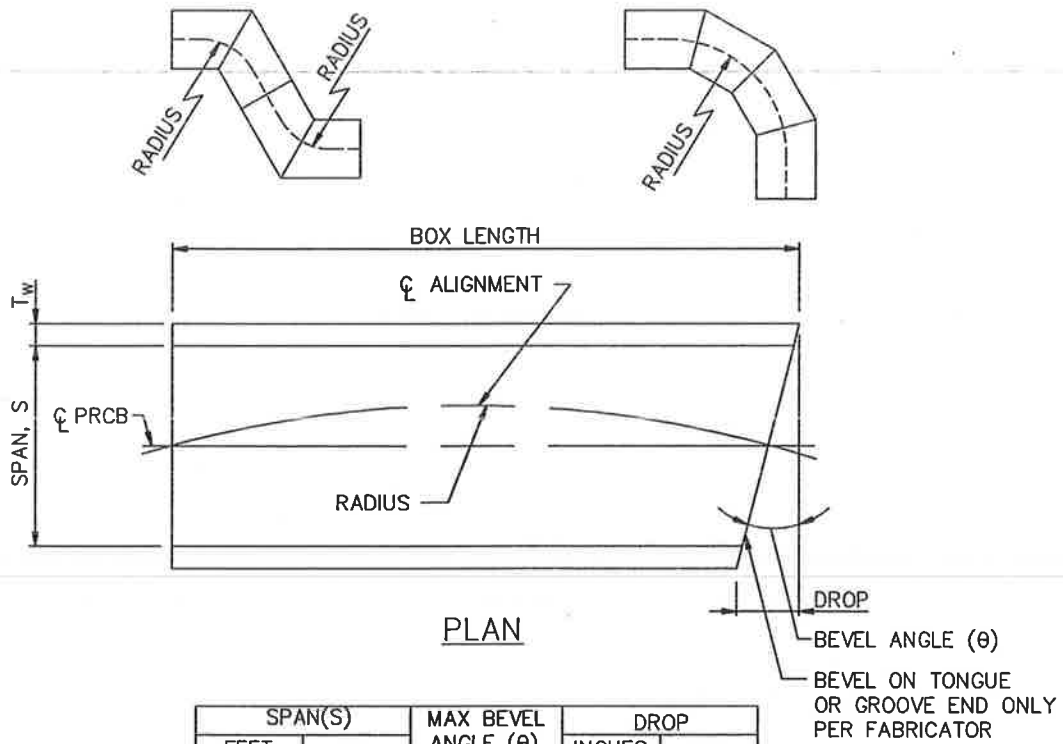
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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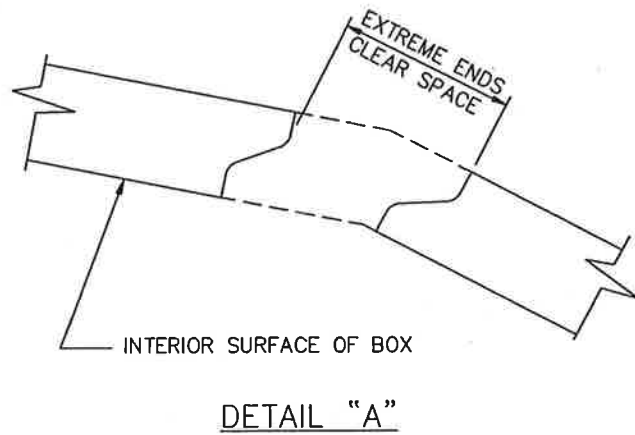
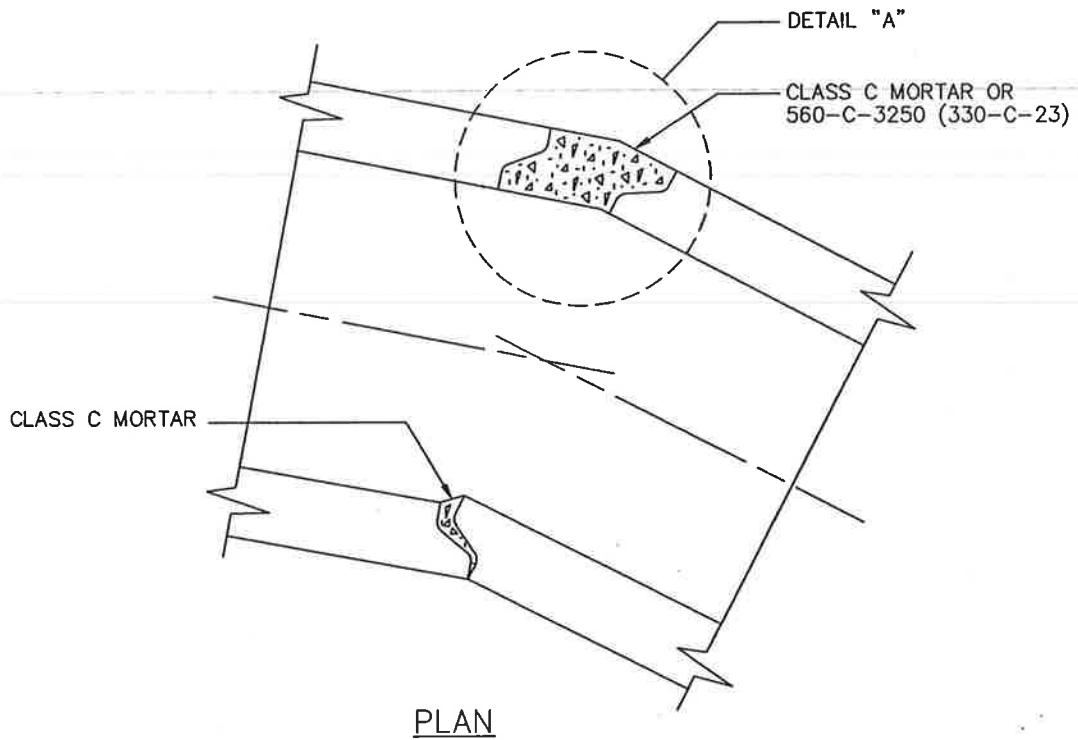
SHEET 10 OF 42



SPAN(S)		MAX BEVEL ANGLE (θ)	DROP	
FEET	mm		INCHES	mm
3	900	5	3.85	97
4	1200	5	5.07	125
5	1500	5	6.30	158
6	1800	5	7.52	188
7	2100	3	5.20	130
8	2400	3	5.87	147
9	2700	3	6.60	165
10	3000	3	7.33	183
11	3300	3	8.07	200
12	3600	3	8.80	220

SPAN(S)		BOX LENGTH		MIN RADIUS	
FEET	mm	FEET	mm	FEET	m
3 THROUGH 6	900 THROUGH 1800	4	1200	45	14
		6	1800	67.5	20.6
		8	2400	90	27
7 THROUGH 12	214 THROUGH 3600	4	1200	75	23
		6	1800	112.5	34.3
		8	2400	150	46

PRECAST REINFORCED CONCRETE BOX BEVELS



PRECAST REINFORCED CONCRETE BOX PULLED

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 12 OF 42

NOTES:

1. STEEL COVER SHALL BE FROM THE FACE OF THE BAR OR WIRE TO THE FACE OF THE CONCRETE.
2. STEEL COVER FROM THE TOP OF INVERT SLAB SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

VELOCITY		STEEL COVER		MINIMUM 28-DAY	
FPS	(m/s)	INCHES	(mm)	CONCRETE STRENGTH	
< 5	(< 1.5)	1.5	(38)	5,000 PSI	(35 MPa)
5 TO 20	(1.5 TO 6)	2.0	(50)	5,000 PSI	(35 MPa)
> 20 TO 40	(> 6 TO 12)	2.5	(63)	5,000 PSI	(35 MPa)
> 40	(> 12)	NOT ALLOWED		NOT ALLOWED	

FPS: FEET PER SECOND
m/s: METERS PER SECOND

3. STEEL COVER FROM THE TOP OF INVERT SLAB MAY BE INCREASED FOR PRCB SUBJECT TO THE ACTION OF SEAWATER, HARMFUL GROUNDWATER, OR APPRECIABLE DEBRIS FLOWS.
4. STEEL COVER GREATER THAN 2.5" (63 mm) MAY RESULT IN DELAMINATION OF CONCRETE. SEE THE PLANS FOR SACRIFICIAL STEEL TO PREVENT SLABBING WHEN THE STEEL COVER EXCEEDS 2.5" (63 mm).
5. PRCB SHALL NOT BE PERMITTED WHEN THE MAXIMUM GROUND WATER TABLE IS LOCATED 1' (300 mm) BELOW THE BOTTOM OF INVERT OR HIGHER, OR THE HYDRAULIC GRADE LINE IS MORE THAN 4' (1200 mm) ABOVE THE SOFFIT.
6. PRCB WITH RISE LARGER THAN 12' (3600 mm) AND SPAN GREATER THAN 12' (3600 mm) SPAN TO 24' (7200 mm), MUST HAVE A SPECIAL DESIGN SUBMITTED FOR REVIEW AND ARE SUBJECT TO APPROVAL BY THE ENGINEER.
7. THE DESIGN TABLES IN THIS STANDARD PLAN DO NOT ACCOUNT FOR TEMPERATURE VARIATIONS, UNBALANCED LATERAL LOADS, RAILROAD LOADING OR LOADING DUE TO OTHER TEMPORARY OR PERMANENT STRUCTURES. SPECIAL DESIGN FOR THESE LOADS, IF APPLICABLE, MUST BE SUBMITTED FOR REVIEW AND ARE SUBJECT TO APPROVAL BY THE ENGINEER.
8. DESIGN CRITERIA: AASHTO SPECIFICATIONS FOR HIGHWAY BRIDGES, CURRENT LFD EDITION, EXCEPT THE LOAD FACTOR FOR DEAD LOAD (β_D) AND EARTH PRESSURE (β_E) = 1.4
9. IF STEEL BARS GRADE 60 (GRADE 420) ARE USED IN LIEU OF WELDED WIRE REINFORCEMENT, THE STEEL AREAS PRESENTED SHALL BE INCREASED TO ACCOUNT FOR THE DIFFERENCES IN STEEL YIELD STRENGTH, STEEL SPACING, CONCRETE COVER, AND CRACK CONTROL.
10. THE JOINTS OF THE SECTIONS SHALL BE OF SUCH DESIGN THAT THEY WILL WITHSTAND THE FORCES CAUSED BY THE COMPRESSION OF THE SEALANT WHEN JOINED, WITHOUT CRACKING OR FRACTURING WHEN TESTED.
11. LONGITUDINAL STEEL SHALL HAVE AN AREA OF AT LEAST 40 PERCENT OF THE TRANSVERSE STEEL AND 8" (200 mm) MAXIMUM SPACING.
12. THE INSIDE TRANSVERSE REINFORCEMENT SHALL EXTEND INTO THE TONGUE PORTION OF THE JOINT AND THE OUTSIDE TRANSVERSE REINFORCEMENT SHALL EXTEND INTO THE GROOVE PORTION OF THE JOINT.
13. THE CLEAR DISTANCE OF THE END TRANSVERSE WIRES SHALL BE NOT LESS THAN 1/2" (12 mm) NOR MORE THAN 2 INCHES (50 mm) FROM THE ENDS OF THE PRCB SECTION.
14. REINFORCEMENT MAY BE ASSEMBLED USING ANY COMBINATION OF SINGLE OR MULTIPLE LAYERS OF WELDED-WIRE REINFORCEMENT.
15. A COMMON REINFORCEMENT UNIT MAY BE USED FOR BOTH A_{S2} (OR A_{S3}) AND A_{S4} AND ALSO FOR BOTH A_{S7} (OR A_{S8}) AND A_{S1} , WITH THE LARGEST AREA REQUIREMENT GOVERNING, BENDING THE REINFORCEMENT 90° AT THE CORNERS AND WAIVING THE EXTENSION REQUIREMENTS SHOWN IN DETAILS 1 THROUGH 4.
16. WHEN A SINGLE CAGE OF MULTIPLE TRANSVERSE STEEL IS USED FOR A_{S2} (OR A_{S3}) AND A_{S4} REINFORCEMENT, THE SLAB OR WALL REQUIRING THE LARGER STEEL AREA SHALL HAVE THIS ADDITIONAL TRANSVERSE STEEL EXTENDING THE FULL LENGTH OF THE SLAB OR WALL.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

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17. WELDED WIRE REINFORCEMENT SHALL BE COMPOSED OF TRANSVERSE AND LONGITUDINAL WIRES WITH SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE PRCB SECTION TO MAINTAIN THE SHAPE AND POSITION OF REINFORCEMENT.
18. THE ENDS OF THE LONGITUDINAL DISTRIBUTION REINFORCEMENT SHALL NOT BE MORE THAN 2" (50 mm) FROM THE ENDS OF THE PRCB SECTION.
19. THE ENDS OF THE LONGITUDINALS, STIRRUPS, AND SPACERS USED TO POSITION THE REINFORCEMENT MAY BE EXPOSED TO CONTACT WITH FORMS.
20. THE OVERLAP MEASURED BETWEEN THE OUTERMOST LONGITUDINAL WIRES OF EACH WELDED WIRE REINFORCEMENT SHEET SHALL NOT BE LESS THAN THE SPACING OF THE LONGITUDINAL WIRES PLUS 2" (50 mm) NOR LESS THAN 10" (250 mm).
21. IF A_{S1} IS EXTENDED TO THE MIDDLE OF EITHER SLAB AND CONNECTED, WELDED SPLICES ARE ALLOWED IN THE CONNECTION.
22. WHEN USED, A_{S7} AND A_{S8} SHALL BE LAPPED WITH A_{S1} AS SHOWN ON DETAILS 3 AND 4.
23. SPLICES IN THE TRANSVERSE REINFORCEMENT SHALL BE MADE BY LAPPING. IF WELDS ARE MADE TO TRANSVERSE REINFORCEMENT, THEY SHALL BE MADE ONLY TO SELECTED TRANSVERSE WIRES THAT ARE NOT LESS THAN 18" (460 mm) APART ALONG THE LONGITUDINAL AXIS OF THE PRCB SECTION. ALSO, WHEN SPACERS ARE WELDED TO TRANSVERSE WIRES, THEY SHALL BE WELDED ONLY TO THE SELECTED TRANSVERSE WIRES.
24. THERE SHALL BE NO WELDING TO OTHER TRANSVERSE WIRES, EXCEPT A_{S4} MAY BE LAPPED AND WELDED AT ANY LOCATION OR CONNECTED BY WELDING AT THE CORNERS TO A_{S2} AND A_{S3} .
25. NO WELDS OR LAPS SHALL BE MADE TO A_{S2} OR A_{S3} TRANSVERSE WIRES IN THE MIDDLE THIRD OF THE SPAN.
26. WHEN DISTRIBUTION REINFORCEMENT IS TO BE FASTENED TO A CAGE BY WELDING, IT SHALL BE WELDED ONLY TO LONGITUDINAL WIRES AND ONLY NEAR THE ENDS OF THE PRCB SECTION.
27. THE SPACING CENTER TO CENTER OF THE TRANSVERSE WIRES SHALL BE NOT LESS THAN 2" (50 mm) NOR MORE THAN 4" (100 mm).
28. THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL BE NOT MORE THAN 8" (200 mm).
29. OUTER CAGE TRANSVERSE REINFORCEMENT AS SHOWN SHALL BE PLACED IN THE TOP AND BOTTOM SLABS AT THE GROOVE PORTION OF THE JOINT WHEN A_{S1} IS NOT CONTINUOUS OVER THE SPAN.
30. IF STEEL BARS (GRADE 60) ARE USED IN LIEU OF WELDED WIRE REINFORCEMENT, THE STEEL AREAS SHALL BE INCREASED TO ACCOUNT FOR THE DIFFERENCE IN STEEL YIELD STRENGTH, STEEL SPACING, CONCRETE COVER, AND CRACK CONTROL BETWEEN THE WELDED WIRE REINFORCEMENT AND STEEL BARS.
31. IN LIEU OF PERFORMING A SPECIAL DESIGN FOR THE SPECIFIC CASE WHERE THE ACTUAL HAUNCH DIMENSIONS ARE LARGER THAN THE STANDARD DIMENSIONS AND VERTICAL AND HORIZONTAL HAUNCH DIMENSIONS ARE EQUAL, THE A_{S1} STEEL AREA SHALL BE INCREASED 1 PERCENT FOR EVERY 5 PERCENT INCREASE IN THE HAUNCH DIMENSION OVER THAT SPECIFIED, AND A_{S2} AND A_{S3} SHALL BE REDUCED BY AN EQUAL PERCENTAGE.

NOTE:

SHEETS 16 TO 24 HAVE 1.5" (38 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.
 SHEETS 25 TO 33 HAVE 2.0" (50 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.
 SHEETS 34 TO 42 HAVE 2.5" (63 mm) OF STEEL COVER AT THE TOP OF INVERT SLAB.

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SPECIFIC CRITERIA USED FOR TABLES

MATERIAL PROPERTIES:

WELDED WIRE REINFORCEMENT,----- 65,000 PSI (450 MPa)
MINIMUM SPECIFIED YIELD STRESS

DEFORMED BARS,----- 60,000 PSI (420 MPa)
MINIMUM SPECIFIED YIELD STRESS

CONCRETE,----- 5,000 PSI (35 MPa)
MINIMUM SPECIFIED COMPRESSIVE STRENGTH

SOIL DATA:

UNIT WEIGHT----- 120 lbf/ft³ (20 kN/m³)

RATIO OF LATERAL TO VERTICAL PRESSURE----- 0.50 MAX TO 0.25 MIN
FROM WEIGHT TO EARTH

ADDITIONAL LATERAL PRESSURE FROM----- 700/H_e, lbf/ft² (10/H_e, kN/m²) OR
APPROACHING TRUCK WHEELS----- 800 lbf/ft² (39 kN/m²)

WHEN H_e < 1 FEET (300 mm), WHERE H_e = EARTH
COVER, FEET (mm)

EXTERNAL WATER TABLE----- BELOW BOX SECTION INVERT

SOIL STRUCTURE INTERACTION FACTOR----- 1.15

CAPACITY REDUCTION FACTORS (FROM AASHTO BRIDGE SPECIFICATIONS):

SHEAR ----- 0.90

AXIAL COMPRESSION COMBINED WITH BENDING----- 0.95

LOADING DATA:

LOAD FACTOR = $\alpha(\beta_D + \beta_L)$ ----- $\delta = 1.3$
 $\beta_D = 1.40$ FOR DEAD LOADS
 $\beta_L = 1.67$ FOR LIVE LOADS

TRUCK AXLE LOAD:

HS20 (MS18)----- 32,000 lbf (142 kN)

IMPACT (VARIABLE WITH DEPTH)----- 0 TO 30%
(FROM AASHTO BRIDGE SPECIFICATIONS):

UNIFORM INTERNAL PRESSURE----- 0.0

DEPTH OF WATER IN BOX SECTION----- EQUAL TO INSIDE HEIGHT

EXTERNAL GROUND WATER PRESSURE----- 0.0

STRUCTURAL ARRANGEMENT:

CONCRETE COVER OVER STEEL----- 1.0 INCH (25 mm)

TOP SLAB----- 1.0 INCH (25 mm) FOR FILL HEIGHT 2 FEET
(600 mm) AND GREATER, 2.0 INCHES (50 mm)
FOR FILL HEIGHTS UNDER 2 FEET (600 mm)

SLAB THICKNESS----- FOR FILL HEIGHTS GREATER THAN 2 FEET
(600 mm), 1/12 TIMES INSIDE SPAN PLUS 1.0
INCH (25 mm) UP TO 7-FOOT (2100 mm) SPAN,
1/12 INSIDE SPAN ABOVE 7-FOOT (2100 mm)
SPAN

SIDE WALL THICKNESS----- 1/12 TIMES INSIDE SPAN PLUS 1.0 INCH
(25 mm) UP TO 7-FOOT (2100 mm) SPAN,
1/12 INSIDE SPAN ABOVE 7-FOOT SPAN
(2100 mm)

MINIMUM HAUNCH DIMENSIONS----- VERTICAL AND HORIZONTAL DIMENSIONS BOTH
EQUAL TO WALL THICKNESS

TRANSVERSE WIRE SPACING----- 4.0 INCHES (100 mm) MAX

MINIMUM REINFORCING INSIDE FACE SLABS
AND SIDE WALLS, OUTSIDE FACE SIDE WALLS
AND CORNERS OF SLABS-----

0.002 x GROSS AREA

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SPAN, S		RISE, R		T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	T ₁₆	H					
FEET	(mm)	FEET	(mm)	INCHES	INCHES	BOTTOM	SIDE	TOP	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	HAUNCH				
AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)																	
3	(900)	2	(600)	7	(175)	6	(150)	4	(100)	0.17	(360)	0.38	(804)	0.23	(487)	0.10	(212)	0.22	(466)	0.17	(360)	0.17	(360)	0.14	(296)
3	(900)	3	(900)	7	(175)	6	(150)	4	(100)	0.17	(360)	0.40	(847)	0.25	(529)	0.10	(212)	0.23	(487)	0.17	(360)	0.17	(360)	0.14	(296)
4	(1200)	2	(600)	7.5	(190)	6	(150)	5	(125)	0.18	(381)	0.40	(847)	0.22	(466)	0.12	(254)	0.21	(445)	0.18	(381)	0.18	(381)	0.14	(296)
4	(1200)	3	(900)	7.5	(190)	6	(150)	5	(125)	0.18	(381)	0.45	(953)	0.26	(550)	0.12	(254)	0.23	(487)	0.18	(381)	0.18	(381)	0.14	(296)
4	(1200)	4	(1200)	7.5	(190)	6	(150)	5	(125)	0.18	(381)	0.47	(995)	0.28	(593)	0.12	(254)	0.25	(529)	0.18	(381)	0.18	(381)	0.14	(296)
5	(1500)	3	(900)	8	(200)	7	(175)	6	(150)	0.19	(402)	0.44	(931)	0.24	(508)	0.14	(296)	0.22	(466)	0.19	(402)	0.19	(402)	0.17	(360)
5	(1500)	4	(1200)	8	(200)	7	(175)	6	(150)	0.19	(402)	0.48	(1016)	0.27	(572)	0.14	(296)	0.24	(508)	0.19	(402)	0.19	(402)	0.17	(360)
5	(1500)	5	(1500)	8	(200)	7	(175)	6	(150)	0.19	(402)	0.50	(1059)	0.29	(614)	0.14	(296)	0.25	(529)	0.19	(402)	0.19	(402)	0.17	(360)
6	(1800)	3	(900)	8	(200)	7	(175)	7	(175)	0.23	(487)	0.45	(953)	0.22	(466)	0.17	(360)	0.22	(466)	0.19	(402)	0.19	(402)	0.17	(360)
6	(1800)	4	(1200)	8	(200)	7	(175)	7	(175)	0.19	(402)	0.49	(1037)	0.25	(529)	0.17	(360)	0.23	(487)	0.19	(402)	0.19	(402)	0.17	(360)
6	(1800)	5	(1500)	8	(200)	7	(175)	7	(175)	0.19	(402)	0.52	(1101)	0.28	(593)	0.17	(360)	0.25	(529)	0.19	(402)	0.19	(402)	0.17	(360)
6	(1800)	6	(1800)	8	(200)	7	(175)	7	(175)	0.19	(402)	0.54	(1143)	0.30	(635)	0.17	(360)	0.26	(550)	0.19	(402)	0.19	(402)	0.17	(360)
7	(2100)	4	(1200)	8	(200)	8	(200)	8	(200)	0.26	(550)	0.49	(1037)	0.25	(529)	0.19	(402)	0.23	(487)	0.19	(402)	0.19	(402)	0.19	(402)
7	(2100)	5	(1500)	8	(200)	8	(200)	8	(200)	0.23	(487)	0.52	(1101)	0.31	(656)	0.19	(402)	0.24	(508)	0.19	(402)	0.19	(402)	0.19	(402)
7	(2100)	6	(1800)	8	(200)	8	(200)	8	(200)	0.21	(445)	0.54	(1143)	0.33	(699)	0.19	(402)	0.26	(550)	0.19	(402)	0.19	(402)	0.19	(402)
7	(2100)	7	(2100)	8	(200)	8	(200)	8	(200)	0.19	(402)	0.56	(1186)	0.36	(762)	0.19	(402)	0.27	(572)	0.19	(402)	0.19	(402)	0.19	(402)
8	(2400)	4	(1200)	8	(200)	8	(200)	8	(200)	0.31	(656)	0.53	(1122)	0.32	(677)	0.19	(402)	0.25	(529)	0.19	(402)	0.19	(402)	0.19	(402)
8	(2400)	5	(1500)	8	(200)	8	(200)	8	(200)	0.28	(593)	0.57	(1207)	0.35	(741)	0.19	(402)	0.26	(550)	0.19	(402)	0.19	(402)	0.19	(402)
8	(2400)	6	(1800)	8	(200)	8	(200)	8	(200)	0.26	(550)	0.59	(1249)	0.37	(783)	0.19	(402)	0.28	(593)	0.22	(466)	0.19	(402)	0.19	(402)
8	(2400)	7	(2100)	8	(200)	8	(200)	8	(200)	0.24	(508)	0.62	(1313)	0.40	(847)	0.20	(423)	0.29	(614)	0.19	(402)	0.19	(402)	0.19	(402)
8	(2400)	8	(2400)	8	(200)	8	(200)	8	(200)	0.22	(466)	0.64	(1335)	0.42	(889)	0.24	(508)	0.30	(635)	0.19	(402)	0.19	(402)	0.19	(402)
9	(2700)	5	(1500)	9	(225)	9	(225)	9	(225)	0.29	(614)	0.53	(1122)	0.33	(699)	0.22	(466)	0.25	(529)	0.22	(466)	0.22	(466)	0.22	(466)
9	(2700)	6	(1800)	9	(225)	9	(225)	9	(225)	0.27	(572)	0.56	(1186)	0.35	(741)	0.22	(466)	0.26	(550)	0.22	(466)	0.22	(466)	0.22	(466)
9	(2700)	7	(2100)	9	(225)	9	(225)	9	(225)	0.25	(529)	0.58	(1228)	0.38	(804)	0.22	(466)	0.27	(572)	0.22	(466)	0.22	(466)	0.22	(466)

SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 600 mm)
 STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

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SPAN, S FEET (mm)	RISE, R FEET (mm)	T _{top} INCHES (mm)	T _{bottom} INCHES (mm)	T _{side} INCHES (mm)	H HAUNCH INCHES (mm)	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)								
						A _{S1}	A _{S2}	A _{S3}	A _{S4}	A _{S5}	A _{S6}	A _{S7}	A _{S8}	
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.41 (868)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	0.24 (508)	0.62 (1313)	0.44 (931)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.34 (720)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.37 (783)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.40 (847)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.43 (910)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.46 (974)	0.25 (529)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.49 (1037)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	0.37 (783)	0.44 (931)	0.33 (699)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.36 (762)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.39 (826)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.43 (910)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.46 (974)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.49 (1037)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.52 (1101)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.55 (1164)	0.30 (635)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.58 (1228)	0.38 (804)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)

SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 610 mm)

STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

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EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)			
	A _{S1}	A _{S2}	A _{S3}			A _{S4}	A _{S1}	A _{S2}		A _{S3}	A _{S4}	
3' x 2' x 4" (900 x 600 x 100 mm)												
3	0.13 (275)	0.21 (445)	0.26 (550)	0.10 (217)	31 (775)	3	(915)	* 0.17 (360)	0.25 (529)	0.28 (593)	0.12 (254)	38 (950)
5	0.10 (217)	0.10 (217)	0.11 (233)	0.10 (217)	31 (775)	5	(1525)	* 0.12 (254)	0.12 (254)	0.15 (318)	0.12 (254)	38 (950)
10	0.10 (217)	0.11 (233)	0.14 (296)	0.10 (217)	31 (775)	10	(3000)	* 0.12 (254)	0.15 (318)	0.19 (402)	0.12 (254)	38 (950)
15	0.10 (217)	0.16 (339)	0.20 (423)	0.10 (217)	31 (775)	15	(4500)	* 0.12 (254)	0.23 (489)	0.27 (572)	0.12 (254)	38 (950)
20	0.12 (254)	0.22 (466)	0.25 (529)	0.10 (217)	31 (775)	20	(6000)	* 0.16 (339)	0.30 (635)	0.36 (762)	0.12 (254)	38 (950)
25	0.16 (339)	0.28 (593)	0.35 (741)	0.10 (217)	31 (775)	25	(7500)	* 0.20 (423)	0.38 (804)	0.46 (974)	0.12 (254)	38 (950)
3' x 3' x 4" (900 x 900 x 100 mm)												
3	0.10 (217)	0.25 (529)	0.31 (656)	0.10 (217)	31 (775)	3	(915)	* 0.14 (296)	0.31 (656)	0.32 (677)	0.12 (254)	38 (950)
5	0.10 (217)	0.11 (233)	0.12 (254)	0.10 (217)	31 (775)	5	(1525)	* 0.12 (254)	0.17 (360)	0.15 (318)	0.12 (254)	38 (950)
10	0.10 (217)	0.11 (233)	0.14 (296)	0.10 (217)	31 (775)	10	(3000)	* 0.12 (254)	0.15 (318)	0.19 (402)	0.12 (254)	38 (950)
15	0.10 (217)	0.16 (339)	0.21 (445)	0.10 (217)	31 (775)	15	(4500)	* 0.12 (254)	0.22 (466)	0.27 (572)	0.12 (254)	38 (950)
20	0.10 (217)	0.22 (466)	0.28 (593)	0.10 (217)	31 (775)	20	(6000)	* 0.13 (275)	0.30 (635)	0.36 (762)	0.12 (254)	38 (950)
25	0.11 (233)	0.28 (593)	0.36 (762)	0.10 (217)	31 (775)	25	(7500)	* 0.16 (339)	0.38 (804)	0.46 (974)	0.12 (254)	38 (950)
4' x 2' x 5" (1200 x 600 x 125 mm)												
3	0.21 (445)	0.23 (489)	0.23 (489)	0.12 (254)	38 (950)	3	(915)	0.21 (445)	0.29 (614)	0.25 (529)	0.14 (296)	45 (1125)
5	0.12 (254)	0.12 (254)	0.13 (275)	0.12 (254)	38 (950)	5	(1525)	0.14 (296)	0.15 (318)	0.17 (360)	0.14 (296)	36 (900)
10	0.12 (254)	0.14 (296)	0.16 (339)	0.12 (254)	38 (950)	10	(3000)	0.14 (296)	0.18 (381)	0.22 (466)	0.14 (296)	36 (900)
15	0.16 (339)	0.20 (423)	0.24 (508)	0.12 (254)	38 (950)	15	(4500)	0.18 (381)	0.27 (572)	0.32 (677)	0.14 (296)	35 (875)
20	0.22 (466)	0.27 (572)	0.32 (677)	0.12 (254)	38 (950)	20	(6000)	0.25 (529)	0.36 (762)	0.42 (889)	0.14 (296)	35 (875)
25	0.28 (593)	0.34 (720)	0.40 (847)	0.12 (254)	38 (950)	25	(7500)	* 0.32 (677)	0.46 (974)	0.53 (1122)	0.14 (296)	35 (875)
5' x 3' x 6" (1500 x 900 x 150 mm)												

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

390-0

SHEET 18 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
5' x 4' x 6" (1500 x 1200 x 150 mm)											
3 (915)	0.18 (381)	0.33 (699)	0.28 (593)	0.14 (296)	45 (1125)	3 (915)	0.22 (466)	0.33 (699)	0.27 (572)	0.17 (360)	43 (1075)
5 (1525)	0.14 (296)	0.16 (339)	0.19 (402)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.18 (381)	0.21 (445)	0.17 (360)	40 (1000)
10 (3000)	0.14 (296)	0.20 (423)	0.24 (508)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.22 (466)	0.27 (572)	0.17 (360)	39 (975)
15 (4500)	0.15 (318)	0.29 (614)	0.34 (720)	0.14 (296)	35 (875)	15 (4500)	0.21 (445)	0.33 (699)	0.39 (826)	0.17 (360)	38 (950)
20 (6000)	0.20 (423)	0.39 (826)	0.45 (953)	0.14 (296)	35 (875)	20 (6000)	0.28 (593)	0.44 (931)	0.50 (1059)	0.17 (360)	38 (950)
25 (7500) *	0.25 (529)	0.49 (1037)	0.57 (1207)	0.14 (296)	35 (875)	25 (7500) *	0.35 (741)	0.56 (1186)	0.64 (1335)	0.17 (360)	38 (950)
5' x 5' x 6" (1500 x 1500 x 150 mm)											
3 (915)	0.16 (339)	0.35 (741)	0.31 (656)	0.14 (296)	45 (1125)	3 (915)	0.19 (402)	0.36 (762)	0.30 (635)	0.17 (360)	52 (1300)
5 (1525)	0.14 (296)	0.17 (360)	0.20 (423)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.20 (423)	0.23 (487)	0.17 (360)	43 (1075)
10 (3000)	0.14 (296)	0.20 (423)	0.25 (529)	0.14 (296)	45 (1125)	10 (3000)	0.17 (360)	0.24 (508)	0.29 (614)	0.17 (360)	39 (975)
15 (4500)	0.14 (296)	0.29 (614)	0.35 (741)	0.14 (296)	36 (900)	15 (4500)	0.18 (381)	0.35 (741)	0.42 (889)	0.17 (360)	38 (950)
20 (6000)	0.17 (360)	0.39 (826)	0.46 (974)	0.14 (296)	35 (875)	20 (6000)	0.24 (508)	0.47 (995)	0.54 (1143)	0.17 (360)	38 (950)
25 (7500) *	0.21 (445)	0.49 (1037)	0.58 (1228)	0.14 (296)	35 (875)	25 (7500) *	0.30 (635)	0.59 (1249)	0.68 (1439)	0.17 (360)	38 (950)
6' x 3' x 7" (1800 x 900 x 175 mm)											
3 (915)	0.24 (508)	0.29 (614)	0.24 (508)	0.17 (360)	43 (1075)	3 (915)	0.17 (360)	0.38 (804)	0.32 (677)	0.17 (360)	52 (1300)
5 (1525)	0.17 (360)	0.17 (360)	0.16 (339)	0.17 (360)	40 (1000)	5 (1525)	0.17 (360)	0.20 (423)	0.24 (508)	0.17 (360)	52 (1300)
10 (3000)	0.17 (360)	0.21 (445)	0.25 (529)	0.17 (360)	39 (975)	10 (3000)	0.17 (360)	0.23 (487)	0.29 (614)	0.17 (360)	43 (1075)
15 (4500)	0.25 (529)	0.31 (656)	0.36 (762)	0.17 (360)	38 (950)	15 (4500)	0.17 (360)	0.34 (720)	0.41 (868)	0.17 (360)	39 (975)
20 (6000)	0.34 (720)	0.41 (868)	0.47 (995)	0.17 (360)	38 (950)	20 (6000)	0.21 (445)	0.46 (974)	0.54 (1143)	0.17 (360)	38 (950)
25 (7500) *	0.44 (931)	0.52 (1101)	0.58 (1228)	0.17 (360)	38 (950)	25 (7500) *	0.27 (572)	0.58 (1228)	0.67 (1418)	0.17 (360)	38 (950)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

390-0

SHEET 19 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
7' x 4' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.24 (508)	0.33 (699)	0.33 (699)	0.19 (402)	47 (1175)	3 (915)	0.19 (402)	0.41 (868)	0.41 (868)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.21 (445)	0.24 (508)	0.19 (402)	43 (1075)	5 (1525)	0.19 (402)	0.25 (529)	0.30 (635)	0.19 (402)	59 (1475)
10 (3000)	0.19 (402)	0.26 (550)	0.31 (656)	0.19 (402)	43 (1075)	10 (3000)	0.19 (402)	0.29 (614)	0.36 (762)	0.19 (402)	47 (1175)
15 (4500)	0.28 (593)	0.38 (804)	0.44 (931)	0.19 (402)	41 (1025)	15 (4500)	0.20 (423)	0.42 (889)	0.50 (1058)	0.19 (402)	43 (1075)
20 (6000)	0.37 (783)	0.51 (1080)	0.57 (1207)	0.19 (402)	41 (1025)	20 (6000)	0.26 (550)	0.56 (1185)	0.65 (1376)	0.19 (402)	41 (1025)
25 (7500) *	0.47 (995)	0.64 (1355)	0.71 (1503)	0.19 (402)	41 (1025)	25 (7500) *	0.32 (677)	0.70 (1482)	0.80 (1693)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)											
3 (915)	0.22 (466)	0.36 (762)	0.36 (762)	0.19 (402)	59 (1475)	3 (915)	0.32 (677)	0.39 (826)	0.38 (804)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.23 (489)	0.26 (550)	0.19 (402)	43 (1075)	5 (1525)	0.22 (466)	0.26 (550)	0.29 (614)	0.19 (402)	45 (1125)
10 (3000)	0.19 (402)	0.28 (593)	0.33 (699)	0.19 (402)	43 (1075)	10 (3000)	0.28 (593)	0.33 (699)	0.39 (826)	0.19 (402)	45 (1125)
15 (4500)	0.24 (508)	0.41 (868)	0.48 (1016)	0.19 (402)	41 (1025)	15 (4500)	0.42 (889)	0.49 (1037)	0.56 (1185)	0.19 (402)	41 (1025)
20 (6000)	0.32 (677)	0.54 (1143)	0.62 (1312)	0.19 (402)	41 (1025)	20 (6000) *	0.57 (1207)	0.65 (1376)	0.73 (1545)	0.19 (402)	41 (1025)
25 (7500) *	0.40 (847)	0.68 (1438)	0.76 (1609)	0.19 (402)	41 (1025)	25 (7500) *	0.73 (1545)	0.83 (1757)	0.92 (1947)	0.19 (402)	41 (1025)
8' x 4' x 8" (2400 x 1200 x 200 mm)											
3 (915)	0.20 (423)	0.39 (826)	0.39 (826)	0.19 (402)	59 (1475)	3 (915)	0.28 (593)	0.42 (889)	0.42 (889)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.24 (508)	0.28 (593)	0.19 (402)	47 (1175)	5 (1525)	0.20 (423)	0.28 (593)	0.33 (699)	0.19 (402)	50 (1250)
10 (3000)	0.19 (402)	0.29 (614)	0.35 (741)	0.19 (402)	43 (1075)	10 (3000)	0.25 (529)	0.35 (741)	0.42 (889)	0.19 (402)	45 (1125)
15 (4500)	0.21 (445)	0.42 (889)	0.50 (1058)	0.19 (402)	41 (1025)	15 (4500)	0.37 (783)	0.52 (1101)	0.60 (1270)	0.19 (402)	41 (1025)
20 (6000)	0.28 (593)	0.55 (1164)	0.64 (1355)	0.19 (402)	41 (1025)	20 (6000) *	0.49 (1037)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)
25 (7500) *	0.35 (741)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)	25 (7500) *	0.63 (1334)	0.89 (1884)	1.00 (2117)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.20 (423)	0.39 (826)	0.39 (826)	0.19 (402)	59 (1475)	3 (915)	0.28 (593)	0.42 (889)	0.42 (889)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.24 (508)	0.28 (593)	0.19 (402)	47 (1175)	5 (1525)	0.20 (423)	0.28 (593)	0.33 (699)	0.19 (402)	50 (1250)
10 (3000)	0.19 (402)	0.29 (614)	0.35 (741)	0.19 (402)	43 (1075)	10 (3000)	0.25 (529)	0.35 (741)	0.42 (889)	0.19 (402)	45 (1125)
15 (4500)	0.21 (445)	0.42 (889)	0.50 (1058)	0.19 (402)	41 (1025)	15 (4500)	0.37 (783)	0.52 (1101)	0.60 (1270)	0.19 (402)	41 (1025)
20 (6000)	0.28 (593)	0.55 (1164)	0.64 (1355)	0.19 (402)	41 (1025)	20 (6000) *	0.49 (1037)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)
25 (7500) *	0.35 (741)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)	25 (7500) *	0.63 (1334)	0.89 (1884)	1.00 (2117)	0.19 (402)	41 (1025)

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)											
3 (915)	0.25 (529)	0.45 (953)	0.45 (953)	0.19 (402)	55 (1375)	3 (915)	0.34 (720)	0.44 (931)	0.58 (1228)	0.22 (466)	54 (1350)
5 (1525)	0.19 (402)	0.30 (635)	0.35 (741)	0.19 (402)	50 (1250)	5 (1525)	0.24 (508)	0.30 (635)	0.35 (741)	0.22 (466)	49 (1225)
10 (3000)	0.23 (489)	0.37 (783)	0.45 (953)	0.19 (402)	45 (1125)	10 (3000)	0.30 (635)	0.38 (804)	0.46 (974)	0.22 (466)	49 (1225)
15 (4500)	0.33 (699)	0.55 (1164)	0.63 (1334)	0.19 (402)	41 (1025)	15 (4500)	0.44 (931)	0.56 (1185)	0.62 (1312)	0.22 (466)	44 (1100)
20 (6000) *	0.44 (931)	0.73 (1545)	0.83 (1757)	0.19 (402)	41 (1025)	20 (6000) *	0.59 (1249)	0.75 (1588)	0.85 (1799)	0.22 (466)	44 (1100)
25 (7500) *	0.56 (1185)	0.93 (1969)	1.05 (2223)	0.19 (402)	41 (1025)	25 (7500) *	0.76 (1609)	0.95 (2011)	1.05 (2223)	0.22 (466)	44 (1100)
8' x 7' x 8" (2400 x 2100 x 200 mm)											
3 (915)	0.23 (489)	0.47 (995)	0.49 (1037)	0.19 (402)	66 (1650)	3 (915)	0.37 (783)	0.47 (995)	0.52 (1101)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.31 (656)	0.37 (783)	0.19 (402)	55 (1375)	5 (1525)	0.22 (466)	0.32 (677)	0.37 (783)	0.22 (466)	54 (1350)
10 (3000)	0.21 (445)	0.38 (804)	0.46 (974)	0.19 (402)	45 (1125)	10 (3000)	0.24 (508)	0.40 (847)	0.49 (1037)	0.22 (466)	49 (1225)
15 (4500)	0.30 (635)	0.56 (1185)	0.65 (1376)	0.19 (402)	41 (1025)	15 (4500)	0.40 (847)	0.59 (1249)	0.69 (1461)	0.22 (466)	44 (1100)
20 (6000) *	0.40 (847)	0.75 (1588)	0.86 (1821)	0.19 (402)	41 (1025)	20 (6000) *	0.53 (1122)	0.79 (1672)	0.89 (1884)	0.22 (466)	44 (1100)
25 (7500) *	0.51 (1080)	0.95 (2011)	1.08 (2286)	0.19 (402)	41 (1025)	25 (7500) *	0.68 (1438)	1.00 (2117)	1.12 (2371)	0.22 (466)	44 (1100)
8' x 8' x 8" (2400 x 2400 x 200 mm)											
3 (915)	0.22 (466)	0.49 (1037)	0.52 (1101)	0.19 (402)	65 (1625)	3 (915)	0.28 (593)	0.49 (1037)	0.53 (1122)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.33 (699)	0.39 (826)	0.19 (402)	65 (1625)	5 (1525)	0.22 (466)	0.34 (720)	0.40 (847)	0.22 (466)	54 (1350)
10 (3000)	0.20 (423)	0.39 (826)	0.48 (1016)	0.19 (402)	50 (1250)	10 (3000)	0.25 (529)	0.42 (889)	0.51 (1080)	0.22 (466)	49 (1225)
15 (4500)	0.29 (614)	0.56 (1185)	0.66 (1397)	0.19 (402)	45 (1125)	15 (4500)	0.36 (762)	0.61 (1291)	0.72 (1524)	0.22 (466)	44 (1100)
20 (6000) *	0.38 (804)	0.75 (1588)	0.87 (1482)	0.19 (402)	45 (1125)	20 (6000) *	0.48 (1016)	0.82 (1736)	0.93 (1969)	0.22 (466)	44 (1100)
25 (7500) *	0.48 (1016)	0.95 (2011)	1.09 (2308)	0.19 (402)	45 (1125)	25 (7500) *	0.61 (1291)	1.04 (2202)	1.17 (2477)	0.22 (466)	44 (1100)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

390-0

SHEET 21 OF 42

EARTH COVER MORE THAN 2' (610 mm) STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
9' x 8' x 9" (2700 x 2400 x 225 mm)											
3 (915)	0.26 (550)	0.51 (1080)	0.57 (1207)	0.22 (466)	72 (1800)	3 (915)	0.35 (741)	0.49 (1037)	0.52 (1101)	0.24 (508)	58 (1450)
5 (1525)	0.22 (466)	0.35 (741)	0.42 (889)	0.22 (466)	59 (1475)	5 (1525)	0.26 (550)	0.34 (720)	0.40 (868)	0.24 (508)	52 (1300)
10 (3000)	0.24 (508)	0.43 (910)	0.53 (1122)	0.22 (466)	54 (1350)	10 (3000)	0.32 (677)	0.44 (931)	0.52 (1101)	0.24 (508)	52 (1300)
15 (4500)	0.34 (720)	0.63 (1334)	0.74 (1566)	0.22 (466)	44 (1100)	15 (4500)	0.47 (995)	0.64 (1355)	0.74 (1566)	0.24 (508)	47 (1175)
20 (6000) *	0.45 (953)	0.83 (1757)	0.95 (2011)	0.22 (466)	44 (1100)	20 (6000) *	0.63 (1334)	0.85 (1799)	0.96 (2032)	0.24 (508)	47 (1175)
25 (7500) *	0.57 (1207)	1.05 (2223)	1.19 (2519)	0.22 (466)	44 (1100)	25 (7500) *	0.80 (1693)	1.07 (2265)	1.18 (2498)	0.24 (508)	47 (1175)
9' x 9' x 9" (2700 x 2700 x 225 mm)											
3 (915)	0.25 (529)	0.53 (1122)	0.60 (1270)	0.22 (466)	72 (1800)	3 (915)	0.32 (677)	0.51 (1080)	0.56 (1185)	0.24 (508)	64 (1600)
5 (1525)	0.22 (466)	0.37 (783)	0.44 (931)	0.22 (466)	72 (1800)	5 (1525)	0.24 (508)	0.36 (762)	0.43 (910)	0.24 (508)	58 (1450)
10 (3000)	0.23 (487)	0.43 (910)	0.54 (1143)	0.22 (466)	59 (1475)	10 (3000)	0.30 (635)	0.46 (974)	0.55 (1164)	0.24 (508)	52 (1300)
15 (4500)	0.32 (677)	0.63 (1334)	0.75 (1588)	0.22 (466)	49 (1225)	15 (4500)	0.43 (910)	0.67 (1418)	0.78 (1651)	0.24 (508)	47 (1175)
20 (6000) *	0.43 (910)	0.84 (1778)	0.96 (2032)	0.22 (466)	49 (1225)	20 (6000) *	0.57 (1207)	0.89 (1884)	1.01 (2138)	0.24 (508)	47 (1175)
25 (7500) *	0.54 (1143)	1.05 (2223)	1.20 (2540)	0.22 (466)	44 (1100)	25 (7500) *	0.73 (1545)	1.12 (2371)	1.24 (2625)	0.24 (508)	47 (1175)
10' x 7' x 10" (3000 x 2100 x 250 mm)											
10' x 8' x 10" (3000 x 2400 x 250 mm)											
3 (915)	0.38 (804)	0.46 (974)	0.48 (1016)	0.24 (508)	58 (1450)	3 (915)	0.30 (635)	0.54 (1143)	0.60 (1270)	0.24 (508)	64 (1600)
5 (1525)	0.28 (593)	0.32 (677)	0.37 (783)	0.24 (508)	52 (1300)	5 (1525)	0.21 (445)	0.38 (804)	0.46 (974)	0.24 (508)	58 (1450)
10 (3000)	0.35 (741)	0.41 (868)	0.49 (1037)	0.24 (508)	52 (1300)	10 (3000)	0.28 (593)	0.47 (995)	0.58 (1228)	0.24 (508)	52 (1300)
15 (4500)	0.52 (1101)	0.60 (1270)	0.70 (1482)	0.24 (508)	47 (1175)	15 (4500)	0.40 (868)	0.68 (1439)	0.81 (1715)	0.24 (508)	47 (1175)
20 (6000) *	0.70 (1482)	0.80 (1693)	0.91 (1926)	0.24 (508)	47 (1175)	20 (6000) *	0.53 (1122)	0.91 (1926)	1.04 (2201)	0.24 (508)	47 (1175)
25 (7500) *	0.90 (1905)	1.01 (2138)	1.11 (2350)	0.24 (508)	47 (1175)	25 (7500) *	0.67 (1418)	1.15 (2434)	1.28 (2709)	0.24 (508)	47 (1175)

DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
	10' x 9' x 10" (3000 x 2700 x 250 mm)						12' x 5' x 12" (3600 x 1500 x 300 mm)				
3 (915)	0.28 (593)	0.56 (1185)	0.64 (1355)	0.24 (508)	79 (1975)	3 (915)	0.47 (995)	0.48 (1016)	0.50 (1059)	0.29 (614)	73 (1825)
5 (1525)	0.24 (508)	0.39 (826)	0.48 (1016)	0.24 (508)	64 (1600)	5 (1525)	0.37 (783)	0.36 (762)	0.42 (889)	0.29 (614)	66 (1650)
10 (3000)	0.27 (572)	0.48 (1016)	0.60 (1270)	0.24 (508)	58 (1450)	10 (3000)	0.47 (995)	0.46 (974)	0.56 (1186)	0.29 (614)	59 (1475)
15 (4500)	0.38 (804)	0.69 (1461)	0.83 (1757)	0.24 (508)	47 (1175)	15 (4500)	0.69 (1461)	0.67 (1418)	0.79 (1672)	0.29 (614)	59 (1475)
20 (6000) *	0.50 (1058)	0.92 (1947)	1.06 (2244)	0.24 (508)	47 (1175)	20 (6000)	0.92 (1947)	0.89 (1884)	1.02 (2159)	0.29 (614)	59 (1475)
25 (7500) *	0.63 (1334)	1.16 (2455)	1.31 (2773)	0.24 (508)	47 (1175)	25 (7500) *	1.18 (2498)	1.12 (2371)	1.25 (2646)	0.29 (614)	59 (1475)
	10' x 10' x 10" (3000 x 3000 x 250 mm)						12' x 6' x 12" (3600 x 1800 x 300 mm)				
3 (915)	0.27 (572)	0.57 (1207)	0.68 (1439)	0.24 (508)	79 (1975)	3 (915)	0.44 (931)	0.52 (1101)	0.54 (1143)	0.29 (614)	66 (1650)
5 (1525)	0.24 (508)	0.41 (868)	0.50 (1058)	0.24 (508)	70 (1750)	5 (1525)	0.34 (720)	0.39 (826)	0.46 (974)	0.29 (614)	59 (1475)
10 (3000)	0.26 (550)	0.48 (1016)	0.61 (1291)	0.24 (508)	64 (1600)	10 (3000)	0.43 (910)	0.49 (1037)	0.60 (1270)	0.29 (614)	59 (1475)
15 (4500)	0.36 (762)	0.70 (1482)	0.84 (1778)	0.24 (508)	52 (1300)	15 (4500)	0.63 (1334)	0.72 (1524)	0.85 (1799)	0.29 (614)	53 (1325)
20 (6000) *	0.48 (1016)	0.92 (1947)	1.07 (2265)	0.24 (508)	52 (1300)	20 (6000) *	0.84 (1778)	0.95 (2011)	1.09 (2307)	0.29 (614)	53 (1325)
25 (7500) *	0.60 (1270)	1.16 (2455)	1.32 (2794)	0.24 (508)	47 (1175)	25 (7500) *	1.07 (2265)	1.20 (2540)	1.34 (2836)	0.29 (614)	53 (1325)
	12' x 4' x 12" (3600 x 1200 x 300 mm)						12' x 7' x 12" (3600 x 2100 x 300 mm)				
3 (915)	0.50 (1058)	0.44 (931)	0.45 (953)	0.29 (614)	73 (1825)	3 (915)	0.41 (868)	0.55 (1164)	0.59 (1249)	0.29 (614)	66 (1650)
5 (1525)	0.40 (847)	0.33 (699)	0.38 (804)	0.29 (614)	66 (1650)	5 (1525)	0.32 (677)	0.41 (868)	0.49 (1037)	0.29 (614)	59 (1475)
10 (3000)	0.51 (1080)	0.42 (889)	0.51 (1080)	0.29 (614)	59 (1475)	10 (3000)	0.40 (847)	0.52 (1101)	0.64 (1355)	0.29 (614)	59 (1475)
15 (4500)	0.76 (1609)	0.61 (1291)	0.72 (1524)	0.29 (614)	59 (1475)	15 (4500)	0.58 (1228)	0.76 (1609)	0.89 (1884)	0.29 (614)	53 (1325)
20 (6000)	1.03 (2180)	0.81 (1715)	0.94 (1990)	0.29 (614)	59 (1475)	20 (6000) *	0.77 (1630)	1.00 (2117)	1.15 (2434)	0.29 (614)	53 (1325)
25 (7500) *	1.32 (2794)	1.02 (2159)	1.15 (2434)	0.29 (614)	59 (1475)	25 (7500) *	0.97 (2053)	1.26 (2667)	1.41 (2985)	0.29 (614)	53 (1325)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

390-0

SHEET 23 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)		
	A _{S1}	A _{S2}	A _{S3}			A _{S4}	A _{S1}	A _{S2}		A _{S3}	A _{S4}
12' x 8' x 12" (3600 x 2400 x 300 mm)											
3 (915)	0.39 (826)	0.58 (1228)	0.63 (1334)	0.29 (614)	66 (1650)	3 (915)	0.35 (741)	0.66 (1397)	0.75 (1588)	0.29 (614)	93 (2325)
5 (1525)	0.30 (635)	0.43 (910)	0.52 (1101)	0.29 (614)	59 (1475)	5 (1525)	0.29 (614)	0.48 (1016)	0.61 (1291)	0.29 (614)	80 (2000)
10 (3000)	0.38 (804)	0.54 (1143)	0.67 (1418)	0.29 (614)	59 (1475)	10 (3000)	0.33 (699)	0.58 (1228)	0.74 (1566)	0.29 (614)	73 (1825)
15 (4500)	0.54 (1143)	0.79 (1672)	0.93 (1969)	0.29 (614)	53 (1325)	15 (4500)	0.46 (974)	0.84 (779)	1.02 (2159)	0.29 (614)	59 (1475)
20 (6000) *	0.71 (1503)	1.04 (2201)	1.20 (2540)	0.29 (614)	53 (1325)	20 (6000) *	0.60 (1270)	1.10 (2328)	1.29 (2731)	0.29 (614)	59 (1475)
25 (7500) *	0.90 (1905)	1.31 (2773)	1.47 (3112)	0.29 (614)	53 (1325)	25 (7500) *	0.75 (1588)	1.38 (2921)	1.56 (3302)	0.29 (614)	59 (1475)
12' x 9' x 12" (3600 x 2700 x 300 mm)											
3 (915)	0.37 (783)	0.61 (1291)	0.67 (1418)	0.29 (614)	80 (2000)	3 (915)	0.31 (656)	0.69 (1461)	0.79 (1672)	0.29 (614)	93 (2325)
5 (1525)	0.29 (614)	0.45 (953)	0.55 (1164)	0.29 (614)	66 (1650)	5 (1525)	0.29 (614)	0.50 (1058)	0.63 (1334)	0.29 (614)	80 (2000)
10 (3000)	0.36 (762)	0.56 (1185)	0.70 (1482)	0.29 (614)	59 (1475)	10 (3000)	0.32 (677)	0.59 (1249)	0.76 (1609)	0.29 (614)	73 (1825)
15 (4500)	0.50 (1058)	0.81 (1715)	0.97 (2053)	0.29 (614)	53 (1325)	15 (4500)	0.45 (953)	0.84 (1778)	1.03 (2180)	0.29 (614)	59 (1475)
20 (6000) *	0.66 (1397)	1.07 (2265)	1.24 (2625)	0.29 (614)	53 (1325)	20 (6000) *	0.58 (1228)	1.11 (2350)	1.30 (2752)	0.29 (614)	59 (1475)
25 (7500) *	0.84 (1778)	1.35 (2858)	1.51 (3196)	0.29 (614)	53 (1325)	25 (7500) *	0.73 (1545)	1.38 (2921)	1.58 (3344)	0.29 (614)	59 (1475)
12' x 10' x 12" (3600 x 3000 x 300 mm)											
3 (915)	0.34 (720)	0.64 (1355)	0.71 (1503)	0.29 (614)	80 (2000)	3 (915)	0.34 (720)	0.64 (1355)	0.71 (1503)	0.29 (614)	80 (2000)
5 (1525)	0.29 (614)	0.47 (995)	0.58 (1228)	0.29 (614)	66 (1650)	5 (1525)	0.29 (614)	0.47 (995)	0.58 (1228)	0.29 (614)	66 (1650)
10 (3000)	0.34 (720)	0.57 (1207)	0.72 (1524)	0.29 (614)	59 (1475)	10 (3000)	0.34 (720)	0.57 (1207)	0.72 (1524)	0.29 (614)	59 (1475)
15 (4500)	0.48 (1016)	0.83 (1757)	1.00 (2117)	0.29 (614)	53 (1325)	15 (4500)	0.48 (1016)	0.83 (1757)	1.00 (2117)	0.29 (614)	53 (1325)
20 (6000) *	0.63 (1334)	1.09 (2307)	1.27 (2688)	0.29 (614)	53 (1325)	20 (6000) *	0.63 (1334)	1.09 (2307)	1.27 (2688)	0.29 (614)	53 (1325)
25 (7500) *	0.79 (1672)	1.37 (2900)	1.54 (3260)	0.29 (614)	53 (1325)	25 (7500) *	0.79 (1672)	1.37 (2900)	1.54 (3260)	0.29 (614)	53 (1325)

SPAN, S		RISE, R		T _{TOP}	T _{BOTTOM}	T _{WIDE}	H	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)							
FEET (mm)	FEET (mm)	FEET (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	A _{S1}	A _{S2}	A _{S3}	A _{S4}	A _{S5}	A _{S6}	A _{S7}	A _{S8}
3 (900)	2 (600)	7 (175)	7 (175)	6 (150)	4 (100)	4 (100)	4 (100)	0.17 (360)	0.37 (783)	0.26 (550)	0.10 (212)	0.22 (466)	0.17 (360)	0.17 (360)	0.14 (296)
3 (900)	3 (900)	7 (175)	7 (175)	6 (150)	4 (100)	4 (100)	4 (100)	0.17 (360)	0.40 (847)	0.28 (593)	0.10 (212)	0.23 (487)	0.17 (360)	0.17 (360)	0.14 (296)
4 (1200)	2 (600)	7.5 (190)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.40 (847)	0.25 (529)	0.12 (254)	0.21 (445)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	3 (900)	7.5 (190)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.44 (931)	0.29 (614)	0.12 (254)	0.23 (487)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	4 (1200)	7.5 (190)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.46 (974)	0.32 (677)	0.12 (254)	0.25 (529)	0.18 (381)	0.18 (381)	0.14 (296)
5 (1500)	3 (900)	8 (200)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.44 (931)	0.26 (550)	0.14 (296)	0.22 (466)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	4 (1200)	8 (200)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.47 (995)	0.29 (614)	0.14 (296)	0.24 (508)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	5 (1500)	8 (200)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.50 (1059)	0.32 (677)	0.14 (296)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	3 (900)	8 (200)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.23 (487)	0.45 (953)	0.24 (508)	0.17 (360)	0.19 (402)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	4 (1200)	8 (200)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.49 (1037)	0.31 (656)	0.17 (360)	0.24 (508)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	5 (1500)	8 (200)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.52 (1101)	0.34 (720)	0.17 (360)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	6 (1800)	8 (200)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.54 (1143)	0.36 (762)	0.17 (360)	0.26 (550)	0.19 (402)	0.19 (402)	0.17 (360)
7 (2100)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.49 (1037)	0.25 (529)	0.19 (402)	0.23 (487)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.23 (487)	0.52 (1101)	0.34 (720)	0.19 (402)	0.24 (508)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.21 (445)	0.54 (1143)	0.37 (783)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.19 (402)	0.56 (1186)	0.39 (826)	0.19 (402)	0.27 (572)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.31 (656)	0.53 (1122)	0.35 (741)	0.19 (402)	0.25 (529)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.28 (593)	0.57 (1207)	0.39 (826)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.59 (1249)	0.42 (889)	0.19 (402)	0.28 (593)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.24 (508)	0.62 (1313)	0.45 (953)	0.19 (402)	0.29 (614)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	8 (2400)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.22 (466)	0.64 (1335)	0.49 (1037)	0.19 (402)	0.30 (635)	0.19 (402)	0.19 (402)	0.19 (402)
9 (2700)	5 (1500)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.29 (614)	0.53 (1122)	0.40 (847)	0.22 (466)	0.25 (529)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	6 (1800)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.27 (572)	0.56 (1186)	0.42 (889)	0.22 (466)	0.26 (550)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	7 (2100)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.25 (529)	0.58 (1228)	0.45 (953)	0.22 (466)	0.27 (572)	0.22 (466)	0.22 (466)	0.22 (466)

SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 600 mm)
STEEL COVER 2.0" (50 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 25 OF 42

SPAN, S		RISE, R		T ₊	T _b	T _{SIDE}	H	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)							
FEET (mm)	FEET (mm)	FEET (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.48 (1016)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.25 (529)	0.62 (1313)	0.54 (1143)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.38 (804)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.42 (889)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.45 (953)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.48 (1016)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.57 (1207)	0.24 (508)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.60 (1270)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.40 (847)	0.44 (931)	0.40 (847)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.44 (931)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.49 (1037)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.53 (1122)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.57 (1207)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.60 (1270)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.64 (1355)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.68 (1439)	0.29 (614)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.72 (1524)	0.29 (614)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)

SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 610 mm)
STEEL COVER 2.0" (50 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
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DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
 TOP SLAB SHEAR REINFORCEMENT

EARTH COVER MORE THAN 2' (610 mm) STEEL COVER 2.0 INCHES (50 mm) AT TOP OF INVERT SLAB		TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)		M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)				
		AS1	AS2			AS3	AS4	AS1		AS2	AS3	AS4	
3' x 2' x 4" (900 x 600 x 100 mm)		4' x 3' x 5" (1200 x 900 x 125 mm)											
3	(915)	0.12 (254)	0.21 (445)	0.33 (899)	0.10 (217)	31 (775)	3	(915)	0.16 (339)	0.28 (593)	0.33 (699)	0.12 (254)	38 (950)
5	(1525)	0.10 (217)	0.10 (217)	0.17 (360)	0.10 (217)	31 (775)	5	(1525)	0.12 (254)	0.15 (318)	0.23 (487)	0.12 (254)	38 (950)
10	(3000)	0.10 (217)	0.12 (254)	0.24 (508)	0.10 (217)	31 (775)	10	(3000)	0.12 (254)	0.17 (360)	0.28 (593)	0.12 (254)	38 (950)
15	(4500)	0.10 (217)	0.18 (381)	0.33 (899)	0.10 (217)	31 (775)	15	(4500)	0.12 (254)	0.24 (508)	0.40 (847)	0.12 (254)	38 (950)
20	(6000) *	0.13 (275)	0.23 (487)	0.43 (910)	0.10 (217)	31 (775)	20	(6000)	0.16 (339)	0.31 (656)	0.51 (1080)	0.12 (254)	38 (950)
3' x 3' x 4" (900 x 900 x 100 mm)		4' x 4' x 5" (1200 x 1200 x 125 mm)											
3	(915)	0.10 (217)	0.25 (529)	0.39 (826)	0.10 (217)	31 (775)	3	(915)	0.13 (275)	0.31 (656)	0.37 (783)	0.12 (254)	38 (950)
5	(1525)	0.10 (217)	0.12 (254)	0.21 (445)	0.10 (217)	31 (775)	5	(1525)	0.12 (254)	0.16 (339)	0.16 (339)	0.12 (254)	38 (950)
10	(3000)	0.10 (217)	0.13 (275)	0.24 (508)	0.10 (217)	31 (775)	10	(3000)	0.12 (254)	0.17 (360)	0.30 (636)	0.12 (254)	38 (950)
15	(4500)	0.10 (217)	0.18 (381)	0.34 (720)	0.10 (217)	31 (775)	15	(4500)	0.12 (254)	0.24 (508)	0.41 (868)	0.12 (254)	38 (950)
20	(6000) *	0.10 (217)	0.24 (508)	0.43 (910)	0.10 (217)	31 (775)	20	(6000)	0.13 (275)	0.32 (677)	0.52 (1101)	0.12 (254)	38 (950)
4' x 2' x 5" (1200 x 600 x 125 mm)		5' x 3' x 6" (1500 x 900 x 150 mm)											
3	(915)	0.21 (445)	0.23 (489)	0.27 (572)	0.12 (254)	38 (950)	3	(915)	0.21 (445)	0.29 (614)	0.30 (635)	0.14 (296)	45 (1125)
5	(1525)	0.12 (254)	0.13 (275)	0.19 (402)	0.12 (254)	38 (950)	5	(1525)	0.14 (296)	0.17 (360)	0.25 (529)	0.14 (296)	36 (900)
10	(3000)	0.12 (254)	0.15 (318)	0.25 (529)	0.12 (254)	38 (950)	10	(3000)	0.14 (296)	0.20 (423)	0.32 (677)	0.14 (296)	36 (900)
15	(4500)	0.17 (360)	0.21 (445)	0.35 (741)	0.12 (254)	38 (950)	15	(4500)	0.19 (402)	0.29 (614)	0.44 (931)	0.12 (254)	35 (875)
20	(6000)	0.23 (487)	0.28 (593)	0.45 (953)	0.12 (254)	38 (950)	20	(6000) *	0.25 (529)	0.37 (783)	0.57 (1207)	0.12 (254)	35 (875)
25	(7500) *	0.29 (614)	0.35 (741)	0.56 (1185)	0.12 (254)	38 (950)	25	(7500) *	0.32 (677)	0.47 (995)	0.70 (1482)	0.12 (254)	35 (875)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

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EARTH COVER MORE THAN 2' (610 mm)
 STEEL COVER 2.0 INCHES (50 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
 HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
 TOP SLAB SHEAR REINFORCEMENT

H _o EARTH COVER FT (mm)	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _o EARTH COVER FT (mm)	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4		
5' x 4' x 6" (1500 x 1200 x 150 mm)												
3 (915)	0.18 (381)	0.33 (699)	0.34 (720)	0.14 (296)	45 (1125)	3 (915)	0.22 (466)	0.33 (699)	0.33 (699)	0.17 (360)	43 (1075)	
5 (1525)	0.14 (296)	0.19 (402)	0.29 (614)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.22 (466)	0.31 (656)	0.17 (360)	40 (1000)	
10 (3000)	0.14 (296)	0.22 (466)	0.35 (741)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.25 (529)	0.39 (826)	0.17 (360)	39 (975)	
15 (4500)	0.15 (318)	0.31 (656)	0.48 (1016)	0.14 (296)	35 (875)	15 (4500)	0.22 (466)	0.32 (677)	0.54 (1143)	0.17 (360)	39 (975)	
20 (6000) *	0.20 (423)	0.40 (847)	0.62 (1312)	0.12 (254)	35 (875)	20 (6000) *	0.29 (614)	0.47 (985)	0.69 (1461)	0.17 (360)	38 (850)	
25 (7500) *	0.25 (529)	0.50 (1058)	0.75 (1588)	0.12 (254)	35 (875)	25 (7500) *	0.36 (762)	0.58 (1228)	0.85 (1799)	0.17 (360)	38 (850)	
5' x 5' x 6" (1500 x 1500 x 150 mm)												
3 (915)	0.16 (339)	0.35 (741)	0.37 (783)	0.14 (296)	45 (1125)	3 (915)	0.19 (402)	0.36 (762)	0.36 (762)	0.17 (360)	52 (1300)	
5 (1525)	0.14 (296)	0.21 (445)	0.31 (656)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.24 (508)	0.35 (741)	0.17 (360)	43 (1075)	
10 (3000)	0.14 (296)	0.22 (466)	0.36 (762)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.37 (783)	0.42 (889)	0.17 (360)	39 (975)	
15 (4500)	0.14 (296)	0.31 (656)	0.49 (1037)	0.14 (296)	35 (875)	15 (4500)	0.19 (402)	0.37 (783)	0.59 (1249)	0.17 (360)	38 (950)	
20 (6000) *	0.17 (360)	0.40 (847)	0.63 (1334)	0.14 (296)	35 (875)	20 (6000) *	0.24 (508)	0.49 (1037)	0.73 (1545)	0.17 (360)	38 (950)	
25 (7500) *	0.22 (466)	0.50 (1058)	0.76 (1609)	0.14 (296)	35 (875)	25 (7500) *	0.31 (656)	0.60 (1270)	0.89 (1884)	0.17 (360)	38 (950)	
6' x 3' x 7" (1800 x 900 x 175 mm)												
3 (915)	0.24 (508)	0.29 (614)	0.29 (614)	0.17 (360)	43 (1075)	3 (915)	0.17 (360)	0.38 (804)	0.40 (847)	0.17 (360)	52 (1300)	
5 (1525)	0.17 (360)	0.19 (402)	0.27 (572)	0.17 (360)	40 (1000)	5 (1525)	0.17 (360)	0.25 (529)	0.37 (783)	0.17 (360)	52 (1300)	
10 (3000)	0.19 (402)	0.23 (489)	0.35 (741)	0.17 (360)	39 (975)	10 (3000)	0.17 (360)	0.27 (572)	0.43 (910)	0.17 (360)	43 (1075)	
15 (4500)	0.27 (572)	0.32 (677)	0.49 (1037)	0.17 (360)	38 (950)	15 (4500)	0.17 (360)	0.38 (804)	0.58 (1228)	0.17 (360)	39 (975)	
20 (6000) *	0.36 (762)	0.42 (889)	0.63 (1334)	0.17 (360)	38 (950)	20 (6000) *	0.22 (466)	0.49 (1037)	0.74 (1567)	0.17 (360)	38 (950)	
25 (7500) *	0.45 (953)	0.53 (1122)	0.78 (1651)	0.17 (360)	38 (950)	25 (7500) *	0.27 (572)	0.61 (1291)	0.89 (1884)	0.17 (360)	38 (950)	

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

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SHEET 28 OF 42

EARTH COVER MORE THAN 2' (610 mm) AT TOP OF INVERT SLAB
 DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
 HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M _e INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
7' x 4' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.24 (508)	0.33 (699)	0.38 (804)	0.19 (402)	47 (1175)	3 (915)	0.19 (402)	0.41 (868)	0.50 (1058)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.24 (508)	0.24 (508)	0.19 (402)	43 (1075)	5 (1525)	0.19 (402)	0.27 (572)	0.44 (931)	0.19 (402)	59 (1475)
10 (3000)	0.21 (445)	0.28 (593)	0.43 (910)	0.19 (402)	43 (1075)	10 (3000)	0.19 (402)	0.32 (677)	0.50 (1058)	0.19 (402)	47 (1175)
15 (4500)	0.38 (804)	0.52 (1101)	0.76 (1609)	0.19 (402)	41 (1025)	15 (4500)	0.20 (423)	0.44 (931)	0.68 (1439)	0.19 (402)	43 (1075)
20 (6000)	0.39 (826)	0.52 (1101)	0.76 (1609)	0.19 (402)	41 (1025)	20 (6000) *	0.26 (550)	0.58 (1228)	0.86 (1820)	0.19 (402)	41 (1025)
25 (7500) *	0.49 (1037)	0.65 (1376)	0.94 (1990)	0.19 (402)	41 (1025)	25 (7500) *	0.33 (699)	0.71 (1503)	1.03 (2180)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)											
3 (915)	0.22 (466)	0.36 (762)	0.42 (889)	0.19 (402)	59 (1475)	3 (915)	0.31 (656)	0.39 (826)	0.45 (953)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.27 (572)	0.38 (804)	0.19 (402)	43 (1075)	5 (1525)	0.25 (529)	0.31 (656)	0.42 (889)	0.19 (402)	45 (1125)
10 (3000)	0.19 (402)	0.30 (635)	0.40 (847)	0.19 (402)	43 (1075)	10 (3000)	0.31 (656)	0.36 (762)	0.54 (1143)	0.19 (402)	45 (1125)
15 (4500)	0.25 (529)	0.43 (910)	0.64 (1355)	0.19 (402)	41 (1025)	15 (4500)	0.44 (931)	0.51 (1080)	0.75 (1588)	0.19 (402)	41 (1025)
20 (6000)	0.33 (699)	0.56 (1185)	0.82 (1736)	0.19 (402)	41 (1025)	20 (6000) *	0.58 (1228)	0.67 (1418)	0.97 (2053)	0.19 (402)	41 (1025)
25 (7500) *	0.41 (868)	0.69 (1461)	0.99 (2096)	0.19 (402)	41 (1025)	25 (7500) *	0.75 (1588)	0.84 (1778)	1.18 (2498)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.20 (423)	0.39 (826)	0.46 (974)	0.19 (402)	59 (1475)	3 (915)	0.27 (572)	0.72 (1524)	0.50 (1058)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.28 (593)	0.41 (868)	0.19 (402)	47 (1175)	5 (1525)	0.23 (487)	0.33 (699)	0.46 (974)	0.19 (402)	50 (1250)
10 (3000)	0.19 (402)	0.32 (677)	0.49 (1037)	0.19 (402)	43 (1075)	10 (3000)	0.27 (572)	0.39 (826)	0.59 (1249)	0.19 (402)	45 (1125)
15 (4500)	0.22 (466)	0.44 (931)	0.66 (1397)	0.19 (402)	41 (1025)	15 (4500)	0.38 (804)	0.55 (1164)	0.81 (1715)	0.19 (402)	41 (1025)
20 (6000) *	0.29 (614)	0.57 (1207)	0.84 (1778)	0.19 (402)	41 (1025)	20 (6000) *	0.51 (1080)	0.72 (1524)	1.04 (2201)	0.19 (402)	41 (1025)
25 (7500) *	0.36 (762)	0.71 (1503)	1.03 (2180)	0.19 (402)	41 (1025)	25 (7500) *	0.65 (1376)	0.91 (1926)	1.27 (2688)	0.19 (402)	41 (1025)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
PRECAST REINFORCED CONCRETE BOX

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SHEET 29 OF 42

EARTH COVER MORE THAN 2' (610 mm) DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
 STEEL COVER 2.0 INCHES (50 mm) AT TOP OF INVERT SLAB HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)											
3 (915)	0.25 (529)	0.45 (953)	0.54 (1122)	0.19 (402)	55 (1375)	3 (915)	0.34 (720)	0.44 (931)	0.54 (1143)	0.22 (466)	54 (1350)
5 (1525)	0.21 (445)	0.36 (762)	0.50 (1058)	0.19 (402)	50 (1250)	5 (1525)	0.28 (593)	0.35 (741)	0.29 (614)	0.22 (466)	49 (1225)
10 (3000)	0.25 (529)	0.41 (868)	0.62 (1312)	0.19 (402)	45 (1125)	10 (3000)	0.33 (699)	0.42 (889)	0.62 (1312)	0.22 (466)	49 (1225)
15 (4500)	0.35 (741)	0.58 (1228)	0.85 (1799)	0.19 (402)	41 (1025)	15 (4500)	0.46 (974)	0.59 (1249)	0.86 (1820)	0.22 (466)	44 (1100)
20 (6000) *	0.45 (953)	0.76 (1609)	1.08 (2286)	0.19 (402)	41 (1025)	20 (6000) *	0.61 (1291)	0.78 (1651)	1.10 (2328)	0.22 (466)	44 (1100)
25 (7500) *	0.57 (1207)	0.95 (2011)	1.32 (2794)	0.19 (402)	41 (1025)	25 (7500) *	0.78 (1651)	0.97 (2053)	1.34 (2836)	0.22 (466)	44 (1100)
8' x 7' x 8" (2400 x 2100 x 200 mm)											
3 (915)	0.23 (489)	0.47 (995)	0.58 (1228)	0.19 (402)	65 (1376)	3 (915)	0.30 (635)	0.47 (995)	0.58 (1228)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.38 (804)	0.54 (1143)	0.19 (402)	55 (1375)	5 (1525)	0.25 (529)	0.38 (804)	0.53 (1122)	0.22 (466)	54 (1350)
10 (3000)	0.23 (487)	0.42 (889)	0.65 (1376)	0.19 (402)	45 (1125)	10 (3000)	0.30 (635)	0.44 (931)	0.66 (1397)	0.22 (466)	49 (1225)
15 (4500)	0.32 (677)	0.59 (1249)	0.88 (1863)	0.19 (402)	41 (1025)	15 (4500)	0.42 (889)	0.62 (1312)	0.91 (1926)	0.22 (466)	44 (1100)
20 (6000) *	0.42 (889)	0.77 (1630)	1.11 (2350)	0.19 (402)	41 (1025)	20 (6000) *	0.55 (1164)	0.82 (1736)	1.16 (2455)	0.22 (466)	44 (1100)
25 (7500) *	0.52 (1101)	0.97 (2053)	1.35 (2858)	0.19 (402)	41 (1025)	25 (7500) *	0.69 (1461)	1.02 (2159)	1.42 (3006)	0.22 (466)	44 (1100)
8' x 8' x 8" (2400 x 2400 x 200 mm)											
3 (915)	0.22 (466)	0.49 (1037)	0.62 (1312)	0.19 (402)	65 (1625)	3 (915)	0.28 (593)	0.49 (1037)	0.63 (1334)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.40 (847)	0.57 (1207)	0.19 (402)	65 (1625)	5 (1525)	0.23 (487)	0.41 (868)	0.57 (1207)	0.22 (466)	54 (1350)
10 (3000)	0.22 (466)	0.43 (910)	0.66 (1397)	0.19 (402)	50 (1250)	10 (3000)	0.27 (572)	0.46 (974)	0.70 (1482)	0.22 (466)	49 (1225)
15 (4500)	0.30 (635)	0.59 (1249)	0.89 (1884)	0.19 (402)	45 (1125)	15 (4500)	0.38 (804)	0.65 (1376)	0.95 (2011)	0.22 (466)	44 (1100)
20 (6000) *	0.39 (826)	0.77 (1630)	1.12 (2371)	0.19 (402)	45 (1125)	20 (6000) *	0.50 (1058)	0.85 (1799)	1.21 (2561)	0.22 (466)	44 (1100)
25 (7500) *	0.49 (1037)	0.97 (2053)	1.36 (2879)	0.19 (402)	45 (1125)	25 (7500) *	0.63 (1334)	1.06 (2244)	1.46 (3090)	0.22 (466)	44 (1100)

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.0" (50 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _o EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _o EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
9' x 8' x 9" (2700 x 2400 x 225 mm)											
3 (915)	0.26 (550)	0.51 (1080)	0.67 (1418)	0.22 (466)	72 (1800)	3 (915)	0.34 (720)	0.49 (1037)	0.63 (1334)	0.24 (508)	58 (1450)
5 (1525)	0.22 (466)	0.43 (910)	0.61 (1291)	0.22 (466)	59 (1475)	5 (1525)	0.30 (635)	0.41 (868)	0.56 (1185)	0.24 (508)	52 (1300)
10 (3000)	0.26 (550)	0.47 (995)	0.72 (1524)	0.22 (466)	54 (1350)	10 (3000)	0.35 (741)	0.48 (1016)	0.71 (1503)	0.24 (508)	52 (1300)
15 (4500)	0.36 (762)	0.66 (1397)	0.98 (2074)	0.22 (466)	44 (1100)	15 (4500)	0.49 (1037)	0.67 (1418)	0.97 (2053)	0.24 (508)	47 (1175)
20 (6000) *	0.46 (974)	0.86 (1820)	1.23 (2604)	0.22 (466)	44 (1100)	20 (6000) *	0.65 (1376)	0.88 (1863)	1.24 (2625)	0.24 (508)	47 (1175)
25 (7500) *	0.58 (1228)	1.07 (2265)	1.49 (3154)	0.22 (466)	44 (1100)	25 (7500) *	0.82 (1736)	1.09 (2307)	1.51 (3196)	0.24 (508)	47 (1175)
9' x 9' x 9" (2700 x 2700 x 225 mm)											
3 (915)	0.25 (529)	0.53 (1122)	0.71 (1503)	0.22 (466)	72 (1800)	3 (915)	0.32 (677)	0.51 (1080)	0.67 (1417)	0.24 (508)	64 (1600)
5 (1525)	0.22 (466)	0.44 (931)	0.64 (1355)	0.22 (466)	72 (1800)	5 (1525)	0.28 (593)	0.43 (910)	0.60 (1270)	0.24 (508)	58 (1450)
10 (3000)	0.25 (529)	0.48 (1016)	0.74 (1567)	0.22 (466)	59 (1475)	10 (3000)	0.32 (677)	0.50 (1058)	0.75 (1588)	0.24 (508)	52 (1300)
15 (4500)	0.34 (720)	0.66 (1397)	0.99 (2096)	0.22 (466)	49 (1225)	15 (4500)	0.45 (953)	0.70 (1482)	1.02 (2059)	0.24 (508)	47 (1175)
20 (6000) *	0.44 (931)	0.86 (1820)	1.25 (2646)	0.22 (466)	49 (1225)	20 (6000) *	0.59 (1249)	0.91 (1926)	1.29 (2731)	0.24 (508)	47 (1175)
25 (7500) *	0.55 (1164)	1.08 (2286)	1.50 (3175)	0.22 (466)	44 (1100)	25 (7500) *	0.74 (1567)	1.14 (2413)	1.57 (3323)	0.24 (508)	47 (1175)
10' x 5' x 10" (3000 x 1500 x 250 mm)											
3 (915)	0.38 (804)	0.46 (974)	0.57 (1207)	0.24 (508)	58 (1450)	3 (915)	0.30 (635)	0.54 (1143)	0.72 (1270)	0.24 (508)	64 (1600)
5 (1525)	0.32 (677)	0.38 (804)	0.52 (1101)	0.24 (508)	52 (1300)	5 (1525)	0.26 (550)	0.46 (974)	0.64 (974)	0.24 (508)	58 (1450)
10 (3000)	0.39 (826)	0.45 (953)	0.66 (1397)	0.24 (508)	52 (1300)	10 (3000)	0.30 (635)	0.52 (1101)	0.78 (1228)	0.24 (508)	52 (1300)
15 (4500)	0.54 (1143)	0.63 (1334)	0.91 (1926)	0.24 (508)	47 (1175)	15 (4500)	0.42 (889)	0.72 (1524)	1.05 (2223)	0.24 (508)	47 (1175)
20 (6000) *	0.72 (1524)	0.82 (1736)	1.17 (2477)	0.24 (508)	47 (1175)	20 (6000) *	0.54 (1143)	0.94 (1990)	1.33 (2815)	0.24 (508)	47 (1175)
25 (7500) *	0.91 (1926)	1.03 (2180)	1.42 (3006)	0.24 (508)	47 (1175)	25 (7500) *	0.68 (1439)	1.17 (2477)	1.62 (3429)	0.24 (508)	47 (1175)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 31 OF 42

EARTH COVER MORE THAN 2' (610 mm) DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
 STEEL COVER 2.0" (50 mm) AT TOP OF INVERT SLAB HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
10' x 9' x 10" (3000 x 2700 x 250 mm)											
3 (915)	0.28 (593)	0.56 (1185)	0.76 (1609)	0.24 (508)	79 (1975)	3 (915)	0.47 (995)	0.48 (1016)	0.61 (1291)	0.29 (614)	73 (1825)
5 (1525)	0.24 (508)	0.47 (995)	0.68 (1439)	0.24 (508)	64 (1600)	5 (1525)	0.42 (889)	0.52 (1101)	0.57 (1207)	0.29 (614)	66 (1650)
10 (3000)	0.29 (614)	0.53 (1122)	0.81 (1715)	0.24 (508)	58 (1450)	10 (3000)	0.51 (1080)	0.50 (1058)	0.71 (1503)	0.29 (614)	59 (1475)
15 (4500)	0.39 (826)	0.73 (1545)	1.08 (2286)	0.24 (508)	47 (1175)	15 (4500)	0.72 (1524)	0.70 (1482)	1.01 (2138)	0.29 (614)	59 (1475)
20 (6000) *	0.51 (1080)	0.95 (2011)	1.36 (2879)	0.24 (508)	47 (1175)	20 (6000) *	0.95 (2011)	0.91 (1926)	1.29 (2731)	0.29 (614)	59 (1475)
25 (7500) *	0.64 (1355)	1.18 (2498)	1.64 (3471)	0.24 (508)	47 (1175)	25 (7500) *	1.21 (2561)	1.14 (2413)	1.57 (3323)	0.29 (614)	59 (1475)
10' x 10' x 10" (3000 x 3000 x 250 mm)											
3 (915)	0.26 (550)	0.57 (1207)	0.80 (1693)	0.24 (508)	79 (1975)	3 (915)	0.44 (931)	0.52 (1101)	0.66 (1397)	0.29 (614)	66 (1650)
5 (1525)	0.24 (508)	0.50 (1058)	0.72 (1524)	0.24 (508)	70 (1750)	5 (1525)	0.39 (826)	0.45 (953)	0.62 (1312)	0.29 (614)	59 (1475)
10 (3000)	0.28 (593)	0.54 (1143)	0.83 (1757)	0.24 (508)	64 (1600)	10 (3000)	0.47 (995)	0.54 (1143)	0.79 (1672)	0.29 (614)	59 (1475)
15 (4500)	0.38 (804)	0.74 (1567)	1.19 (2519)	0.24 (508)	52 (1300)	15 (4500)	0.66 (1397)	0.75 (1588)	1.08 (2286)	0.29 (614)	53 (1325)
20 (6000) *	0.49 (1037)	0.95 (2011)	1.38 (2921)	0.24 (508)	52 (1300)	20 (6000) *	0.86 (1820)	0.98 (2074)	1.38 (2921)	0.29 (614)	53 (1325)
25 (7500) *	0.61 (1291)	1.19 (2519)	1.65 (3493)	0.24 (508)	47 (1175)	25 (7500) *	1.09 (2307)	1.22 (2582)	1.68 (3556)	0.29 (614)	53 (1325)
12' x 4' x 12" (3600 x 1200 x 300 mm)											
3 (915)	0.31 (656)	0.69 (1461)	0.95 (2011)	0.29 (614)	73 (1825)	3 (915)	0.41 (868)	0.55 (1164)	0.77 (1630)	0.29 (614)	66 (1650)
5 (1525)	0.46 (974)	0.53 (1122)	0.80 (1693)	0.29 (614)	66 (1650)	5 (1525)	0.37 (783)	0.49 (1037)	0.67 (1418)	0.29 (614)	59 (1475)
10 (3000)	0.56 (1185)	0.46 (974)	0.67 (1418)	0.29 (614)	59 (1475)	10 (3000)	0.44 (931)	0.57 (1207)	0.84 (1778)	0.29 (614)	59 (1475)
15 (4500)	0.80 (1693)	0.64 (1355)	0.92 (1947)	0.29 (614)	59 (1475)	15 (4500)	0.60 (1270)	0.79 (1672)	1.15 (2434)	0.29 (614)	53 (1325)
20 (6000)	1.06 (2244)	0.83 (1757)	1.18 (2498)	0.29 (614)	59 (1475)	20 (6000) *	0.79 (1672)	1.03 (2180)	1.46 (3090)	0.29 (614)	53 (1325)
25 (7500) *	1.35 (2858)	1.03 (2180)	1.44 (2434)	0.29 (614)	59 (1475)	25 (7500) *	0.99 (2096)	1.28 (2731)	1.77 (3747)	0.29 (614)	53 (1325)

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.0" (50 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
12' x 8' x 12" (3600 x 2400 x 300 mm)											
3 (915)	0.38 (804)	0.58 (1228)	0.76 (1609)	0.29 (614)	66 (1650)	3 (915)	0.32 (677)	0.66 (1397)	0.90 (1905)	0.29 (614)	93 (2325)
5 (1525)	0.35 (741)	0.51 (1080)	0.72 (1524)	0.29 (614)	59 (1475)	5 (1525)	0.31 (656)	0.58 (1228)	0.84 (1778)	0.29 (614)	80 (2000)
10 (3000)	0.41 (868)	0.59 (1249)	0.89 (1884)	0.29 (614)	59 (1475)	10 (3000)	0.35 (741)	0.64 (1355)	0.99 (2096)	0.29 (614)	73 (1825)
15 (4500)	0.56 (1186)	0.83 (1757)	1.20 (2540)	0.29 (614)	53 (1325)	15 (4500)	0.48 (1016)	0.88 (1863)	1.31 (2773)	0.29 (614)	59 (1475)
20 (6000) *	0.73 (1545)	1.07 (2265)	1.52 (3217)	0.29 (614)	53 (1325)	20 (6000) *	0.62 (1312)	1.14 (2413)	1.63 (3450)	0.29 (614)	59 (1475)
25 (7500) *	0.92 (1947)	1.34 (2836)	1.84 (3895)	0.29 (614)	53 (1325)	25 (7500) *	0.77 (1630)	1.41 (2985)	1.96 (4159)	0.29 (614)	59 (1475)
12' x 9' x 12" (3600 x 2700 x 300 mm)											
3 (915)	0.36 (762)	0.61 (1291)	0.81 (1715)	0.29 (614)	80 (2000)	3 (915)	0.31 (656)	0.65 (1376)	0.95 (2011)	0.29 (614)	93 (2325)
5 (1525)	0.33 (699)	0.54 (1143)	0.76 (1609)	0.29 (614)	66 (1650)	5 (1525)	0.29 (614)	0.60 (1270)	0.88 (1863)	0.29 (614)	80 (2000)
10 (3000)	0.39 (826)	0.61 (1291)	0.92 (1947)	0.29 (614)	59 (1475)	10 (3000)	0.34 (720)	0.65 (1376)	1.01 (2138)	0.29 (614)	73 (1825)
15 (4500)	0.53 (1122)	0.85 (1799)	1.24 (2625)	0.29 (614)	53 (1325)	15 (4500)	0.46 (974)	0.89 (1884)	1.33 (2815)	0.29 (614)	59 (1475)
20 (6000) *	0.68 (1439)	1.10 (2328)	1.57 (3323)	0.29 (614)	53 (1325)	20 (6000) *	0.60 (1270)	1.14 (2413)	1.65 (3493)	0.29 (614)	59 (1475)
25 (7500) *	0.85 (1799)	1.37 (2900)	1.90 (4022)	0.29 (614)	53 (1325)	25 (7500) *	0.74 (1567)	1.41 (2985)	1.96 (4159)	0.29 (614)	59 (1475)
12' x 10' x 12" (3600 x 3000 x 300 mm)											
3 (915)	0.34 (720)	0.63 (1334)	0.75 (1588)	0.29 (614)	80 (2000)						
5 (1525)	0.31 (656)	0.56 (1185)	0.80 (1693)	0.29 (614)	66 (1650)						
10 (3000)	0.37 (783)	0.63 (1334)	0.96 (2032)	0.29 (614)	59 (1475)						
15 (4500)	0.50 (1058)	0.87 (1842)	1.27 (2688)	0.29 (614)	53 (1325)						
20 (6000) *	0.64 (1355)	1.13 (2307)	1.60 (3387)	0.29 (614)	53 (1325)						
25 (7500) *	0.80 (1693)	1.40 (2963)	1.94 (4106)	0.29 (614)	53 (1325)						

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 33 OF 42

SPAN, S		RISE, R		T _b	T _{side}	H	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)							
FEET (mm)	FEET (mm)	INCHES (mm)	INCHES (mm)	BOTTOM INCHES (mm)	SIDE INCHES (mm)	HAUNCH INCHES (mm)	A _{S1}	A _{S2}	A _{S3}	A _{S4}	A _{S5}	A _{S6}	A _{S7}	A _{S8}
3 (900)	2 (600)	7 (175)	6 (150)	4 (100)	4 (100)	4 (100)	0.17 (360)	0.38 (804)	0.30 (635)	0.10 (212)	0.22 (466)	0.17 (360)	0.17 (360)	0.14 (296)
3 (900)	3 (900)	7 (175)	6 (150)	4 (100)	4 (100)	4 (100)	0.17 (360)	0.40 (847)	0.32 (677)	0.10 (212)	0.23 (487)	0.17 (360)	0.17 (360)	0.14 (296)
4 (1200)	2 (600)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.40 (847)	0.29 (614)	0.12 (254)	0.21 (445)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	3 (900)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.45 (953)	0.34 (720)	0.12 (254)	0.23 (487)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	4 (1200)	7.5 (190)	6 (150)	5 (125)	5 (125)	5 (125)	0.18 (381)	0.47 (995)	0.36 (762)	0.12 (254)	0.25 (529)	0.18 (381)	0.18 (381)	0.14 (296)
5 (1500)	3 (900)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.44 (931)	0.30 (635)	0.14 (296)	0.22 (466)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	4 (1200)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.48 (1016)	0.33 (699)	0.14 (296)	0.24 (508)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	5 (1500)	8 (200)	7 (175)	6 (150)	6 (150)	6 (150)	0.19 (402)	0.50 (1059)	0.35 (741)	0.14 (296)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	3 (900)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.23 (487)	0.45 (953)	0.30 (635)	0.17 (360)	0.22 (466)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	4 (1200)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.49 (1037)	0.33 (699)	0.17 (360)	0.23 (487)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	5 (1500)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.52 (1101)	0.37 (783)	0.17 (360)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	6 (1800)	8 (200)	7 (175)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.54 (1143)	0.39 (826)	0.17 (360)	0.26 (550)	0.19 (402)	0.19 (402)	0.17 (360)
7 (2100)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.49 (1037)	0.34 (720)	0.19 (402)	0.23 (487)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.23 (487)	0.52 (1101)	0.38 (804)	0.19 (402)	0.24 (508)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.21 (445)	0.54 (1143)	0.41 (868)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.19 (402)	0.56 (1186)	0.44 (931)	0.19 (402)	0.27 (572)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.31 (656)	0.53 (1122)	0.38 (804)	0.19 (402)	0.25 (529)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.28 (593)	0.57 (1207)	0.43 (910)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.59 (1249)	0.46 (974)	0.19 (402)	0.28 (593)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.24 (508)	0.62 (1313)	0.51 (1080)	0.20 (423)	0.29 (614)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	8 (2400)	8 (200)	8 (200)	8 (200)	8 (200)	8 (200)	0.22 (466)	0.64 (1335)	0.55 (1164)	0.24 (508)	0.30 (635)	0.19 (402)	0.19 (402)	0.19 (402)
9 (2700)	5 (1500)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.29 (614)	0.53 (1122)	0.43 (910)	0.22 (466)	0.25 (529)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	6 (1800)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.27 (572)	0.56 (1186)	0.47 (995)	0.22 (466)	0.26 (550)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	7 (2100)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.25 (529)	0.58 (1228)	0.51 (1080)	0.22 (466)	0.27 (572)	0.22 (466)	0.22 (466)	0.22 (466)

SHALLOW COVER BOXES – COVER 0' TO 2' (0 TO 600 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 34 OF 42

SPAN, S		RISE, R	T ₁ TOP INCHES (mm)	T ₂ BOTTOM INCHES (mm)	T ₃ SIDE INCHES (mm)	H HAUNCH INCHES (mm)	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)								
FEET (mm)	FEET (mm)	FEET (mm)					AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8	
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.54 (1143)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	9 (225)	0.24 (508)	0.62 (1313)	0.58 (1228)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.45 (953)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.49 (1037)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.52 (1101)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.57 (1207)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.60 (1270)	0.25 (529)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.64 (1355)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.37 (783)	0.44 (931)	0.42 (889)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.47 (995)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.51 (1080)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.55 (1164)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.60 (1270)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.64 (1355)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.68 (1439)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.72 (1524)	0.30 (635)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.76 (1609)	0.38 (804)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)

SHALLOW COVER BOXES - COVER 0' TO 2' (0 TO 610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

390-0

SHEET 35 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	
	A _{S1}	A _{S2}	A _{S3}			A _{S4}	A _{S1}	A _{S2}		A _{S3}
3' x 2' x 4" (900 x 600 x 100 mm)										
3 (915)	0.13 (275)	0.21 (445)	0.25 (529)	0.10 (217)	3 (915) *	0.17 (360)	0.28 (593)	0.41 (868)	0.12 (254)	38 (950)
5 (1525)	0.10 (217)	0.10 (217)	0.22 (466)	0.10 (217)	5 (1525) *	0.12 (254)	0.12 (254)	0.25 (529)	0.12 (254)	38 (950)
10 (3000)	0.10 (217)	0.11 (233)	0.28 (593)	0.10 (217)	10 (3000) *	0.12 (254)	0.15 (318)	0.32 (677)	0.12 (254)	38 (950)
					15 (4500) *	0.12 (254)	0.23 (489)	0.46 (974)	0.12 (254)	38 (950)
3' x 3' x 4" (900 x 900 x 100 mm)										
3 (915)	0.10 (217)	0.25 (529)	0.27 (572)	0.10 (217)	3 (915) *	0.14 (296)	0.31 (656)	0.45 (953)	0.12 (254)	38 (950)
5 (1525)	0.10 (217)	0.10 (217)	0.23 (487)	0.10 (217)	5 (1525) *	0.12 (254)	0.14 (296)	0.26 (550)	0.12 (254)	38 (950)
10 (3000)	0.10 (217)	0.11 (233)	0.29 (614)	0.10 (217)	10 (3000) *	0.12 (254)	0.15 (318)	0.32 (677)	0.12 (254)	38 (950)
					15 (4500) *	0.12 (254)	0.22 (466)	0.46 (974)	0.12 (254)	38 (950)
4' x 2' x 5" (1200 x 600 x 125 mm)										
3 (915)	0.19 (402)	0.23 (489)	0.34 (720)	0.12 (254)	3 (915)	0.21 (445)	0.29 (614)	0.34 (720)	0.14 (296)	45 (1125)
5 (1525)	0.12 (254)	0.12 (254)	0.21 (445)	0.12 (254)	5 (1525)	0.14 (296)	0.15 (318)	0.26 (550)	0.14 (296)	36 (900)
10 (3000)	0.12 (254)	0.14 (296)	0.28 (593)	0.12 (254)	10 (3000)	0.14 (296)	0.18 (381)	0.34 (720)	0.14 (296)	36 (900)
15 (4500)	0.16 (339)	0.20 (423)	0.41 (868)	0.12 (254)	15 (4500)	0.18 (381)	0.27 (572)	0.49 (1037)	0.14 (296)	35 (875)
20 (6000)	0.22 (466)	0.27 (572)	0.54 (1143)	0.12 (254)	20 (6000) *	0.25 (529)	0.36 (762)	0.64 (1355)	0.14 (296)	35 (875)
					25 (7500) *	0.32 (677)	0.46 (974)	0.80 (1693)	0.14 (296)	35 (875)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 36 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H ₀ EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H ₀ EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
5' x 4' x 6" (1500 x 1200 x 150 mm)											
3 (915)	0.18 (381)	0.33 (699)	0.39 (826)	0.14 (296)	45 (1125)	3 (915)	0.22 (466)	0.33 (699)	0.36 (762)	0.17 (360)	43 (1075)
5 (1525)	0.14 (296)	0.16 (339)	0.29 (614)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.18 (381)	0.30 (635)	0.17 (360)	40 (1000)
10 (3000)	0.14 (296)	0.20 (423)	0.37 (783)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.22 (466)	0.39 (826)	0.17 (360)	39 (975)
15 (4500)	0.15 (318)	0.29 (614)	0.53 (1122)	0.14 (296)	35 (875)	15 (4500)	0.21 (445)	0.33 (699)	0.57 (1207)	0.17 (360)	38 (850)
20 (6000) *	0.20 (423)	0.39 (826)	0.69 (1461)	0.14 (296)	35 (875)	20 (6000) *	0.28 (593)	0.44 (931)	0.74 (1567)	0.17 (360)	38 (850)
						25 (7500) *	0.35 (741)	0.56 (1185)	0.91 (1926)	0.17 (360)	38 (850)
5' x 5' x 6" (1500 x 1500 x 150 mm)											
3 (915)	0.16 (339)	0.35 (741)	0.43 (910)	0.14 (296)	45 (1125)	3 (915)	0.19 (402)	0.36 (762)	0.41 (868)	0.17 (360)	52 (1300)
5 (1525)	0.14 (296)	0.17 (360)	0.31 (656)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.20 (423)	0.34 (720)	0.17 (360)	43 (1075)
10 (3000)	0.14 (296)	0.20 (423)	0.38 (804)	0.14 (296)	45 (1125)	10 (3000)	0.17 (360)	0.24 (508)	0.43 (910)	0.17 (360)	39 (975)
15 (4500)	0.14 (296)	0.29 (614)	0.54 (1143)	0.14 (296)	36 (900)	15 (4500)	0.18 (381)	0.35 (741)	0.61 (1291)	0.17 (360)	38 (950)
20 (6000) *	0.17 (360)	0.39 (826)	0.70 (1482)	0.14 (296)	35 (875)	20 (6000) *	0.24 (508)	0.47 (995)	0.79 (1672)	0.17 (360)	38 (950)
						25 (7500) *	0.30 (635)	0.59 (1249)	0.97 (2053)	0.17 (360)	38 (950)
6' x 3' x 7" (1800 x 900 x 175 mm)											
3 (915)	0.24 (508)	0.30 (635)	0.32 (677)	0.17 (360)	43 (1075)	3 (915)	0.17 (360)	0.38 (804)	0.43 (910)	0.17 (360)	52 (1300)
5 (1525)	0.17 (360)	0.17 (360)	0.27 (572)	0.17 (360)	40 (1000)	5 (1525)	0.17 (360)	0.20 (423)	0.35 (741)	0.17 (360)	52 (1300)
10 (3000)	0.17 (360)	0.21 (445)	0.36 (762)	0.17 (360)	39 (975)	10 (3000)	0.17 (360)	0.24 (508)	0.43 (910)	0.17 (360)	43 (1075)
15 (4500)	0.25 (529)	0.31 (656)	0.52 (1101)	0.17 (360)	38 (950)	15 (4500)	0.17 (360)	0.34 (720)	0.60 (1270)	0.17 (360)	39 (975)
20 (6000) *	0.34 (720)	0.41 (868)	0.68 (1439)	0.17 (360)	38 (950)	20 (6000) *	0.21 (445)	0.46 (974)	0.78 (1651)	0.17 (360)	38 (950)
25 (7500) *	0.44 (931)	0.52 (1101)	0.84 (1778)	0.17 (360)	38 (950)	25 (7500) *	0.25 (529)	0.58 (1228)	0.96 (2032)	0.17 (360)	38 (950)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
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SHEET 37 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H ₀ EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	H ₀ EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)		
	A _{S1}	A _{S2}	A _{S3}			A _{S4}	A _{S1}	A _{S2}		A _{S3}	A _{S4}
7' x 4' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.24 (508)	0.33 (699)	0.41 (868)	0.19 (402)	47 (1175)	3 (915)	0.19 (402)	0.41 (868)	0.54 (1143)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.21 (445)	0.33 (699)	0.19 (402)	43 (1075)	5 (1525)	0.19 (402)	0.25 (529)	0.42 (889)	0.19 (402)	59 (1475)
10 (3000)	0.19 (402)	0.26 (550)	0.43 (910)	0.19 (402)	43 (1075)	10 (3000)	0.19 (402)	0.29 (614)	0.51 (1080)	0.19 (402)	47 (1175)
15 (4500)	0.28 (593)	0.38 (804)	0.62 (1312)	0.19 (402)	41 (1025)	15 (4500)	0.19 (402)	0.42 (889)	0.71 (1503)	0.19 (402)	43 (1075)
20 (6000) *	0.37 (783)	0.51 (1080)	0.81 (1715)	0.19 (402)	41 (1025)	20 (6000) *	0.26 (550)	0.56 (1185)	0.91 (1926)	0.19 (402)	41 (1025)
25 (7500) *	0.47 (995)	0.64 (1355)	1.00 (2117)	0.19 (402)	41 (1025)	25 (7500) *	0.32 (677)	0.70 (1482)	1.11 (2350)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)											
3 (915)	0.22 (466)	0.36 (762)	0.46 (974)	0.19 (402)	59 (1475)	3 (915)	0.32 (677)	0.39 (826)	0.49 (1037)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.23 (489)	0.37 (783)	0.19 (402)	43 (1075)	5 (1525)	0.22 (466)	0.26 (550)	0.41 (868)	0.19 (402)	45 (1125)
10 (3000)	0.19 (402)	0.28 (593)	0.47 (995)	0.19 (402)	43 (1075)	10 (3000)	0.28 (593)	0.33 (699)	0.55 (1164)	0.19 (402)	45 (1125)
15 (4500)	0.24 (508)	0.41 (868)	0.67 (1418)	0.19 (402)	41 (1025)	15 (4500)	0.42 (889)	0.49 (1037)	0.79 (1672)	0.19 (402)	41 (1025)
20 (6000) *	0.32 (677)	0.54 (1143)	0.87 (1842)	0.19 (402)	41 (1025)	20 (6000) *	0.57 (1207)	0.65 (1376)	1.03 (2180)	0.19 (402)	41 (1025)
25 (7500) *	0.40 (847)	0.68 (1438)	1.07 (2265)	0.19 (402)	41 (1025)	25 (7500) *	0.73 (1545)	0.83 (1757)	1.27 (2688)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)											
3 (915)	0.20 (423)	0.39 (826)	0.50 (1058)	0.19 (402)	59 (1475)	3 (915)	0.28 (593)	0.42 (889)	0.55 (1164)	0.19 (402)	50 (1250)
5 (1525)	0.19 (402)	0.24 (508)	0.40 (847)	0.19 (402)	47 (1175)	5 (1525)	0.20 (423)	0.28 (593)	0.46 (974)	0.19 (402)	50 (1250)
10 (3000)	0.19 (402)	0.29 (614)	0.49 (1037)	0.19 (402)	43 (1075)	10 (3000)	0.25 (529)	0.35 (741)	0.60 (1270)	0.19 (402)	45 (1125)
15 (4500)	0.21 (445)	0.41 (868)	0.70 (1482)	0.19 (402)	41 (1025)	15 (4500)	0.37 (783)	0.52 (1101)	0.85 (1799)	0.19 (402)	41 (1025)
20 (6000) *	0.28 (593)	0.55 (1164)	0.90 (1905)	0.19 (402)	41 (1025)	20 (6000) *	0.49 (1037)	0.70 (1482)	1.11 (2350)	0.19 (402)	41 (1025)
25 (7500) *	0.33 (699)	0.70 (1482)	1.10 (2328)	0.19 (402)	41 (1025)	25 (7500) *	0.63 (1334)	0.89 (1884)	1.36 (2879)	0.19 (402)	41 (1025)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

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SHEET 38 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _g EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				INCHES (mm)	H _g EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	A _{S1}	A _{S2}	A _{S3}	A _{S4}			A _{S1}	A _{S2}	A _{S3}	A _{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)											
3 (915)	0.25 (529)	0.45 (953)	0.59 (1249)	0.19 (402)	55 (1375)	3 (915)	0.34 (720)	0.44 (931)	0.58 (1228)	0.22 (466)	54 (1350)
5 (1525)	0.19 (402)	0.30 (635)	0.50 (1058)	0.19 (402)	50 (1250)	5 (1525)	0.24 (508)	0.30 (635)	0.48 (1016)	0.22 (466)	49 (1225)
10 (3000)	0.23 (489)	0.37 (783)	0.63 (1334)	0.19 (402)	45 (1125)	10 (3000)	0.30 (635)	0.38 (804)	0.63 (1334)	0.22 (466)	49 (1225)
15 (4500)	0.33 (699)	0.55 (1164)	0.89 (1884)	0.19 (402)	41 (1025)	15 (4500)	0.44 (931)	0.56 (1185)	0.89 (1884)	0.22 (466)	44 (1100)
20 (6000) *	0.44 (931)	0.73 (1545)	1.16 (2455)	0.19 (402)	41 (1025)	20 (6000) *	0.59 (1249)	0.75 (1588)	1.16 (2455)	0.22 (466)	44 (1100)
8' x 7' x 8" (2400 x 2100 x 200 mm)											
3 (915)	0.23 (489)	0.47 (995)	0.64 (1355)	0.19 (402)	65 (1625)	3 (915)	0.37 (783)	0.47 (995)	0.71 (1503)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.31 (656)	0.53 (1122)	0.19 (402)	55 (1375)	5 (1525)	0.22 (466)	0.32 (677)	0.51 (1080)	0.22 (466)	54 (1350)
10 (3000)	0.21 (445)	0.38 (804)	0.65 (1376)	0.19 (402)	45 (1125)	10 (3000)	0.27 (572)	0.40 (847)	0.67 (1418)	0.22 (466)	49 (1225)
15 (4500)	0.30 (635)	0.56 (1185)	0.92 (1947)	0.19 (402)	41 (1025)	15 (4500)	0.40 (847)	0.59 (1249)	0.95 (2011)	0.22 (466)	44 (1100)
20 (6000) *	0.40 (847)	0.75 (1588)	1.19 (2519)	0.19 (402)	41 (1025)	20 (6000) *	0.53 (1122)	0.79 (1672)	1.23 (2604)	0.22 (466)	44 (1100)
8' x 8' x 8" (2400 x 2400 x 200 mm)											
3 (915)	0.22 (466)	0.49 (1037)	0.68 (1439)	0.19 (402)	65 (1625)	3 (915)	0.28 (593)	0.49 (1037)	0.68 (1439)	0.22 (466)	59 (1475)
5 (1525)	0.19 (402)	0.33 (699)	0.55 (1164)	0.19 (402)	65 (1625)	5 (1525)	0.22 (466)	0.34 (720)	0.55 (1164)	0.22 (466)	54 (1350)
10 (3000)	0.20 (423)	0.39 (826)	0.67 (1418)	0.19 (402)	50 (1250)	10 (3000)	0.25 (529)	0.42 (889)	0.70 (1482)	0.22 (466)	49 (1225)
15 (4500)	0.29 (614)	0.56 (1185)	0.94 (1990)	0.19 (402)	45 (1125)	15 (4500)	0.36 (762)	0.61 (1291)	0.98 (2074)	0.22 (466)	44 (1100)
20 (6000) *	0.38 (804)	0.75 (1588)	1.20 (2540)	0.19 (402)	45 (1125)	20 (6000) *	0.48 (1016)	0.82 (1736)	1.27 (2688)	0.22 (466)	44 (1100)
9' x 5' x 9" (2700 x 1500 x 225 mm)											
9' x 6' x 9" (3300 x 1800 x 225 mm)											
9' x 7' x 9" (2700 x 2100 x 225 mm)											

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
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SHEET 39 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)			M INCHES (mm)		
	AS1	AS2	AS3			AS4	AS1	AS2		AS3	AS4
9' x 8' x 9" (2700 x 2400 x 225 mm)											
3 (915)	0.26 (550)	0.51 (1080)	0.73 (1545)	0.22 (466)	72 (1800)	3 (915)	0.35 (741)	0.49 (1037)	0.67 (1418)	0.24 (508)	58 (1450)
5 (1525)	0.22 (466)	0.35 (741)	0.58 (1228)	0.22 (466)	59 (1475)	5 (1525)	0.26 (550)	0.34 (720)	0.54 (1143)	0.24 (508)	52 (1300)
10 (3000)	0.24 (508)	0.43 (910)	0.72 (1524)	0.22 (466)	54 (1350)	10 (3000)	0.32 (677)	0.44 (931)	0.70 (1482)	0.24 (508)	52 (1300)
15 (4500)	0.34 (720)	0.63 (1334)	1.01 (2138)	0.22 (466)	44 (1100)	15 (4500)	0.47 (995)	0.63 (1334)	1.00 (2117)	0.24 (508)	47 (1175)
20 (6000) *	0.45 (953)	0.83 (1757)	1.30 (2752)	0.22 (466)	44 (1100)	20 (6000) *	0.63 (1334)	0.85 (1799)	1.29 (2731)	0.24 (508)	47 (1175)
25 (7500) *	0.57 (1207)	1.05 (2223)	1.59 (3366)	0.22 (466)	44 (1100)	25 (7500) *	0.80 (1693)	1.07 (2265)	1.59 (3366)	0.24 (508)	47 (1175)
9' x 9' x 9" (2700 x 2700 x 225 mm)											
3 (915)	0.25 (529)	0.53 (1122)	0.77 (1630)	0.22 (466)	72 (1800)	3 (915)	0.32 (677)	0.51 (1080)	0.71 (1503)	0.24 (508)	64 (1600)
5 (1525)	0.22 (466)	0.37 (783)	0.61 (1291)	0.22 (466)	72 (1800)	5 (1525)	0.24 (508)	0.35 (741)	0.56 (1185)	0.24 (508)	58 (1450)
10 (3000)	0.23 (487)	0.43 (910)	0.74 (1567)	0.22 (466)	59 (1475)	10 (3000)	0.30 (635)	0.47 (995)	0.75 (1588)	0.24 (508)	52 (1300)
15 (4500)	0.32 (677)	0.63 (1334)	1.03 (2180)	0.22 (466)	49 (1225)	15 (4500)	0.42 (889)	0.65 (1376)	1.02 (2159)	0.24 (508)	47 (1175)
20 (6000) *	0.43 (910)	0.84 (1778)	1.31 (2773)	0.22 (466)	49 (1225)	20 (6000) *	0.54 (1143)	0.84 (1778)	1.28 (2709)	0.24 (508)	47 (1175)
10' x 5' x 10" (3000 x 1500 x 250 mm)											
3 (915)	0.38 (804)	0.46 (974)	0.61 (1291)	0.24 (508)	58 (1450)	3 (915)	0.30 (635)	0.54 (1143)	0.77 (1630)	0.24 (508)	64 (1600)
5 (1525)	0.28 (593)	0.32 (677)	0.50 (1058)	0.24 (508)	52 (1300)	5 (1525)	0.24 (508)	0.38 (804)	0.61 (1291)	0.24 (508)	58 (1450)
10 (3000)	0.35 (741)	0.41 (868)	0.66 (1397)	0.24 (508)	52 (1300)	10 (3000)	0.28 (593)	0.47 (995)	0.77 (1630)	0.24 (508)	52 (1300)
15 (4500)	0.52 (1101)	0.60 (1270)	0.94 (1990)	0.24 (508)	47 (1175)	15 (4500)	0.40 (868)	0.68 (1439)	1.08 (2286)	0.24 (508)	47 (1175)
20 (6000) *	0.70 (1482)	0.80 (1693)	1.22 (2582)	0.24 (508)	47 (1175)	20 (6000) *	0.53 (1122)	0.91 (1926)	1.39 (2942)	0.24 (508)	47 (1175)
25 (7500) *	0.90 (1905)	1.01 (2138)	1.50 (3175)	0.24 (508)	47 (1175)	25 (7500) *	0.67 (1418)	1.15 (2434)	1.70 (3598)	0.24 (508)	47 (1175)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN

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SHEET 40 OF 42

EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5 INCHES (63 mm) AT TOP OF INVERT SLAB

DIMENSIONS SHOWN ARE SPAN x RISE x
HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR
TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
10' x 9' x 10" (3000 x 2700 x 250 mm)											
3 (915)	0.28 (593)	0.56 (1185)	0.81 (1715)	0.24 (508)	79 (1975)	3 (915)	0.47 (995)	0.48 (1016)	0.64 (1355)	0.29 (614)	73 (1825)
5 (1525)	0.24 (508)	0.39 (826)	0.64 (1355)	0.24 (508)	64 (1600)	5 (1525)	0.37 (783)	0.36 (762)	0.55 (1164)	0.29 (614)	66 (1650)
10 (3000)	0.27 (572)	0.48 (1016)	0.80 (1693)	0.24 (508)	58 (1450)	10 (3000)	0.47 (995)	0.46 (974)	0.72 (1524)	0.29 (614)	59 (1475)
15 (4500)	0.38 (804)	0.63 (1334)	1.11 (2350)	0.24 (508)	47 (1175)	15 (4500)	0.69 (1461)	0.67 (1418)	1.03 (2180)	0.29 (614)	59 (1475)
20 (6000) *	0.50 (1058)	0.92 (1947)	1.42 (3006)	0.24 (508)	47 (1175)	20 (6000)	0.92 (1947)	0.89 (1884)	1.33 (2815)	0.29 (614)	59 (1475)
25 (7500) *	0.63 (1334)	1.16 (2455)	1.73 (3662)	0.24 (508)	47 (1175)	25 (7500) *	1.18 (2498)	1.12 (2371)	1.64 (3471)	0.29 (614)	59 (1475)
10' x 10' x 10" (3000 x 3000 x 250 mm)											
3 (915)	0.27 (572)	0.57 (1207)	0.86 (1820)	0.24 (508)	79 (1975)	3 (915)	0.44 (931)	0.52 (1101)	0.70 (1482)	0.29 (614)	66 (1650)
5 (1525)	0.24 (508)	0.41 (868)	0.67 (1418)	0.24 (508)	70 (1750)	5 (1525)	0.34 (720)	0.39 (826)	0.60 (1270)	0.29 (614)	59 (1475)
10 (3000)	0.26 (550)	0.48 (1016)	0.82 (1736)	0.24 (508)	64 (1600)	10 (3000)	0.43 (910)	0.49 (1037)	0.78 (1651)	0.29 (614)	59 (1475)
15 (4500)	0.36 (762)	0.70 (1482)	1.13 (2392)	0.24 (508)	52 (1300)	15 (4500)	0.63 (1334)	0.72 (1524)	1.10 (2328)	0.29 (614)	53 (1325)
20 (6000) *	0.48 (1016)	0.92 (1947)	1.46 (3090)	0.24 (508)	52 (1300)	20 (6000) *	0.84 (1778)	0.95 (2011)	1.43 (3027)	0.29 (614)	53 (1325)
25 (7500) *	0.60 (1270)	1.06 (2244)	1.74 (3683)	0.24 (508)	47 (1175)	25 (7500) *	1.07 (2265)	1.20 (2540)	1.75 (3704)	0.29 (614)	53 (1325)
12' x 4' x 12" (3600 x 1200 x 300 mm)											
3 (915)	0.50 (1058)	0.44 (931)	0.58 (1228)	0.29 (614)	73 (1825)	3 (915)	0.41 (868)	0.55 (1164)	0.75 (1588)	0.29 (614)	66 (1650)
5 (1525)	0.40 (847)	0.33 (699)	0.50 (1058)	0.29 (614)	66 (1650)	5 (1525)	0.32 (677)	0.41 (868)	0.64 (1355)	0.29 (614)	59 (1475)
10 (3000)	0.51 (1080)	0.42 (889)	0.66 (1397)	0.29 (614)	59 (1475)	10 (3000)	0.40 (847)	0.52 (1101)	0.83 (1757)	0.29 (614)	59 (1475)
15 (4500)	0.76 (1609)	0.61 (1291)	0.94 (1990)	0.29 (614)	59 (1475)	15 (4500)	0.58 (1228)	0.76 (1609)	1.17 (2477)	0.29 (614)	53 (1325)
20 (6000)	1.03 (2180)	0.81 (1715)	1.22 (2582)	0.29 (614)	59 (1475)	20 (6000) *	0.77 (1630)	1.00 (2117)	1.50 (3175)	0.29 (614)	53 (1325)
25 (7500) *	1.32 (2794)	1.02 (2159)	1.50 (3175)	0.29 (614)	59 (1475)	25 (7500) *	0.97 (2053)	1.26 (2667)	1.84 (3895)	0.29 (614)	53 (1325)

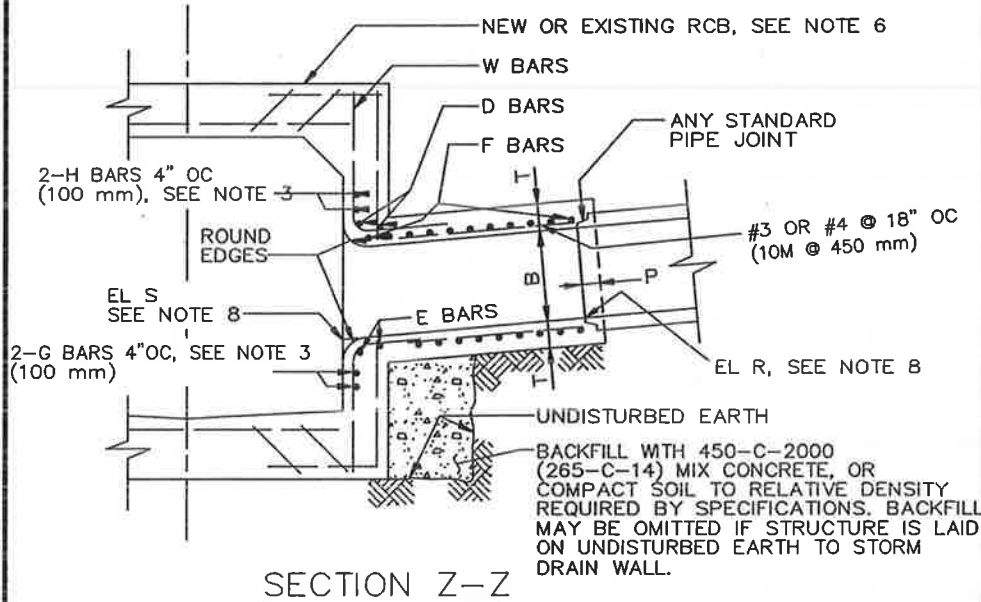
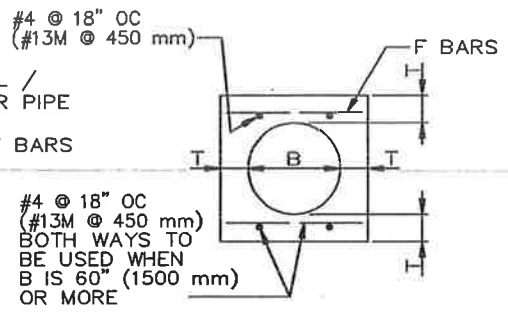
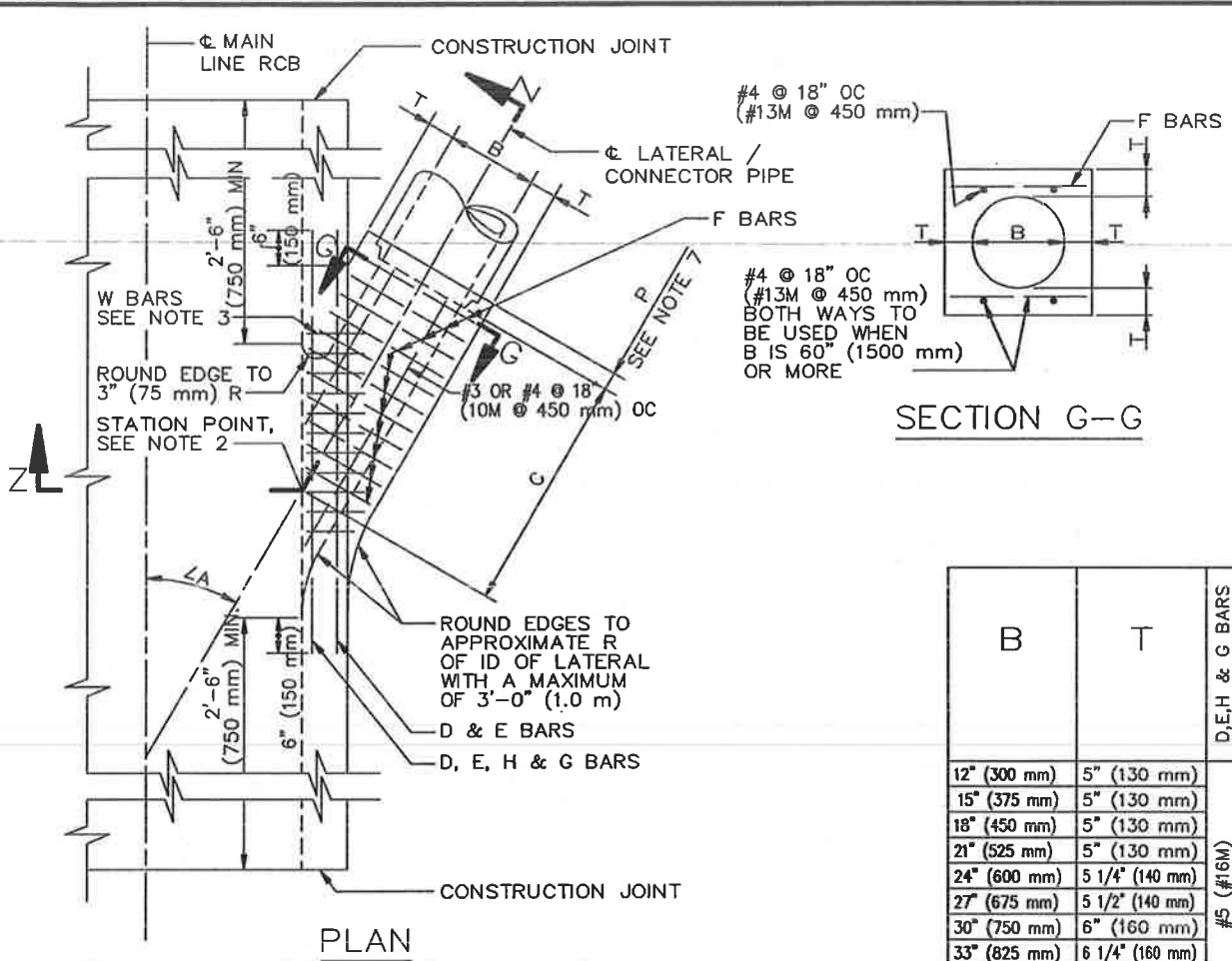
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390-0
SHEET 41 OF 42

DIMENSIONS SHOWN ARE SPAN x RISE x * WHERE NOTED, SUBMIT DETAILS FOR
 HAUNCH, WALL AND SLAB THICKNESS TOP SLAB SHEAR REINFORCEMENT

H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)	H _e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN ² / FT (mm ² / m)				M INCHES (mm)
	AS1	AS2	AS3	AS4			AS1	AS2	AS3	AS4	
12' x 8' x 12" (3600 x 2400 x 300 mm)											
3 (915)	0.39 (826)	0.58 (1228)	0.81 (1715)	0.29 (614)	66 (1650)	3 (915)	0.35 (741)	0.66 (1397)	0.95 (2011)	0.29 (614)	93 (2325)
5 (1525)	0.30 (635)	0.43 (910)	0.68 (1439)	0.29 (614)	59 (1475)	5 (1525)	0.29 (614)	0.48 (1016)	0.79 (1672)	0.29 (614)	80 (2000)
10 (3000)	0.38 (804)	0.54 (1143)	0.87 (1842)	0.29 (614)	59 (1475)	10 (3000)	0.33 (699)	0.58 (1228)	0.97 (2053)	0.29 (614)	73 (1825)
15 (4500)	0.54 (1143)	0.79 (1672)	1.22 (2582)	0.29 (614)	53 (1325)	15 (4500)	0.46 (974)	0.84 (779)	1.33 (2815)	0.29 (614)	59 (1475)
20 (6000) *	0.71 (1503)	1.04 (2201)	1.57 (3323)	0.29 (614)	53 (1325)	20 (6000) *	0.60 (1270)	1.10 (2328)	1.68 (3556)	0.29 (614)	59 (1475)
25 (7500) *	0.90 (1905)	1.31 (2773)	1.91 (4043)	0.29 (614)	53 (1325)	25 (7500) *	0.75 (1588)	1.38 (2921)	2.04 (4318)	0.29 (614)	59 (1475)
12' x 9' x 12" (3600 x 2700 x 300 mm)											
3 (915)	0.37 (783)	0.61 (1291)	0.86 (1820)	0.29 (614)	80 (2000)	3 (915)	0.31 (656)	0.69 (1461)	1.00 (2117)	0.29 (614)	93 (2325)
5 (1525)	0.29 (614)	0.45 (953)	0.72 (1524)	0.29 (614)	66 (1650)	5 (1525)	0.29 (614)	0.50 (1058)	0.83 (1757)	0.29 (614)	80 (2000)
10 (3000)	0.36 (762)	0.56 (1185)	0.91 (1926)	0.29 (614)	59 (1475)	10 (3000)	0.32 (677)	0.59 (1249)	1.00 (2117)	0.29 (614)	73 (1825)
15 (4500)	0.50 (1058)	0.81 (1715)	1.26 (2667)	0.29 (614)	53 (1325)	15 (4500)	0.45 (953)	0.84 (779)	1.35 (2858)	0.29 (614)	59 (1475)
20 (6000) *	0.66 (1397)	1.07 (2265)	1.62 (3429)	0.29 (614)	53 (1325)	20 (6000) *	0.58 (1228)	1.11 (2350)	1.70 (3598)	0.29 (614)	59 (1475)
25 (7500) *	0.84 (1778)	1.35 (2858)	1.97 (4170)	0.29 (614)	53 (1325)	25 (7500) *	0.73 (1545)	1.38 (2921)	2.05 (4339)	0.29 (614)	59 (1475)
12' x 10' x 12" (3600 x 3000 x 300 mm)											
3 (915)	0.34 (720)	0.64 (1355)	0.90 (1905)	0.29 (614)	80 (2000)						
5 (1525)	0.29 (614)	0.47 (995)	0.76 (1609)	0.29 (614)	66 (1650)						
10 (3000)	0.34 (720)	0.57 (1207)	0.94 (1990)	0.29 (614)	59 (1475)						
15 (4500)	0.48 (1016)	0.83 (1757)	1.30 (2752)	0.29 (614)	53 (1325)						
20 (6000) *	0.63 (1334)	1.09 (2307)	1.65 (3493)	0.29 (614)	53 (1325)						
25 (7500) *	0.79 (1672)	1.37 (2900)	2.01 (4255)	0.29 (614)	53 (1325)						



B	T	D, E, H & G BARS	F BARS
12" (300 mm)	5" (130 mm)	#5 (#16M)	#4 @ 6" (#13M @ 150 mm) OC
15" (375 mm)	5" (130 mm)		
18" (450 mm)	5" (130 mm)		
21" (525 mm)	5" (130 mm)		
24" (600 mm)	5 1/4" (140 mm)		
27" (675 mm)	5 1/2" (140 mm)		
30" (750 mm)	6" (160 mm)		
33" (825 mm)	6 1/4" (160 mm)		
36" (975 mm)	6 1/2" (170 mm)		
39" (990 mm)	7" (180 mm)		
42" (1050 mm)	7 1/2" (190 mm)	#6 (#19M)	#5 @ 6" (#16M @ 150 mm) OC
45" (1125 mm)	7 3/4" (200 mm)		
48" (1220 mm)	8" (210 mm)		
51" (1275 mm)	8 1/2" (220 mm)		
54" (1350 mm)	9" (230 mm)		
57" (1500 mm)	9 1/4" (240 mm)		
60" (1500 mm)	9 1/2" (240 mm)		
63" (1650 mm)	10" (260 mm)		
66" (1680 mm)	10 1/4" (260 mm)		
69" (1800 mm)	10 3/4" (280 mm)		
72" (1850 mm)	11 (280 mm)	#7 (#22M)	#5 @ 6" (#16M @ 150 mm) OC
78" (1950 mm)	11 3/4" (300 mm)		
84" (2100 mm)	12 1/2" (320 mm)		
90" (2400 mm)	13 1/4" (340 mm)		
96" (2440 mm)	14" (360 mm)		
102" (2550 mm)	15 1/2" (400 mm)		
108" (2700 mm)	16" (410 mm)		
114" (3000 mm)	16 1/2" (420 mm)		
120" (3050 mm)	17" (430 mm)		
126" (3150 mm)	17" (430 mm)		
132" (3300 mm)	17 1/2" (450 mm)		
138" (3450 mm)	17 1/2" (450 mm)		
144" (3600 mm)	18" (460 mm)		

NOTES

1. VALUES FOR A, B AND C SHALL BE SHOWN ON THE PLANS. ELEVATION R AND ELEVATION S SHALL BE SHOWN WHEN REQUIRED PER NOTE 8.
2. STATIONS SPECIFIED ON THE PLANS APPLY AT THE INTERSECTION OF CENTERLINES OF MAIN LINE AND LATERALS, EXCEPT THAT STATIONS FOR CATCH-BASIN-CONNECTOR-PIPES APPLY AT INSIDE-WALL OF STRUCTURE.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40, (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.
 - a. W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON PLANS, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
 - b. OMIT H BARS WHEN SOFFIT OF SPUR IS 12" (300 mm) OR LESS BELOW SOFFIT OF MAIN LINE, AND OMIT G BARS WHEN INVERT OF SPUR IS 12" (300 mm) OR LESS ABOVE FLOOR OF MAIN LINE.
4. JUNCTION STRUCTURE SHALL BE POURED MONOLITHICALLY WITH MAIN LINE, MANHOLE OR TRANSITION STRUCTURE.
5. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO THE SPRING LINE.
6. WHEN CONNECTING TO EXISTING RCB, BREAKOUT LIMITS AND DETAILS SHALL BE SHOWN ON THE PLANS.
7. EMBEDMENT, P, SHALL BE 5" (130 mm) FOR B = 96" (2400 mm) OR LESS 8" (200 mm) FOR B OVER 96" (2400 mm).
8. IF ELEVATION R AND ELEVATION S ARE NOT SHOWN ON THE PLANS THEN THE INLET OPENING SHALL FALL 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE FROM MAIN LINE TO CATCH BASIN OR TO GRADE BREAK IN INLET LINE. ELEVATION S SHALL BE SHOWN ON THE PLANS IF THE INLET OPENING FALLS MORE THAN 6" (150 mm) BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE AS STATED ABOVE.
ELEVATION R SHALL BE SHOWN ON THE PLANS ONLY WHEN A STUB IS TO BE PROVIDED FOR A FUTURE CONNECTION.
9. LATERALS OR CONNECTOR PIPES 24" (600 mm) OR LESS IN DIAMETER SHALL BE NO MORE THAN 5' (1.5 m) ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" (675 mm) OR LARGER IN DIAMETER SHALL BE NO MORE THAN 18" (450 mm) ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50' (15 m) IN LENGTH SHALL NOT BE MORE THAN 5' (1.5 m) ABOVE THE INVERT.
10. THE NEED FOR AN EDGE BEAM AND/OR ADDITIONAL REINFORCEMENT SHALL BE INVESTIGATED BY THE ENGINEER FOR ANY ONE OF THE FOLLOWING CONDITIONS:
 - a. ANGLE A IS LESS THAN 30°
 - b. TOP OF INLET PIPE IS LESS THAN 6" (150 mm) BELOW THE SOFFIT
 - c. FLOW LINE OF INLET PIPE IS LESS THAN 7" (180 mm) ABOVE THE THE FLOOR OF THE RCB AT THE INSIDE FACE

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

JUNCTION STRUCTURE – PIPE TO RCB

STANDARD PLAN

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SHEET 2 OF 2

DIST COUNTY ROUTE MOST WALKS SHEET TOTAL PROJECT NO. SHEETS

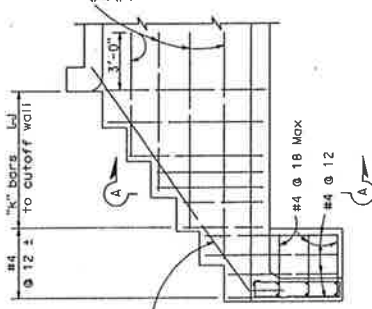
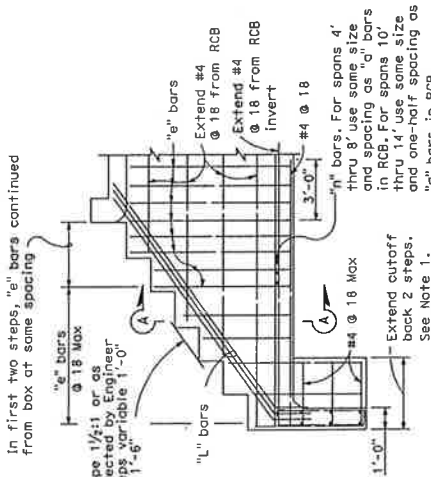
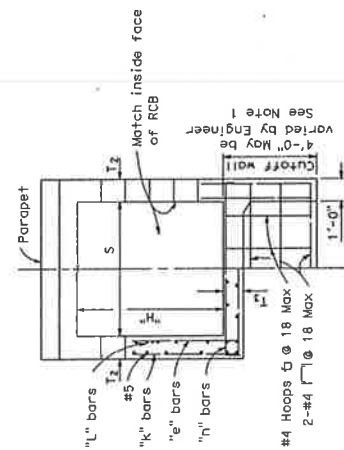
REGISTERED CIVIL ENGINEER

PROFESSIONAL ENGINEER
 POLINA FORESTER
 C37185
 12-11-05
 STATE OF CALIFORNIA

NOV 1, 2006
 PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy, completeness or electronic nature of this plan.

To get to the Caltrans web site, go to: <http://wwwdot.ca.gov>

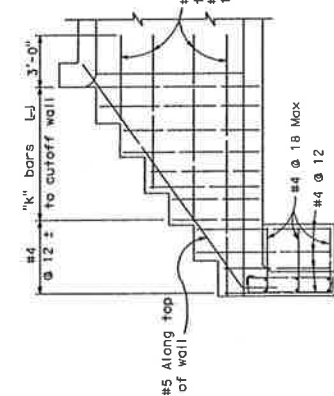
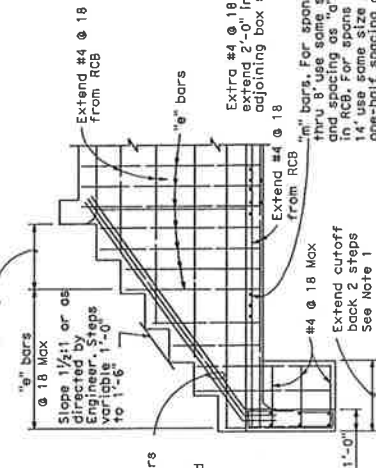


LONGITUDINAL SECTION Showing reinforcement in outside face

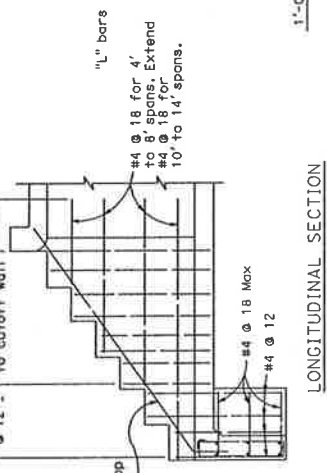
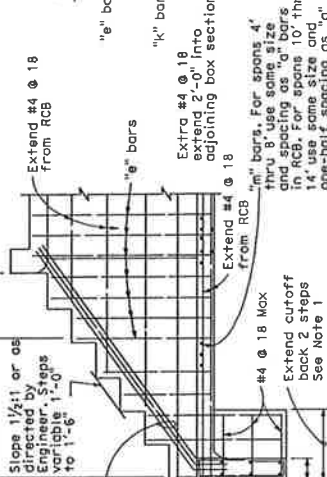
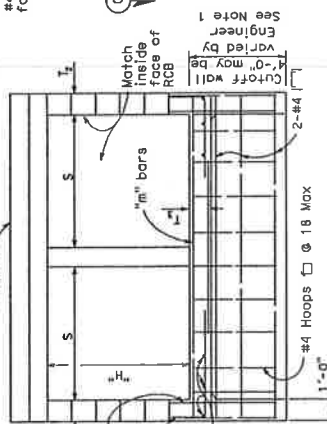
TYPE "E" STEPPED WINGWALL (SINGLE BOX CULVERT)

LONGITUDINAL SECTION Showing reinforcement in inside face

LONGITUDINAL SECTION Showing reinforcement in inside face



LONGITUDINAL SECTION Showing reinforcement in outside face



END ELEVATION Showing reinforcement in inside face

END ELEVATION Showing reinforcement in inside face

END ELEVATION Showing reinforcement in inside face

TYPE "E" STEPPED WINGWALL (MULTIPLE BOX CULVERT)

TABLE OF REINFORCEMENT FOR TYPE "E" WINGWALLS

"H" (See Note 2)	3'	4'	5'	6'	7'	8'	10'	12'	14'
"k" Bar No.	#4	#4	#5	#5	#5	#5	#5	#5	#5
"e" Bar Spacing	@ 12	@ 12	@ 12	@ 12	@ 10	@ 8	@ 7	@ 5	@ 4
"n" Bar No.	#5	#5	#5	#6	#7	#7	#7	#7	#7
"m" Bar No.	2	2	3	3	3	3	3	3	3
Number each wall	2	2	3	3	3	3	3	3	3

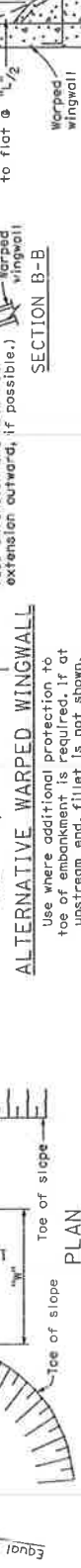
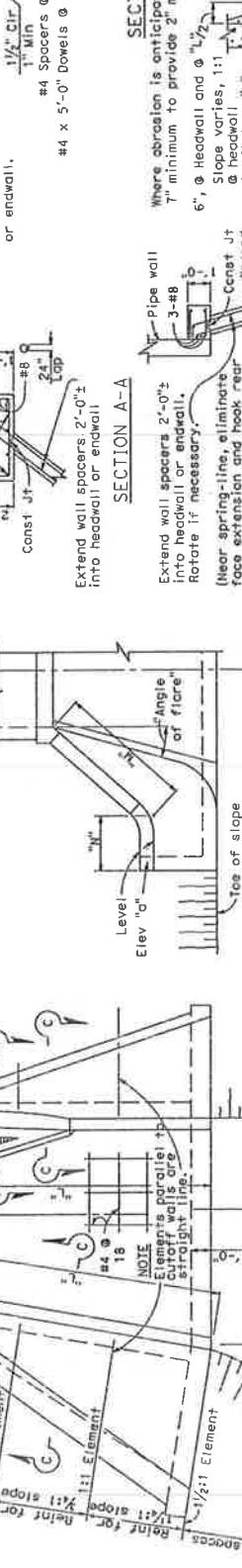
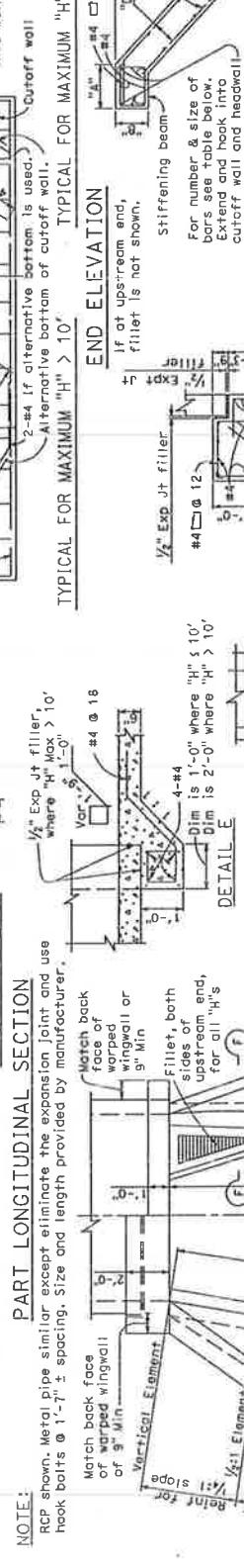
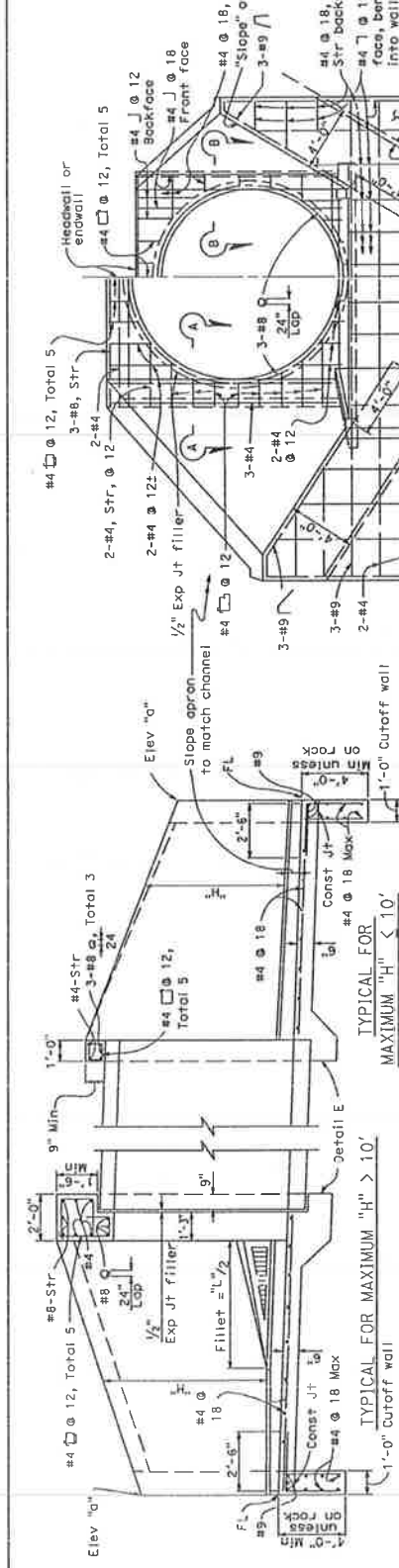
- NOTES:
- Eliminate cutoff walls if adjacent channel is paved.
 - For "H" not shown use reinforcement for next greater height.

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION

**BOX CULVERT WINGWALLS
 TYPES D AND E**

NO SCALE

DIST COUNTY ROUTE SHEET NO. DATE
 REGISTERED CIVIL ENGINEER
 May 1, 2006
 PLANS APPROVAL DATE
 12-31-06
 To get the Collins web site, go to <http://www.collins.com>



Element	WALL DIMENSIONS AND REINFORCING																			
	"H"	8'	10'	12'	14'	16'	18'	20'	"H" _{Max}	12'	14'	16'	18'	20'	25'	30'	35'	40'	or more	
Front face Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#6 @ 6	#7 @ 7	#7 @ 7	#7 @ 6	#6	No beads. Place 2-#6 in each face along top of wall.	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
Rear face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	
Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	
Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	
Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	#4 @ 6	
"D" at Cutoff Wall	6"	5"	6"	6"	7 1/2"	8"	9 1/2"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	11"	
"D" of Culvert	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	

NOTES: Walls designed for 2'-0" surcharge; earth density = 120 LB/CF; equivalent fluid pressure = 36 LB/CF. Vary "D" of warped wall uniformly from that at cutoff wall to that at headwall or endwall, for maximum "H" > 12'-0". Dimensions "L", "W", "H", "M", "N", "Elevation "o", "Angle of flare", and end "Slope" (as apply) are shown on the plans.

D86B

DIST COUNTY ROUTE POST MILES TO PROJECT SHEET TOTAL NO. SHEETS

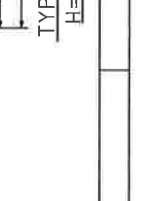
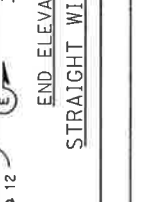
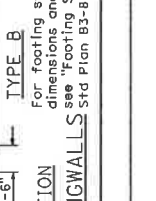
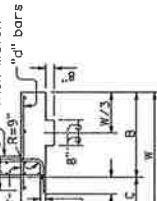
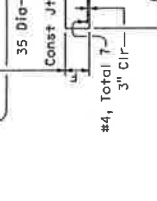
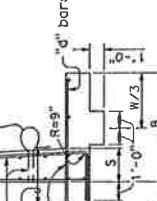
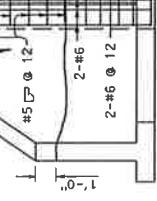
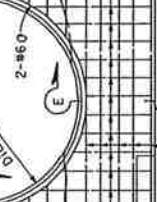
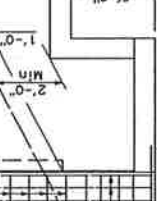
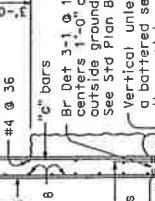
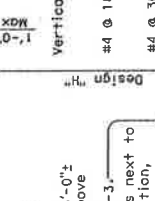
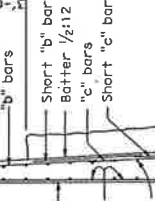
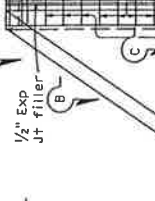
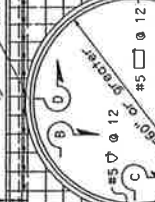
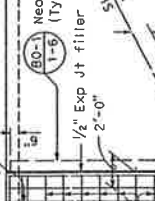
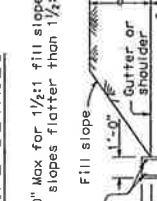
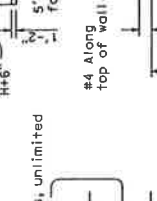
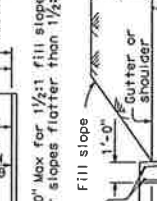
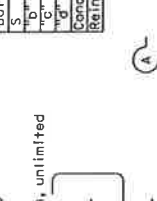
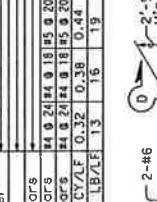
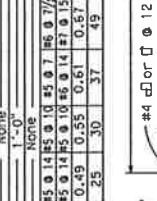
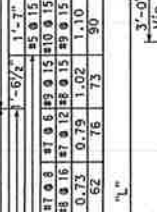
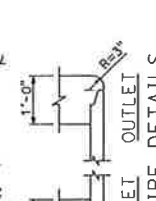
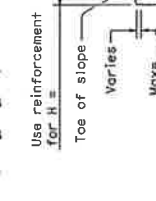
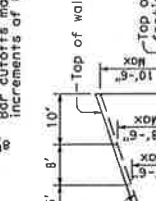
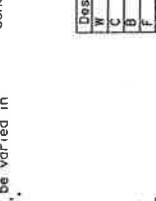
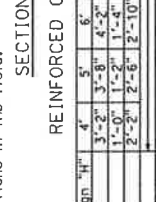
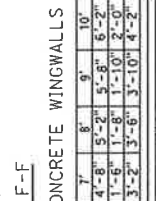
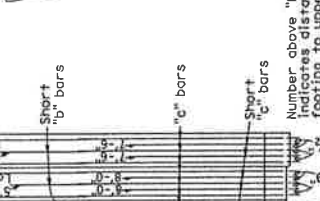
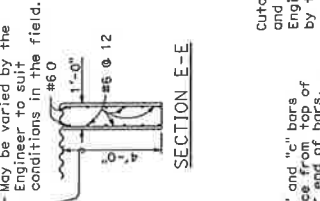
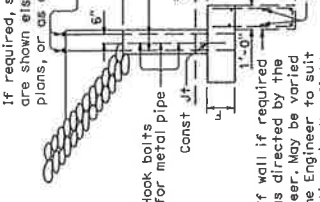
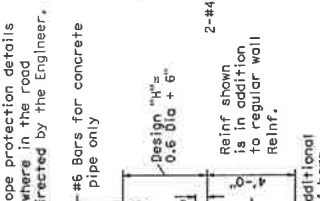
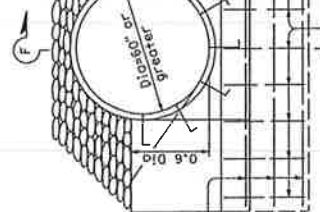
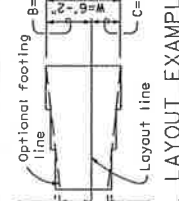
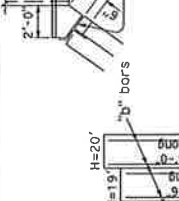
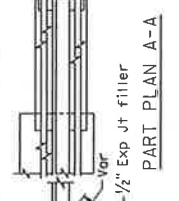
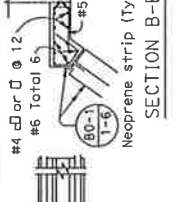
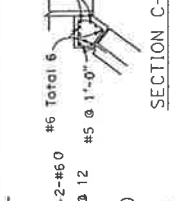
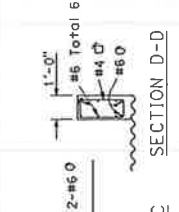
REGISTERED CIVIL ENGINEER

MAV 11 2006

PLANS APPROVAL DATE

The State of California and its officers and agents shall not be responsible for the accuracy or completeness of electronic copies of this plan.

To refer to the California web site, go to: <http://www.dir.ca.gov>

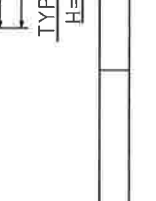
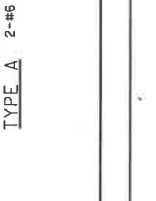
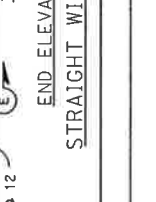
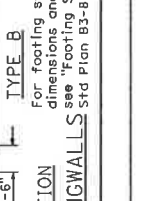
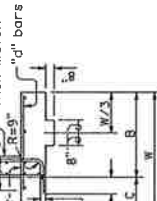
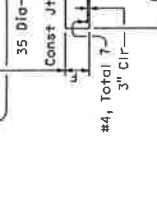
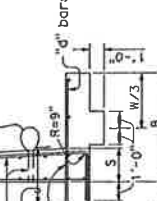
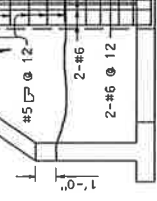
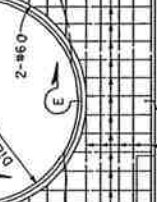
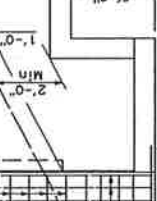
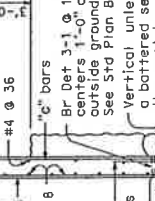
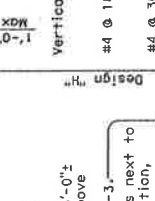
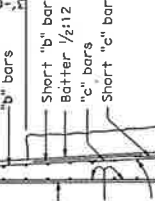
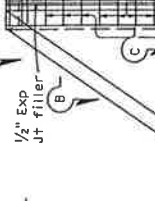
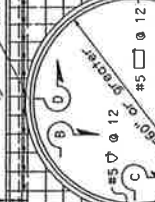
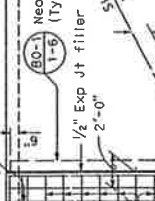
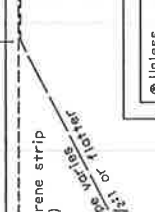
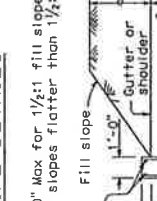
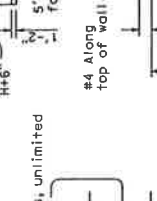
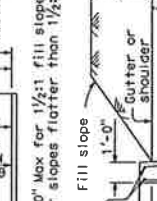
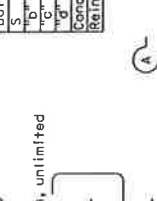
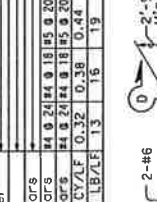
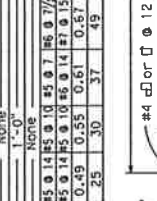
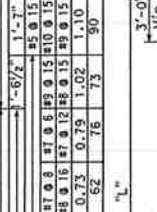
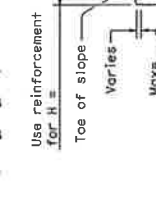
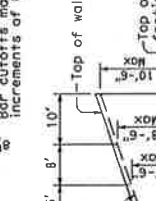
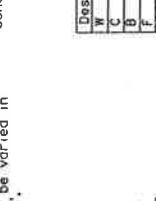


REINFORCED CONCRETE WINGWALLS

Design "H"	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Reinf. LB/LF	13	18	19	25	30	37	49	62	78	90	104	123	141	170	199	206	

RC PIPE DETAILS

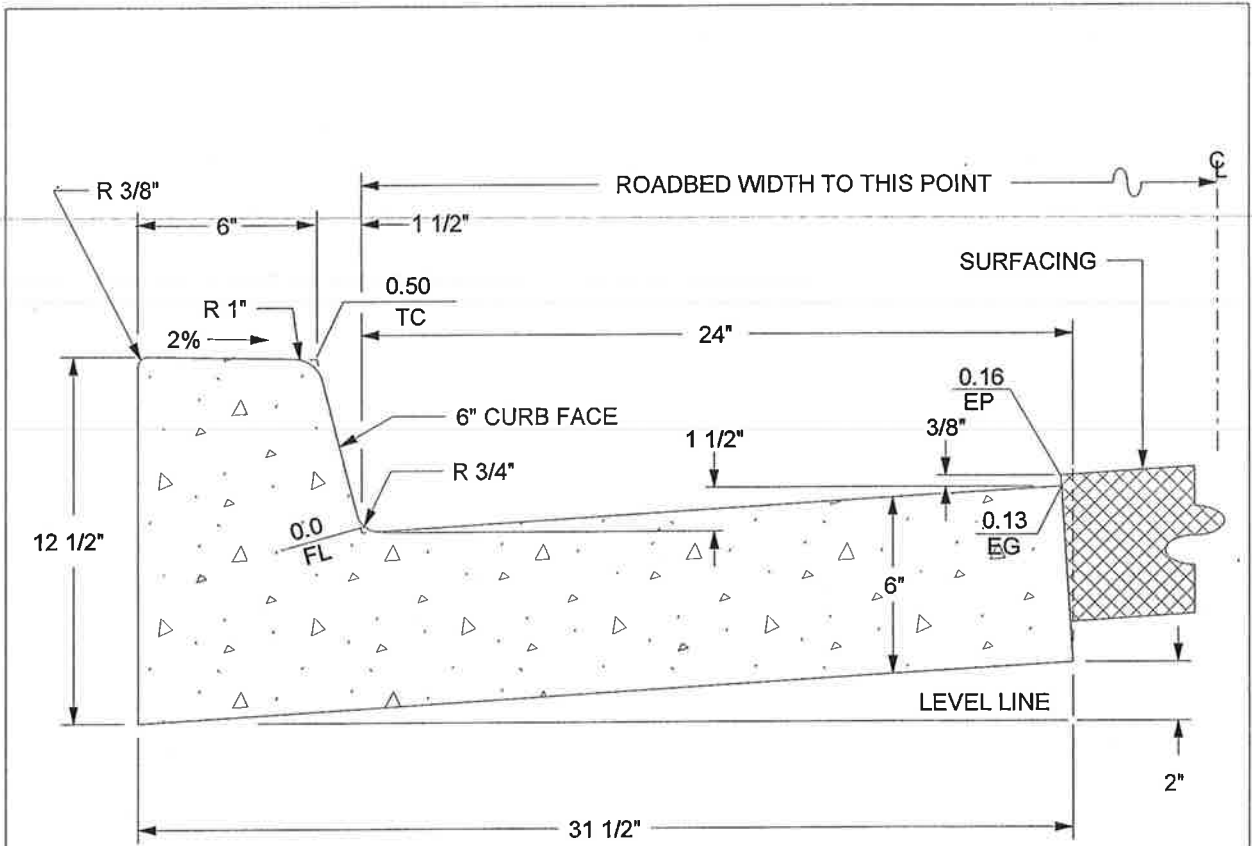
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Reinf. LB/LF	13	18	19	25	30	37	49	62	78	90	104	123	141	170	199	206	



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PIPE CULVERT HEADWALLS, ENDWALLS AND WINGWALLS TYPES A, B AND C
NO SCALE

END ELEVATION
STRAIGHT WINGWALLS
For footing step dimensions and reinforcement see "Footing Step" on Std Plan 83-8.

D90



CLASS "B" CONCRETE

1.601 CU. FT. / L.F.

1 CU. YD. = 16.86 L.F.

ABBREVIATIONS:

TC = TOP OF CURB

FL = FLOWLINE

EG = EDGE OF GUTTER

EP = EDGE OF PAVEMENT

APPROVED BY:

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

DATE: 05/01/07

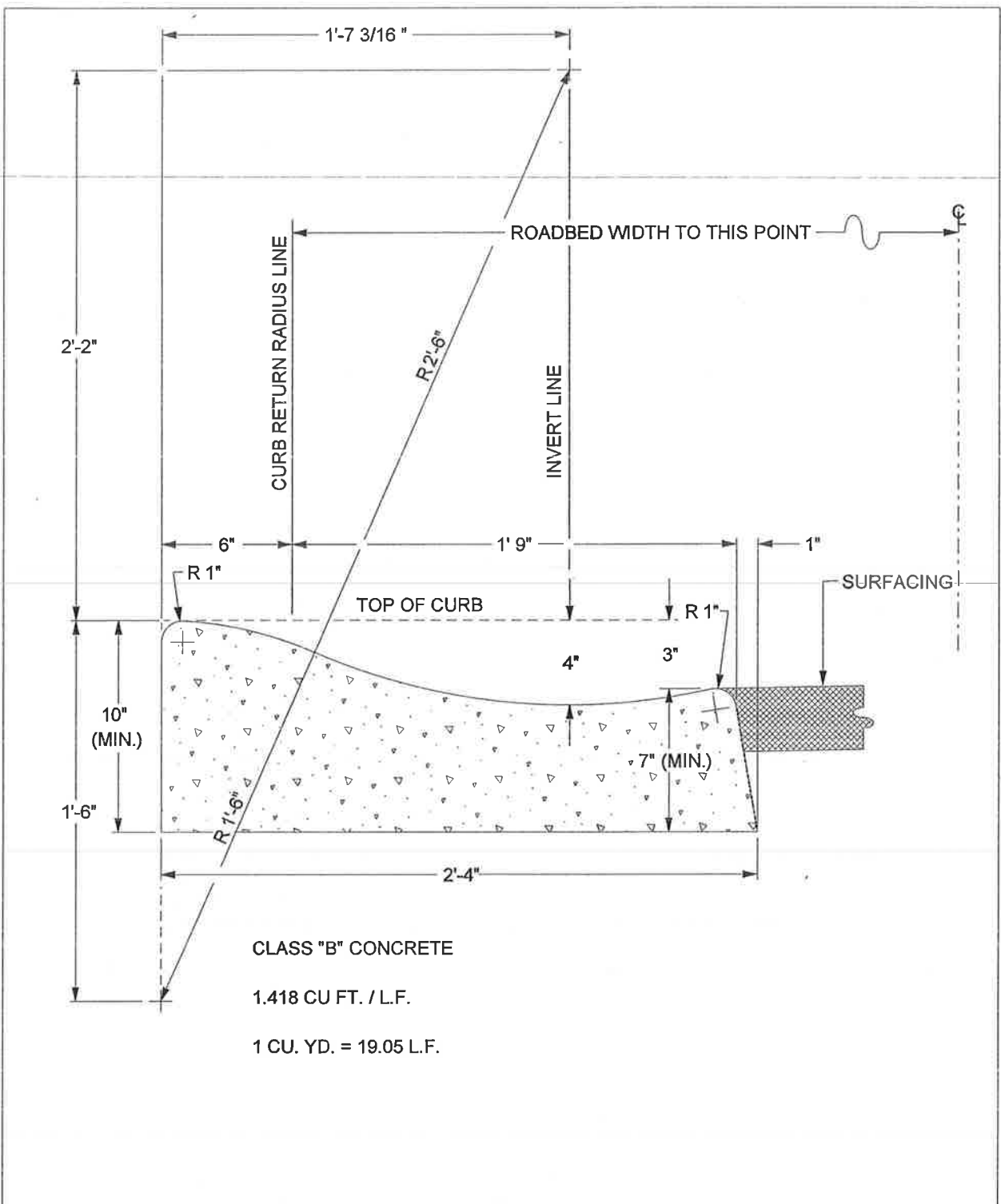


COUNTY OF RIVERSIDE

TYPE A-6 CURB

STANDARD NO. 200

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-71, 9-88	1				4			
2-90, 11-04	2				5			
	3				6			



CLASS "B" CONCRETE
 1.418 CU FT. / L.F.
 1 CU. YD. = 19.05 L.F.

APPROVED BY:

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

DATE: 05/01/07

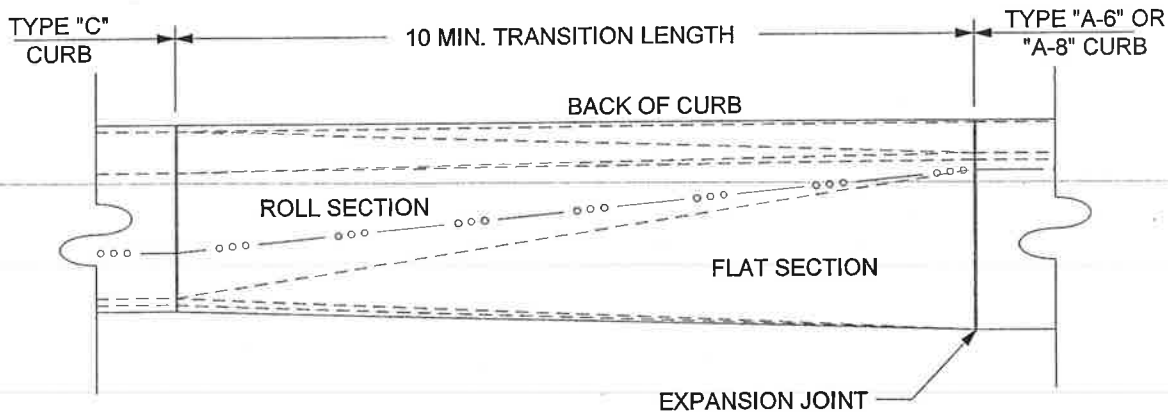


COUNTY OF RIVERSIDE

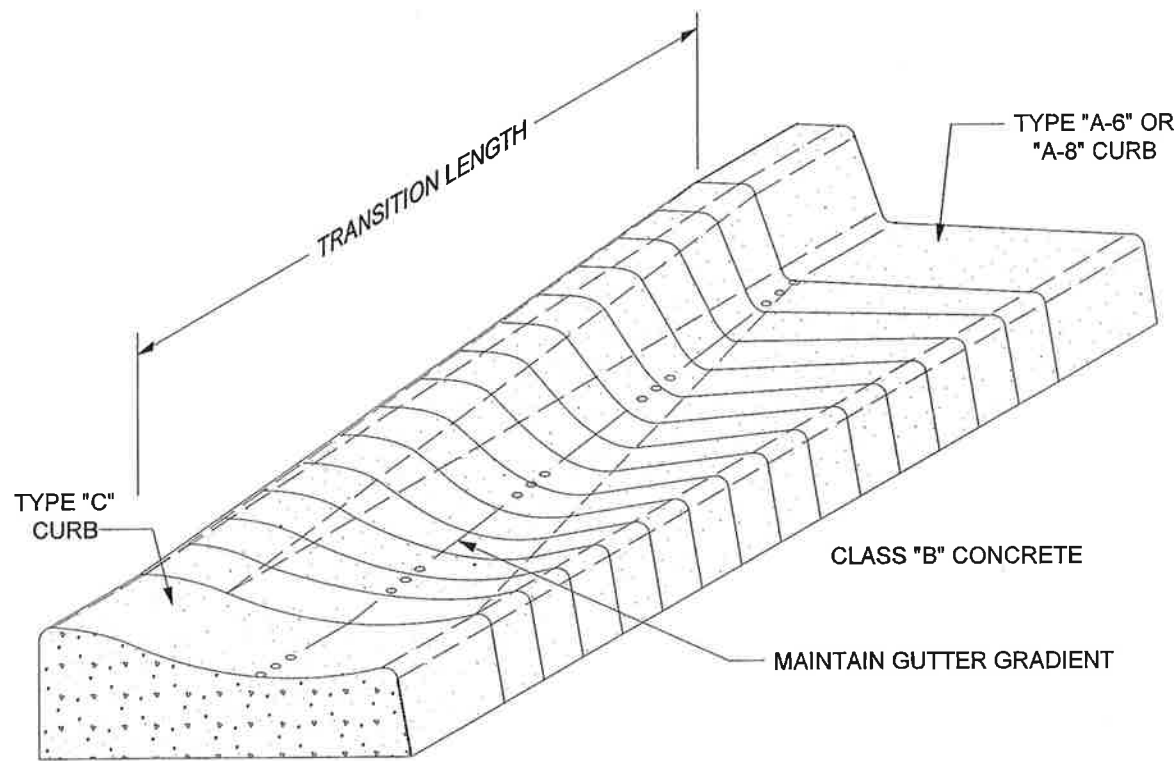
TYPE "C" CURB

STANDARD NO. 202

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
2-71, 3-82	1				4			
2-90, 11-04	2				5			
	3				6			





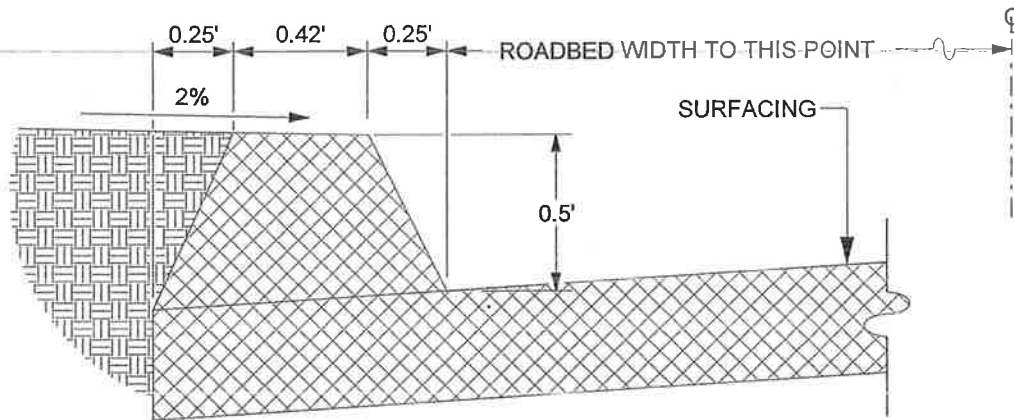
PLAN VIEW



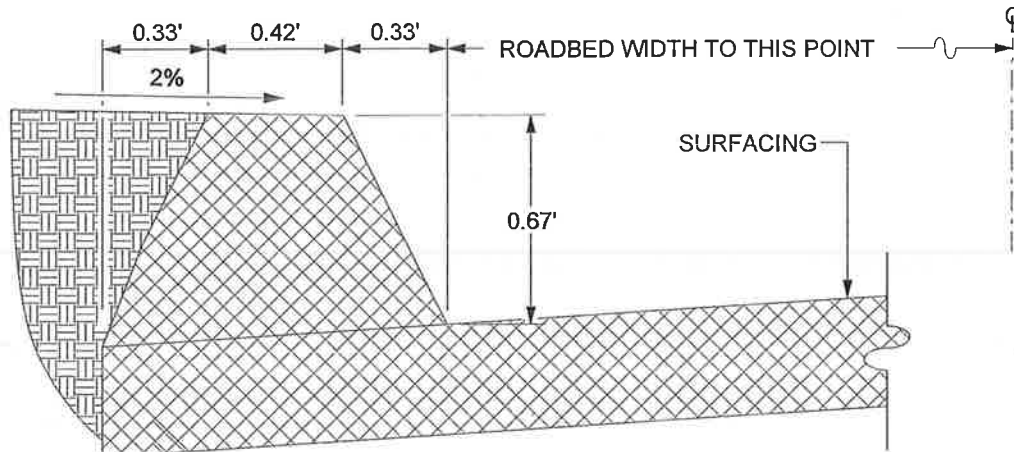
ISOMETRIC VIEW

NOT TO SCALE

APPROVED BY:										COUNTY OF RIVERSIDE				
										DATE: 05/01/07				
DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328										STANDARD NO. 211				
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE					
8-24-71, 6-82		1				4								
		2				5								
		3				6								



6" A.C. DIKE



8" A.C. DIKE

NOT TO SCALE

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

APPROVED BY:

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

DATE: 05/01/07

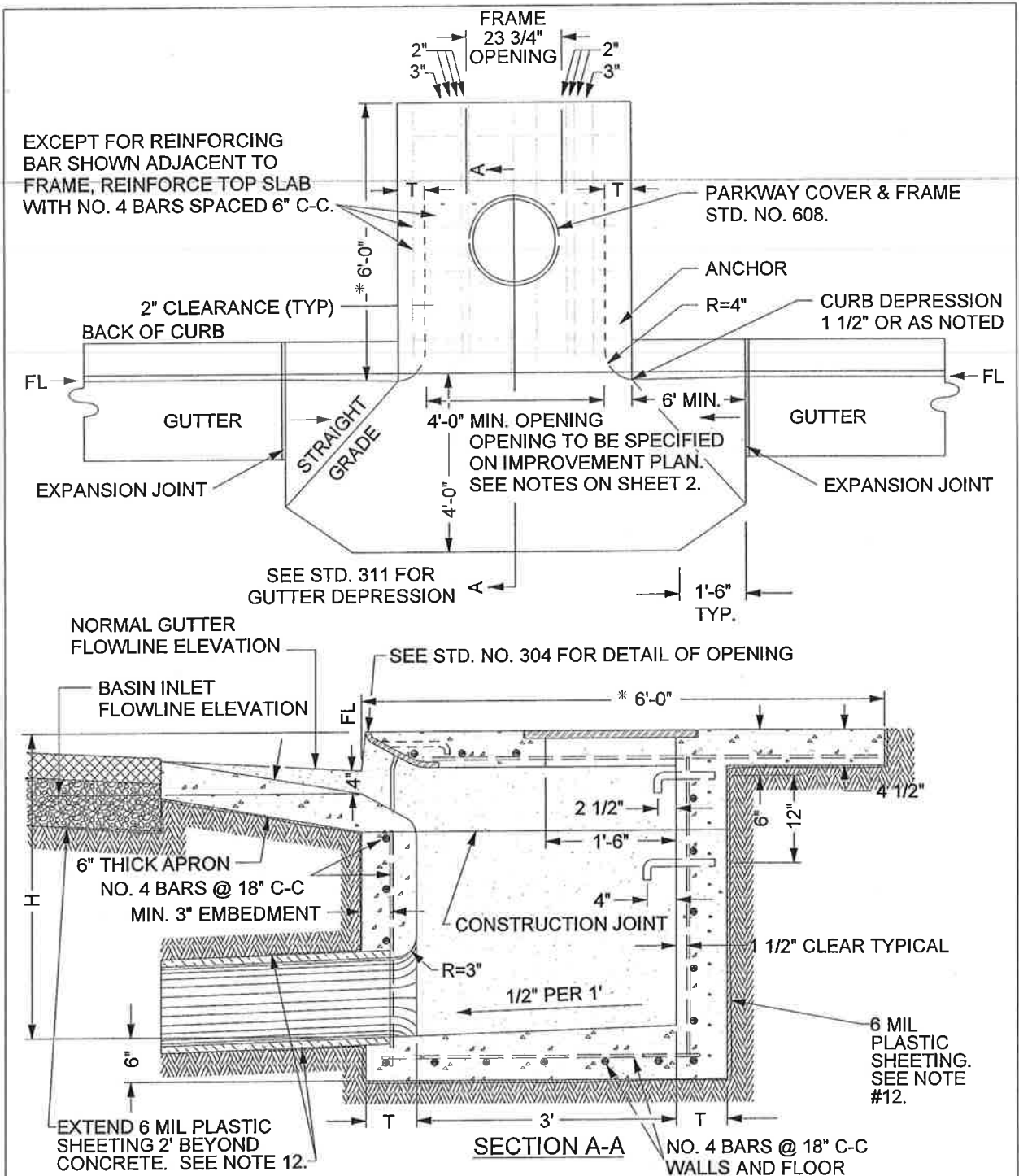


COUNTY OF RIVERSIDE

**ASPHALT CONCRETE
 DIKES**

STANDARD NO. 212

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
	1				4			
	2				5			
	3				6			



CATCH BASIN SHALL BE CLASS "A" P.C.C.
 *TOP OF CATCH BASIN TO BE POURED MONOLITHIC WITH SIDEWALK, 6 FT. NOT TO SCALE

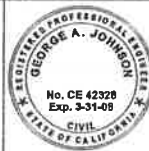
APPROVED BY:				COUNTY OF RIVERSIDE				
				CURB INLET CATCH BASIN				
DIRECTOR OF TRANSPORTATION GEORGE A. JOHNSON, RCE 42328		DATE: 05/01/07		STANDARD NO. 300 (1 OF 2)				
REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-71, 9-88	1				4			
4-90, 11-04	2				5			
	3				6			

1. CONNECTION PIPES MAY BE PLACED ANY POSITION AROUND THE WALLS, PROVIDED THEY POINT IN THE PROPER DIRECTION AND THE POSITION IS OTHERWISE CONSISTENT WITH THE IMPROVEMENT PLAN.
2. CURVATURE OF THE LIP AND SIDEWALLS AT GUTTER OPENING SHALL BE FORMED BY CURVED FORMS AND SHALL NOT BE MADE BY PLASTERING.
3. DIMENSIONS:
 T = 6" IF H IS 8 FEET OR LESS.
 T = 8" IF H IS GREATER THAN 8 FEET AND LESS THAN 20 FEET.
 H = 3 FEET 6 INCHES, UNLESS OTHERWISE SPECIFIED.
4. FLOOR OF BASIN SHALL BE GIVEN A STEEL - TROWELLED FINISH.
5. MANHOLE SHALL BE PLACED AS SHOWN ON STANDARD NO. 300, UNLESS NOTED DIFFERENTLY ON IMPROVEMENT PLANS.
6. OUTLET PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
7. OPENING SHALL BE 4'-0" (MINIMUM) UNLESS OTHERWISE SPECIFIED.
8. REINFORCING STEEL SHALL BE NO. 4 ROUND DEFORMED BARS IN TOP SLAB, AT 18" CENTERS IN THE SIDES AND FLOOR OF THE BOX.
9. 3/4 INCH PLAIN ROUND GALVANIZED STEEL STEPS (ALHAMBRA FDY. A-3320 OR EQUAL) ARE REQUIRED AS FOLLOWS:
 IF H IS 3.5 FEET OR LESS, NO STEPS ARE REQUIRED.
 IF H IS MORE THAN 3.5 FEET, AND NOT MORE THAN 5 FEET, INSTALL 1 STEP 16" ABOVE FLOOR OF THE BASIN.
 IF H IS MORE THAN 5 FEET, INSTALL STEPS 12 INCHES APART, WITH THE TOP STEP 6 INCHES BELOW THE SURFACE OF THE BASIN.
 ALL STEPS SHALL BE 4 INCHES FROM THE WALL, EXCEPT THE TOP STEP, WHICH SHALL BE 2 1/2 INCHES (CLEAR) FROM THE WALL, AND ANCHORED NOT LESS THAN 5 INCHES INTO THE WALL OF THE BASIN.
10. SURFACE OF ALL EXPOSED CONCRETE IN BASIN SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH AND SCORING TO EXISTING OR PROPOSED CURB AND WALL ADJACENT TO THE BASIN.
11. CONCRETE SHALL BE CLASS "A" WHEN THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF A PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH A SIDEWALK. THE TOP OF THE BASIN SHALL BE POURED MONOLITHIC WITH THE SIDEWALK, USING CLASS "A" CONCRETE IN THE SIDEWALK AND THE TOP OF THE CATCH BASIN PER SIDEWALK STANDARDS.
12. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

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

DATE: 05/01/07

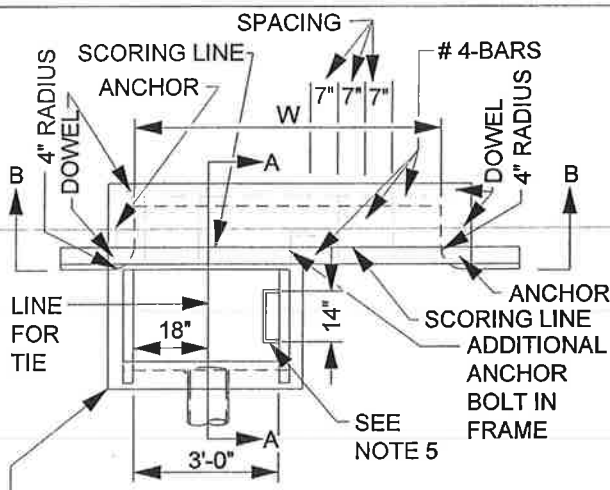


COUNTY OF RIVERSIDE

**CURB INLET
 CATCH BASIN
 (SPECS)**

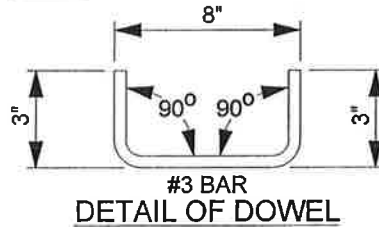
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-24-71		1				4			
11-04		2				5			
		3				6			

STANDARD NO. 300 (2 OF 2)

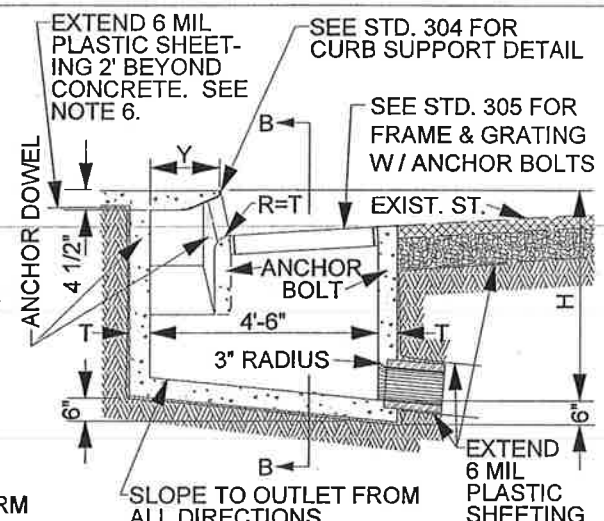


THE OUTER EDGES OF THE WALLS SHALL CONFORM TO THE STREET OR LOCAL DEPRESSION SURFACE. THE GRATING SHALL BE LAID IN THE PLANE OF THIS SURFACE, SEE STD. NO. 312 CASE B FOR GUTTER DEPRESSION.

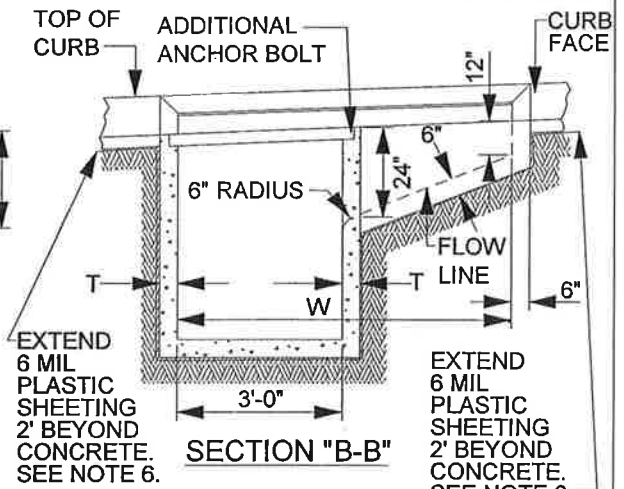
PLAN



NOT TO SCALE



SECTION "A-A"



SECTION "B-B"

NOTES:

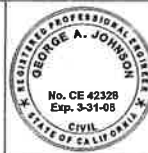
1. DIMENSIONS UNLESS OTHERWISE SPECIFIED*

Y	W	T	H
2' 3"	7"*	6"*	4' 6"*
		6"	5' OR LESS
		8"	5' TO 8'
		10"	8' OR GREATER
2. CONCRETE SHALL BE CLASS "A" PORTLAND CEMENT CONCRETE (6 SACK).
3. THE REINFORCING STEEL SHALL BE NUMBER 4 DEFORMED BARS. CLEARANCE SHALL BE 1 1/2" FROM THE BOTTOM OF THE SLAB.
4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE, COLOR, FINISH, AND SCORING IN THE EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP AND SIDEWALLS AT THE GUTTER OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE THE CONCRETE IS POURED.
5. STEPS: 3/4" PLAIN ROUND NON-GALVANIZED STEEL STEPS, OR MATERIAL AS APPROVED BY DIRECTOR OF TRANSPORTATION, SHALL BE INSTALLED 16 INCHES APART WHEN H EXCEEDS 4 FEET 6 INCHES. THE TOP STEP SHALL BE 6 INCHES BELOW THE TOP SURFACE AND SHALL BE 2 1/2 INCHES CLEAR FROM THE WALL. ALL OTHER STEPS SHALL BE 4 INCHES CLEAR OF THE WALL. ONLY ONE STEP 12 INCHES FROM THE BOTTOM SHALL BE INSTALLED IF H IS 4 FEET 6 INCHES OR LESS. ALL STEPS SHALL BE ANCHORED NOT LESS THAN 4 INCHES INTO THE WALL OF THE BASIN.
6. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

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

DATE: 05/01/07

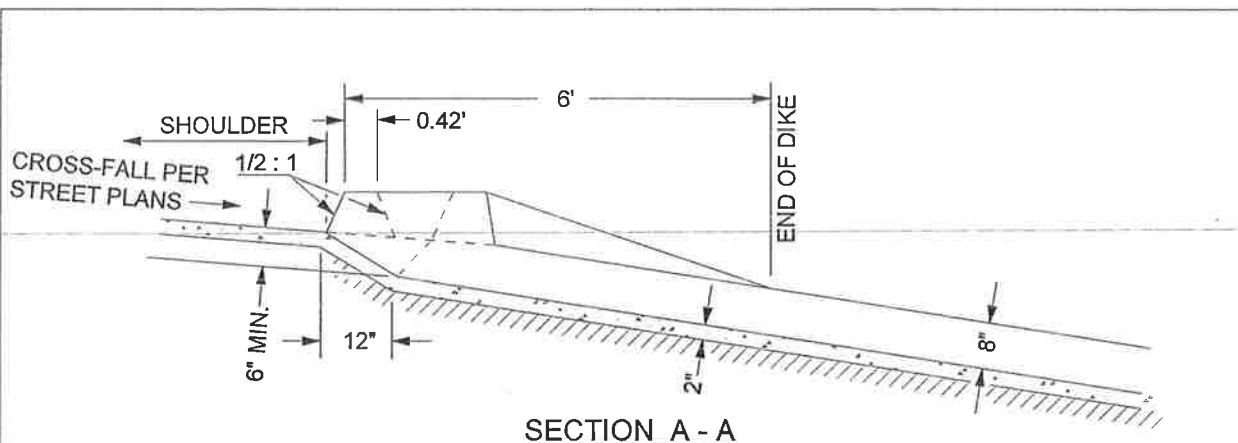


COUNTY OF RIVERSIDE

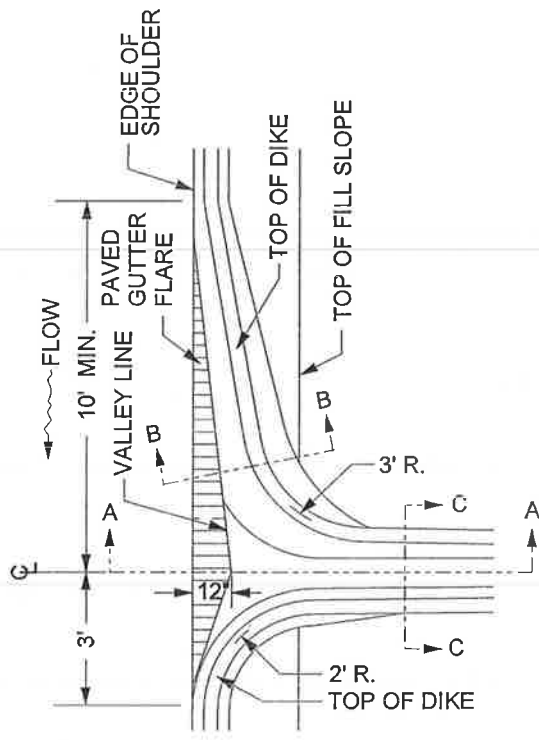
**COMBINATION INLET
CATCH BASIN NO.1**

REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-71, 12-97		1				4			
11-04		2				5			
		3				6			

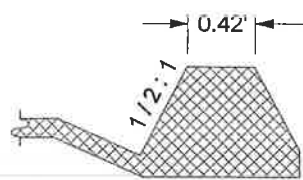
STANDARD NO. 301



SECTION A - A

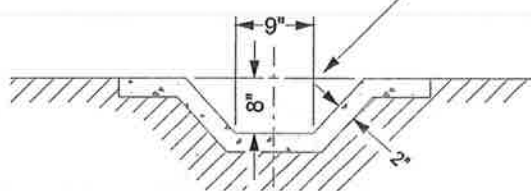


PLAN



SECTION B - B

NOTE:
 CROSS - SECTION OF SLOPE DITCH MAY BE SEMICIRCULAR, VEE, OR TRAPEZOIDAL.
 MIN. TOP WIDTH = 25", MIN. DEPTH = 8".



SECTION C - C

NOT TO SCALE

TO BE USED ON FILL SLOPES FLATTER THAN 4 : 1.
 USE MIN. 10' LENGTH OF GUTTER ON BOTH SIDES
 IN A SAG LOCATION. USE PIPE DOWNDRAINS FOR
 SLOPES STEEPER THAN 4 : 1 SLOPES.

APPROVED BY:

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

DATE: 05/01/07

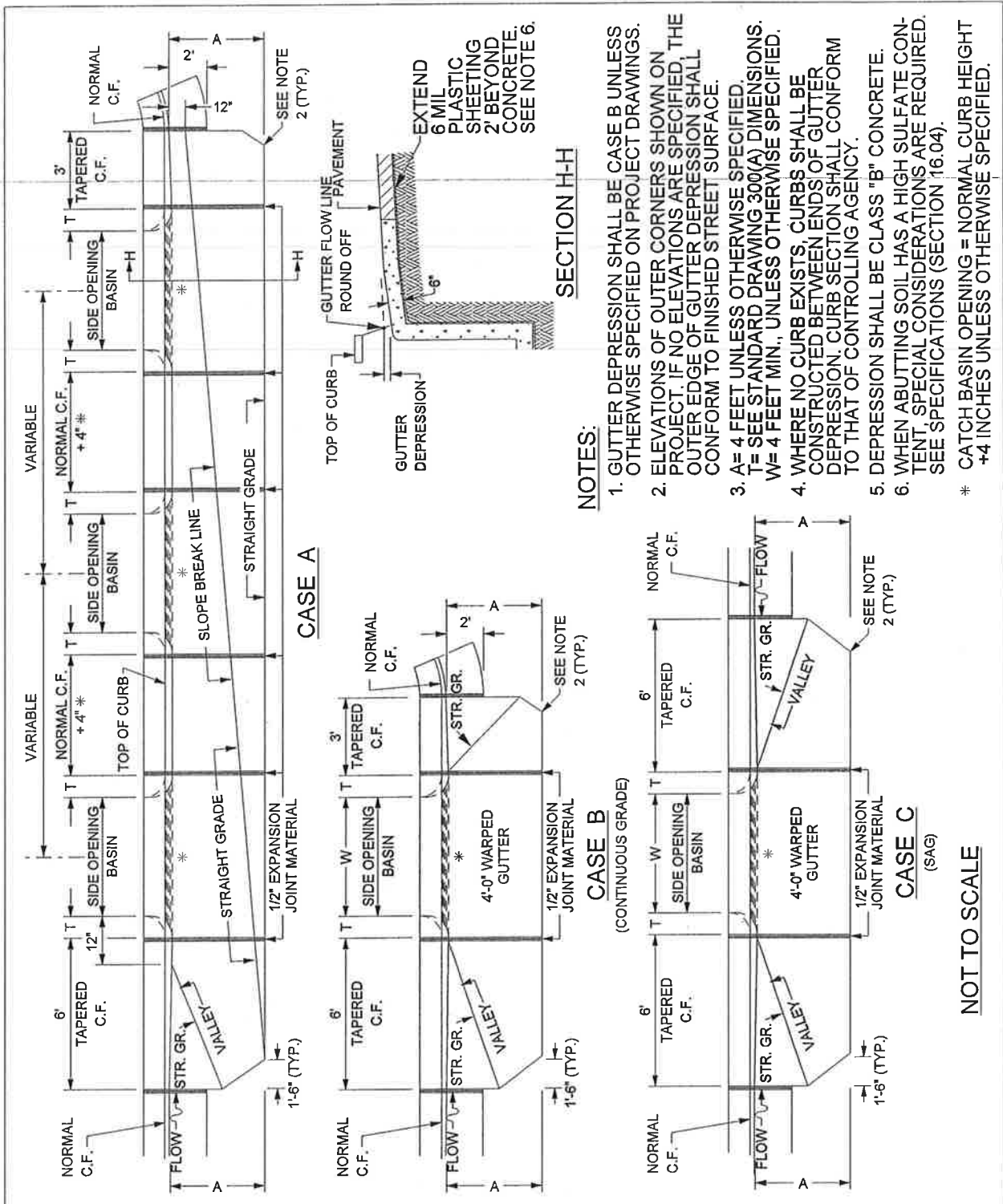


COUNTY OF RIVERSIDE

**ASPHALT CONCRETE
 OVERSIDE DRAIN**

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-18-77, 2-82	1				4			
11-04	2				5			
	3				6			

STANDARD NO. 306



NOTES:

1. GUTTER DEPRESSION SHALL BE CASE B UNLESS OTHERWISE SPECIFIED ON PROJECT DRAWINGS.
2. ELEVATIONS OF OUTER CORNERS SHOWN ON PROJECT. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF GUTTER DEPRESSION SHALL CONFORM TO FINISHED STREET SURFACE.
3. A= 4 FEET UNLESS OTHERWISE SPECIFIED.
T= SEE STANDARD DRAWING 300(A) DIMENSIONS.
W= 4 FEET MIN., UNLESS OTHERWISE SPECIFIED.
4. WHERE NO CURB EXISTS, CURBS SHALL BE CONSTRUCTED BETWEEN ENDS OF GUTTER DEPRESSION. CURB SECTION SHALL CONFORM TO THAT OF CONTROLLING AGENCY.
5. DEPRESSION SHALL BE CLASS "B" CONCRETE.
6. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

* CATCH BASIN OPENING = NORMAL CURB HEIGHT +4 INCHES UNLESS OTHERWISE SPECIFIED.

APPROVED BY:

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

DATE: 05/01/07



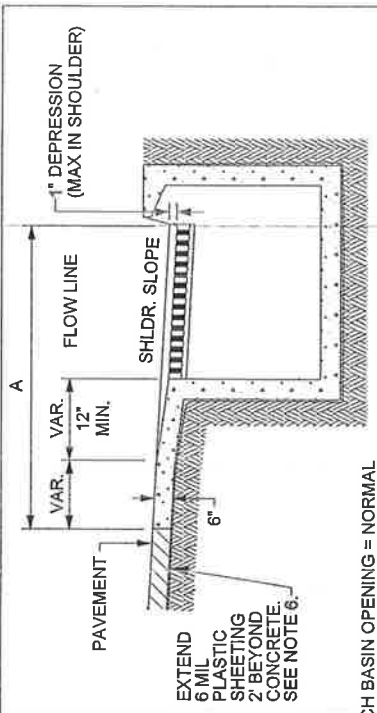
COUNTY OF RIVERSIDE

**GUTTER DEPRESSION
 FOR CURB OPENING
 CATCH BASIN**

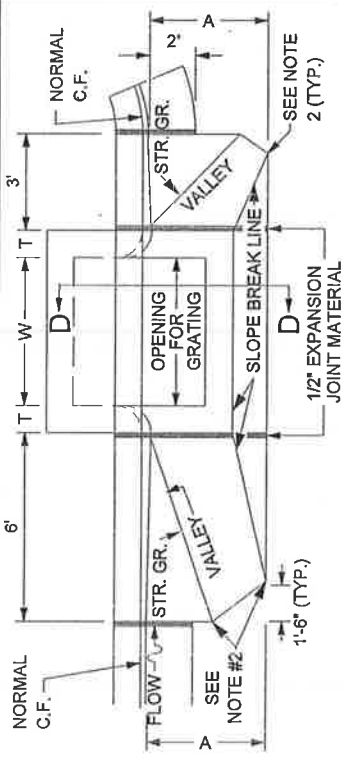
STANDARD NO. 311

REVISIONS	REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
11-04	1				4			
	2				5			
	3				6			

NOT TO SCALE

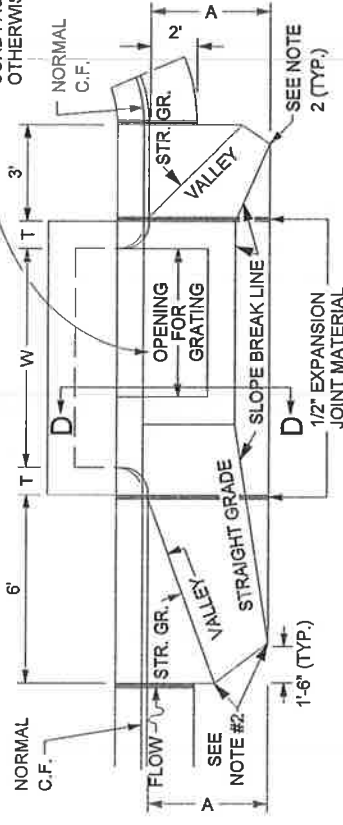


SECTION D-D

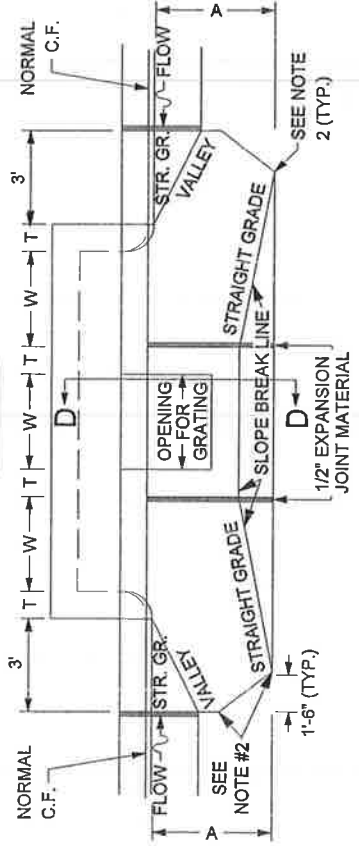


CASE A

CATCH BASIN OPENING = NORMAL CURB FACE + 4 INCHES UNLESS OTHERWISE SPECIFIED.



CASE B



CASE C

NOTES:

- GUTTER DEPRESSION SHALL BE:
 - CASE "A" SEE STD. NO. 302 COMBINATION CATCH BASIN, UNLESS OTHERWISE SPECIFIED.
 - CASE "B" SEE STD. NO. 301 COMBINATION INLET CATCH BASIN, UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS AT OUTER CORNERS SHOWN ON THE PROJECT DRAWINGS. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF THE GUTTER DEPRESSION SHALL CONFORM TO THE FINISHED STREET SURFACE.
- A = 4' UNLESS OTHERWISE SPECIFIED.
T = SEE STD. DRAWING NO. 302 (2) DIMENSIONS.
W = SEE STD. DRAWING 302 (2) DIMENSIONS.
- WHERE NO CURB EXISTS, CURB SHALL BE CONSTRUCTED BETWEEN ENDS OF GUTTER DEPRESSION. CURB SECTION SHALL CONFORM TO THAT OF CONTROLLING AGENCY.
- DEPRESSION SHALL BE CLASS B CONCRETE.
- WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

NOT TO SCALE

APPROVED BY:

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

DATE: 05/01/07

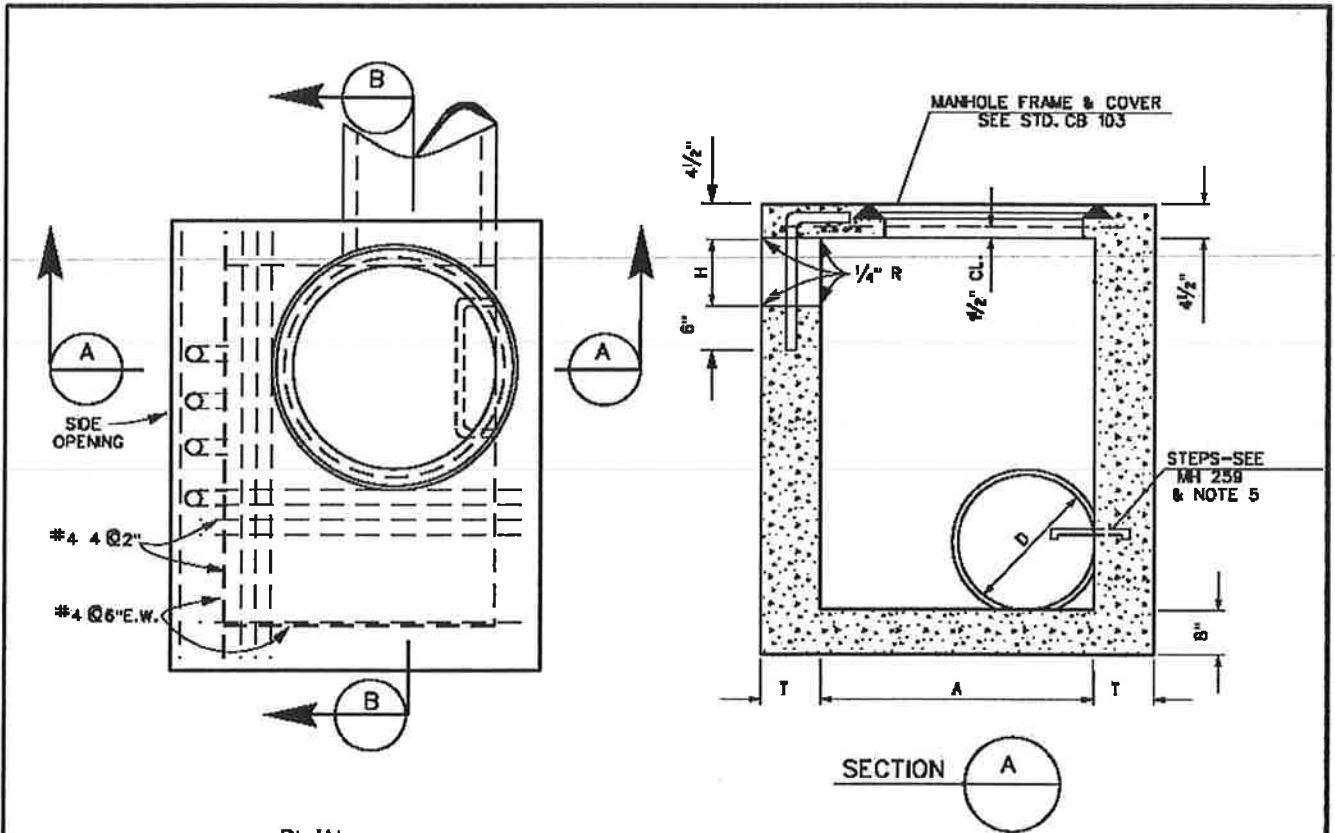


COUNTY OF RIVERSIDE

**GUTTER DEPRESSION
 FOR GRATE OPENING
 CATCH BASIN**

REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
11-04		1				4			
		2				5			
		3				6			

STANDARD NO. 312



1. DIMENSIONS:

- H = 9" OR AS NOTED ON PLANS
- V = SHALL BE SHOWN ON THE PLANS (8' MAX.)
- W = SHALL BE 36" OR AS NOTED ON PLANS.
- T = 6" IF V IS 4' OR LESS.
- T = 8" IF V IS 8' OR LESS
- D = 18" UNLESS OTHERWISE SPECIFIED.
- A = 36" UNLESS OTHERWISE SPECIFIED.

2. SEE STANDARD DRAWING CB 106 FOR WALL AND FLOOR STEEL REINFORCING

3. STRUCTURAL CONCRETE SHALL BE CLASS "A".

4. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS. CLEARANCE SHALL BE 1/2" FROM BOTTOM OF SLAB.

5. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP & SIDEWALLS AT THE SIDE OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE & LENGTH BEFORE THE CONCRETE IS POURED.

6. STEPS—3/4" PLAN ROUND GALVANIZED STEEL STEPS SHALL BE INSTALLED 18" APART WHEN V EXCEEDS 4'-8". THE TOP STEP SHALL BE 6" BELOW THE TOP SURFACE & SHALL BE 2 1/2" CLEAR FROM THE WALL ALL OTHER STEPS SHALL BE 4" CLEAR FROM THE WALL ONLY ONE STEP 12" FROM THE BOTTOM SHALL BE ANCHORED NOT LESS THAN 4" INTO THE WALL OF THE BASIN.

7. PROTECTION BARS ARE PLAIN ROUND STEEL BARS 1" DIAMETER AND SHALL BE INSTALLED WITH ENDS EMBEDDED 6".

8. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED.

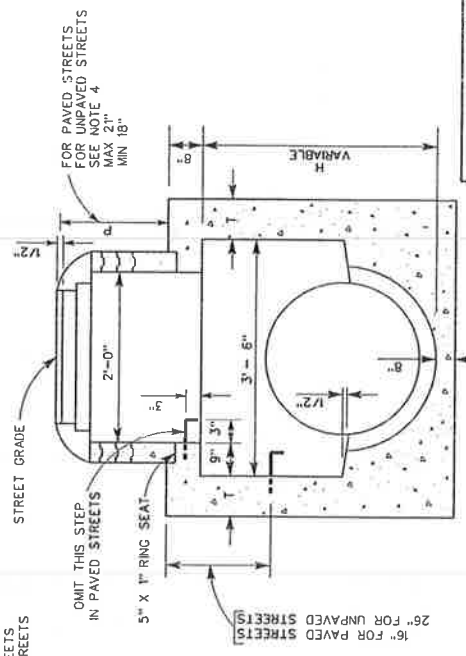
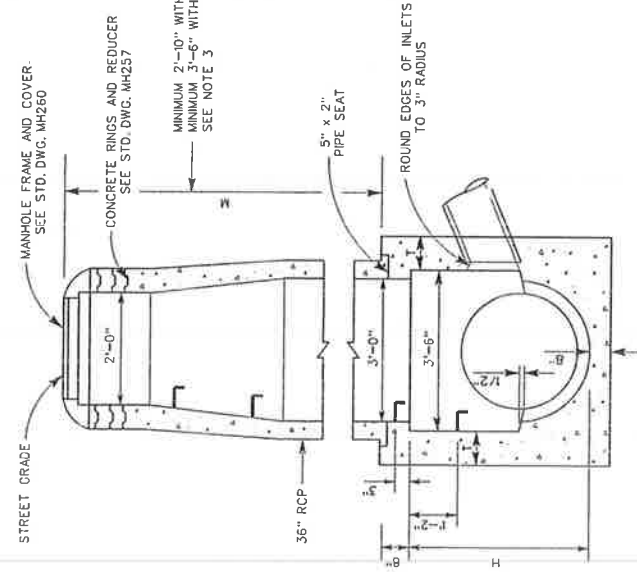
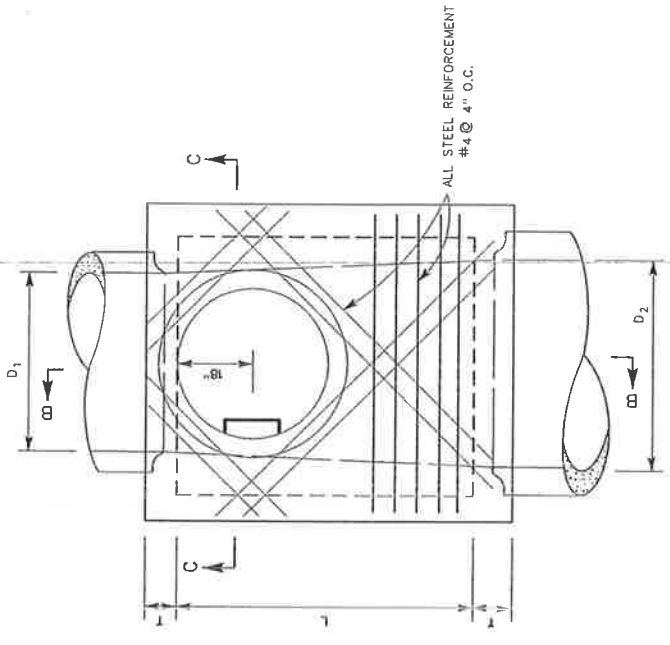
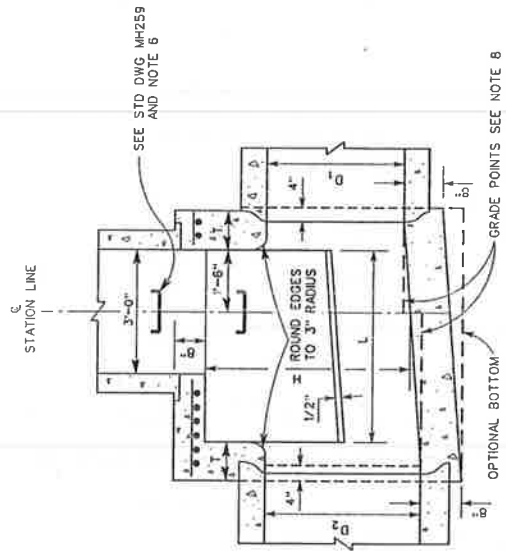
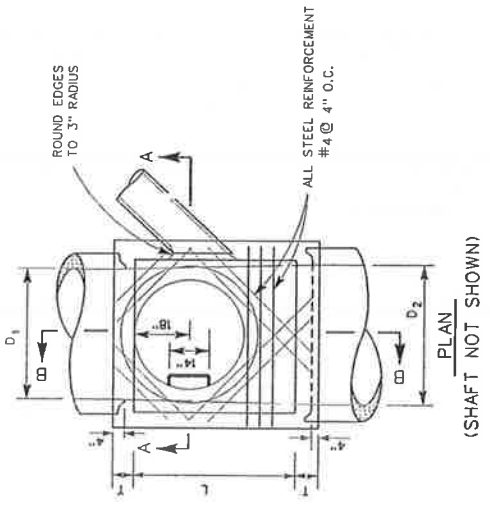
9. SLOPE BOTTOM TO OUTLET FROM ALL DIRECTIONS.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Willard D. Williams</i>
CIVIL ENGINEER	
DATE: Apr 15, 2004	R.C.E. NO. 32376

CONCRETE
DROP INLET

STANDARD DRAWING NUMBER CB110

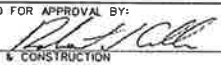
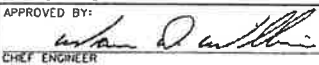


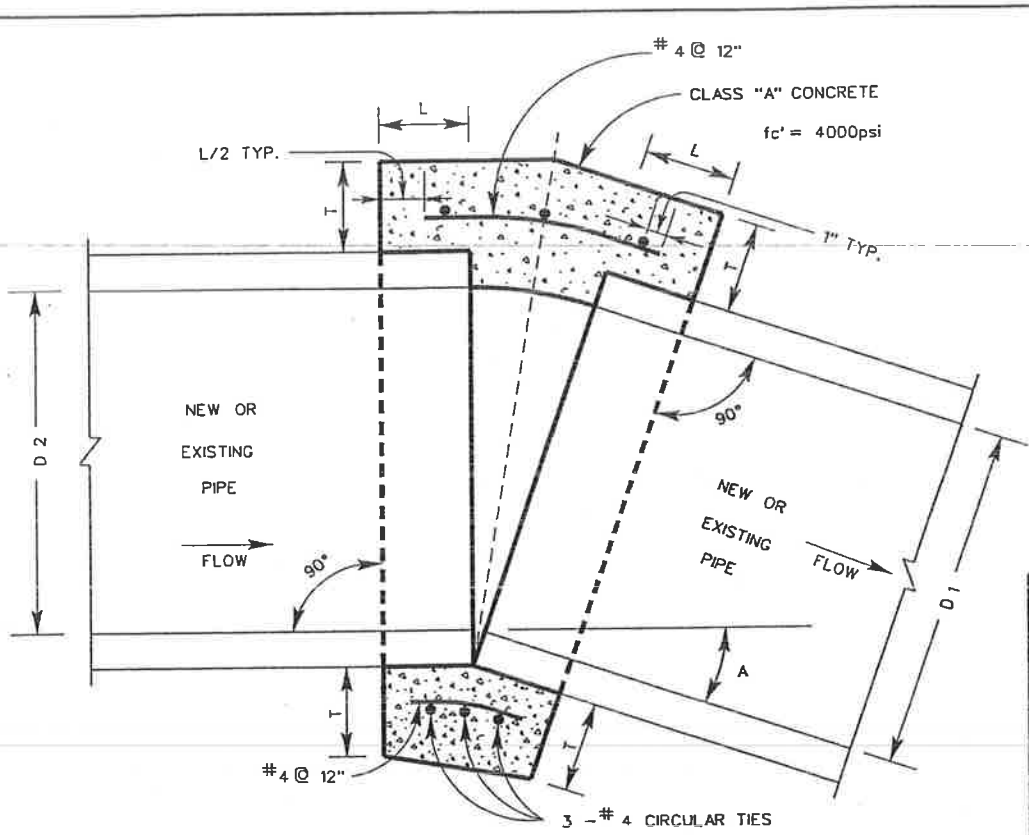
MANHOLE NO. 1
STANDARD DRAWING NUMBER MH251
SHEET 1 OF 2

REVERSE COUNTY FLOOD CONTROL DISTRICT
RECOMMENDED FOR APPROVAL BY WAIED COLLECTION DISTRICT
APPROVED BY: [Signature]
DATE: JANUARY 2011
R.E. No. 11488 DATE: JANUARY 2011
R.E. No. 32228

NOTES

1. HEIGHT H SHALL BE NOT LESS THAN 4'-0" BUT MAY BE INCREASED AT OPTION OF CONTRACTOR PROVIDED THAT THE VALUE OF M SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED AND THAT THE REDUCER SHALL BE USED. FOR H (IN SEC. C-C) SEE NOTE 4.
2. LENGTH L SHALL BE 4' UNLESS OTHERWISE SHOWN ON IMPROVEMENT PLAN. L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS, AT THE OPTION OF CONTRACTOR, EXCEPT THAT ANY CHANGE IN LOCATION OF MANHOLE MUST BE APPROVED BY THE ENGINEER.
3. SHAFT SHALL BE CONSTRUCTED AS PER SECTION C-C AND DETAIL N WHEN DEPTH M FROM STREET GRADE TO TOP OF BOX IS LESS THAN 2'-10 1/2" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS.
4. DEPTH P MAY BE REDUCED TO AN ABSOLUTE LIMIT OF 6" WHEN LARGER VALUES OF P WOULD REDUCE H (IN SECTION C-C) TO BE 3'-6" OR LESS.
5. T SHALL BE 8" FOR VALUES OF H UP TO AND INCLUDING 8'.
T SHALL BE 10" FOR VALUES OF H OVER 8'.
6. STEPS SHALL BE 3/4" ROUND, GALVANIZED STEEL AND ANCHORED NOT LESS THAN 4" IN THE WALLS OF STRUCTURES. UNLESS OTHERWISE SHOWN, STEPS SHALL BE SPACED 16" ON CENTER. THE LOWEST STEP SHALL BE NOT MORE THAN 2' ABOVE THE INVERT.
7. REINFORCING STEEL SHALL BE ROUND, DEFORMED, BARS, NO. 4 AND 1 1/2" CLEAR FROM INSIDE FACE OF CONCRETE.
8. STATIONS REFER TO PLAN AND PROFILE SHEETS. ELEVATIONS AT € AND PROLONGED INVERT GRADE LINE. SEE NOTE 2 FOR SHIFTING LOCATION.
9. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN CEMENT MORTAR AND NEATLY POINTED OR WIPED INSIDE SHAFT.
10. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRINGLINE.
11. CONCRETE SHALL BE CLASS "A".
12. WHERE PRESSURE MANHOLE NO. 1 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH25B.

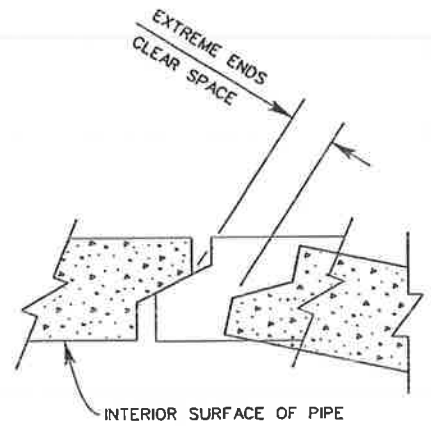
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		MANHOLE NO. 1 STANDARD DRAWING NUMBER MH251 SHEET 2 OF 2
RECOMMENDED FOR APPROVAL BY:  CHIEF, DESIGN & CONSTRUCTION	APPROVED BY:  CHIEF ENGINEER	
DATE: JANUARY 2011 R.E. No. 44684	DATE: JANUARY 2011 R.C.E. NO. 32336	



D	L	T
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
57"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"

NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 0.10 FT. PER FOOT, OR IF CHANGE IN ALIGNMENT EXCEEDS 0.10 FT. PER FOOT.
2. IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 1", BUT LESS THAN 6", A CONCRETE COLLAR IS REQUIRED (SEE DETAIL A THIS SHEET). IF THE CLEAR SPACE IS 6" OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.
3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.
4. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. $D = D_1$ OR D_2 , WHICHEVER IS GREATER.
5. FOR PIPE LARGER THAN 66" A SPECIAL COLLAR DETAIL IS REQUIRED.
6. FOR PIPE SIZE NOT LISTED USE THE NEXT SIZE LARGER.
7. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE A IS LESS THAN 10°.
8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE $D + (2 \times \text{WALL THICKNESS}) + 8"$.
9. WHEN D_1 IS EQUAL TO OR LESS THAN D_2 JOIN INVERTS AND WHEN D_1 IS GREATER THAN D_2 JOIN SOFFITS.
10. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE, OR REINFORCED CONCRETE PIPE.



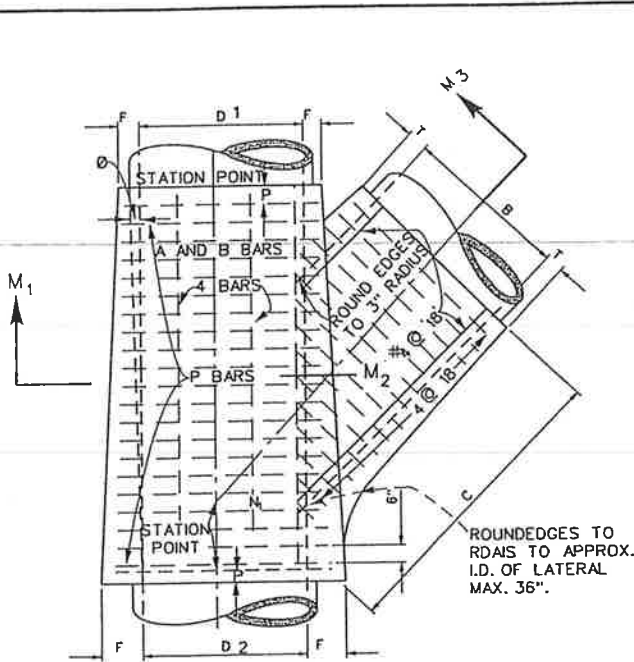
DETAIL "A"
TYPICAL JOINT FOR REINFORCED CONCRETE PIPE

APWA STD. PLAN 380-1
L.A.C.F.C. 2-0393

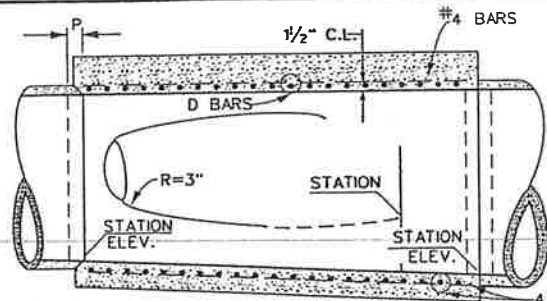


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
 APPROVED BY: *Warren D. Willard*
 CHIEF ENGINEER
 DATE: April 5, 2004 R.C.E. NO. 32336

CONCRETE COLLAR FOR PIPE 12 INCHES THROUGH 66 INCHES
 STANDARD DRAWING NUMBER M803



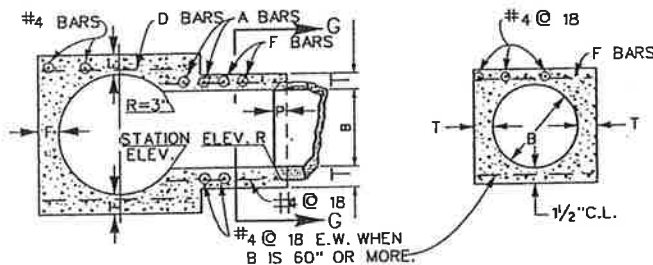
PLAN



LONGITUDINAL SECTION

4 @ 18
E.W. WHEN
D2 IS 60" OR
MORE.

ROUNDEDGES TO
RDAS TO APPROX.
I.D. OF LATERAL
MAX. 36".



SECTION M1, M2, M3.

SECT. G

NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, θ , SHALL NOT EXCEED $5^\circ 45'$.
2. VALUES FOR A1, B1, C1, D1, D2, ELEV. R AND ELEV. S ARE SHOWN ON IMPROVEMENT PLAN. LENGTH OF THE STRUCTURE MAY BE INCREASED TO MEET PIPE ENDS USING D BARS IN EXTENDED PORTION OF SAME DIM. AND SPACING AS APACING AS SPECIFIED.
3. CONC. SHALL BE CLASS A. FLOOR OF THE STRUCTURE SHALL BE STEEL-TROWELED TO SPRINGING LINE. STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRINGING LINE A CONST. JOINT WITH A LONGITUDINAL KEYWAY.
4. REINFORCING STEEL CLEAR COVER SHALL BE $1\frac{1}{2}$ " ON INSIDE. TIE BARS SHALL BE NO.4 B SPACED 18" C/C.
5. WHEN DIM. C IS NOT SPECIFIED THE SPUR SHALL NOT BE CONSTRUCTED AND A A & B BARS SHALL BE OMITTED.
6. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25'. IF THE COVER EXCEEDS 25', A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PROJECT DRAWINGS.

TABLE

D2, D1, OR B	F OR T	REINFORCING BARS		P	
		A OR B BARS	D OR F BARS		
12	4				
15	4 1/4				
18	4 1/2				
21	5				
24	5 1/4	#5 @ 3	#4 @ 6		
27	5 1/2				
30	6				
33	6 1/4				
36	6 1/2				
39	7				
42	7 1/2	#6 @ 3	#5 @ 6	5"	
45	7 3/4				
48	8				
51	8 1/2				
54	9				
57	9 1/4				
60	9 1/2	#7 @ 3	#6 @ 6	8"	
63	10				
66	10 1/4				
69	10 3/4				
72	11				
78	11 3/4				
84	12 1/2				
90	13 1/4				
96	14				
102	15 1/2				
108	16				
114	16 1/2				
120	17				
126	17				
132	17 1/2				
138	17 1/2				
144	18				

*USE D2, OR D1,
WHICHEVER
IS GREATER, OR B



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

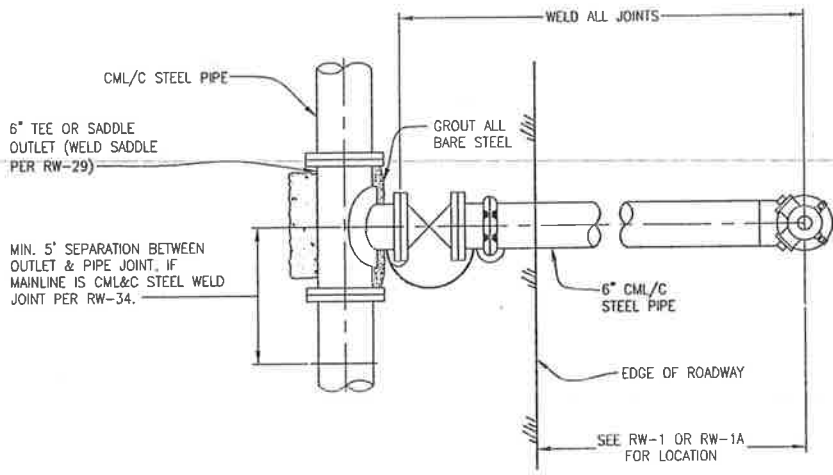
APPROVED BY: *Warren D. Williams*
CHIEF ENGINEER

DATE: April 5, 2004

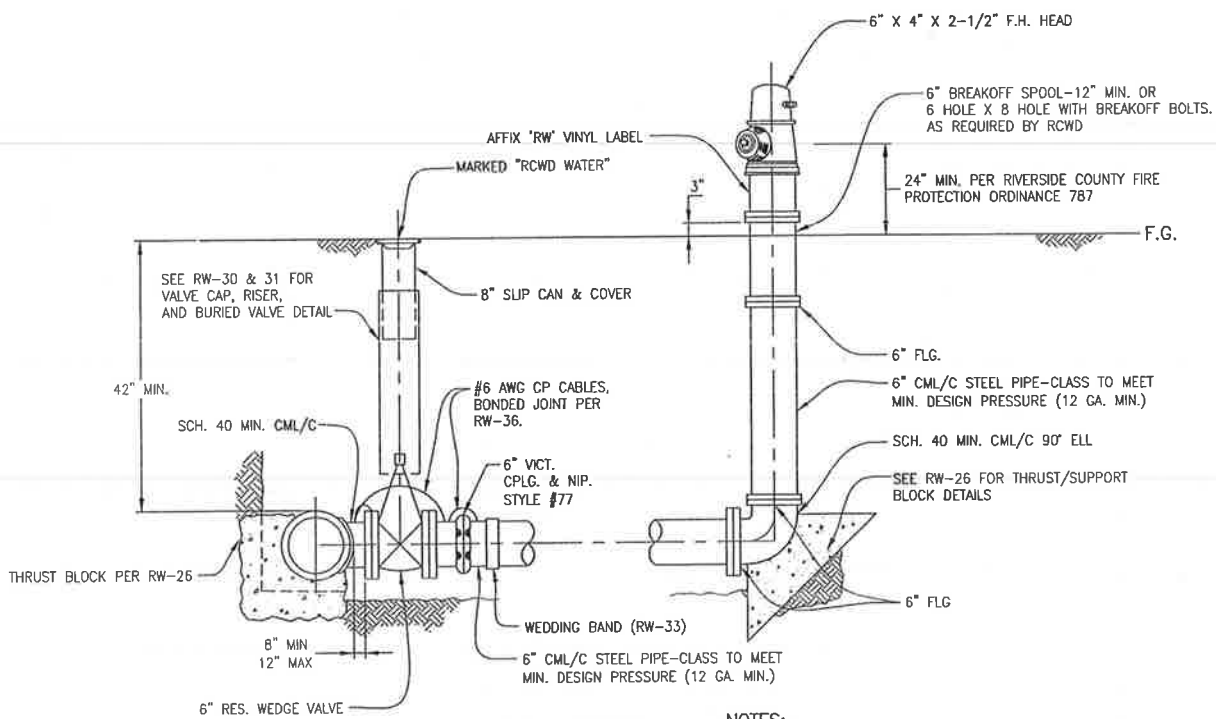
TRANSITION STRUCTURE
NO.3

STANDARD DRAWING NUMBER TS303

R.C.E. NO. 32336



PLAN



PROFILE

NOTES:

1. REFER TO RW-1 OR RW-1A, "APPURTENANCE LOCATIONS AND NOTES".
2. FIRE HYDRANTS TO BE PAINTED PER RW-1.
3. GROUT ALL BARE STEEL AND IRON.
4. COLD-APPLY WAX TAPE COATING TO ALL BOLTS, NUTS, AND FLANGES PER SPECIFICATIONS.
5. DIRECTION OF OUTLETS AT 45° PER RIVERSIDE COUNTY FIRE PROTECTION ORDINANCE 787.
6. REFER TO RW-36 FOR COATING BONDED JOINTS.
7. INSTALL BLUE RETRO REFLECTING PAVEMENT MARKER PER FIRE DEPARTMENT STANDARDS.
8. USE CL. E OR CL. F FLANGES AS APPROPRIATE PER SPECIFICATIONS.
9. INSTALL BREAKOFF CHECK VALVE WHERE NOTED ON PLANS.

REVISION NO.	DATE
1	1-09



APPROVED: 3-17-2008
Andrew Webster
 ANDREW WEBSTER
 ACTING DISTRICT ENGINEER

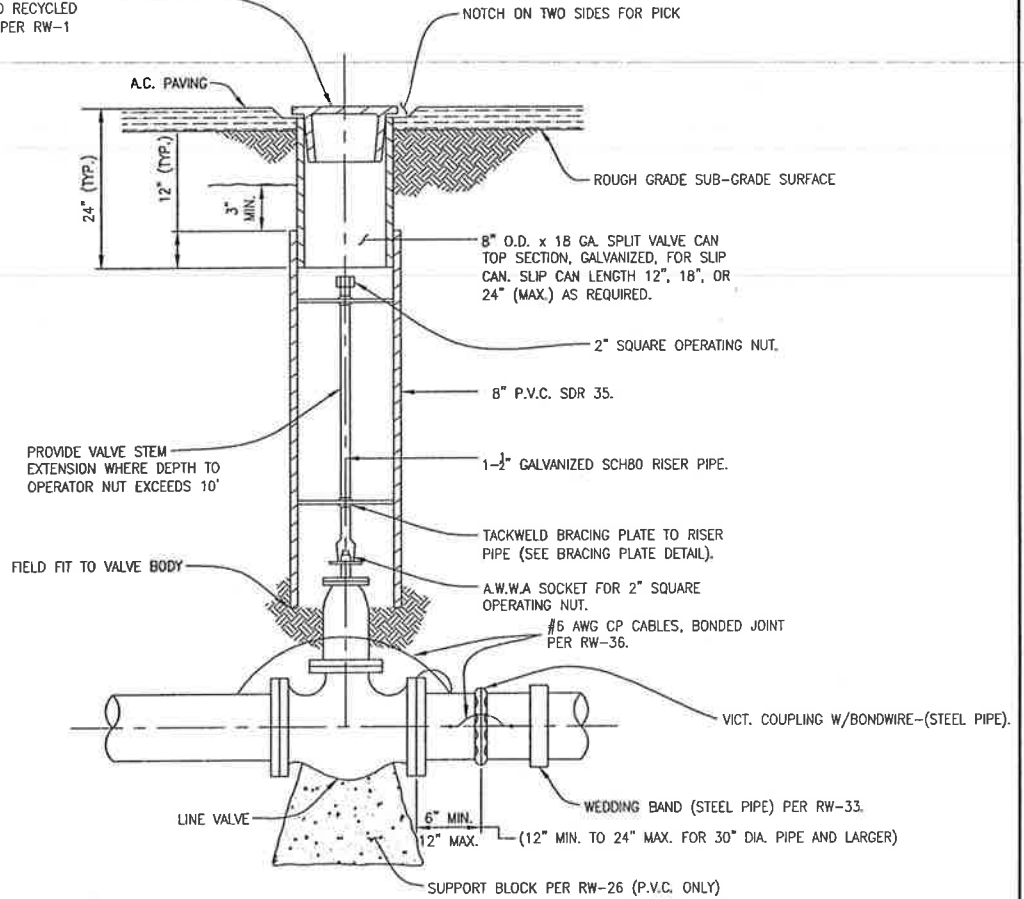


Rancho Water
 Rancho California Water District

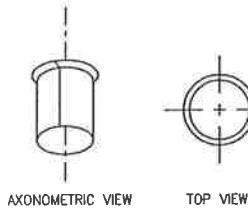
STANDARD DRAWING
**6" F.H. ASS'Y
 (STEEL PIPE)**

SCALE: NTS
 DWG. NO.
RW-7

8" VALVE CAP MARKED "RCWD WATER" FOR POTABLE WATER, MARK "RCWD RECYCLED WATER" & PAINT VALVE CAP PER RW-1

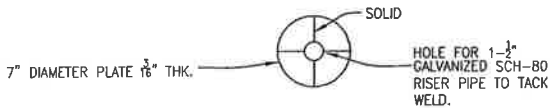


VALVE COVER AND RISER DETAIL



SPLIT SLIP CAN

8" O.D. GALV. 18 GA. MIN. LENGTH OF 24" MAX.



BRACING PLATE PLAN VIEW DETAIL

NOTES

1. CONTRACTOR SHALL RAISE SLIP CAN TO FINISH STREET GRADE, WHERE PAVING IS PROPOSED.
2. IN UNPAVED AREAS, CONTRACTOR SHALL LEAVE CAP AND SPLIT SLIP CAN 6" BELOW FINISH GRADE (I.E. GRADED SHOULDERS).
3. FOR UNPAVED ROADS ONLY SET TOP OF VALVE CAN (COVERED) MIN. 6" BELOW ROUGH-GRADED SUB-GRADE TO AVOID DAMAGE DURING FINE GRADING AND SCARIFYING OPERATION.
4. REFER TO RW-36 FOR BONDED JOINTS.

REVISION NO.	DATE
1	1-09



APPROVED: 3-17-2008

Andrew Webster
ANDREW WEBSTER
ACTING DISTRICT ENGINEER



Rancho Water

Rancho California Water District

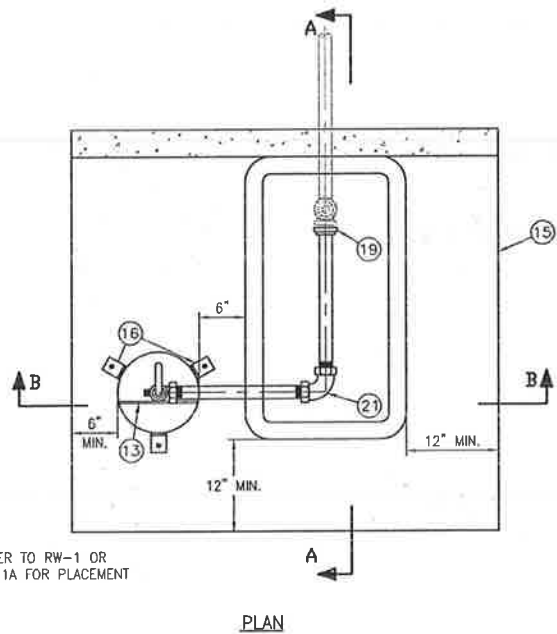
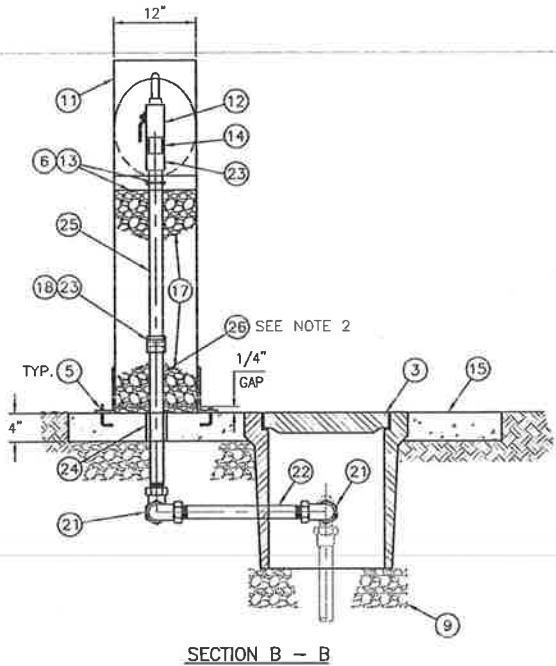
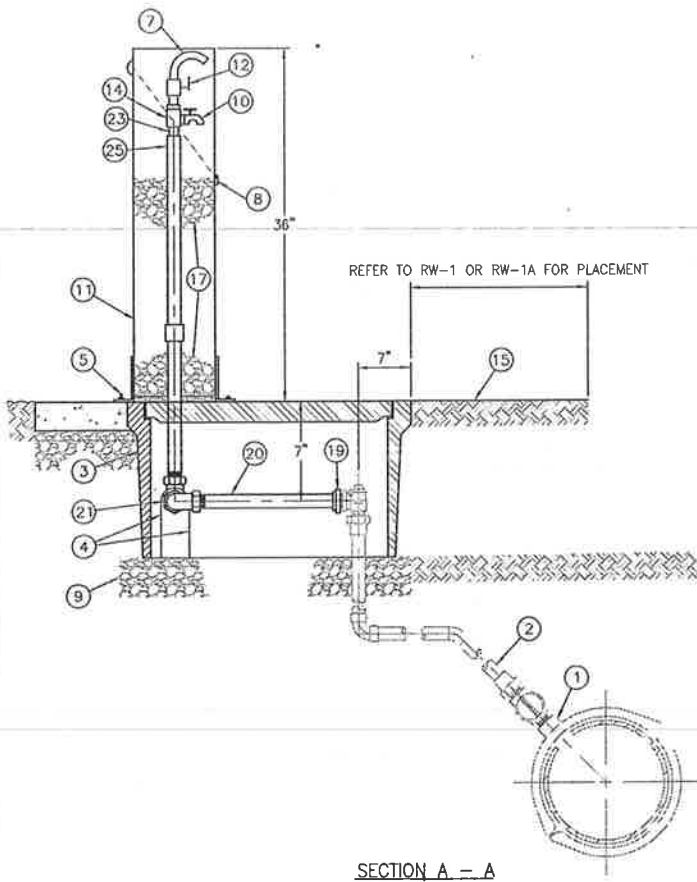
STANDARD DRAWING

VALVE CAP & RISER DETAIL

SCALE: NTS

DWG. NO.

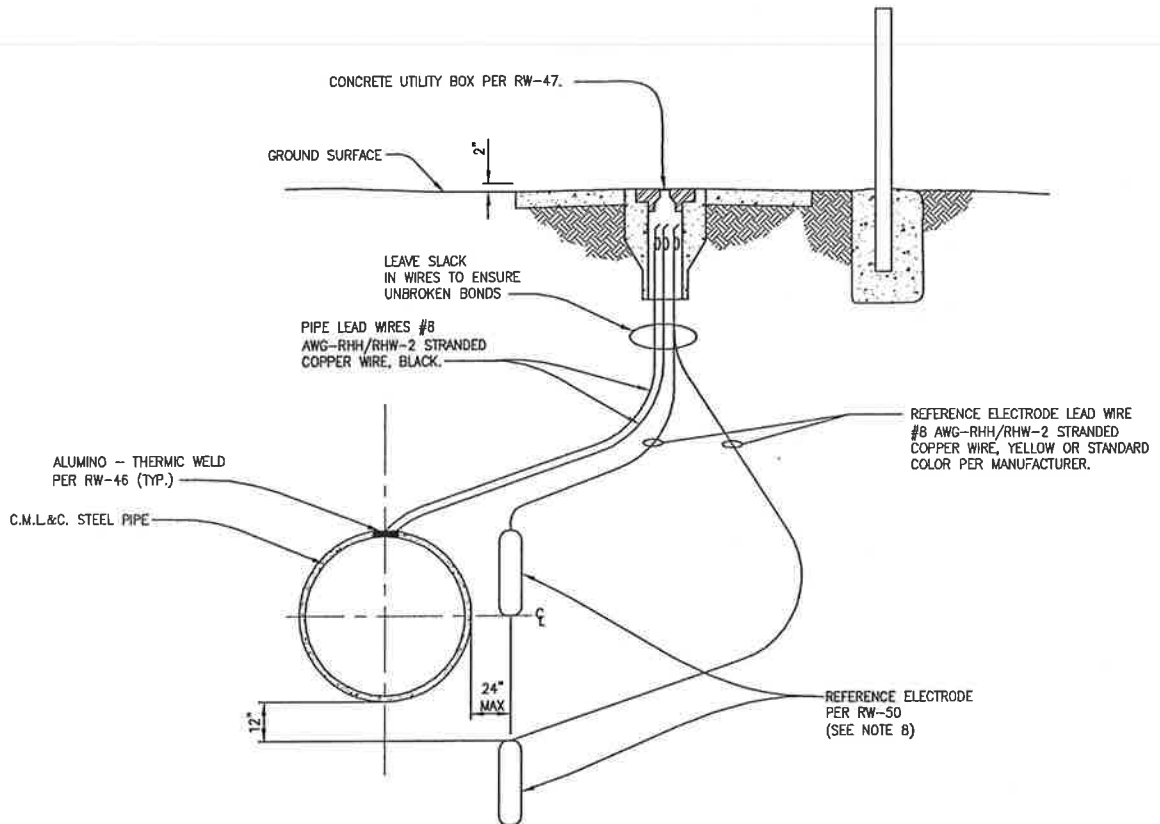
RW-30



NO.	DESCRIPTION	QTY.
1	1" SERVICE CONNECTION PER RW-13	1
2	1" TYPE "K" COPPER TUBING PER RW-13	1
3	CONCRETE METER BOX WITH READING LID (15" x 21" x 12")	1
4	SAWCUT OR CORE DRILL FOR 1" PIPE	1
5	3/8" DIA X 4" LONG STAINLESS STEEL J ANCHOR BOLT CAST IN SLAB (3 EACH AT 120" APART WITH STAINLESS STEEL NUTS AND WASHERS) INSTALL WITH RUBBER GROMMET UNDER ANCHOR CLIPS TO PROVIDE 1/4" GAP.	3
6	INTERNAL MOUNT AND STAINLESS STEEL U-BOLT.	1
7	3/8" TYPE "K" SOFT COPPER SPIGOT BEND TO 120° FOR DOWNWARD OPENING.	1
8	LOCKING HASP ASSEMBLY FOR 5HOB PADLOCK	1
9	3/4" CRUSHED ROCK PLACE TO DEPTH 6" BELOW CONCRETE METER BOX	-
10	STD. HOSE BIBB	1
11	STD. STEEL PIPE 12" DIAMETER x 36" HIGH. W/ HINGED COVER SEE NOTE 5.	1
12	3/8" STAINLESS STEEL TEFLON SEATED BALL VALVE, F.I.P.T. x F.I.T.P. (ORIENT VALVE HANDLE TOWARD FRONT OF SAMPLE STATION).	1
13	1 3/4" WIDE x 3/8" THICK STEEL FLAT BAR, WELDED TO INTERIOR OF SAMPLE STATION.	1
14	1" BRASS TEE (M.I.D.T.) W/ 1" x 3/8" BRASS REDUCING BUSHING (TOP).	1
15	4" THICK CLASS "B" CONCRETE.	3
16	ANCHOR CLIPS WITH 1/2" HOLES AT 120" SPACING WELD TO WATER SAMPLE STATION COVER.	-
17	1/2" PEA GRAVEL.	1
18	1" PVC SCH. 80 COUPLING, F.I.P.T. x F.I.T.P.	1
19	1" METER NUT BY F.I.P.T. ADAPTER.	1
20	1" RED BRASS NIPPLE, T.B.E. 6" LONG.	2
21	1" BRASS 90° BEND F.I.P.T. x F.I.P.T.	1
22	1" RED BRASS NIPPLE, T.B.E. 18" LONG.	2
23	1" WROT COPPER SUIP BY M.I.P.T. ADAPTER.	1
24	2" SCH. 80 PVC SLEEVE.	-
25	1" TYPE "K" RIGID COPPER PIPE.	1
26	1" RED BRASS NIPPLE, T.B.E. 10" LONG.	1

- NOTES**
- ALL STAINLESS STEEL HARDWARE SHALL BE TYPE 316 ALLOY.
 - REFER TO RW-1 OR RW-1A FOR PLACEMENT.
 - INSTALL "RW" VINYL LABEL AND STENCIL "DOMESTIC" OR "RECLAIMED" AS DIRECTED BY RCWD.

<table border="1"> <thead> <tr> <th>REVISION NO.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1-09</td> </tr> </tbody> </table>	REVISION NO.	DATE	1	1-09		APPROVED: 3-17-2008 ANDREW WEBSTER ACTING DISTRICT ENGINEER		STANDARD DRAWING WATER QUALITY SAMPLE STATION Rancho California Water District	SCALE: NTS DWG. NO. RW-38
REVISION NO.	DATE								
1	1-09								



NOTES:

1. WELD LEAD WIRES TO PIPE AFTER INSTALLATION IN TRENCH.
2. WIRE AND BONDED CONNECTIONS TO BE PROTECTED DURING FIELD MORTARING.
3. LEAD WIRES SHALL HAVE A BURY DEPTH OF 5' (MIN.) AT CURB OR SHOULDER OF ROAD WITH 3" WIDE MARKING DETECTOR TAPE 24" ABOVE WIRE LABELED, "CAUTION: BURIED CATHODIC PROTECTION LINE."
4. REFER TO RW-1 OR RW-1A FOR CP TEST STATION PLACEMENT.
5. TERMINATE ALL WIRES PER RW-48.
6. LEAD WIRES SHALL BE COLORED AND TAGGED AS NOTED PER RW-48.
7. TEST STATIONS SHALL BE INSTALLED MIN. EVERY 1000- FEET OR AS INDICATED BY CONTRACT DRAWINGS.
8. REFERENCE ELECTRODE LOCATION: UPPER - EXISTING PIPE
LOWER - NEW PIPE INSTALLATION

REVISION	
NO.	DATE
1	1-09
2	8-09



APPROVED: 3-17-2008

 ANDREW WEBSTER
 ACTING DISTRICT ENGINEER



STANDARD DRAWING
**CATHODIC PROTECTION
 TEST STATION
 W/ REFERENCE CELL**

SCALE: NTS
 DWG. NO.
RW-40A

ATTACHMENT C RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:
 - a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
 - b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.
2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:
 - a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
 - b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

- c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
 - d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).
 - e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.
2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:
- a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.
 - b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.
 - c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.
 - d. Cover waste disposal containers at the end of every business day and during a rain event.
 - e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.
 - f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
 - g. Implement procedures that effectively address hazardous and non-hazardous spills.
 - h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:
 - i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

- ii. Appropriate spill response personnel are assigned and trained.
 - i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.
3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:
- a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.
 - b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.
 - c. Clean leaks immediately and disposing of leaked materials properly.
4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:
- a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.
 - b. Contain fertilizers and other landscape materials when they are not actively being used.
 - c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
 - d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
 - e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.
5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

- a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
 - b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
 - c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.
 - d. Ensure retention of sampling, visual observation, and inspection records.
 - e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.
6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.
2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.
3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.
2. Risk Level 1 dischargers shall provide effective soil cover for inactive¹ areas and all finished slopes, open space, utility backfill, and completed lots.
3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.
2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

¹ Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.
4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.
5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:
 - a. Inspection date and date the inspection report was written.
 - b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
 - c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.
 - d. A description of any BMPs evaluated and any deficiencies noted.
 - e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
 - f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
 - g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
 - h. Photographs taken during the inspection, if any.
 - i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. Construction Site Monitoring Program Requirements

- a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.
- b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.
- c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. Objectives

The CSMP shall be developed and implemented to address the following objectives:

- a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

- b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;
 - c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and
 - d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.
- 3. Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**
- a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.
 - b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
 - c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.
 - d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.
 - e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):
 - i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.
 - ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

- iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.
- g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.
- h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. Risk Level 1 – Visual Observation Exemptions

- a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:
 - i. During dangerous weather conditions such as flooding and electrical storms.
 - ii. Outside of scheduled site business hours.
- b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. Risk Level 1 – Monitoring Methods

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements

a. Visual Monitoring Requirements:

- i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.
- ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).
- iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. Risk Level 1 – Non-Visible Pollutant Monitoring Requirements

- a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.
- b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.
- c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.
- d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.
- e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

- f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.
- g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.²
- h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. Risk Level 1 – Particle Size Analysis for Project Risk Justification

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. Risk Level 1 – Records

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

- a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.
- b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.
- c. The date and approximate time of analyses.
- d. The individual(s) who performed the analyses.

² For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

- e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.
- f. Rain gauge readings from site inspections.
- g. Quality assurance/quality control records and results.
- h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).
- i. Visual observation and sample collection exception records (see Section I.4 above).
- j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.



OFFICE OF
CLERK OF THE BOARD OF SUPERVISORS

1st FLOOR, COUNTY ADMINISTRATIVE CENTER
P.O. BOX 1147, 4080 LEMON STREET
RIVERSIDE, CA 92502-1147

PHONE: (951) 955-1060

FAX: (951) 955-1071

KECIA HARPER-IHEM
Clerk of the Board of Supervisors

KIMBERLY A. RECTOR
Assistant Clerk of the Board

June 30, 2011

THE PRESS ENTERPRISE
ATTN: LEGALS
PO BOX 792
RIVERSIDE, CA 92501

FAX (951) 368-9018
E-MAIL: legals@pe.com

RE: NOTICE INVITING BIDS: RANCHO CA ROAD & ANZA ROAD – B9-0957

To Whom It May Concern:

Attached is a copy for publication in your newspaper for **TEN (10) TIMES:**

Saturday	- July 2, 2011	Thursday	- July 7, 2011
Sunday	- July 3, 2011	Friday	- July 8, 2011
Monday	- July 4, 2011	Saturday	- July 9, 2011
Tuesday	- July 5, 2011	Sunday	- July 10, 2011
Wednesday	- July 6, 2011	Monday	- July 11, 2011

We require your affidavit of publication immediately upon completion of the last publication.

Your invoice must be submitted to this office in duplicate, WITH TWO CLIPPINGS OF THE PUBLICATION.

NOTE: PLEASE COMPOSE THIS PUBLICATION INTO A SINGLE COLUMN FORMAT.

Thank you in advance for your assistance and expertise.

Sincerely,

Mcgil

Cecilia Gil, Board Assistant to
KECIA HARPER-IHEM, CLERK OF THE BOARD

Gil, Cecilia

From: PE Legals <legals@pe.com>
Sent: Wednesday, June 29, 2011 10:53 AM
To: Gil, Cecilia
Subject: RE: FOR PUBLICATION: Bids for Rancho CA Rd B9-0957

Received for publication from July 2 to July 11

Please Note: The Press-Enterprise offices will be closed on Monday, July 4th in observance of Independence day. Below are our Independence Day Holiday Deadlines.

Deadlines:

- Wed., June 29th at 10:30 am for all ads publishing on Fri. July 1st or Sat. July 2nd
- Thurs. June 30th at 10:30 am for all ads publishing on Sun. July 3, Mon. July 4, Tues. July 5
- Fri. July 1st at 10:30 am for all ads publishing on Wed. July 6

From: Gil, Cecilia [<mailto:CCGIL@rcbos.org>]
Sent: Wednesday, June 29, 2011 10:47 AM
To: PE Legals
Subject: FOR PUBLICATION: Bids for Rancho CA Rd B9-0957

Notice of Inviting Bids for publication from July 2 to July 11, 2011. Please confirm. THANK YOU!

Cecilia Gil

Board Assistant to the
Clerk of the Board of Supervisors
951-955-8464

***THE COUNTY ADMINISTRATIVE CENTER IS CLOSED EVERY FRIDAY UNTIL FURTHER NOTICE.
PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING.***

NOTICE INVITING BIDS

County of Riverside, herein called Owner, invites sealed proposals for:

RANCHO CALIFORNIA ROAD AT ANZA ROAD ROUNDBOUT PROJECT IN THE COUNTY OF RIVERSIDE

PROJECT No. B9-0957

Proposal shall be delivered to the Riverside County Transportation Department, 14th Street Annex, 3525 14th Street, Riverside, California 92501, telephone (951) 955-6780 not later than 2:00 p.m., on **Wednesday, July 20, 2011**, to be promptly opened in public at said address. Each proposal shall be in accordance with plans, specifications, and other contract documents, dated **May 2011**, and prepared by County of Riverside, whose address is same as the above, from whom they may be obtained upon deposit of **\$45** per set, plus mailing. No refund. Prospective bidders may preview the plans, specifications and other contract documents, at no charge prior to purchase, at the above noted location.

The Contractor is required to have a Class "A" license or C-12 license at the time of bid submission.

Engineering Estimate

Base Bid:	\$1,390,000- \$1,628,000
Alternative 1:	\$ 61,000 - \$ 71,200
Alternative 2:	\$ 13,500 - \$ 15,700
Bid Bond	10%
Performance Bond	100%
Payment Bond	100%
Working Days	63 Calendar Days

www.tlma.co.riverside.ca.us/trans

Dated: June 30, 2011

Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant



Legal Advertising Invoice

THE PRESS-ENTERPRISE PE.com

THE BUSINESS PRESS SoCal

LA PRENSA WEEKLY



① BILLING PERIOD 07/10/11 - 07/11/11 ② ADVERTISING/CLIENT NAME BOARD OF SUPERVISORS
 ③ BILLING DATE 07/11/11 | FOR BILLING INFORMATION CALL (951) 368-9713 ④ PAGE NO 1
 ⑤ TOTAL AMOUNT DUE 1,040.60 * UNAPPLIED AMOUNT ⑥ TERMS OF PAYMENT Due Upon Receipt

⑦ REMITTANCE ADDRESS
 POST OFFICE BOX 12009
 RIVERSIDE, CA 92502-2209

⑧ BILLED ACCOUNT NAME AND ADDRESS
 BOARD OF SUPERVISORS
 COUNTY OF RIVERSIDE
 P.O. BOX 1147
 RIVERSIDE CA 92502

⑨ BILLED ACCOUNT NUMBER 045202 | REP NO LE04

Statement #: 56603819 Amount Paid \$ _____ Your Check # _____

PLEASE DETACH AND RETURN UPPER PORTION WITH YOUR REMITTANCE

⑪ DATE	⑫ REFERENCE	⑬ ⑭ ⑮ DESCRIPTION-OTHER COMMENTS/CHARGES	⑯ SAU SIZE ⑰ BILLED UNITS	⑱ RATE	⑲ GROSS AMOUNT	⑳ NET AMOUNT
07/02	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.30		111.80
07/03	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/04	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/05	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/06	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/07	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/08	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/09	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/10	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20
07/11	4311665 CO	NIB - PROJECT NO. B9-0957 Class : 10 Ctext Ad# 10715077 Placed By : Cecilia Gil	86 L	1.20		103.20

2011 JUL 19 PM 1:58
 RECEIVED RIVERSIDE COUNTY
 CLERK / HEAD OF SUPERVISORS

Transp.
 3.105 of 06/28/11

⑳ CURRENT NET AMOUNT DUE	㉑ 30 DAYS	㉒ 60 DAYS	㉓ OVER 90 DAYS	㉔ UNAPPLIED AMOUNT	㉕ PLEASE PAY THIS AMOUNT
					1,040.60

enterprise media P.O. BOX 12009
 THE PRESS-ENTERPRISE PE.com RIVERSIDE, CA 92502-2209
 FAX (951) 368-9026

ADVERTISING STATEMENT/INVOICE

* UNAPPLIED AMOUNTS ARE INCLUDED IN TOTAL AMOUNT DUE



① STATEMENT NUMBER	② BILLING PERIOD	③ BILLED ACCOUNT NUMBER	④ ADVERTISER/CLIENT NUMBER	⑤ ADVERTISER/CLIENT NAME
56603819	07/10/11 - 07/11/11	045202		BOARD OF SUPERVISORS

THE PRESS-ENTERPRISE

3450 Fourteenth Street
Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

**PROOF OF PUBLICATION
(2010, 2015.5 C.C.P.)**

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: NIB - Project No. B9-0957

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

- 07-02-11
- 07-03-11
- 07-04-11
- 07-05-11
- 07-06-11
- 07-07-11
- 07-08-11
- 07-09-11
- 07-10-11
- 07-11-11

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Jul. 11, 2011
At: Riverside, California



BOARD OF SUPERVISORS

P.O. BOX 1147
COUNTY OF RIVERSIDE
RIVERSIDE CA 92502

Ad #: 10715077

PO #:

Agency #: _____

Ad Copy:

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AT ANZA ROAD
ROUNDBOUT PROJECT
IN THE COUNTY OF RIVERSIDE
PROJECT No. B9-0957**

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www.tlma.co.riverside.ca.us/trans

Dated: June 30, 2011

Kecia Harper-Ihem, Clerk of the Board

By: Cecilia Gil, Board Assistant

7/2 - 7/11

07/11/2011 10:51 AM
COUNTY OF RIVERSIDE
RECEIVED
CLERK OF THE BOARD