



**SECTION F**

**TECHNICAL SPECIFICATIONS**

**SNOWDROP ROAD PROJECT**

FOR

**Assessment District 2018-1**  
**UNINCOPORATED RANCHO CUCAMONGA, CALIFORNIA**

**PROJECT NO.: 30.30.0009**

## **DIVISION 01000 - GENERAL REQUIREMENTS**

### **01000.01 DESCRIPTION OF WORK**

The Contractor shall furnish, in accordance with these Specifications and Drawings, all plant, labor, equipment, and materials required for the grading, placing, compacting and paving of existing roads and placement of drainage facility as indicated in these plans and specifications.

The work consists of preparing the existing dirt road, over-excavation of subgrade per the recommendations of Geotechnical Investigation Reports; pulverizing existing asphalt re-using the grindings by placing them and using them as 2" thick base surfacing, and placing 6" thick Class II base to have a total of 8" aggregate base. Place new asphalt pavement (PG 64-14) to a compacted thickness of 4" on the prepared 8" aggregate base or new 8" Class II base. Restore all driveway transitions, intersections and drainage flow lines. Install storm drain facilities including HDPE pipe, inlet structures, headwall and wing walls, rip-rap. Construct retaining walls. Relocate or adjust to grade of existing water valve, meter, fire hydrant, air release valve and blow-off. Roads will generally follow a 2% cross fall per the typical street sections. Width of road typically is 26 feet, with minimum width of 22 feet.

### **01000.02 COMPLETION OF WORK**

All work under this project shall be completed within 320 calendar days after the date of written Notice to Proceed issued by the Owner.

### **01000.03 WORKING SPACE**

The Contractor shall limit his work activities, including the temporary storage of materials and excavated dirt inside any Owner's rights-of-way and temporary construction easements. Where not shown on the Drawing and within street rights-of-ways or road easement, the Contractor shall limit the area to be disturbed and shall keep streets open for local traffic at all time. The Contractor shall coordinate with Property Owners and the District in scheduling of work tasks to avoid possible interference during construction activity. Emergency access shall always be made available to residents, emergency personnel and/ or their equipment. Contractor shall acquire with separate written permission by any land owner to temporarily store materials and/or equipment on their property. This shall be done without any cost or compensation by the District.

### **01000.04 PRECONSTRUCTION MEETING**

Following award of contract but prior to commencement of work, the Contractor shall meet with the Representatives of the Office of Special Districts and County Assessment District 2018-1 staff and shall furnish the following items:

- A schedule of completing the principal items of work.
- A list of names, titles, addresses, and telephone numbers of the Contractor's responsible personnel indicating those who may be reached outside of the normal working hours for emergency purposes.

#### **01000.05 CONSTRUCTION UTILITIES**

- (a) **POTABLE WATER:** All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water or water furnished in approved dispensers.
- (b) **CONSTRUCTION WATER:** The Contractor shall obtain construction water at no cost to the District. Water shall be obtained from the appropriate water jurisdiction providing water to the specific project area. Any meter charges, permits or costs associated with construction water are at the expense of the contractor.
- (c) **SANITARY FACILITIES:** The Contractor shall provide adequate temporary toilet and washing facilities for his workmen. The Contractor shall maintain such facilities in a sanitary condition throughout the construction period. After construction is complete, the temporary facilities shall be removed and the premises disinfected, as required.

#### **01000.06 PERMITS AND LICENSE**

As the roads are in the jurisdiction of the District, encroachment and construction permits are waived. At his own expense, the Contractor shall apply and obtain all other permits and licenses required for the execution of work under this Contract such as moving permits required by CALTRANS, County Transportation Department, compliance with the jurisdictional permits, etc. Contractor may be required to pay and obtain encroachment permit from the County Flood Control District in the area of Haven Avenue.

#### **01000.07 PROTECTION OF EXISTING UTILITIES**

The Contractor shall exercise his best effort and care to protect existing utilities (water lines, gas mains, power poles, etc.) against damage from his operations. All damages shall be repaired by the Contractor at his own expense. Contractor shall raise all water and gas valve cans during course of paving and set the cans to final grade. Contractor shall contact Underground Service Alert at least 48 hours prior to commencement of any work, (800) 422-4133.

#### **01000.08 ACCIDENT PREVENTION**

It shall be required that precautions shall be exercised at all times for the protection of any and all persons (including employees) and property and that the safety provisions of applicable laws, building, construction and traffic codes shall be observed and that all machinery, equipment, and all hazards shall be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction published by the Associated General Contractor of America, to the extent that such provisions are not in contravention of applicable laws.

#### **01000.09 CONSTRUCTION STAKING**

The contractor shall provide construction staking. The Contractor shall preserve all existing lot, property or survey stakes, markers, or monuments as they exist in the field. The Contractor shall be responsible for the disturbance, removal, or covering of existing lot stakes and shall at his own expense pay for all costs incurred for the proper replacement of said lot stakes or monuments. Only Licensed Land Surveyor or Registered Civil

Engineer of the State of California shall be employed to restore or replace the disturbed property monuments. Tying-out the disturbed monuments by the contractor will not be acceptable as a permanent solution.

#### **01000.10 MATERIALS**

Contractor shall use only new materials contemplated for the execution of the work. Asphalt shall be plant batched with the proper ratio of oil, aggregate, sand and any other binder material needed as specified in section 02610. Materials shall be delivered in a timely manner to avoid cooling; placed by proper paving machines that are self-propelled, having heated screed bars and are in good working condition; rolled at least three times with a minimum of 8-ton steel drum rollers to achieve proper compaction. Material cut sheets shall be supplied by the batch plant and presented to Engineer for approval prior to commencement of the work.

#### **01000.11 COMPACTION TESTING**

If necessary, District shall employ and pay for the services of a soil engineer to take appropriate compaction tests in the preparation of fill areas and the base/subgrade and ensure that the relative compaction is maintained throughout the work area and is at least a 90% on all subgrade surface and 95% on all base section. Minimum amount of tests shall be at 500 foot intervals unless failing tests are obtained at which additional tests will be taken at least within 100 feet of such failing test(s) after the area has been satisfactorily re-worked. Any re-tests of failed areas shall be borne and paid for by the contractor.

#### **01000.12 TEMPORARY TRAFFIC CONTROL**

Temporary Traffic Control shall conform to the 2014 Edition of the California Manual on Uniform Traffic Control Devices (California MUTCD), the Standard Specifications for Public Works Construction and the project General Provisions.

It shall be the Contractor's responsibility to prepare and furnish a detailed work area traffic control plans. This plan must be approved prior to issuance of the Encroachment Permits from County of San Bernardino and City of Rancho Cucamonga. The Contractor shall provide, at his expense, advanced warning signs advising the public of the impending construction project and his proposed schedule. Said signs shall be posted at all major approaches to the construction zones a minimum of two weeks prior to the start of construction.

The Contractor shall provide and maintain all other signs, barricades, pedestals, flashers, delineators, and other necessary facilities for the protection of the public within the limits of the construction area. The Contractor shall also post proper signs to notify the public regarding detours and the condition of the roadway, all in accordance with the provisions of the Vehicle Code and the California Manual on Uniform Traffic Control Devices (MUTCD) latest edition.

Contractor shall notify the following entities at least forty-eight (48) hours in advance of any street closure or restriction to access.

1. Fire Department
2. Police Department

3. Trash Collectors
4. United States Post Office

During construction, access shall be maintained to all driveways within the construction zone, unless other prior arrangements have been made with the Engineer and the affected property owner.

Notwithstanding the Contractor's primary responsibility for safety at the site of the Work when the Contractor is not present, the District Inspector, at his option, after attempting to contact the Contractor, may direct District forces to perform any functions he may deem necessary to ensure public safety at or in the vicinity of the site of the Work. If such procedures are implemented, the Contractor shall be responsible for all expenses incurred by the District.

Full compensation for compliance with the preceding requirements shall be considered as being included in the Contract item of "Temporary Traffic Control" in the bid schedule and no additional compensation will be allowed therefore.

#### **01000.13 DUST CONTROL AND WATER SUPPLY**

Contractor shall prepare, implement, and maintain a job-specific Dust Control Plan. The compensation paid for Dust Control shall include, but not be limited to compensation for maintaining dust control and air contaminants within the project area. Watering site as needed to control dust during project duration, street sweeping as needed to control dust and maintain clean public roadways, and application of chemical dust stabilizers shall be included in the contract lump sum bid price for Dust Control and Water Supply and shall be full compensation for all costs incurred by the Contractor for performing all the work involved in performing Dust Control and Clean Up measures as specified herein.

The Contractor shall develop the water supply for the entire project. The water supply shall consist of the necessary fees and equipment required by Cucamonga Valley Water District (CVWD) to provide the water supply for the project. Contractor is responsible to secure water supply locations acceptable to CVWD and shall be responsible for the use of water from these facilities for the duration of the project. The compensation paid for Develop Water Supply shall include, but not be limited to compensation for all fees, materials, and equipment necessary to establish the project-related water supply, including CVWD fees, water trucks, hoses, towers, pumps, and miscellaneous items, and shall be full compensation for all costs incurred by the Contractor for performing all the work involved in the Develop Water Supply measures as specified herein with no additional compensation allowed.

#### **01000.14 SWPPP PREPARATION AND IMPLEMENTATION**

Contractor shall prepare, implement, and maintain a job-specific SWPPP for their work. The compensation paid for SWPPP shall include, but not be limited to compensation for preparation of an approved SWPPP, maintaining the BMP's during the life of the construction, preparation of the Notice of Intent and filing with the State's SMART system, and preparation and filing of the Notice of Termination at the completion of the project.

At the time of the Preconstruction meeting, the Contractor shall have the SWPPP completed and signed by the Qualified SWPPP Developer (QSD), and it shall be reviewed for acceptance by the District prior to submittal to the Regional Board. The District LRP will appoint the Contractors QSD

as the Data Entry Person (DEP) for uploading all SWPPP information to the State Water Boards "SMART" Web based system. The District reserves the right to require an approved SWPPP and the issuance of a Waste Discharge Identification Number (WDID) prior to issuance of the Notice to Proceed. The Contractor's Qualified SWPPP Practitioner (QSP) shall be responsible for implementing the SWPPP and conducting all required monitoring inspections and shall file original copies of the inspections and all other reports, certifications or records as required by the SWPPP with the Water Quality Control Board. All fines levied as a result of the Contractor's failure to comply with the requirements of the SWPPP shall be the Contractor's responsibility.

Time extensions will not be allowed for any suspension of work as a result of the Contractor's noncompliance with the SWPPP.

The compensation paid for SWPPP Preparation and Implementation shall include, but not be limited to compensation for coverage, development, preparation, filing of the Notice of Intent (NOI) and Notice of Termination (NOT), permit fees, and preparation/ implementation of a Storm Water Pollution Prevention Plan (SWPPP) under General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ. the contract lump sum bid price for "SWPPP Preparation and Implementation" and shall be full compensation for all costs incurred by the Contractor for performing all the work involved in carrying out the SWPPP with no additional compensation allowed.

County Public Works Department (DPW), Environmental Management Division has general oversight of all County SWPPP and MS-4 Permit compliance requirements and may need to be consulted for assistance with providing SWPPP documents, inspections and compliance.

#### **01000.15 PRE-CONSTRUCTION VIDEO LOG**

The contractor shall compile a Pre-Construction Video Log of entire project site; video log shall identify all existing improvements adjacent to the proposed roadway and drainage improvement. The contractor shall provide a digital copy of the video log to the Special Districts Department (SDD).

#### **01000.16 PRE-CONSTRUCTION POTHOLING**

The contractor shall pothole existing utilities at any potential conflict with the roadway and storm drain construction. The contractor shall notify the SDD and Engineer of the pothole results, and allow 10-working days for any design adjustment. There shall be no additional measurement and payment made for the pre-construction potholing and shall be considered included in the lump sum price for Mobilization, Demobilization, and Final Cleanup.

#### **01000.17 CLEARING AND GRUBBING**

Grading areas within the existing roadway as designated on the plans shall be conducted in accordance with Section 300 of the Standard Specifications and these Technical Specifications. This work, shall include, but not be limited to, removal and disposal of existing trash, debris, vegetation, removal, and disposal of unused pulverized material, protection of utilities and other facilities within the work zone, clearing, and removal of debris from the work zone and misc. minor removals such as existing bollards, metal post minor block wall and etc. Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines or as directed by SDD. The contractor shall supply and apply an approved soil sterilant prior to installing new paving.

All areas indicated on the Plans to receive PCC or Asphalt Concrete Pavement over base material shall be prepared in accordance with applicable sections of the Standard Specifications concerning subgrade preparation. In addition, after the compaction is completed, the Contractor shall apply a soil sterilant to the subgrade. The application shall be by spray equipment which provides good mechanical agitation and even coverage of the area to be treated. Spray equipment shall be calibrated before the material is applied, and the Engineer's decision as to the effectiveness of the spray equipment shall be final. Great care shall be taken to apply soils sterilant to the designated areas only. Concrete or asphalt may be placed immediately after placement of soilsterilant.

The Contractors' operator applying the soil sterilant shall be licensed by the State of California, Department of Food and Agricultural Affairs and registered with the Office of the Agricultural Commissioner of San Bernadino County as a pest control officer. Any soil sterilant, which is approved in writing by a licensed pest control advisor (for the purpose to which it will apply) may be used upon acceptance by the Engineer. The dye shall not stain concrete or masonry. The certification shall be furnished to the Engineer showing the purchase receipt and the manufacturer's recommended rate of application of the material. The Contractor shall supply all labor, materials, and equipment to apply the soil sterilant and shall include the cost for application in the unit price quoted for the related items of work.

This work shall include all material-related work required to get the project ready to pave except for those items where there is a more specific bid item for an item of work.

It shall be the Contractor's responsibility to protect all existing improvements not designated for removal. The Contractor shall be responsible for any and all damage that was done to existing property and adjacent properties during all construction work under this contract, and the Contractor, at its expense, shall make any repairs that result from its operations to the approval of SDD and the subject property owner.

It shall be the Contractor's responsibility to remove existing boulders and place them outside new edge of pavement as shown on Sheet

Payment for clearing, grubbing and miscellaneous removals, relocations or adjustments not specifically identified on the Plans, not specifically designated in these Technical Specifications or separately paid for in the Bid Schedule(s), shall be considered as included in the bid items of Clearing and Grubbing, and no additional compensation shall be allowed therefore. The Contractor shall be required to adequately and completely remove any and all existing improvements within the limits of the Work, as necessary to construct the required improvements.

#### **01000.18 HYDRO-SEED GRADED SLOPES**

The contractor shall hydro-seed all graded slopes 1.5:1 or flatter after slope grading and terrace drain/ down drain construction are completed for erosion control purposes. Hydro-seedings shall be native vegetation and wildflower mix.

Payment for hydro-seed Graded Slope shall be considered as included in the lump sum bid item, no additional compensation shall be allowed, therefore.

## **01000.19 SIGNING, STRIPING AND MARKERS**

Signing and Striping shall include all work necessary to remove and install the signing and striping for the project in accordance with the plans and the specifications included herein. Any existing painted striping, legend, pavement marking or curb painting, which are in conflict with proposed striping shall be removed by wet sandblasting.

The contract lump sum price paid for Signing, Striping and Markers shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the signing and striping complete-in-place with no additional compensation allowed.

## **01000.20 FIELD ORDERS**

Field Order also known as a Force Account shall conform to the provisions in Section 3 – Changes in Work of the Standard Specifications (Green Book) with the following modifications.

Add the following to 3-2 Changes Initiated by Agency;

SDD may request additional work which is not shown on project plans and specifications. SDD may provide plans or details for additional work or may show the scope of work to the contractor in the field.

Add the following to 3-3.2.2 Basis of Establishing Costs:

The Contractor shall provide a detailed breakdown of labor, materials, tools, equipment, and sub-contractors cost proposal to SDD. SDD will review Contractor's proposal, negotiate, and provide written authorization to the Contractor to proceed with the work.

Full compensation for Field Order (Miscellaneous Work as Directed) shall be made on the preset allowed amount up to the agreed price for each task to include mark ups (if any) and will be in accordance with Changes in the Work provisions of the Projects General Conditions, Section 7.

## **01000.21 ADJUST OR RLOCATE EXISTING UTILITIES**

It is the Contractor's responsibility to review the related plans, utility specifications, verify quantities and be aware of all utility practices and requirements and coordinate with utility companies. The following utility requirements are applicable to the project:

The Contractor shall adjust the water valves to the finish grade as shown on plans per Cucamonga Valley Water District (CVWD) Standards and requirements.

The contractor shall protect in-place, elevate or reroute where required, to protect 12inch CVWD water main as per CVWD standards, specifications and requirements. The contractor to notify CVWD Lead Construction Inspector, Randy Rockwell, at (909) 483-7469 at least 2 working days prior to starting any work in the vicinity of CVWD facilities.

The Contractor shall relocate existing Fire Hydrant, Air Release Valve, Blow-off, and Water Meter per Cucamonga Valley Water District (CVWD) Standards, Specifications and requirements.

The Contractor shall coordinate with Southern California Gas Company for the Gas Valve adjustment to the finish grade if needed. The Gas Company will perform the adjustment.

The Contractor shall coordinate with SCE for the adjustment and relocation of SCE power pole and other facilities.

END OF SECTION



NOT FOR BID

## **DIVISION 02200 - EARTHWORK**

### **02200.01 GENERAL**

- (a) The Contractor shall perform all earthwork required for the construction of the proposed improvements as specified and shown.
- (b) Earthwork includes all plant, labor, equipment, and materials as required or necessary to clear, grub, excavate, pulverized asphalt, trench, fill, backfill and grade for the construction of all structures, pipelines, ditches, embankments, roadways, and graded areas. Specifically grading the roadways and compacting prepared subgrade and base.
- (c) The contractor's attention is directed to the possible existence of pipe and other underground improvements. All reasonable precautions shall be taken to preserve and protect any such improvements whether shown on the plans or not. Where it is necessary to remove and replace or to relocate such improvements in order to prosecute the work, they shall be removed, maintained and permanently replaced following review by District Representatives and owners of the utility.
- (d) Earthwork within the rights-of-way of the State Division of Highways, the County Road Department, and City or other governmental agency (Bureau of Land Management), having jurisdiction, work shall be done in accordance with the requirements and the provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these specifications. These technical specifications shall be the minimum requirement.
- (e) In addition to the requirements herein set forth for piping and structural earthwork, all work shall be in accordance with the requirements of the County grading ordinance or ordinance of any other agencies having jurisdiction.

### **02200.02 EXCAVATION**

- (a) GENERAL. Except when specifically provided to the contrary, the excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades shown or ordered.

Unless otherwise provided, the areas of construction shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. Excavated material suitable for backfill shall be stored temporarily in such a manner as will facilitate work under the Contract. Any damage done to private property by reason of work on easements shall be the responsibility of the Contractor. Fences and landscaping which are removed or damaged by the Contractor shall be restored to their original condition at the Contractor's expense.

The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other approved measures for the removal or exclusion of water, including taking care of stormwater reaching the site of work from any source as to prevent damage to the work or adjoining property.

Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State and Federal industrial safety requirements, and as reviewed by the Engineer. All excavations shall be performed, protected, and supported as required for safety and in the manner set forth in the operating rules, orders and regulations prescribed by the Division of Industrial Safety of the Department of Industrial Relations of the State of California. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to prevent accidents. Lights shall also be placed along with excavations from sunset each day to sunrise of the next day until such excavation is entirely refilled.

(b) PIPELINE TRENCH EXCAVATION

(1) GENERAL. Unless otherwise shown or ordered, excavation for pipelines, fittings, valves, and appurtenances, shall be open-cut trenches. The bottom of the trench shall have a minimum width equal to the outside diameter of the pipe plus 12 inches and a maximum width equal to the outside diameter of the pipe plus 20 inches. Except when otherwise shown or ordered by the Engineer, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required.

The maximum amount of open trench permitted in any one location shall be 500 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, when reviewed by the Engineer, heavy steel plate adequately braced and capable of supporting vehicular traffic may be used in certain locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights satisfactory to the Engineer shall be provided and maintained.

(2) TRENCH OVER-EXCAVATION WHERE SHOWN. Trenches shall be over excavated where shown, to the depth shown, then backfilled to the grade of the bottom of the pipe with suitable selected granular material or with sand. Said backfill shall be brought to optimum moisture content and compacted to 95 percent of maximum dry density where the pipeline trench passes under structures, and 90 percent elsewhere. Work specified in this Subsection shall be performed by the Contractor at his own expense.

(3) TRENCH OVER-EXCAVATION WHEN ORDERED. Trenches shall be over-excavated beyond the depth shown when ordered by the Engineer in areas where pool soil (soft, spongy, or unstable material) or rock is encountered. Such over-excavation shall be to the depth ordered. The trench then shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained shall be well-graded material of 1-1/2-inch maximum size. Bedding material shall be placed in layers, brought to optimum moisture content, and compacted to 95 percent of maximum dry density where the pipeline trench passes under structures, and 90 percent elsewhere. All work specified in this subsection shall be performed by the Contractor at his own expense when the over-excavation ordered by the Engineer is less than 6-inches below the limits shown. When the over-excavation ordered by the Engineer is 6- inches or greater below the limits shown, additional payment will be made to the Contractor for that portion of the work which is located below the said 6-inch distance. Said additional payment will be made under a separate unit price bid item for over-excavation and bedding if such bid item has been established; otherwise, payment will be made in accordance with a negotiated price for execution of a change order.

(c) EXCAVATION BENEATH STRUCTURES. Except where otherwise specified for a particular structure or ordered by the Engineer, the excavation shall be carried to the grade of the bottom of the footing or slab. Where shown or ordered, areas beneath structures shall be over-excavated. When such over-excavation is shown on the drawings, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor at his own expense. When such over-excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to 95 percent of maximum dry density.

(d) SITE GRADING. After stripping has been done, all areas covered by the work, including excavated and filled section, shall be graded uniformly to the lines and grades indicated on the drawings or as ordered. The finished surface shall be reasonably smooth and well compacted. All excavated or pulverized asphalt material suitable for fill shall be transported to and placed in the pavement area within the limits of the work.

All excavated materials which are unsuitable for fill shall be disposed of by the Contractor at his own expense. During construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times.

Ditches shall be cut accurately to the cross-sections and grades indicated. Any excessive ditch excavation shall be back-filled to grade either with suitable, thoroughly compacted material or with suitable stone or cobble to form adequate paving.

(e) OVER-EXCAVATION AS SPECIFIED PER GEOTECHNICAL INVESTIGATION REPORT OR NOT ORDERED, SPECIFIED, OR SHOWN. Any over-excavation carried below the grade ordered, specified, or shown, shall be refilled to the required grade with suitable selected granular material. Such material shall be moistened as required and compacted to 95 percent of maximum dry density under structures, and 90 percent elsewhere. Such work shall be performed by the Contractor at his own expense.

(f) EXCAVATION IN LAWN AREA. Where pipeline excavation occurs in lawn areas, the sod shall be carefully removed and stockpiled to preserve it for replacement. Excavated material from the trench may be placed on the lawn provided a drop cloth or another suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced in a manner so as to restore the lawn as near as possible to its original condition.

(g) EXCAVATION IN VICINITY OF TREES. Trees and other natural growths outside the actual lines of construction operations shall not be destroyed and such measures as are necessary shall be taken by the Contractor for the protection thereof. Trees shall be supported during excavation as may be directed by the Engineer. In the installation of pipelines outside of public rights of way or in easements, trees shall not be removed and no tree roots over 2-inches in diameter shall be cut without express permission of the Engineer.

(h) ROCK EXCAVATION. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which cannot be removed without systematic drilling; (3) concrete or

masonry structures which have been abandoned; and (4) deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling. Said rock excavation shall be performed by the Contractor at his own expense, provided that should the quantity of rock excavation be affected by any change in the scope of the work, an appropriate adjustment of the contract price will be made under a separate additive-deductive bid item if such bid item has been established: otherwise payment will be made in accordance with a negotiated price.

(i) **DISPOSAL OF EXCESS EXCAVATED MATERIAL.** The Contractor shall remove and dispose of all excess excavated or waste material at his own expense. Along pipeline alignments, excess excavated material suitable for fill may be spread evenly over the limits of permanent easement and compacted to 90 percent of maximum dry density.

Excavated material shall not be deposited on private property unless written permission from the owner is secured by the Contractor thereof. Copies of said written permission, duly signed by the owner of the private property involved, shall be furnished to the District by the Contractor before such material is placed on private property.

### **02200.03 BACKFILL**

(a) **GENERAL.** Backfill shall not be dropped directly upon any structure or pipe. Materials used for backfill shall be selected material, free from grass, roots, brush, or other vegetation, or boulders having maximum dimension larger than 6-inches.

Material coming within 6-inches of any structure or pipe shall be free of rocks or unbroken masses of earthy materials having maximum dimension larger than 3-inches. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

Whenever the excavated or pulverized asphalt material is unsuitable for backfill, the Contractor shall arrange for and furnish imported backfill material at his own expense.

#### **(b) PIPELINE TRENCH BACKFILL**

(1) Pipeline trenches shall be back-filled to a level 6-inches above the top of the pipe with selected sandy material obtained from the excavation; provided if, in the Engineer's opinion, said material is unsuitable for backfill purposes, imported material having a sand equivalent value of not less than 20 shall be used for this portion of the trench backfill. Imported sand backfill, when ordered by the Engineer, will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with negotiated price.

Such material shall be compacted to 95 percent of maximum dry density where the trench is located under structures, and 90 percent of maximum dry density elsewhere. Compaction shall be obtained by mechanical means or, if reviewed by the Engineer, by using excess water and passing concrete vibrator between the pipe and side of trench.

(2) After the initial portion of backfill has been placed as specified above, and after excess water has completely drained from the trench, back-filling of the remainder of the trench may proceed. The remainder of the backfill shall be selected material obtained from the

excavation and shall be placed in horizontal layers. Each layer shall be moistened, tamped, rolled or otherwise compacted to 95 percent of maximum dry density where the trench is located under structures, and 90 percent of maximum density elsewhere.

If the back-fill material is sandy or granular in nature and the trench is not located under a structure, the layer construction may be eliminated, the compaction may be obtained by flooding and jetting, provided this latter method meets with the approval of the agency having jurisdiction over the highway or street. If flooding and jetting is permitted, the remaining backfill shall be placed in layers not exceeding 3 feet in thickness. Each layer shall be flooded, jetted and poled to secure complete saturation of the material before placing the next layer. Prior to flooding and jetting, the pipe shall be filled with water to prevent floating.

- (3) For plastic sewer pipes (ABS or PVC type), trenches shall be back-filled with selected granular material (screened gravel) in the bedding area up to 6-inches above the top of pipe. The remaining backfill shall be as specified in previous paragraphs of this Section.

(c) **BACKFILL AROUND AND BENEATH STRUCTURES, AND BENEATH PAVED AREAS.** Except where otherwise specified for a particular structure or ordered by the Engineer, backfill placed around and beneath structures, and beneath paved areas, shall be placed in horizontal layers not to exceed 8-inches in thickness, as measured before compaction, where compaction is attained by means of steel drum vibratory rollers. Where the use of rollers is impractical, the layers shall not exceed 6-inches in thickness before compaction, and compaction shall be attained by means of hand-operated power-driven tampers. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to 95 percent of maximum density beneath structures and paved areas.

#### **02200.04 COMPACTION TESTS**

Where back-fill is required to be compacted to a specified density, test for compliance may be made by the Owner, at the expense of the Contractor, using the test procedure specified in "Methods of Test for Moisture-Density Relations of Soils, Using a 10-lb Rammer and 18-inch Drop" (ASTM D 1557).

Field density test shall be performed in accordance with the test procedure specified in "Method of Test for Density of Soil in Place by the Sand Cone Method" (ASTM D 1556). The Contractor's attention is directed to additional provisions related to testing contained in Section 3.09 of the General Conditions. Compaction test of the backfill will be required approximately every 500 feet (within streets), or more often if tests indicate the need, along the alignment of the road reconstruction. The Contractor at his expense shall excavate the holes for all the tests, backfill the holes and compact this backfill.

#### **02200.05 SUBGRADE PREPARATION AND AGGREGATE BASE**

Preparation of subgrade shall conform to Section 301-1.2 of the Standard Specifications. The top 4 inches of subgrade material shall be compacted to a relative compaction of 95 percent.

Water for use in subgrade preparation shall be potable. Water shall be applied to compact soil, subgrade, base, and surfacing material through the use of a watering truck which shall spray water uniformly. No chemical additives shall be used during the water application process.

Untreated base shall conform to Section 301-2 of the Standard Specifications and shall consist entirely of crushed aggregate base. Aggregate Base shall be clean and free from roots, vegetable matter and other deleterious substances, and be of such character that when wet it will compact to form a firm stable base. Material shall be in accordance with Section 200-2, and placing shall be in accordance with Section 301-2.3 of the Standard Specifications.

Payment – Payment for preparation of subgrade shall be made at the unit price bid per cubic yard for **“Place Aggregate Base”** and shall constitute full compensation for all equipment, materials, and labor necessary for preparation of subgrade, and no additional compensation will be allowed therefore.

END OF SECTION

## **DIVISION 02500 - ASPHALT PAVING**

### **02500.01 GENERAL**

This Section covers the furnishing and placement of new asphalt concrete and of asphalt concrete required for the repair and replacement of pavements along streets, private driveways, and parking areas damaged by Contractor's operations. Where re-pavement is covered under the County, City or State Permits, the more stringent requirements shall govern. Minimum thickness of asphalt re-pavement shall be three inches along public streets and parking areas and 2-1/2 inches for private driveways, except for overlay at street inlets, feather overlay at all driveways and side road parking areas, the thickness as shown on plan and details.

Paving materials and methods of construction shall be in accordance with referenced sections of the 2010 Standard Specifications, California Department of Transportation. Thickness and extent of base courses, paving courses and other construction details shall be as shown. All provisions contained in the referenced Standard Specifications involving "measurement" and "payment" (Section 39-6 of the Standard Specs) are not applicable to work performed under this Contract.

### **02500.02 SUBGRADE PREPARATION**

The subgrade on dirt roads only shall be scarified, mixed, compacted to a total depth of 6-inches and brought to the proper finish elevation. The subgrade shall be sprinkled with water and rolled with a steel roller until the subgrade is unyielding and a compaction of 95% of maximum density is achieved.

### **02500.03 WEED CONTROL (REQUIRED FOR DIRT ROADS ONLY)**

One day before the application or placement of bituminous material on the base, the surface shall be sterilized with herbicide. Apply chemical at the rate of four pounds per 100 square feet. Apply to the surface dry or as a solution. If applied dry, add water to the surface at a rate of four gallons per 100 square feet. If applied as solution, dissolve chemical at the rate of one pound per gallon of water, and spray on at the rate of four gallons of solution per 100 square feet.

Herbicide shall be a dry, free-flowing, dust-free chemical compound which is nonflammable, nonpoisonous and non-corrosive. The chemical shall be chlorate-borate compound, such as polybor-chlorate and 68 percent sodium metaborate or 73 percent disodium octaborate, and shall be suitable for application in powder form or in a solution.

### **02500.04 ASPHALT CONCRETE**

Asphalt concrete shall conform to the provisions in Section 39 of the referenced Standard Specifications. Aggregates shall be Type A and shall conform to the grading specified for 1/2" maximum - medium grading.

Paving asphalt shall be a steam-refined asphalt with a viscosity grade of PG 64-16.



## 02500.05 MIXING AND TRANSPORTING

The asphaltic concrete shall be mixed at a central plant in accordance with Section 39 of the referenced Standard Specifications. Transportation of the asphaltic concrete from mixing plant to site shall be in trucks having tight, clean, smooth beds coated with the least quantity of concentrated solution of hydrated lime and water to prevent adhesive of mixture to trunk bodies. Each load of mixture shall be covered with canvas, or other suitable material, of ample size to protect mixture from weather and to prevent loss of heat. Deliveries shall be scheduled so that spreading and rolling of all mixture prepared for one day's run can be completed during daylight. Mixture shall be delivered in such a manner that temperature at the time of dumping into the spreader will be not less than below specified. Loads that have crusts of cold, unworkable material or have become wet by rain will be rejected. Hauling over freshly placed material will not be permitted.

## 02500.06 PLACING

- (a) PREPARATION. Prior to placing the surface course, the underlying course shall be cleared of all foreign or objectionable matter with power blowers, power brooms or handbrooms.
- (b) CONTRACT SURFACES. Contract surfaces of previously constructed pavement, curbs, manholes and similar, structures shall be sprayed with a thin coat of bituminous material.
- (c) SPREADING. Spreading shall conform to requirement of Section 39 of the referenced Standard Specifications. The material shall be placed at a minimum temperature of 275 degrees F. and shall be compacted by rolling. **No asphaltic concrete shall be spread when the atmospheric temperature is below 50 degrees F. or during unsuitable weather.** The asphaltic concrete shall be evenly distributed and spread upon the subgrade or base to such a depth that after being thoroughly rolled it will be of the specified thickness and true to the prescribed cross-section and grade of the course being constructed. Spreading, once commenced, must be continued without interruption, and the equipment provided for that purpose must be sufficient to ensure such result. No greater amount of the mixture shall be delivered in any one day than can be properly distributed and rolled during that day.

Spreading machine shall be a self-propelled either track or wheeled type conveyed machine and shall have properly operated screed with automatic and manual controls to control mat thickness. Rate of spread will be made to sufficiently place the material at the proper un-compacted thickness to ensure that the specified compacted thickness is accomplished. Mat thickness may be placed in one single lift per pass provided that the placed, completed and compacted mat equals the specified thickness.

As soon as the layer of asphaltic concrete has attained a consistency that will permit, it shall be thoroughly compacted by rolling in accordance with Section 39 of the referenced Standard Specifications. Rolling surfaces shall be treated with water or oil to prevent the adherence of the asphaltic concrete, but the quantity used must not be such as to be detrimental to the surface being rolled.

## **02500.07 JOINTS**

GENERAL. Joints between old and new pavements or between successive day's work, or joints that have become cold because of delay, shall be made carefully to ensure continuous bond between old and new sections of course. All joints shall have the same texture, density, and smoothness as other sections of course.

Contract surfaces of previously constructed pavements that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with approved power saw as directed. The surface against which new material is placed shall be sprayed with a thin, uniform coat of bituminous material. Material shall be applied far enough in advance of placement of fresh mixture to ensure adequate curing. Care shall be taken to prevent damage or contamination of sprayed surface.

(b) TRANSVERSE JOINTS. The roller shall pass over the unprotected end of freshly placed mixture only when placing of course is discontinued or when delivery of mixture is interrupted to the extent that unrolled material may become cold. In all cases, edge of previously placed course shall be cut back to expose an even, vertical surface the full thickness of the course. In continuing placement of strip, the mechanical spreader shall be positioned on transverse joint so that sufficient hot mixture will spread to obtain joint after rolling to conform to required density and smoothness specified herein. When required, the fresh mixture shall be raked against joints, thoroughly tamped with hot tamper, smoothed with hot irons, and rolled.

(c) LONGITUDINAL JOINTS. Edges of previously placed strip that have cooled or are irregular, honeycombed, poorly compacted, damaged, or otherwise defective, and unsatisfactory sections of the joint shall be cut back to expose clean, sound surface for full thickness of the course as directed.

When required, fresh mixture shall be raked against the joint, thoroughly tamped with hot tampers, smoothed with hot irons, and rolled.

## **02500.8 EDGES**

Edges of pavement adjacent to shoulders shall be trimmed neatly to line. After final rolling has been completed and pavement is sufficiently hardened, an earth berm of selected material, not less than one foot wide, shall be placed against and to the full height of the pavement as soon as possible.

## **02500.9 CORRECTING DEFICIENT AREAS**

Mixtures that become contaminated or that are defective shall be removed. Skin patching of an area that has been rolled will not be permitted. Holes that are full thickness of course shall be cut so that sides are perpendicular and parallel to the direction of traffic and edges are vertical. Edges shall be sprayed with bituminous material. Fresh paving mixture shall be placed in holes in sufficient quantity so that finished surface will conform to density specified herein.

## **02500.10      PROTECTION OF PAVEMENT**

After final rolling of the pavement, vehicular traffic may not be permitted until the pavement has sufficiently cooled and hardened or for at least four hours.

## **02500.11      SURFACE REQUIREMENTS**

Surface course, upon completion of final rolling, shall be smooth and true to grade and cross section. When a ten-foot straightedge is laid on the surface parallel with the centerline, the surface shall not vary more than 1/8 inch from straightedge. When the ten-foot straightedge is laid on surface transverse to centerline between crown and edge of pavement, surface shall not vary more than 1/4" from straightedge. Low or defective areas shall be immediately corrected by cutting out faulty areas and replacing with fresh, hot mixture and compacting area to conform to remainder of pavement.

END OF SECTION

## **DIVISION 02600 - ASPHALT CONCRETE**

Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the standard Specifications and these special provisions.

The last sentence of the first paragraph in Section 39-2.01, "Asphalts," of the Standard Specifications and the fifth, sixth, seventh and eighth paragraphs of Section 39-3.03, "Proportioning," of the Standard Specifications shall not apply.

The asphalt binder grade shall be PG 64-16. The amount of asphalt binder to be mixed with the aggregate for Type A ½-inch maximum asphalt concrete will be determined by the Contractor and submitted to the Engineer for approval in accordance with California Test 367 using the samples of aggregates furnished by the Contractor in conformance with Section 39-3.03, "Proportioning," of the Standard Specifications.

The aggregate for asphalt concrete (Type A) shall conform to the maximum, medium grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and doing all the work necessary to hand rake said conforms shall be considered as included in the contract prices paid per square foot for the various contract items of asphalt concrete surfacing involved and no additional compensation will be allowed therefore.

Immediately in advance of applying paint binder, the roadway shall be free of moisture, loose or extraneous material and the cost of said work shall be considered as included in the contract price per square foot for the asphalt concrete involved and no additional compensation will be allowed therefore.

A prime coat is not required.

The price paid for asphalt concrete will include all costs for tack coat(s), applied to all edges and between layers of asphalt concrete and/or concrete paving or overlay.

END OF SECTION

## **DIVISION 02700 - CONCRETE**

### **02700.01 GENERAL**

Concrete shall be composed of Portland cement, natural aggregates, and water proportioned to produce required strength and well mixed into required consistency.

Portland cement concrete for thrust blocks, cradles, encasements, and structures shall be composed of portland cement, fine aggregate, coarse aggregate and water proportioned and mixed in accordance with the requirements of Section 90 of the State of California, Department of Transportation, Standard Specifications, latest Edition except as may be herein modified.

Concrete for cradles and encasements, and all other concrete structures, shall be constructed to the lines and grades and in accordance with the design shown in the details on the plans.

Prior to placing any concrete, the Contractor shall submit to the Owner the design mix proposed to be used. Said mix shall set forth the weights of cement, sand, coarse aggregate and the amount of water to be used

### **02700.02 PORTLAND CEMENT CONCRETE CLASSIFICATION**

<u>Concrete Class</u>	<u>Compressive Strength @ 28 days (psi)</u>	<u>Minimum Sacks of Cement/CY</u>
"A"	3,500	6
"B"	2,500	5
"C"	2,000	4
"D"	4,500	7

The amount of free water used in concrete shall not exceed 312 pounds per cubic yard, plus 20 pounds for each required 100 pounds of cement in excess of 564 per cubic yard. For concrete that is specified to be pumped, cement content shall be increased as required to maintain specified compressive strength.

### **02700.03 MIX DESIGNS**

Designs of concrete mixes, including recommended amounts of admixture and water to be used in the mixes, shall be obtained by the Contractor from a recognized independent testing laboratory. Costs of obtaining the mix designs shall be paid for by the Contractor. Contractor shall be responsible for incorporating into the structure, concrete of the minimum strengths specified. The Contractor shall submit designs for each class of concrete.

No substitution of flyash in lieu of the required Portland cement will be allowed. An air-entraining admixture (4% air content) will be required for "cold weather" concrete placement Chemical admixtures (water reducing agents, etc.) may be utilized subject to

approval by the Engineer. Concrete supplier shall provide submittals and manufacturer's data sheets for all proposed admixtures.

#### **02700.04 SUBMITTALS**

Submit concrete mix designs, reinforcing steel, fibrous reinforcing, expansion joints, water stops and related product data to the Engineer for review and approval.

Certified copies in triplicate of mill tests representative of each shipment of cement shall be furnished to the Engineer for verification of compliance with these Specifications. Mill tests on cement shall include a report on alkali content.

#### **02700.05 CONVEYING AND PLACING CONCRETE**

The Contractor shall submit a proposal sequence of placing concrete showing proposed beginning and ending of individual placements. After acceptance, this sequence shall be adhered to except when specific changes are requested by the Contractor and accepted by the Engineer.

Before placing concrete, forms shall be thoroughly inspected. All wood chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement and which is set and dry, shall be cleaned off and the forms and steel washed off before proceeding.

#### **02700.06 REINFORCING**

Where steel reinforcing is specified, reinforcing shall be Grade 60 bars as indicated on the Plans or Standard Drawings.

Where fibrous reinforcing is specified, fibrous reinforcing shall be Novomesh e3 as manufactured by SI Concrete Systems, or approved equal by Grace Construction Products. Quantity shall be a minimum of 1-24 pound bag of Novomesh e3 per cubic yard of concrete, and suitable for traffic loading.

#### **02700.07 INSPECTION**

Prior to placing of any concrete, and after placement of reinforcing steel in the forms, Contractor shall notify the Owner so that proper inspection may be made. Such notification shall be made at least two working days in advance of placing concrete to permit proper arrangements to be made for inspection. Defective concrete work shall be removed and replaced at Contractor's expense.

#### **02700.08 DRAINAGE INLET TYPE G1 AND GT1 PER CALTRANS STD. PLANS D 73 AND D 74A**

Construct Drainage Inlet per Caltrans Std. Plan D73, Type G1 or Std. Plan D74A, Type GT1 shall be in conformance with Section 201 and 303-5 of the Standard Specifications for Public Works Construction and as modified by these Special Provisions.

Except for alternate class and special exposure mixes, Type III Portland cement (High Early Strength) may be used in lieu of Type II Portland cement in the same designated batch quantities as specified or approved for Type II Portland cement.

The same brand, type and source of cement and aggregate shall be used for all Portland Cement Concrete. All concrete used on this project shall be 560-C-3250. Upon review and approval of the City Engineer, the Contractor may add additives to the concrete for things such as high early; however, these shall be at no cost to the City.

Following concrete placement, the Contractor shall remove all forms within 72 hours for all reconstruction locations.

Construct Drainage Inlet per Caltrans Std. Plan RSP D73, Type G1 or Std. Plan D74A, Type GT1 shall be measured and paid for at the contract unit price per each. The contract unit price shall include full compensation for inlet filter, forms, expansion joints, and details, finishing and curing. Full compensation for furnishing all labor, materials, equipment, and doing all work involved in placing the concrete median curb as detailed on the Plans and these Specifications and no additional compensation shall be allowed.

END OF SECTION

## **DIVISION 02800 – ARIZONA CROSSINGS**

### **02800.01 GENERAL**

- (a) The Contractor shall perform all over-excavation, excavation; bedding, and compaction required for construction of the Arizona Crossings (Cross Gutters) as specified and shown on the contract drawings.
- (b) Arizona Crossings will be constructed in accordance with the Standard Specifications for Public Works Construction (SSPWC) (Greenbook) and per the detail called out on Sheet 2 of the contract drawings and these specifications. Cutoff walls and channel crossings shall be per the County of San Bernardino standard drawings 200 and 200A respectfully.

### **02800.02 INSTALLATION**

- (a) MATERIAL. Concrete used for the construction of the Arizona Crossings shall conform to Section 201 of the SSPWC. Concrete class and/or strength shall be as shown on the construction drawings. Where not specified, Contractor shall use the appropriate class from Table 201-1.1.2 (A) of the SSPWC. Slump for the Arizona Crossings shall be a maximum of 4-inches.
- (b) CONSTRUCTION. Construction of the Arizona Crossings shall conform to Section 303-1 of the SSPWC.



## **DIVISION 02900 – RETAINING WALLS**

### **02900.01 GENERAL**

- (a) The Contractor shall perform all over excavation, excavation; bedding, backfill and compaction required for construction of the retaining walls as specified and shown on the contract drawings.
- (b) Retaining walls will be constructed in accordance with the Standard Specifications for Public Works Construction (SSPWC) (Greenbook) per the standard drawings called out on the contract drawings and these specifications.

### **02900.02 INSTALLATION**

- (a) **MATERIAL.** Concrete used for the construction of the retaining walls shall conform to Section 201 of the SSPWC. Concrete class and/or strength shall be as shown on the construction drawings. Where not specified, Contractor shall use the appropriate class from Table 201-1.1.2 (A) of the SSPWC. Slump for the retaining walls shall be a maximum of 4-inches. Reinforcing bars shall be installed as shown on the construction drawings. Lap and splice lengths shall conform to the requirements of the SSPWC. No splices will be allowed within 20-inches of the top of the footing. Wall drainage will include weep holes, French drain and wall drains as shown and at the locations shown on the construction drawings. Piping for the wall drains, where not specified shall be Schedule 80 PVC and the drains will extend through the wall and outlet onto the roadway. Pipe dome inlets shall be per Standard 617-3 of the SSPWC.
- (b) **CONSTRUCTION.** Construction of the retaining walls shall conform to Section 303-1 of the SSPWC.

The Contractor may utilize Concrete Inter-Block Gravity Wall as an alternative to the specified cast in place concrete walls indicated on the construction drawings and these specifications, however, the contractor must supply the design, structural calculations and details for the alternative construction as part of his submittal. In no case shall additional compensation be made to the Contractor for the substitution.

Retaining walls shall be designed based on criteria in the recommendations and analysis provided in the Section 9.2 Retaining Wall Foundation Design Parameters in the Updated Geotechnical Investigation Report for Snowdrop Road Improvement Project, Dated October 16, 2019.

The contractor shall submit detailed drawings for the type of wall(s) to be constructed to the Engineer for review. The detailed drawings and calculations shall be prepared, signed, and stamped by a California Registered Professional Engineer or a California Registered Structural Engineer. The contractor shall provide written certification that the wall design conforms to the manufacturer's recommendations.

Inter-Block concrete wall units shall have form liner finish and be gray in color. Reinforced concrete closure pours shall be incorporated at angle points in Inter-Block wall alignment. Exposed surfaces of closure pours shall be chamfered, colored, and formliner finished to match adjacent wall units.

The square foot pay quantity for Retaining Wall shall be the area between top of wall and finish grade at face of wall based on the "Pay Limits" shown on the plan. No additional area will be included for overlap of tiered wall reaches.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including providing and placing permeable material granular material, unit backfill material, geogrid, pins, return walls, and for doing the work to design and obtain approval of alternative wall design and to construct the retaining wall(s) as shown on the plans, as described in these Special Provisions, and as directed by the Engineer shall be considered as included in the contract unit price paid per square foot for "Retaining Wall Alternative and no additional compensation will be allowed therefor.

## INTER-BLOCK SPECIFICATIONS

### GENERAL

The Contractor shall provide all measures necessary to protect the structure, workers, and other persons during construction. Such measures shall include, but not be limited to, bracing, shoring for construction equipment, shoring for the earth banks, forms, scaffolding, planking, safety nets, support systems, and bracing for cranes and jib poles, etc.

In particular, contractor shall remove all loose rocks and unstable soil from the bluff face above the work area and provide a temporary protective barrier above the work area to protect the workman.

Temporary bracing of sufficient strength and stiffness to resist all imposed loads, including wind and seismic loads, shall be provided for structural elements. Contractor shall engage and pay for properly qualified persons to determine where and how temporary precautionary measures shall be used and inspect same in field. Observation visits to the site by the engineer shall not include inspection of the above items.

Contractor shall investigate site during clearing and earthwork operations for filled excavations or buried structures such as foundations, etc. If any such structures are found, engineer shall be notified.

## INSTALLATION

### Foundation

Compaction requirements:

All subbase foundation soils shall be compacted to 95% RC and verified by Soils Engineer. Reference test: Relative density shall be determined by field tests performed in accordance with ASTM D1556 or ASTM D2922 and D3017 with reference to the maximum dry density determined by laboratory tests in accordance with the modified AASHTO test for compaction: ASTM D1557, method C (4" mold, 5 layers, 10lb hammer, 18" drop, 25 blows per layer).

Wall construction shall not proceed until foundation is certified by Soils Engineer to be acceptable. Project manager and Inter-Block'\* manufacturer's representative shall perform inspection of foundation.

### **Drainage**

Wrap all perforated drainpipe in highly permeable geotextile fabric.

Ensure that the discharge from the drain's outlet will not cause, localized erosion that may impact the stability of the wall's foundation.

### **Backfill**

In cases of battered walls, no more than two courses shall be placed without backfilling as specified by the Soils Engineer.

Backfill should be compacted to at least 90 percent of the laboratory maximum dry density as determined by ASTM Standard D1557 test method. Compaction of backfill adjacent to retaining walls can produce excessive lateral pressures. Improper types and locations of compaction equipment and/or compaction techniques may damage the walls. To prevent damage to structures due to backfilling operations, backfill within a distance from the face of the structure of not less than 1 the depth of the backfill should be placed with equipment that does not exceed H—20 loading. The depth of the backfill is the vertical distance between the level being compacted and the bottom of the excavation. Outside this distance, heavier compaction equipment may be used.

### **CONCRETE**

All concrete work shall be done in accordance with the latest edition of the ACI Building Code (ACI318) and the latest editions of the ACI Manuals of Concrete Practice.

### **EQUIPMENT AND MATERIALS**

#### **A. Portland Cement**

Cement shall be Type II, low alkali Portland Cement conforming to ASTM C150 and the low alkali requirements of Table IA therein.

#### **B. Aggregate**

Aggregate shall conform to alternate rock material Type S as specified in Section 400. All aggregate shall meet the requirements of the combined aggregate gradation C. Soundness loss determined by California Test Method 214 shall not exceed 10 percent.

C. Materials Handling and Storage

Contractor shall check all materials delivered to the site to ensure that the correct materials have been received.

Materials shall be stored on site in a manner that ensures safety to the general public and property. Care should also be taken, so that no damage occurs to any of the materials. Damaged materials shall be replaced at the contractor's expense.

Inter-Block Product Data

The Inter-Block Retaining Wall system is an interlocking block system. Each standard full size block weighs approximately 4,000 pounds and measures approximately 2.5' x 2.5' x 5.0'. All edges of blocks are chamfered. Each non-cap unit has two 4" male keys at the top which are used to provide a positive shear transfer at the upper block's female interlock. The Inter-Block units allow 1/2" yield per 5' of length. All blocks have top side centered lifting eyelets to facilitate handling.

## **DIVISION 03000 – WING AND HEAD WALLS**

### **03000.01 GENERAL**

(a) The Contractor shall perform all over excavation, excavation; bedding, backfill and compaction required for construction of the head and wing walls for drainage inlet/outlets as specified and shown on the contract drawings.

(b) Head walls, wing type shall be constructed in accordance with the Standard Specifications for Public Works Construction (SSPWC) (Greenbook) and per the San Bernardino County Road Department (SBCRD) Standard 209 for head walls out-letting pipes between 24 and 54-inches in diameter. The head walls, wing type for the 60-inch pipe outlets shall be constructed in accordance with CALTRANS Standard D90, modified for dual outlet pipe. Contractor shall submit a design for these head walls including reinforcing steel, design details and structural calculations.

### **02700.02 INSTALLATION**

- (a) **MATERIAL.** Concrete used for the construction of the head walls, wing type shall conform to Section 201 of the SSPWC. Concrete class and/or strength shall be as shown on the construction drawings. Where not specified, Contractor shall use the appropriate class from Table 201-1.1.2 (A) of the SSPWC for surface drainage features. Slump for the head walls shall be a maximum of 5-inches. Reinforcing bars shall be installed as shown on the construction drawings. Lap and splice lengths shall conform to the requirements of the SSPWC. No splices will be allowed within 20- inches of the top of the footing.
- (b) **CONSTRUCTION.** Construction of the head walls shall conform to Section 303-1 of the SSPWC.

## **DIVISION 03100 - HIGH DENSITY POLYETHYLENE PIPE**

### **03100.01 GENERAL**

The contractor shall perform all work including but not limited to excavation, installation, backfill, compaction, and testing necessary to install High density polyethylene pipe as shown on the contract drawings and in accordance with these specifications

### **03100.02 STANDARDS**

The following standards apply to the installation and testing of HDPE pipelines and are referenced herein:

- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
- AASHTO M 294 (2010) Standard Specification for Corrugated Polyethylene Pipe, 24 to 60 inch Diameter
- ASTM INTERNATIONAL (ASTM)
- ASTM D 3350 (2010a) Polyethylene Plastics Pipe and Fittings Materials
- ASTM F 894 (2007) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe

### **03100.03 SUBMITTALS**

SD-03 Product Data  
Placing Pipe; A  
SD-07 Certificates  
Resin Certification  
Hydrostatic Test on Watertight Joints

### **03100.04 DELIVERY, STORAGE, AND HANDLING**

#### **03100.04.01 Delivery and Storage**

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Construction Manager or Project Inspector. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and

shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

#### 03100.04.02 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

#### 03100.05 **PRODUCTS**

##### 03100.05.01 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

##### 03100.05.02 HPDE Pipe

Submit the pipe manufacturer's resin certification, indicating the cell classification of PE used to manufacture the pipe, prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350.

##### 03100.05.03 Smooth Wall PE Pipe

ASTM F 714, maximum DR of 21 for pipes 3 to 24 inches in diameter and maximum DR of 26 for pipes 26 to 48 inches in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

##### 03100.05.04 Corrugated PE Pipe

AASHTO M 294, Type S or C. For slow crack growth resistance, acceptance of resins shall be determined by using the notched constant ligament-stress (NCLS) test meeting the requirements of AASHTO M 294.

##### 03100.05.05 Profile Wall PE Pipe

ASTM F 894, RSC 160, produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 334433C.

#### 03100.06 **DRAINAGE STRUCTURES**

##### 03100.06.01 Flared End Sections

Sections shall HDPE or be of a standard design fabricated from zinc coated steel sheets meeting requirements ASTM A929M.

## 03100.07 MISCELLANEOUS MATERIALS

### 03100.07.01 Joints

#### Flexible Watertight Joints

- a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443M. Factory-fabricated resilient joint materials shall conform to ASTM C 425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.
- b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gaske requirements of ASTM C 443M. Certified copies of test results shall be delivered to the Construction Manager before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

#### External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877M and ASTM C877M.

#### Flexible Watertight, Gasketed Joints

- a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches wide and approximately 3/8 inch thick, meeting the requirements of ASTM D 1056, Type 2 A1, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 21 mm (13/16 inch) in diameter for pipe diameters of 36 inches or smaller and 7/8 inch in diameter for larger pipe having 1/2 inch deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches in diameter for pipe having 1 inch deep end corrugations. O-rings shall meet



the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

- c. **Connecting Bands:** Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

#### 03100.07.02 Corrugated PE Plastic Pipe

Pipe joints shall be silt tight and shall conform to the requirements in AASHTO M 294.

#### 03100.07.03 Profile Wall PE Plastic Pipe

Joints shall be gasketed or thermal weld type with integral bell in accordance with ASTM F 894.

#### 03100.07.04 Resilient Connectors

Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C 923M.

### 03100.08 EXECUTION

#### 03100.08.01 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of the EXCAVATION AND FILL Section herein and the requirements specified below. This section is not intended to conflict with Section 02200 EARTHWORK of these specifications. Where a conflict arises, the more stringent requirement prevails.

#### 03100.08.02 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 12 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheet piling and bracing, where required, shall be placed within the trench width as specified, without any over-excavation. Where trench widths are exceeded, redesign with a resultant increase in cost

of stronger pipe or special installation procedures will be necessary. This section is not intended to conflict with Section 02200 EARTHWORK of these specifications. Where a conflict arises, the more stringent requirement prevails.

#### 03100.08.03 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between un-removed rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe.

#### 03100.08.04 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Construction Manager, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING below. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed with no additional compensation.

#### 03100.08.05 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

#### 03100.08.06 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

#### 03100.08.06 PLACING PIPE

Submit printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation. Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches.

Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

#### MAXIMUM ALLOWABLE

TYPE OF PIPE	DEFLECTION (%)
Plastic (PVC & HDPE)	5

### 03100.09 BACKFILLING

#### 03100.09.01 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of pipe or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 8 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Construction Manager, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

#### 03100.09.02 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill

shall be placed and thoroughly compacted in layers not exceeding 8 inches. Use select granular material for this entire region of backfill for flexible pipe installations.

#### 03100.09.03 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

#### 03100.09.04 Compaction

- General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

- Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

- a. Under paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
- c. Under nontraffic areas, density shall be not less than that of the surrounding material.

## 03100.10.00 Installation

### **Install 24" to 60" HDPE Storm Drain Pipe**

Install 24" to 60" HDPE Storm Drain Pipe shall be in compliance with section 207-18 and 306 of the Standard Specifications for Public Works Construction and these Special Provisions.

Pipe shall meet N-12 ADS Specifications.

Installation shall include all trenching, backfill, connections, and all work necessary to install the pipe complete-in-place.

Installation of 24" to 60" HDPE Storm Drain Pipe shall be measured and paid for at the contract price per linear foot based on the length indicated on the plans. The Contract unit price shall include full compensation for furnishing all labor, materials, equipment, and doing all work involved placing the HDPE Storm Drain Pipe, pipe fittings if needed, complete-in-place as detailed

Installation of HDPE Storm Drain Pipe Fitting, connection to the existing headwall or proposed headwall and inlet shall be included in the linear feet of pipe and there shall be no separate measurement and payment made.

-- End of Section --

## **DIVISION 04000 – ROCK WORK**

Description - This section covers the contract items Rock Slope Protection of various classes; Concreted Rock; Filter Blanket, No. 2 Backing; and Rock Slope Protection Fabric.

General - All rock materials shall meet the quality requirements of Section 72-2.02 of the State Standard Specifications.

Rock materials shall be blocky and predominantly angular in shape. Not more than 25% of the rock shall have a length more than 2.5 times the breadth or thickness. No rock shall have a length exceeding 3.0 times its breadth or thickness. All oversize rocks, as determined by the Engineer, shall be removed.

Rock materials shall be placed on a firm dry foundation in conformance with Method B of Section 72-2.03 of the State Standard Specifications, however, additional placement effort shall be required to meet the lines and grades as shown on the drawings and to fill and chink oversize voids with selected rock to establish a stable interlock. Chinking of voids will not be required for rock specified to be concreted.

Permeable materials such as filter blankets shall be consolidated and the surface trimmed to final grade as directed by the Engineer.

Concrete for concreted (grouted) rock shall be Class "B", and shall have a slump sufficient to allow gravity flow into the interstices of the rock with rodding and vibration. Concrete for concreted rock shall be placed in accordance with Section 72-5.04 of the State Standard Specifications except that total penetration of the rock blanket by the concrete will be required, and the outer rocks of the finished rock surface shall project approximately 9 to 12 inches from the concrete surface.

Rock Slope Protection, 1-Ton Class; Rock Slope Protection, 1/2-Ton Class; and Rock Slope Protection, 1/4-Ton Class - The contract items Rock Slope Protection, 1-Ton Class; Rock Slope Protection, 1/2-Ton Class; and Rock Slope Protection 1/4-Ton Class covers the rock furnished and placed as shown on the drawings as specified. Rock shall conform to 1-Ton Class, 1/2-Ton Class and 1/4-Ton Class, for Method B placement per Section 72-2.02 of the State Standard Specifications.

Filter Blanket, No. 2 Backing (for RSP, 1/2 Ton Class Only) - The contract item Filter Blanket, No. 2 Backing covers the 9-inch filter blanket installed under the Rock Slope Protection.

The filter blanket shall be permeable material conforming to Section 72-2.01 of the State Standard Specifications for No. 2 Backing, and shall be placed to the lines and grades as shown on the plans. Material shall be placed on firm, dry foundation. Soft, spongy material shall be removed and replaced with acceptable compacted material as directed by the Engineer. The cost of foundation preparation shall be included in the price bid for excavation and no additional allowance will be made for such work. The permeable material shall be consolidated and the surface trimmed to final grade as shown on the drawings or as directed by the Engineer.

Rock Slope Protection Fabric – Rock Protection Fabric placed beneath rock shall conform to Type "B" per Section 88-1.04 of the State Standard Specifications with the exception the weight in ounces per square yard shall be a minimum of 10. A six-inch minimum layer of backing material shall be placed over the fabric prior to placing rock unless otherwise shown on the plans.

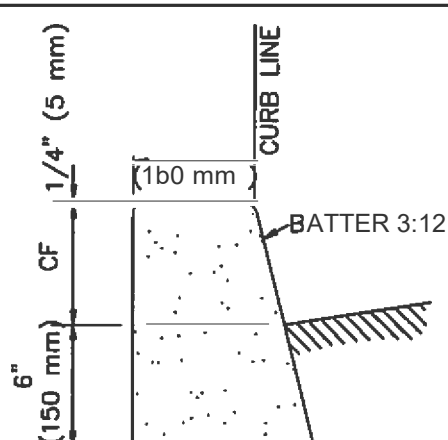
Measurement - Measurement for payment for the contract item Rock Slope Protection, 1-Ton Class; Rock Slope Protection, 1/2-Ton Class; Rock Slope Protection, 1/4-Ton Class; and Filter Blanket, No. 2 Backing, including all rock to be concreted, shall be the number of cubic yards placed as specified.

Measurement for payment for the contract item Rock Slope Protection, Fabric shall be the number of square yards placed as specified. No measurement for payment will be made for laps required for installation or for convenience to the Contractor.

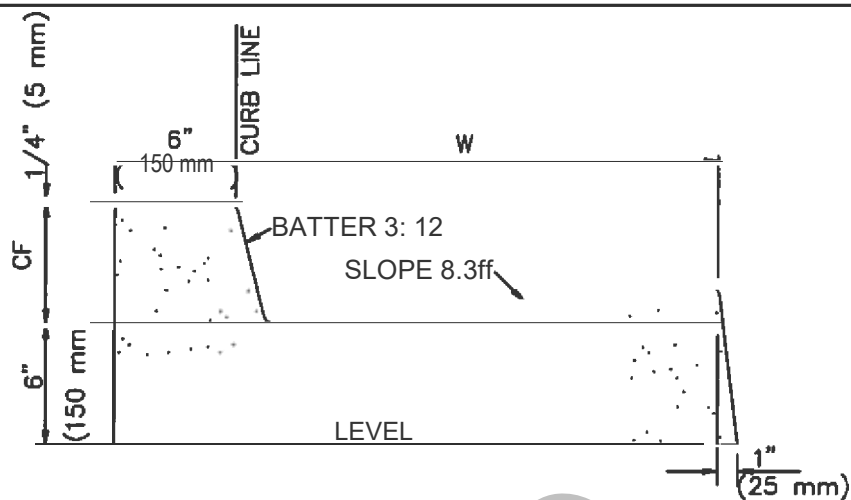
Concrete for concreted rock shall be measured and paid for as specified under the Concrete Construction Section of these Specifications, and no additional payment for labor, equipment, materials or incidentals for concreting rock will be made.

Payment - The contract prices paid for Rock Slope Protection, 1-Ton Class; Rock Slope Protection, 1/2-Ton Class; Rock Slope Protection 1/4-Ton Class; Filter Fabric; and Filter Blanket, No. 2 Backing; and Rock Slope Protection Fabric shall include full compensation for all costs incurred under this section.

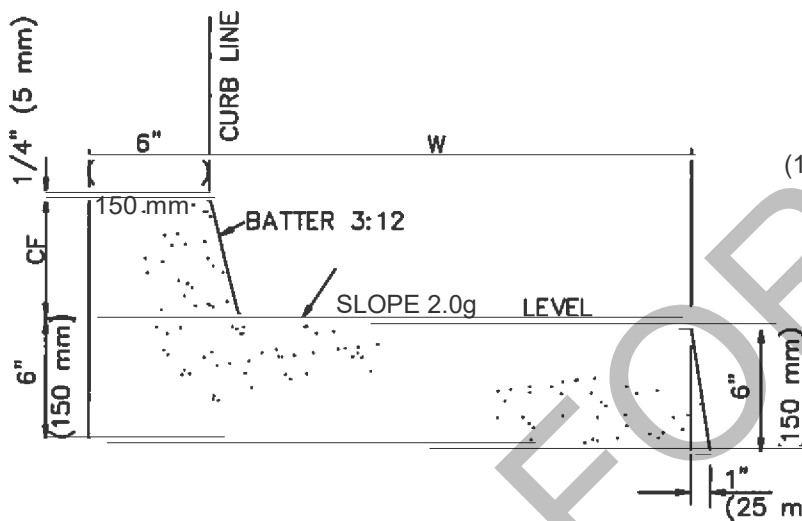
-- End of Section --



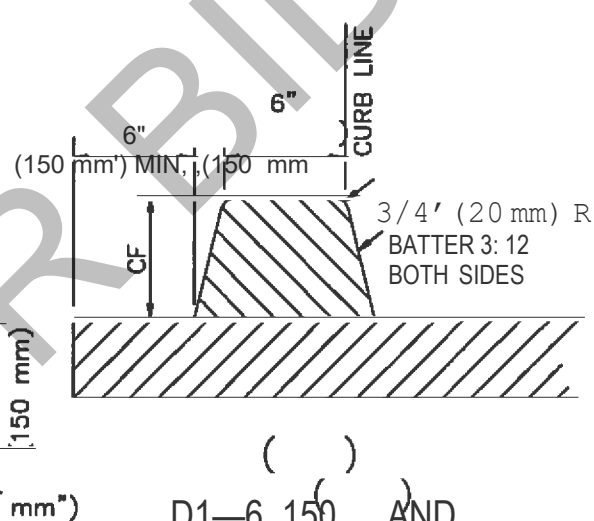
A1—6(150) AND  
A1—8(200)



A2—6(150) AND A2—8(200)



A3—6(150) AND A3—8(200)



D1—6(150) AND  
D1—8(200)

NOTES:

1. THE LAST NUMBER IN THE DESIGNATION IS THE CURB FACE (CF) HEIGHT, INCHES (mm).

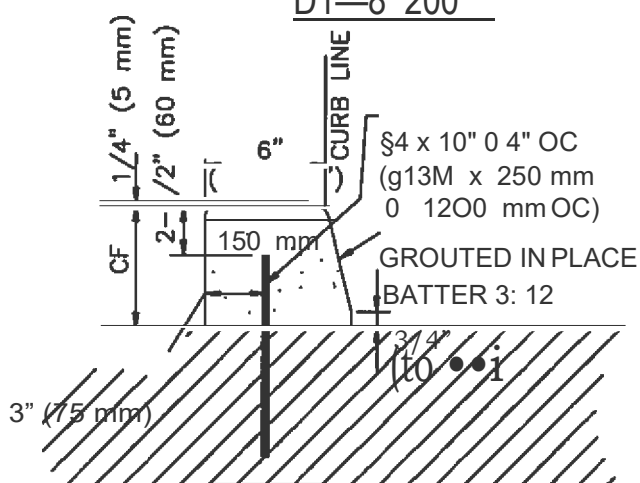
GUTTER WIDTH, W, IS 24" (600 mm) UNLESS OTHERWISE SPECIFIED.

2. TYPES A1, A2, A3 AND C1 SHALL BE CONSTRUCTED FROM PCC.

TYPE D1 CURB SHALL BE CONSTRUCTED FROM ASPHALT CONCRETE.

3. TYPE C1 CURB SHALL BE ANCHORED WITH STEEL DOWELS AS SHOWN OR WITH AN EPOXY APPROVED BY THE ENGINEER.

4. ALL EXPOSED CORNERS ON PCC CURBS AND GUTTERS SHALL BE ROUNDED WITH A 1/2" (15 mm) RADIUS.



C1—6(150) AND C1—8(200)



dual :X*	CURB AND GU i ic« — BARRIER (	STANDARD PLAN 120-2 SHEET 01"•1
	WU 51ANoAeo seccincacoNS Foe euauc mess constrUCTION	

NOT FOR BID

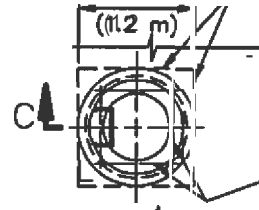
3 - #4 (#13M) J BARS,  
4'-8" (1.4 m) LONG,  
3" (75 mm) OC CONTINUE  
ADDITIONAL BARS  
s" (150 mm) OC TO INSIDE

≤ A

ROUND 70 3" (75 mm) R  
OPTIONAL FILLET

4'-0"

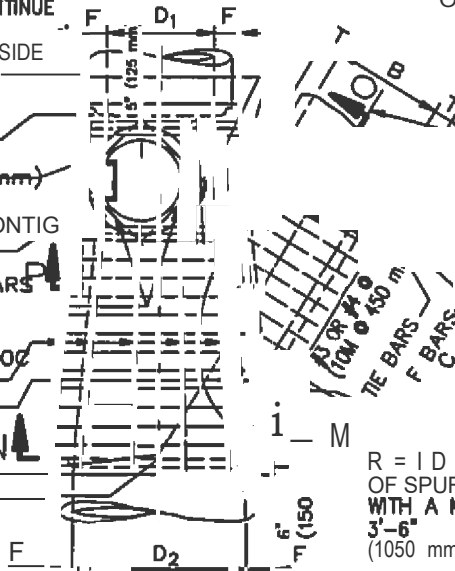
OPTIONAL  
OUTSIDE  
EDGE OF  
CONCRETE



**DETAIL "N"**  
(RINGS AND COVER NOT SHOWN)  
SEE NOTE Z

**STATION**  
5'x2" PIPE SEAT  
(125 mm x 5fJ  
5-D BARS, 3"  
(75 mm) OC CONTIG  
6" (150 mm) OC  
4-#6 (#19M) E BARS  
SEE NOTE 3  
#3 OR #4 @ 18"  
(10M @ 450 mm) OC  
TIE BARS  
A & B BARS

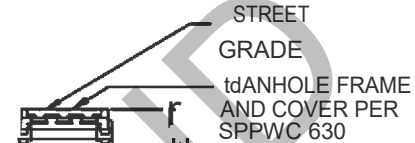
**STATION POINT**  
**STATION**



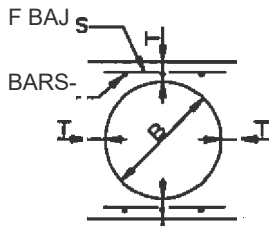
**PLAN**  
(SHAFT NOT SHOWN)

R = 1 D  
OF SPUR £  
WITH A MAX.  
3'-6"  
(1050 mm)

MANHOLE  
SHAFT PER  
SPPWC 32  
STEPS



**SECTION N—M—P—O**

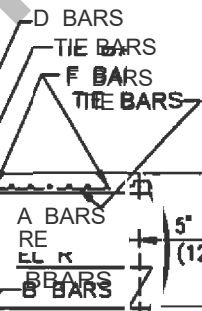


**SECTION G—G**

5'x2"  
PIPE SEAT  
EL 5

#4 @ 18" (3M @ 450 mm) OC  
BOTH WAYS, TO BE USED  
WHEN B IS 60" (1500 mm)  
OR MORE

STREET  
GRADE  
MANHOLE FRAME  
AND COVER PER  
SPPWC 630



#4 @ 18" (gt 3M @ 450 mm)  
OC BOTH WAYS, TO BE  
USED WHEN B IS 60"  
(1500 mm) OR MORE

OMIT THIS STEP IN  
PAVED STREETS  
H BAR  
6" (150 mm)

16" (400 mm) FOR PAVED  
STREETS, 2'-2" (650 mm)  
FOR UNPAVED STREETS

TIE BARS  
6" (150 mm)

CONCRETE RINGS PER  
SPPWC 324

6" (150 mm)

STREET GRADE  
RING SEAT  
5'x2" (125 mm x 25 mm)

\* (350)  
H BAR

VARIABLE  
E BARS  
IE BARS  
J BARS

ROUND EDGES TO  
3" (75 mm) R

**SECTION C—C**

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE  
PUBLIC WORKS STANDARDS INC.

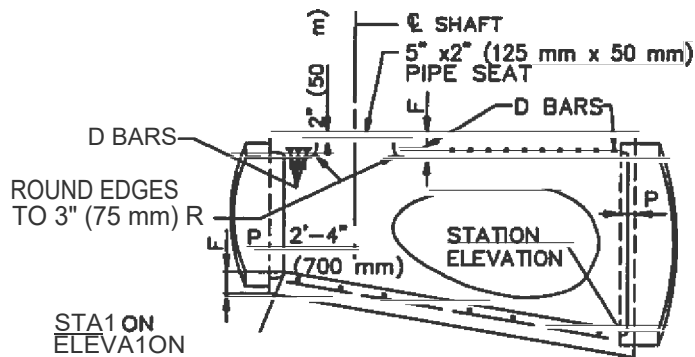
**MANHOLE PIPE-TO-PIPE  
(LARGE SIDE INLET)**

USC WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

**322-2**

SHEET 1 OF 4-



## LONGITUDINAL SECTION

TABLE OF BARS SIZES					
@ OR B		A A B		D OR F	
12" (300 mm)	-39" (975 mm)	1/8" x 3"	z16ki O 75 mm	1	4 o 6" (y13M o 150 mm)
42" (1050 mm)	-84" (2100 mm)	1/4" x 6 3/4"	#19K 16 75 mm	1	5 6 6" (y16M o 150 mm)
90"	2250 mm	-144"	3600 mm	1/2" x 7 0 3"	1/2" x 6 Q 6"
					1/2" x 19M Q 150 mm

TABLE OF VALUES FOR M				SEE NOTE 2	
SECTION	PAVED STREET			UNPAVED STREET	
	MAX	MIN		MAX	MIN
N-M-P-O		2'-10 1/2"	867 mm		5'-g- (JggQ)
C-C	11"	282 mm	8 1/2" (217 mm)	16"	410 mm
				15"	3a0 mm

TABLE OF VALUES FOR F	
D2	F
36" (900 mm)	6 1/2- 155 mm
39" (975 mm)	7" (180 mm)
42" (1050 mm)	7 1/2" (190 mm)
45" (1125 mm)	7 3/4" 195 mm
48" (1200 mm)	8" 205 mm
51" (1275 mm)	8 1/2- 215 mm
54" (1350 mm)	9" (230 mm)
57" (1425 mm)	9 1/4" 235 mm
60" (1500 mm)	9 1/2" 240 mm
63" (1575 mm)	10- 255 mm
66" (1650 mm)	10 1/4" 260 mm
69" (1725 mm)	10 3/4" 275 mm
72" (1800 mm)	11" 280 mm
78" (1950 mm)	11 3/4" (300 mm)
84" (2100 mm)	12 1/2" (320 mm)
90" (2250 mm)	13 1/4" 335 mm
96" (2400 mm)	14" 355 mm
102" (2550 mm)	15 1/2" 395 mm
108" (2700 mm)	16" (405 mm)
114" (2850 mm)	16 1/2" (420 mm)
120" (3000 mm)	17" 430 mm
126" (3150 mm)	17" 430 mm
132" (3300 mm)	17 1/2" 445 mm
138" (3450 mm)	17 1/2" 445 mm
144" (3600 mm)	18" 455 mm

TABLE OF VALUES FOR T	
B	T
12" (300 mm)	4" (100 mm)
15" (375 mm)	4 1/4" (110 mm)
18" (450 mm)	4 1/2" (115 mm)
21" (525 mm)	5" (125 mm)
24" (600 mm)	5 1/4" (135 mm)
27" (675 mm)	5 1/2" (140 mm)
30" (750 mm)	6" (150 mm)
33" (825 mm)	6 1/4" (160 mm)
36" (900 mm)	6 1/2" (165 mm)
39" (975 mm)	7" (180 mm)
42" (1050 mm)	7 1/2" (190 mm)
45" (1125 mm)	7 3/4" (195 mm)
48" (1200 mm)	8" (205 mm)
51" (1275 mm)	8 1/2" (215 mm)
54" (1350 mm)	9" (230 mm)
57" (1425 mm)	9 1/4" (235 mm)
60" (1500 mm)	9 1/2" (240 mm)
63" (1575 mm)	10" (255 mm)
66" (1650 mm)	10 1/4" (260 mm)
69" (1725 mm)	10 3/4" (275 mm)
72" (1800 mm)	11" (280 mm)
75" (1875 mm)	11 1/4" (290 mm)
78" (1950 mm)	11 3/4" (300 mm)
81" (2025 mm)	12 1/2" (320 mm)
84" (2100 mm)	13 1/4" (335 mm)
87" (2175 mm)	14" (355 mm)
90" (2250 mm)	15 1/2" (395 mm)
93" (2325 mm)	16" (405 mm)
96" (2400 mm)	16 1/2" (420 mm)
99" (2475 mm)	17" (430 mm)
102" (2550 mm)	17" (430 mm)
105" (2625 mm)	17 1/2" (445 mm)
108" (2700 mm)	17 1/2" (445 mm)
111" (2775 mm)	18" (455 mm)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MANHOLE PIPE—TO-PIPE  
(LARGE DDE INUE)

STANDARD PLAN

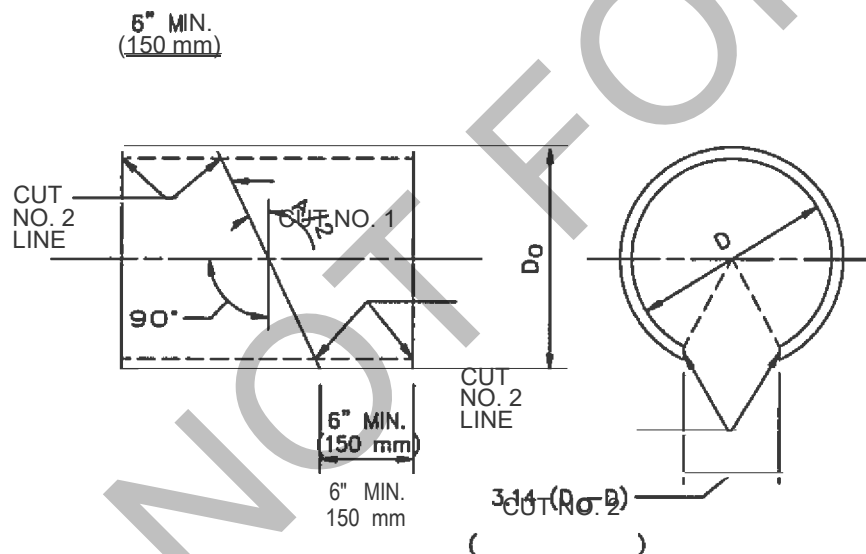
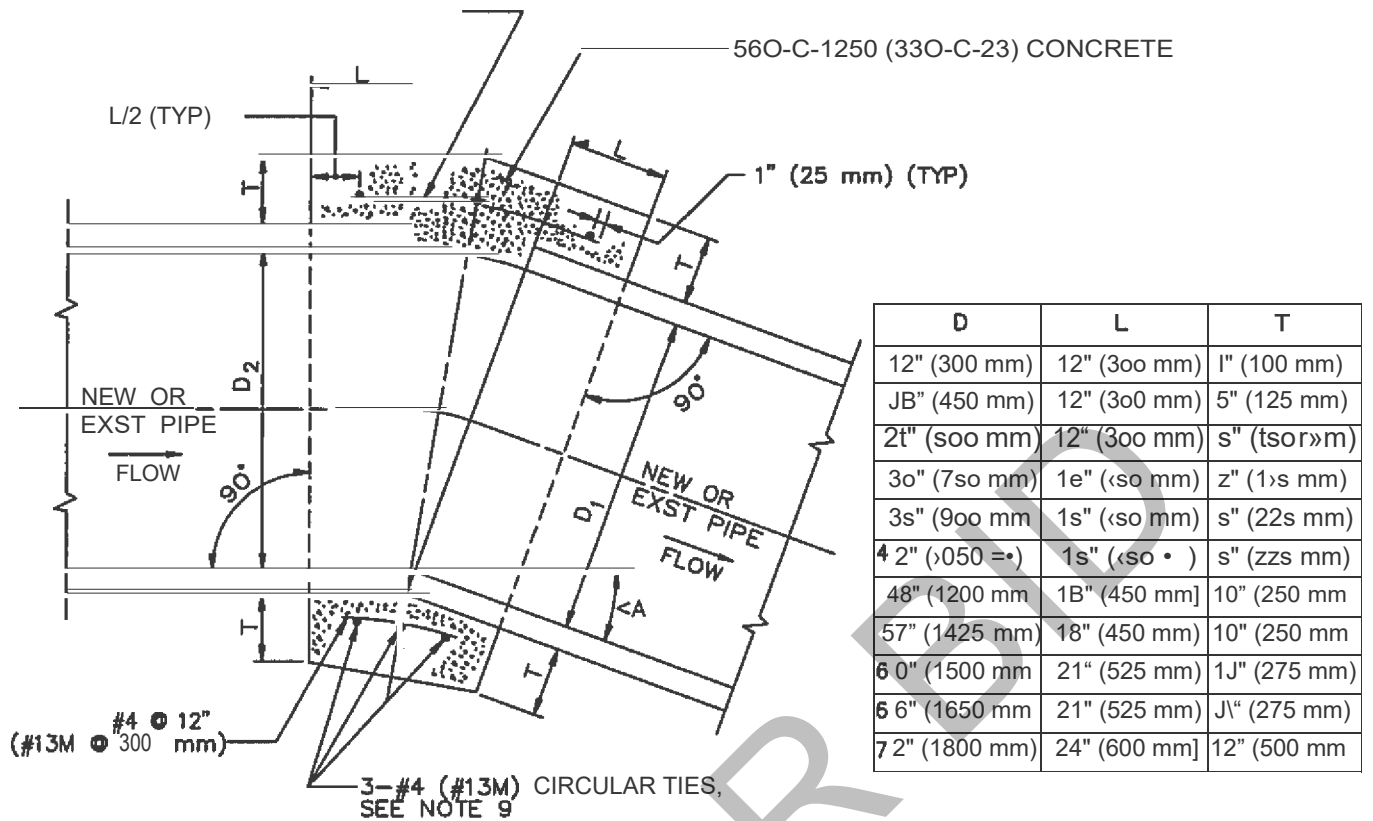
322-2

SHEET 2 OF 4

## NOTES

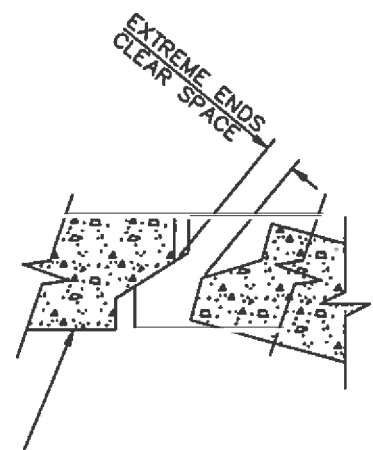
1. VALUES FOR A, B, C, Q, Dy, ELEVATION R AND ELEVATION S ARE SHOWN ON THE PLANS. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.
2. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'-10 1/2" (867 mm) FOR PAVED STREETS OR 3'-6" (1060 mm) FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C—C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D<sub>j</sub> IS 48" (1200 mm) OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 3.
3. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTERLINE OF STORM DRAIN WHEN DIAMETER D<sub>j</sub> IS 48" (1200 mm) OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE.
4. LENGTH OF MANHOLE MAY BE INCREASED AT OPTION TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
5. P SHALL BE 5" (125 mm) FOR (2400 mm) OR LESS AND 8" (200 mm) FOR D<sub>y</sub> OVER 96" (2400 mm).  $=96" D_2$
6. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 (ASTM A 615M, GRADE 300), AND SHALL TERMINATE 1 1/2" (40 mm) CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
7. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
8. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
9. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES OF F SHOWN ON TABLE, SHEET 1.
10. IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.
11. STEPS SHALL CONFORM TO SPPWC 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 14" (350 mm) TO 15" (375 mm) OC. THE LOWEST STEP SHALL NOT BE MORE THAN (600 mm) ABOVE THE INVERT.
12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
  - A. THIS STANDARD PLAN IS USED WHEN SPPWC 320 IS [NADeQuAw. MAIN LINE - 36" (900 mm) INSIDE DIAMETER OR LARGER.
  - B. LATERAL - 12" (300 mm) TO 144" (3600 mm) INSIDE DIAMETER; HOWEVER, THE INSIDE DIAMETER SHALL NOT EXCEED THE INSIDE DIAMETER OF THE MAIN LINE.

13. MANHOLE FRAME AND COVER SHALL CONFORM TO SPPWC 630 UNLESS OTHERWISE SHOWN.
14. MANHOLE SHAFT SHALL CONFORM TO SPPWC 324 UNLESS OTHERWISE SHOWN.
15. WHERE A MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 326.
16. WHERE A PRESSURE MANHOLE SHAFT — WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO SPPWC 328.
17. WHERE A PRESSURE MANHOLE SHAFT - 36" (914 mm) WITHOUT REDUCER IS SPECIFIED REFER TO SPPWC 329.
18. THE FOLLOWING SPPWC ARE INCORPORATED HEREIN:
  - 324 MANHOLE SHAFT - WITH ECCENTRIC REDUCER
  - 326 MANHOLE SHAFT — 36" (900 mm) WITHOUT REDUCER
  - 328 PRESSURE MANHOLE SHAFT — WITH ECCENTRIC
  - 329 PRESSURE MANHOLE SHAFT — 36" (914 mm) WITHOUT REDUCER
  - 630 24" (610 mm) MANHOLE FRAME AND COVER
  - 633 36" (914 mm) MANHOLE FRAME AND COVER
  - 635 STEEL STEP
  - 636 POLYPROPYLENE PLASTIC STEP



**DETAIL "A"** SEE NOTE 10  
SONO-TUBE. OR EQUIV., INTERIOR FORM

CUT NO. 1: SAW THE TUBE AT AN ANGLE OF A/2 WITH THE TRANSVERSE PLANE. REVERSE ONE SECTION AND TAPE BOTH SECTIONS TOGETHER FORMING THE DEFLECTION ANGLE A.  
CUT NO. 2: SAW THE TUBE LONGITUDINALLY REMOVING A STRIP 3.14 (@-D) WIDE ON THE SIDE OPPOSITE THE OPEN JOINT. BEND THE ENDS OF THE CUT TOGETHER AND INSERT THE TUBE IN THE PIPE.



INTERIOR SURFACE OF PIPE

**DETAIL "B"**  
TYPICAL JOINT FOR  
REINFORCED CONCRETE PIPE

<div>PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. BOOK COMMITTEE NEV. 1946, 1497, 9999, 21 19</div>	<div>CONCRETE COLLAR 12" (300 mm) THROUGH</div> <div>RCB 1800 +&lt;+&lt;J</div> <div>USE WITH STANOARD SPECIFICATIONS FOR PUBMC WORKS CONSTRUCTION</div>	<div>STANDARD PLAN</div> <div>380-4</div> <div>FEET 1 OF 2</div>
---	--	--

NOT FOR BID

## NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 10P
2. FOR CURVE JOINTS (SEE DETAIL B, SHEET 1)  
 IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 1" (25 mm), BUT IS LESS THAN 3" ( 75 mm) A CONCRETE COVER IS REQUIRED IN ACCORDANCE WITH SSPWC 306—1.2.4.  
 IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS EQUAL TO OR GREATER THAN 3" (75 mm), BUT LESS THAN 6" (150 mm), A CONCRETE COLLAR IS REQUIRED. IF THE CLEAR SPACE IS 6" (150 mm) OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.
3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.
4. CONNECTOR PIPES
  - A. 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.
  - B. WHEN  $D_1$  IS EQUAL TO OR LESS THAN  $D_2$ , JOIN INVERTS AND WHEN  $D_1$  IS GREATER THAN  $D_2$ , JOIN SOFFITS.
5. FOR PIPE LARGER THAN 72" (1800 mm) SPECIAL COLLAR DETAILS ARE REQUIRED.
6. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
7. REINFORCEMENT SHALL CONFORM TO ASTM A 615 (A 615 M) GRADE 40 (300).
8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE  $D+(2X \text{ WALL THICKNESS}) + T$ .
9. REINFORCING SHALL BE USED WHERE THE PIPE DIAMETER IS GREATER THAN 21" (525 mm) AND ON ALL PIPES WHERE THE SPACES BETWEEN THE EXTREME OUTER ENDS IS 3" (75 mm) OR LARGER.

CIRCULAR TIES:

PIPE DIAMETER				NO. OF CIRCULAR TIES
21" (525 mm) OR LESS				3
24" (600 mm) TO 30" (750 mm)				3
33"	825 mm	TO 57"	1425 mm)	4
60" (1500 mm) TO 72" (1800 mm)				5

WHERE THE SPACE BETWEEN PIPE ENDS EXCEEDS 3" (75 mm), THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN AN APPROXIMATE SPACING OF 6" (150 mm) O.C.

10. WHERE THE PIPE IS 21" (525 mm) OR LESS IN DIAMETER AN INTERIOR FORM OF UNSEALED SONO—TUBE OR EQUAL SHALL BE USED TO PROVIDE A SMOOTH INTERIOR JOINT. THE PAPER FORM MAY BE LEFT IN PLACE (SEE DETAIL A). WHEN THE PIPE IS 24" (600 mm) OR LARGER A REMOVABLE INTERIOR FORM SHALL BE USED OR THE INTERIOR JOINT SHALL BE COMPLETELY FILLED WITH MORTAR AND NEATLY POINTED.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

**CONCRETE COLLAR FOR RCB**  
**12" (300 mm) THROUGH 72" (1800 mm)**

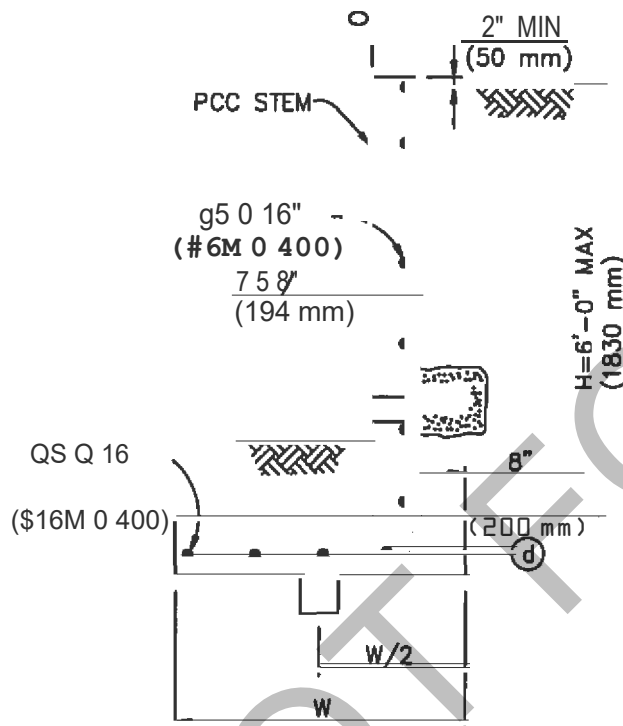
STANDARD PLAN

**380—4**

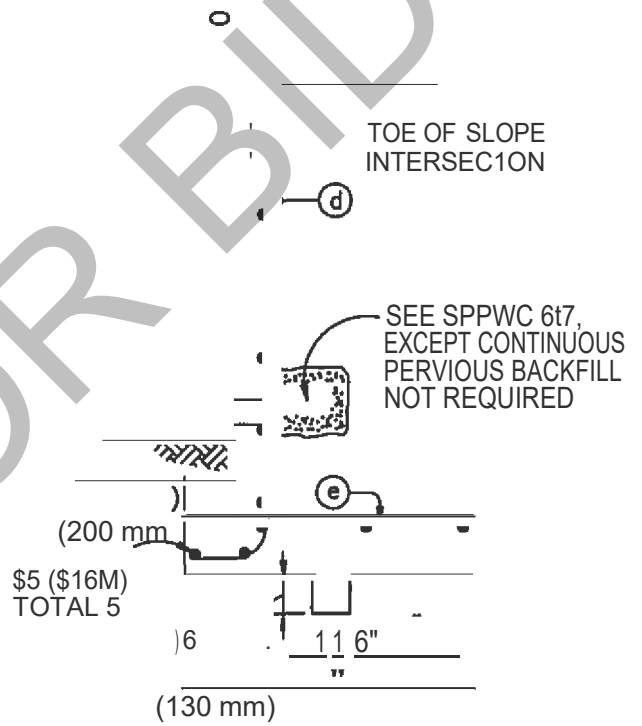
SHEET 2 OF 2



DESIGN LOADING  
CASE I OR II PER  
SPPWC 617



TYPE 7A



TYPE 7B

ATd BARS, HO SPLICES WITHIN  
20"/500 mm) FROM TOP OF FOOTING

NOTES

1. SEE SPPWC 617 FOR STANDARD WALL DETAILS.
2. METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.

SIMILAR TO CALTRANS WPE 6

REINFORCED CONCRETE  
RETAINING WALL TYPE 7

616—3

NOT FOR BID

WPE 7A WALL

DESIGN H	3'-4" (1020 mm)	4'-0" (1220)	4'-8" (1420)	5'-4" 16ZO	6'-0" (1830)
W	3'-2" (1000)	3'-6" (1100)	3'-10" (1200)	4'-2" (1300)	4'-6" (1400)
BARS	\$5 6 15" (\$16M Q 375)	\$5 0 15" (16M 6 375)	j/5 6 15" (\$16M 6 375)	\$5 Q 15" (\$16M 0 375)	\$5 0 12" (\$16M 6 300)

TYPE 7B ¥/ALL

DESIGN H	3'-4" (1020 )	4'-0" (1220)	4'-8" (1120)	5'-4" (1630)	6'-0" (1830)
W	2'-8" (850)	3'-0" (950)	1'-4" (1050)	3'-8" (1150)	4'-0" (1250)
BARS	5 6 15" (\$16M 0 375)	\$5 6 15" (16M 0 375)	QS Q 15" (16M 0 375)	\$5 6 15" (\$16M 0 375)	\$5 6 12" (\$16M 0 300)
BARS	(\$5 Q 15") (\$16M 0 375)	ys o s" (16M Q 375)	ys O 15" (\$16M 6 375)	ys e 1s" ( 16M Q 375)	ys 6 12" (\$16M 0 300)



REINFORCED CONCRETE  
RETAINING WALL DETAILS

617—3

SHEET 6 OF 8

NOT FOR BID

7 5/8" (194 mm)

2—#5 (#16M) BUNDLED

#5 (#16M)

NISHED GRADE

#5 (#16M) 400

8" (200 mm)

1 1/2" (40 mm)

H=4'-8" MAX (1422 mm)

W

12" MIN (300 mm)

H = 6'-0" MAX (1830 mm)

2" (50 mm) CLEAR

W

TOTAL 5

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

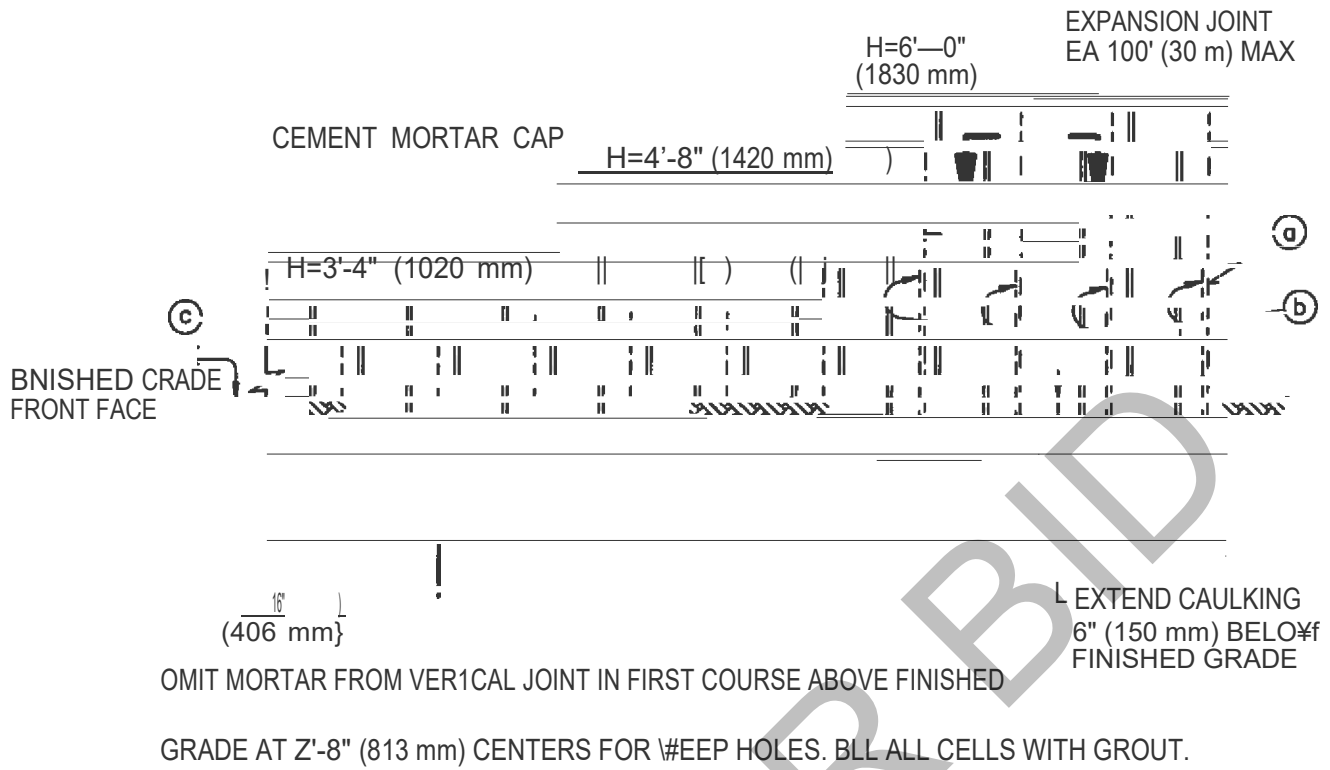
# MASONRY RETAINING WALL

**618-3**

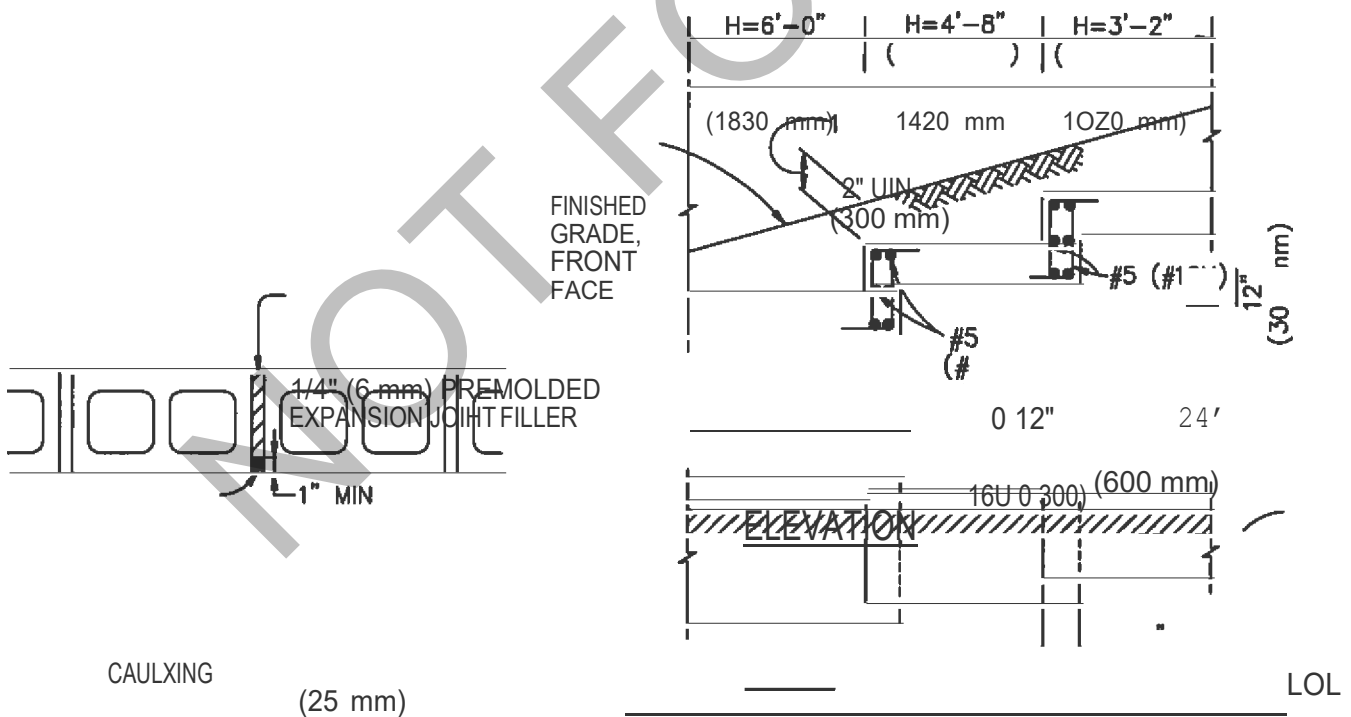
USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 3

NOT FOR BID



## ELEVATION



## SECTION A—A

PLAN

12 (300 mm)

## FOOTING STEP DETAILS



MASONRY RETAINING WALL

618-3

SHEET 2 OF 3

NOT FOR BID

# WPE A WALL

DESIGN H	3'-4" (1020)	4'-0" (1220)	4'-8" (1420)	5'-4" (1630)	6'-0" (1830)
W	3'-2" (1000 mm)	3'-6" (1100)	3'-10" (1200)	4'-2" (1300)	4'-6" (1400)
BARs	_____	_____	_____	QS 0 16" (\$1su o 4o6)	5 Q 16" (yt6M 6 406)
BBARS	_____	_____	_____	QS Q 16" (}16U Q 400)	\$5 0 16" ({16M 6 406)
OBARS	\$5 0 16" ( 16M 0 406)	QS 6 16" (}16M 0 406)	\$5 0 16" (\$16M 6 406)	_____	_____

# TYPE B YICALL

DESIGN H	3'-4" (1020 mm)	4'-0" (1220)	4'-8" (1420)	5'-4" (1630)	6'-0" (1830)
W	2'-8" (850)	3'-0" (950)	3'-4" (1050)	3'-8" (>50)	*-0" (i250)
@BAR5	_____	_____	_____	QS 6 15" (\$16M Q 375)	j\$5 0 15" (g16M 6 375)
BARS	_____	_____	_____	#5 Q 15" (#16M e 37s)	\$5 0 15" (\$1sM e 375)
0 BARS	\$5 0 15" (y su e 37s)	\$5 Q 15" (\$16M 6 375)	6 15" (y16M Q 375)	_____	_____
eBARS	#5 15" (g16M e 37s)	\$5 0 15" (j16M 0 375)	5 0 15" (g16M 0 375)	\$5 0 15" (g16M 0 375)	\$5 6 12" (#16M 0 300)

DESIGN DATA (SEE SPPWC 617 FOR PCC, STEEL, AND OTHER SOIL DATA)

= 500 psi (3.5 MPa) £ = 1500 psi (10.5 MPa)

REQUIRED SOIL BEARING CAPACITY 2000 psf (95 kPa)

## NOTES

- SEE SPPWC 617 FOR STANDARD WALL DETAILS.
- METRIC REINFORCING BAR SPACING IS IN MILLIMETERS.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MASONRY RETAINING WALL

STANDARD PLAN

618—3

SHEET 3 OF 3



PROMULGATES BY THE  
PUBLIC WORKS STANDARDS INC.  
GREENBOOK COMMITTEE  
18 5  
REV. 1996, 2005, 2009

# RONFORCED CONCRETE RETAINING WALL BE 3

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

612—3

SHEET 1 OF 3

NOT FOR BID

NUMBER ABOVE BARS SHOW  
DISTANCE, INCHES (mm), FROM TOP  
OF FOOTING TO UPPER END  
OF BARS.

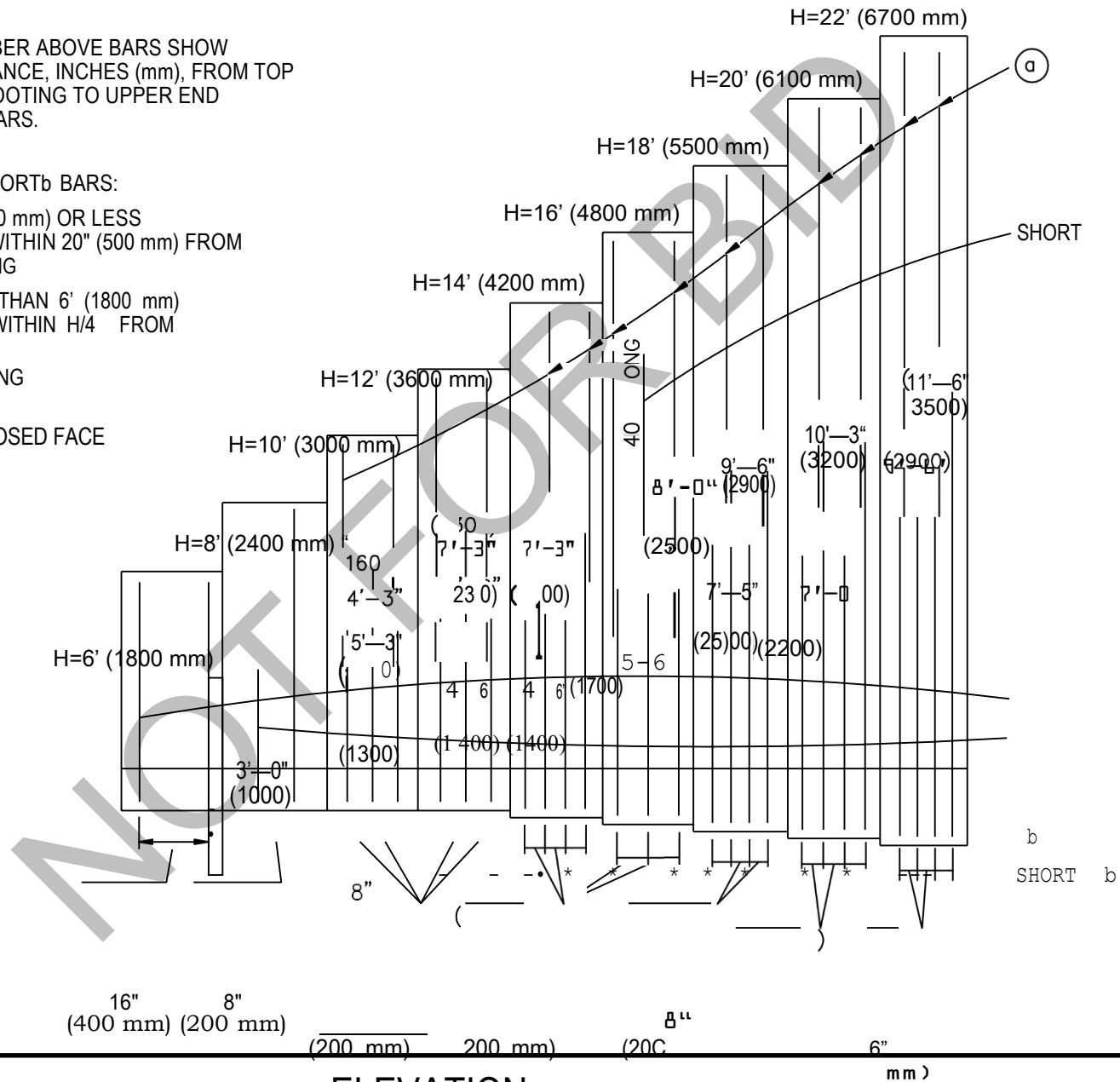
ATb AND SHORTb BARS:

FOR H=6' (1800 mm) OR LESS  
NO SPLICES WITHIN 20" (500 mm) FROM  
TOP OF FOOTING

FOR H MORE THAN 6' (1800 mm)  
NO SPLICES WITHIN H/4 FROM

TOP OF FOOTING

BARS ALONG EXPOSED FACE  
NOT SHOWN



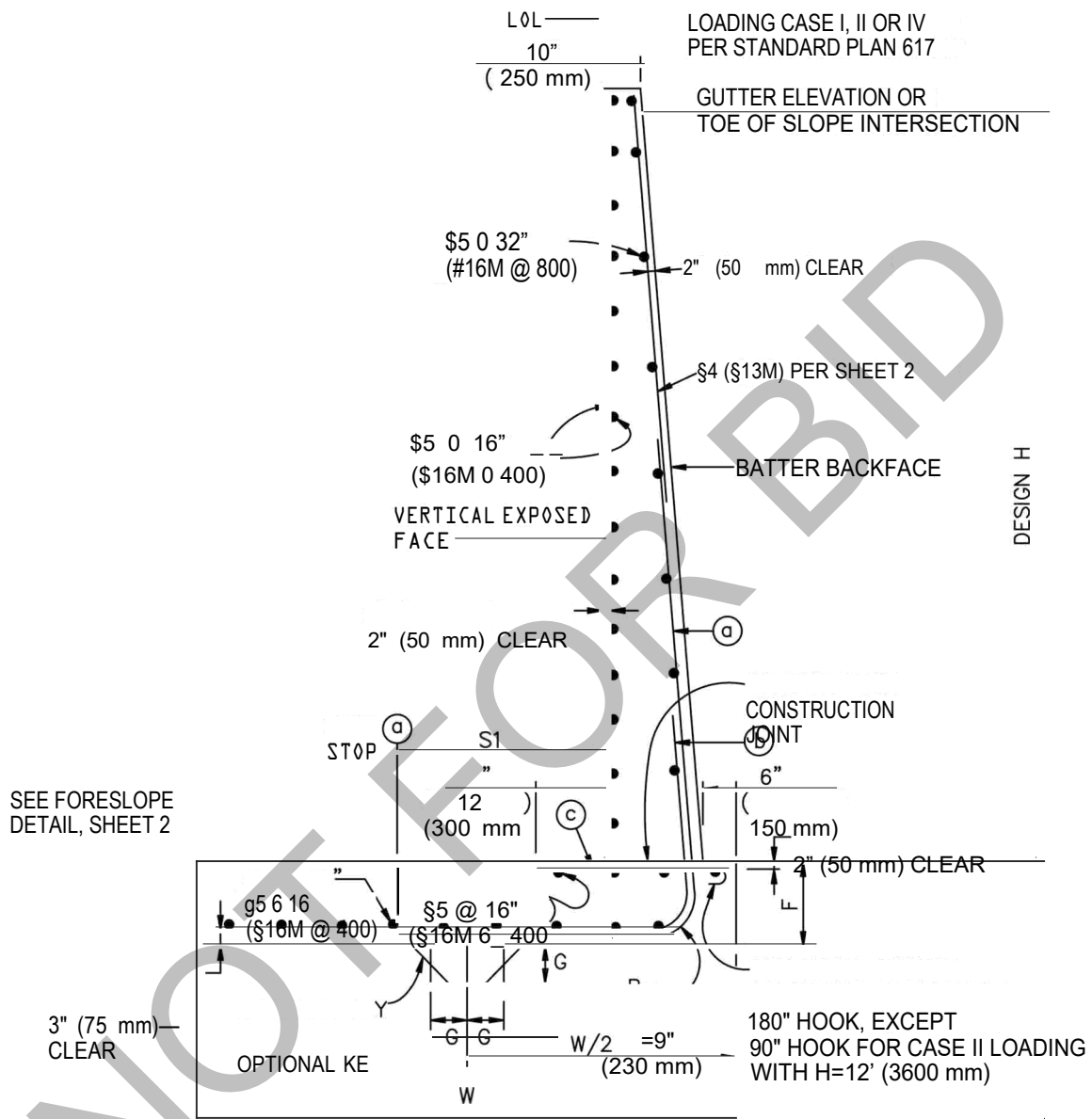
ELEVATION

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	6' (1800 mm)	8' (2400)	10' (3000)	12' (3600)	14' (4200)	16' (4800)	18' (5500)	20' (6100)	22' (6700)
W	3'—10" (1200)	5'—5" (1600)	6'—7" (2000)	8'—1" (2500)	9'—10" (3000)	11'—4" (3500)	13'—0" (4000)	14'—10" (4600)	17'—6" (5400)
C	1'—4" (400)	1'—7" (500)	1'—10" (550)	2'—1" (650)	2'—6" (750)	2'—10" (850)	3'—1" (950)	3'—8" (1150)	4'—4" (1350)
B	2'—6" (800)	3'—8" (1100)	4'—9" (1450)	6'—0" (1850)	7'—4" (2250)	8'—6" (2650)	9'—11" (5050)	11'—2" (5450)	13'—2" (4050)
F	1'—4" (400)	1'—4" (400)	1'—4" (400)	1'—4" (400)	1'—6" (450)	1'—10" (550)	2'—2" (650)	2'—6" (750)	2'—10" (850)
G	12" (300)	12" (300)	12" (300)	18" (450)	18" (450)	18" (450)	18" (450)	18" (450)	18" (450)
K	W/4	W/4	W/4	W/3	W/3	W/3	W/3	W/3	W/3
S1	14" (350)	16" (400)	16" (400)	16" (400)	16" (400)	32" (800)	32" (800)	32" (800)	32" (800)
S2	55 BAR DIA	35 BAR DIA	35 BAR DIA	35 BAR DIA	35 BAR DIA	45 BAR DIA	45 BAR DIA	45 BAR DIA	45 BAR DIA
BATTER	100: 4	100: 4	100: 4	100: 4	100: 4	100: 4	100: 5	100: 6	100: 7
BARS	_____	_____	\$5 6 16" (g16M 6 400)	\$5 6 16" (g16M 6 400)	\$6 6 16" (g19M 6 400)	\$6 6 8" (g19M 8 200)	\$8 6 16" (g25M 6 400)	(\$8 6 14") (g25M 6 350)	\$8 6 12" (g25M 6 300)
b BARS	\$5 6 16" (g16M 8 400)	\$5 6 8" (g16M 6 200)	\$6 6 8" (g19M 6 200)	ø8 6 8" (g25M 6 200)	\$9 6 8" (g29M 6 200)	\$11 6 8" (g36M 6 200)	\$11 6 8" (g36M 6 200)	(\$11 6 7") (g36M 6 175)	\$11 6 6" (g56M 150)
c BARS	\$5 6 16" (g16M 6 400)	\$5 6 16" (g16M 6 400)	g6 6 16" (g19M 6 400)	\$6 6 8" (g19M 6 200)	\$6 6 8" (g19M 6 200)	\$8 6 8" (g25M 6 200)	\$8 6 8" (g25M 6 200)	(\$8 6 7") (g25M 6 175)	g8 6 6" (g25M 6 150)
TOE PRESS. LOAD CASE IV	2540 psf (125 kPa)	3170 (155)	3880 (185)	4470 (215)	4950 (240)	5720 (275)	6540 (315)	(6970) 335	6990 (335)

METRIC REINFORCING BAR SPACING IS IN MILLIMETERS

NOT FOR BID



## SECTION

### NOTES:

FOR H LT 8' (2400 mm) S1 = C-2" (S1 C-50 mm)  
 FOR H GE 8' (2400 mm) SI = W/3

SEE SPPWC 617 FOR STANDARD WALL DETAILS.

NO SIMILAR CALTRANS TYPE



<p>PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE</p>	<p>REINFORCED CONCRETE RETAINING WALL TYPE 4</p> <p>USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION</p>	<p>STANDARD PLAN</p> <p>613—4</p> <p>SHEET 1 OF 3</p>
---	--	---

NOT FOR BID

FILL PER STD PLAN 617

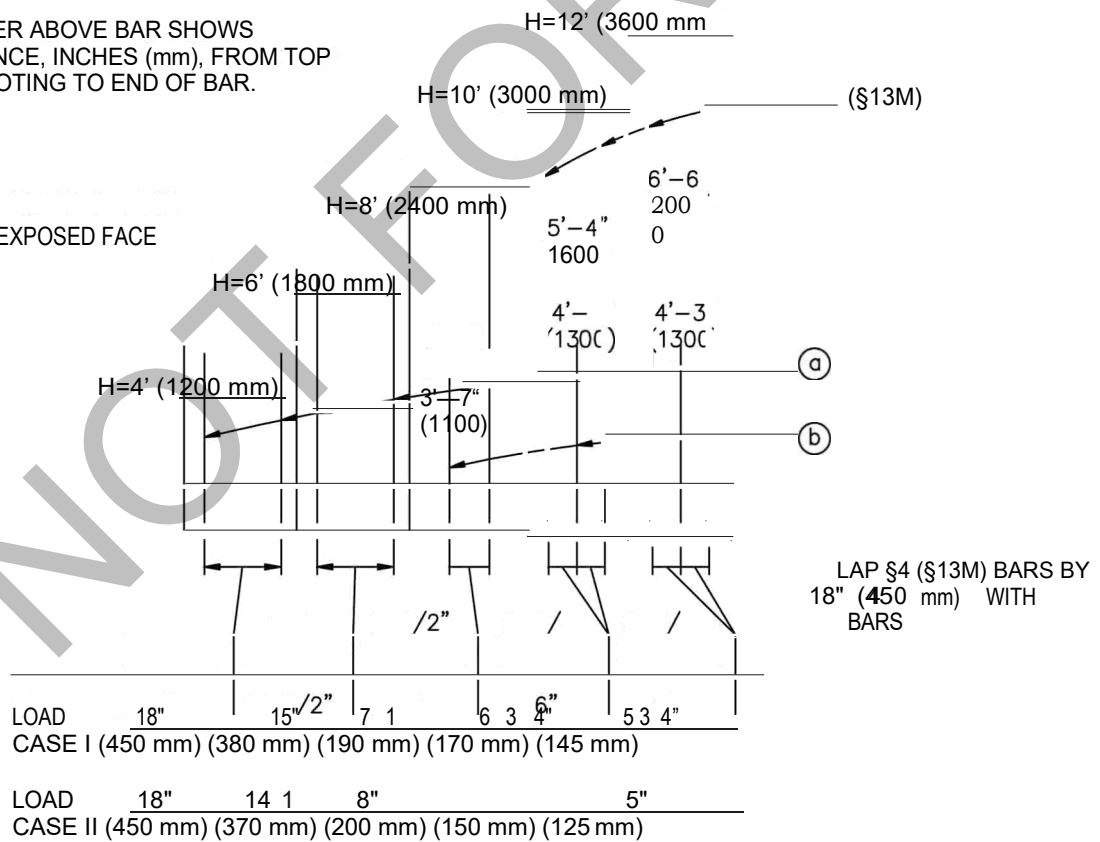
"en

## FORESLOPE

**5** (1500 mm) MIN  
FOR H=6' (1800 mm)  
OR LESS  
**8** (2400 mm) MIN  
FOR H MORE THAN  
**6** (1800 mm)

NUMBER ABOVE BAR SHOWS  
DISTANCE, INCHES (mm), FROM TOP  
OF FOOTING TO END OF BAR.

BARS ALONG EXPOSED FACE  
NOT SHOWN



## ELEVATION

RONFORCED CONCRETE  
RETAINING WALL TYPE 4

613—4

SHEET 2 OF 3

NOT FOR BID

## LOAD CASE I OR II

H	4' (1200 mm)	6' (1800)	8' (2400)	10' (3000)	12' (3600)
W	3'—8" (1120)	5'—3" (1600)	7'—1" (2J60)	9'—4" (2840)	11'—9" (3580)
F	0'—10" (250)	0'—10" (250)	0'—10" (250)	0'—11" (280)	1'—1" (330)
C	2'—4" (710)	3'—11" (1190)	5'—9" (1750)	8'—0" (2440)	10'—5" (3180)
G	8" (200)	8" (200)	8" (200)	12" (300)	12" (500)
BATTER	NONE	NONE	NONE	NONE	100: 1
BARS	\$4 @ 18" (\$13M 6 450)	\$5 @ 15" (\$16M 0 380)	\$4 @ 15" (\$13M 0 380)	\$5 @ 13 1/2" (\$16M 0 340)	\$6 @ 11 1/2" (g19M 6 290)
BARS	_____	_____	\$6 @ 15" (\$19M 0 380)	\$7 @ 15 1/2" (\$22M 0 340)	\$7 @ 1J 1/2" (\$22M 8 290)
BARS	\$4 @ 18" (g13M 6 450)	\$4 @ 15" (\$13M 6 380)	\$4 @ 15" (g13M @ 380)	\$4 @ 13 1/2" (gJ 3M 6 340)	\$4 @ 11 1/2" (\$13M 6 290)
TOE SOIL PRESSURE	630 psf (30 kPa)	650 (30)	660 (30)	660 (30)	700 (35)

## LOAD CASE IV

H	4' (1200 mm)	6' (1800)	8' (2400)	10' (3000)	12' (3600)
W	3'—8" (1120)	5'—3" (1600)	7'—1" (2160)	9'—4" (2840)	11'—10" (3600)
F	0'—10" (250)	0'—10" 250	0'—10" 250	1'—0" TOO	1'—3" 380
C	2'—4" (710)	3'—11" (1190)	5'—9" (1750)	8'—0" (2440)	10'—5" (3180)
G	8" (200)	8" (200)	8" (200)	12" (300)	12" (300)
BATTER	NONE	NONE	NONE	100: 1	100: 2
BARS	\$4 @ 18" (\$13M 6 450)	\$5 @ 14 1/2" (\$16M 0 370)	\$4 @ 16" (\$13M 6 400)	\$5 @ 12" (\$16M 6 300)	\$6 @ 10" (g19M 6 250)
BARS	_____	_____	\$7 @ 16" (\$22M 6 400)	\$7 @ 12" (\$22M 8 300)	\$7 @ 10" (\$22M 6 250)
BARS	\$4 @ 18" (\$13M @ 450)	\$4 @ 14 1/2" (\$13M 6 370)	\$4 @ 16" (g13M @ 400)	\$4 @ 12" (\$13M 6 300)	\$4 @ 10" (\$13M @ 250)
TOE SOIL PRESSURE	490 psf (25 kPa)	560 (25)	610 (30)	680 (35)	750 (35)

11" • 2J" x t2" UETER j  
BOX (DISTRICT SUPPMED)  
SIDE6ALK

CURB & LUTTER \*"

BALL ANGLE UETER  
STOP (KE TABLE)

BALL VALVE  
(DISTRICT SUPPLI0)

IMPORTEO SAND

AND DF 0ERVICE  
INSTALLATION NOT  
To EXCEED 32"

1" WPE "K" SOFT COPPER  
(NO SPUCES ACCEPTED)

CORP. S70P (S0E TABLE)

HEAVY DUTY WELD COuPMNG  
(I.P. THREADED, 3000#)

## 7«• AND 1" METERS

FIXEO NCTWDRX  
ENDPCNT

FI0ED NET#YORK  
ENDPONT

FI0ED NET##0RK  
ENDPCNT

DATE APP

- METER LOCAtiOns AS SHOWf4 ONPLM6
- R0ELED C0URB METER ADJACEH 7 TO SIDEWALx.
- IF 7+- UETER IS REOUiRED DISTRICT 70 PROVIDE  
1 J"•• t° METER BUSHINCS (ONE EAC0 StDL)
- NO. 15 SILVER S0EOER OR APPROVED EOUAL.
- OLD—SWLE PACK J0CNT NOT ACKPTED.

## FIXED NETWORK ENDPOINT MOUNTING OPTIONS

UETER

UULMR

JONES

! E

BALL CORP.  
STOP

BALL M00E  
METER STOP

METER  
BUQJING

BALL CORP.  
STOP

BALL M00E  
METER STOP

uEtER  
BUSHING

BML Conc.  
STOP

axtz xNCLE  
METER STOP

METER  
BUMINC

3/«", i"

B-25o2e

uB—24276

E-«s355sZ

E-t97s5GZ

----

z47o4B0z

7460ZBOZ

Val ley' \A/water D istrict  
TYPICAL WATER SERVICE .75-INCH AND 1-INCH

REV,

# Cucamonga Valley Water District

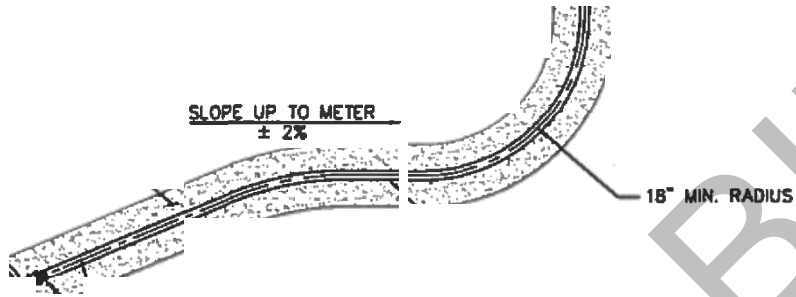
e \ \-g coaa a\*\*»a\* -- \*ta e\*s e\*e\Xs\«--cwtv toe

PROPERTY LINE

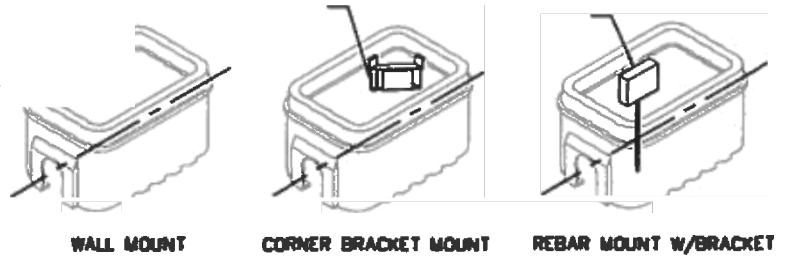
SHT. OF

8"

PAVEMENT



WATER MAIN



DESCRIPTION

## SERVICE INFORMATION TABLE




ENGINEERING DEPARTMENT  
10440 ASHFORD STREET, RANCHO CUCAMONGA, CA 91729  
(909) 987-2591

*John Bosler*  
JOHN BOSLER P.E., DIRECTOR OF OPERATIONS &  
ENGINEERING

DATE

REV.	DEgCRIPTE0N	DATE	APP'D

code drawings used

eng drawing file name: 113

1044 ASPH/STREET / RANCHO CUCAMONGA, CA 91729  
(909) 917-2581

ENGINEER  
JEROME

DESIGNER  
D ECTOR

DATE  
8-11-09

SHT. OF

Cucamonga  
Water District

Fire Hydrant  
FIRE HYDRANT

STD. DWG

Cucamonga Water District

WATER MAIN 12" x 6"  
D.I. FLCD. TEE OR CML  
& C TEE BUILT TO  
D.I. DIMENSION STD. C-1 IO

VALVE MD BOX ASSEMBLY,  
SEE STD. OPG. 115

MIN.

1. CONTACTOR SHALL PAINT FIRE HYDRANTS WITH RUST-OMUO \$7644 SAFETY YELLOW OIL APPROVED EQUI.
2. STANDARD CURB AS SHOWN.
3. ROLLED CURB WITH SIDEWALK ADJACENT - LOCATE CENTER OF FIRE HYDRANT 12" BEHIND SIDEWALK.
4. LOTS SIDE RAMP ACCESS SERVICE TO HAVE DUAL CONTROL VALVE AT WATER MAIN AND SERVICE BOX.
5. VALVE SHALL BE LOCATED A MIN. OF 6' FROM FIRE HYDRANT.

CURB & GUTTER

6" STD. WT CML & C STL PIPE

S.O.W. FLMGE  
6" STD. WT. CUL A: C

S.O.FI. FLANGE

6" RY V1VE 250 PSI WORKING PRESSURE.  
REKR TO 570. DOE. IIS FOR TYPICAL V1VE  
MD VALVE BOX INSTALLATION.

SEE NOTE 3

S- » « ° » z It- nRE uvoRNt  
JANES JONES #3710R (B HOLE)  
0)3 CLOW MODEL ISO. 2050

3/4" x 3" BREAK AWAY BOLTS

6" x 12" FLANGED FIRE HYDRANT  
EXTENSION »/ BRExx AytAY CROOVE

SIDEWALK

5.0.W. FLAIXCE

6" O.I, 91d 8ASE Ek8OW

THRUST BLOCK.  
SEE STD. OPG. 504





B" x B" V1YE BOX UD MARKED  
xATrR OR APPROvro EOUAL W/  
PICK SLOT, SEE NOTE 3 MD 4

FINISHEO SURFACE

B- x t2" GALVANIZED  
DUP CAN" TOP SECTION

TOP OF SLEEVE TO  
BE AT SUBGRAQE

B" FOR 35 RAC, BOTTOM  
SECTION L&NETH AS REQUIRED

NOTES:

1. RESIEUHT-WE0GE M7E VALvES TO  
OE USED FOR ALL APPUCATIONS  
4-INCH THROUGH 12-IFICH. APPROvEB  
RESILIENT—WE06E VALVES AS FOLLOWS:  
KENNEDY (KEN-sEAL t t) \$456J  
MUELKR QA-2360  
AFC SERIES SOO  
**CLOW #F6102**  
**AVK SERIES #25**
2. AWYfa C504 BUTTERFLY VALVES  
TO BE USED FOR ALL APPLICTIONS  
t6-MCH AND GREATER. APPRQ/E0  
BLITTERFLY VALVES AS FOLLOWS:  
MULLER
3. OX WITH CAST IRON  
**RING AND COVER MANKED WATER"**  
**REQUIRED FOR USE i8i CONCRETE PAVEMENT.**
4. V1VE BOX MSEMBLY IN MhDSCAPE  
AnEA sMLL BE BROoKS /t -RT SET  
ABOVE FLOOD RIU ELEVATION.  
H A C CONCRETE
5. VALVE OPERATOR EXTENSION REOUED  
WHEN TOP OF Nut EXCEEDS A DEPTN  
s rzcz rnou n isnc0 suRFACE.  
SEE ST0. ONG. NO. I J 6.

CDO PMTD.  
B0L7 SIZE, SEE  
STD. DWG. 307

VALVE PER NDTE 1 OR 2  
ABOVE, SIZE PER PLAN

Valley Water District

VALVE AND BOX ASSEMBLY



Cucamonga Valley  
Water Distit

ENGINEERING DEPARTMENT  
10440 ASHFORD STREET, RANCHO CUCAMONGA, CA 91729  
(909) 987-2581

JOHN BOSLER P.E., DIRECTOR OF OPERATIONS &  
ENGINEERING

DATE

115

SHT. 1 OF 1

6" x ZIP" FIRE HYDRANT  
JAMES JONES /344HP

BLK. SCH. 50 RPE

5/8" x 3" BREAK AWAY BOLTS

FINISHED SURFACE

CURB & GUTTER

4" CITE VALVE MD  
VIEW BOX ASSEMBLY,  
SEE STD. DWC. NO.  
1 ts

4" x 12" FIRE EXTINGUISHANT  
EXTENSION W/ BREAK  
AWAY GROOVE

4" S.O.W.

4" STD. WT. CML A C STL PIPE

4" ID.W.

4" 45° WELD  
ELBOW CML & C

ELBOW CML & C

1 TERMITE  
TANGENTIAL  
OUTLET

WATER MAIN 8"  
MD GRMTER

6"  
MIN.

4" S.O.W.

4" STD. WT. CML & C  
STL. PIPE

THRUST BLOCK,  
SEE STD. OWG. 30J

THRUST BLOCK,  
SEE STD. DCC. 304

4" STD. WT. CML A C

IP, SEE 0.  
DQG. NO. 123

ELBOW CML & C

ELBOW CML & C

THRUST BLOCK,  
SEE STD. DWS. 304

1. CONTACTOR IS RESPONSIBLE FOR THE  
PAINTING OF THE HYDRANTS. PAINT  
SHALL BE RUST-PROOF SAFETY  
**YELLOW OR** APPROVED EQUAL FOR POTABLE WATER  
AND PERMITTED FOR RECYCLED WATER

# Cucamonga Valley Water District

## BLOW-OFF ASSEMBLY

<x>axostret  
xe00ax>ux<s< cxstm



Cucamonga Valley  
Water District

D BY

*[Signature]*  
JAMES JONES

q:\cadd\cadd cadd drawings\cadd sht 060\060\060\_119

NOT FOR BID

2" x 4" x J" WELDED  
MIGLE IRON (3 TOTAL)

PIPEMNE PRODUCTS VENTED PPE  
COVER

AIR AND YACIUU RELMSE  
VALVE SEE TABLE BELOW

MALE x FIP

2" x 36" BRASS  
NIPPLE TBE

2' x 2' x 4"  
CONCRETE PAD  
OR 5 DENALX

PVC SLEEVE

TYPE W" SOFT COPPER TUBING  
(NO SPMCES ALLOWED)

CORPORATION STOP REFER TO  
TABLE ON STD. DWG. NO. 102

SLOPE UP 70 FILE#SE

90' THREADED BRASS ELBOW  
SCH. 80 THREAOEO BRASS NIPPLE  
HEAVY DUTY WEL0 COUPLING  
THREAOED 3000\$)

TYPE "K" 50ET COPPER TUBING  
(NO SPLICES ALLOWED)

WALK MAIN

**NOTE:**

1. CRISPIN AIR/VAC UL SERIES DR. APPROVED EOI

**RELIEF VALVE SIZE**

PIPE DIA.	SIZE	AIR/VAC CAN	AIR/VAC
LESS THAN 8-INCH	1"	#CUCA1230	UL10
8-INCH OR GREATER	2"	#CUCA1630	UL20

**Cucamonga Valley Water District**  
**AIR VACGUM RELEASE VALVE**

PROVED BY:

STD. DW.



**Cucamonga Valley  
Water District**

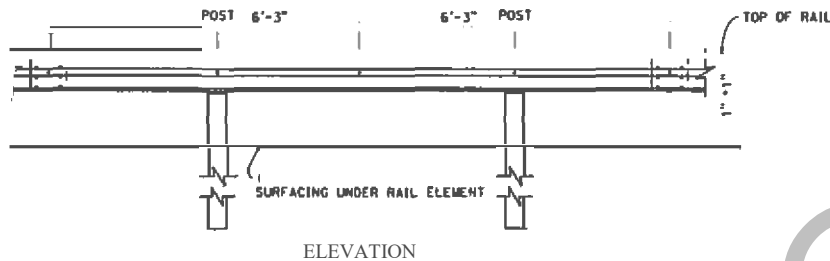
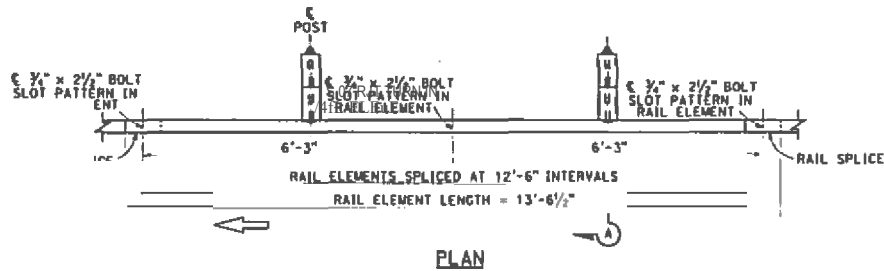
ENGINEERING DEPARTMENT  
10440 ASHFORD STREET, RANCHO CUCAMONGA, CA 91729  
(909) 987-2591

JOHN BOSE P.E., DIRECTOR OF OPERATIONS  
ENGINEERING

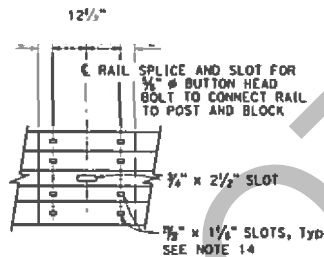
6-11-09  
DATE

120

SHT. 1 OF 1



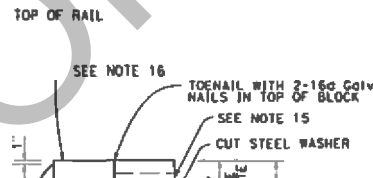
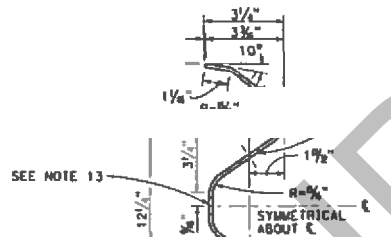
# MCD WEST GUARDRAIL SYSTEM WITH WOOD POST AND BLOCKS



- a) 3" x 1/2" x 1/2" wood post to be inserted into the 7/8" x 1 1/2" slots and bolted together with 3/4" x 2 1/2" bolts. Recess of hex nut points toward rail element. A total of 4 bolts and nuts are to be used at each rail splice connection.
- b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).
- c) Where end cap is to be attached to the end of a rail element, to be used.

3/4" x 2 1/2" BOLT WITH HEX NUT, NO FOR SOLID ATTACHMENT TO LINE POST

GROUND LINE  
SURFACING UNDER RAILING



## SECTION A-A

## TYPICAL WOOD LINE POST INSTALLATION

DATE	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
January 20, 2017					

**Randell D. Hiett**  
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA BY ITS OFFICERS OF AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCALPED COPIES OF THIS PLAN SHEET.

TO ACCOMPANY PLANS DATED

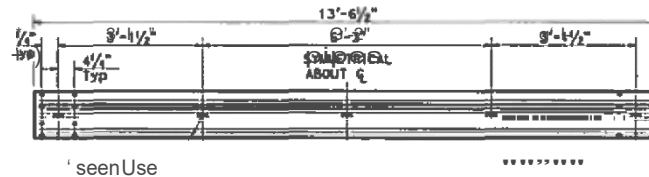
## NOTES:

- F. For construction details, see Standard Plans RSP A77N1, A77N2, and A77N3.
3. For details of wood posts and wood blocks used to construct MGS, see Revised Standard Plan RSP A77N1.
4. For additional installation details, see Standard Plan A77N3.
5. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
6. For MGS typical layouts, see the A77P, A77Q and A77R Series of Standard Plans.
7. If railing is connected to terminal system and treatment use 31" height terminal system and treatment.
8. For MGS end anchor details, see Standard Plans.
9. For MGS details, see Standard Plans.
10. For MGS details, see Standard Plans.
11. For MGS details, see Standard Plans.
12. For MGS details, see Standard Plans.
13. For MGS details, see Standard Plans.
14. Slotted holes for splice bolts to overlap ends of rail element.
15. Additional hole in uppermost portion of line post is for potential future adjustments of rail element.

## MCD WEST GUARDRAIL SYSTEM STAND A RD RAILING SECTION WOOD POST WITH WOOD BLOCK

NO SCALE

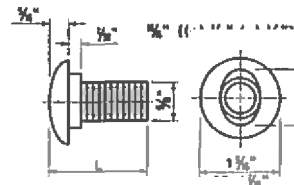
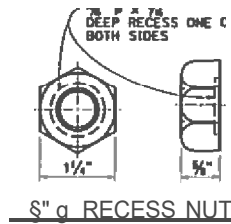
84rD uJxcR 3o, 7oys Pete ss o'rHE srutog'rLxis aux oltEe z4Is.



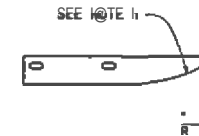
TYPICAL RAIL ELEMENT

NOTE:

1. Slotted holes for splice bolts to overlap ends of rail element.



5/8" g BUTTON HEAD BOLT



PLAN

1 1/4" x 2 1/4" SLOTTED HOLES

BUTTON HEAD BOLT

L	THREAD LENGTH
13 1/2"	SILL THREAD LENGTH
2"	FILL THREAD LENGTH
10"	4" MIN THREAD LENGTH
18"	4" MIN THREAD LENGTH
22"	4" MIN THREAD LENGTH
26"	4" MIN THREAD LENGTH
36"	4" MIN THREAD LENGTH
** 2 1/2"	

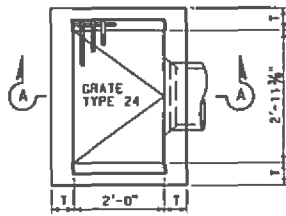
NOMINAL THICKNESS  
SAME SHAPE AS RAIL  
ELEMENT SECTION

ELEVATION  
END VIEW  
(TYPE A)

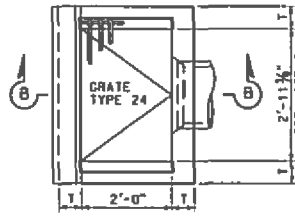
MID WEST GUARDRAIL SYSTEM  
STANDARD HARDWARE

NO SCALE

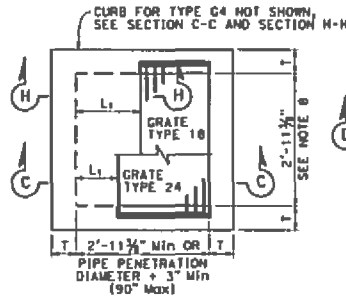
A77M1



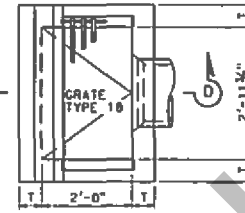
PLAN  
TYPE G1



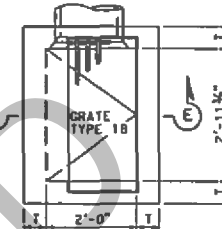
PLAN  
TYPE G3



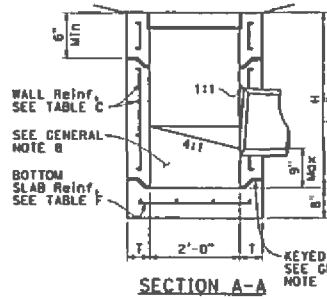
PLAN  
STANDARD TYPE G2 OR G4  
(INTEGRAL TOP ALTERNATIVE)  
FOR "L" AND "T" VALUES, SEE TABLE 1



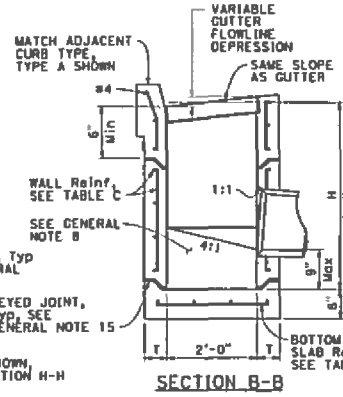
PLAN  
TYPE G5



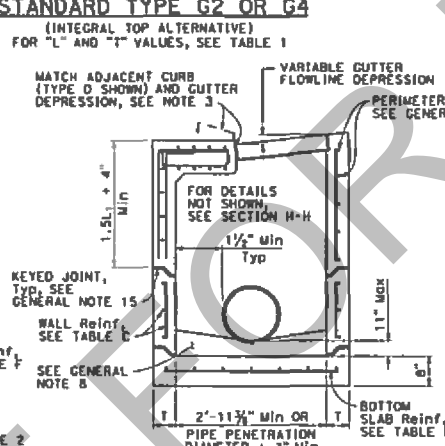
PLAN  
TYPE G6



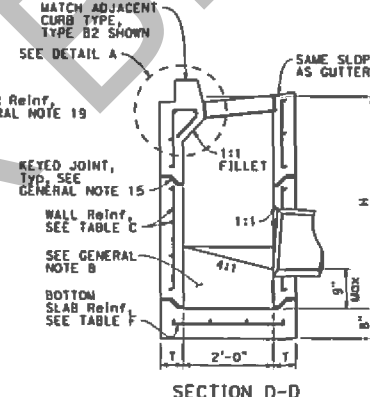
SECTION A-A



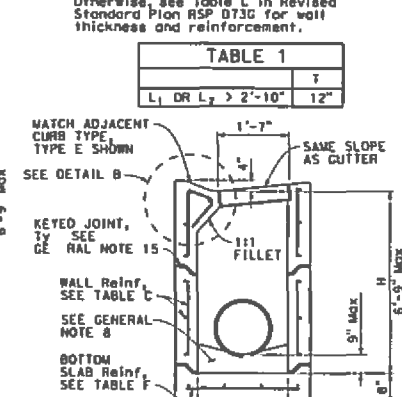
SECTION B-B



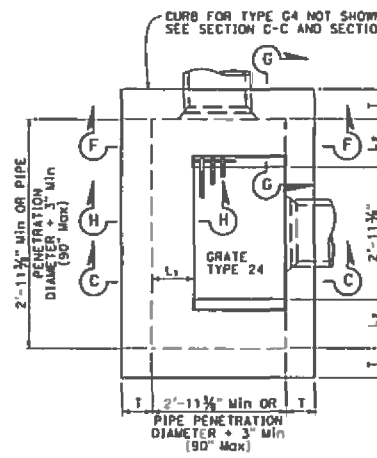
SECTION C-C



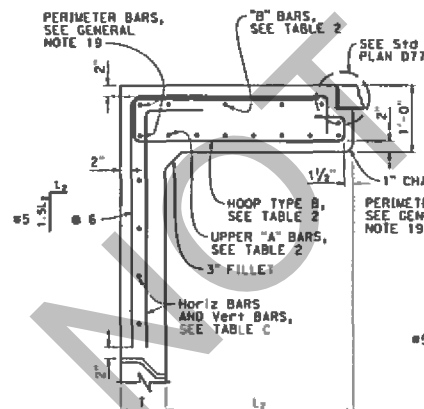
SECTION D-D



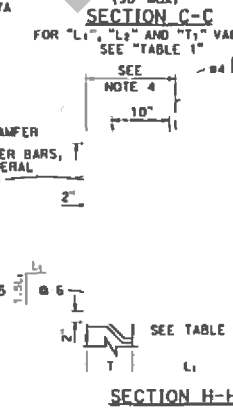
SECTION E-E



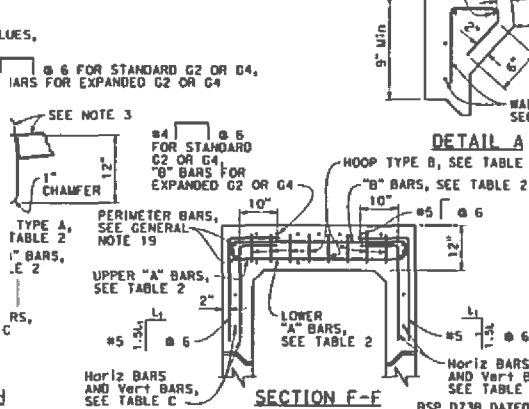
PLAN  
EXPANDED  
TYPE G2 OR G4



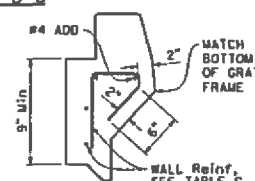
SECTION G-G



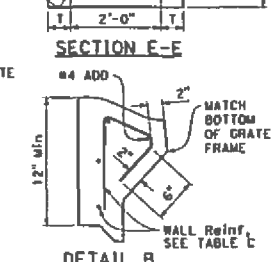
SECTION H-H



SECTION F-F



DETAIL A



DETAIL B

0161 COUNTY ROUTE POST MILES SHEET TOTAL  
TOTAL PROJECT 10.00 10.00

**pm dwp**  
REGISTERED CIVIL ENGINEER

July 21, 2017  
PLANS APPROVAL DATE

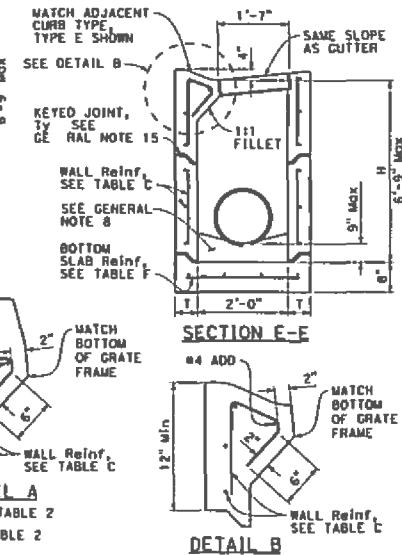
THE STATE OF CALIFORNIA AND ITS OFFICERS  
OR AGENTS SHALL NOT BE RESPONSIBLE FOR  
THE ACCURACY OR COMPLETENESS OF SCANNED  
COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER  
CIVIL  
No. C-39978  
Exp. 6-30-18  
City of California

TO ACCOMPANY PLANS DATED \_\_\_\_\_

- NOTES:**
- For notes and Table 2, See Revised Standard Plan RSP D73C.
  - For L<sub>1</sub> or L<sub>2</sub> greater than 2'-10", see Table 1 for wall thickness dimension and see Table C in Revised Standard Plan RSP D73G for reinforcement. Otherwise, see Table C in Revised Standard Plan RSP D73G for wall thickness and reinforcement.

TABLE 1	
L <sub>1</sub> OR L <sub>2</sub> > 2'-10"	T
12"	12"



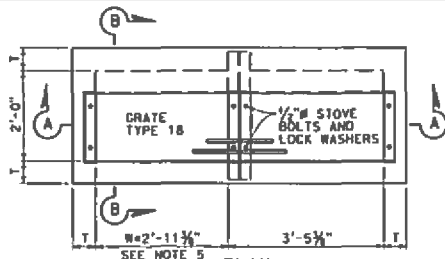
DETAIL B

STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
PREC AST  
DRADNA GE INLETS  
TYPES G2, G3, G4, G5, J(ND), G6  
NO SCALE

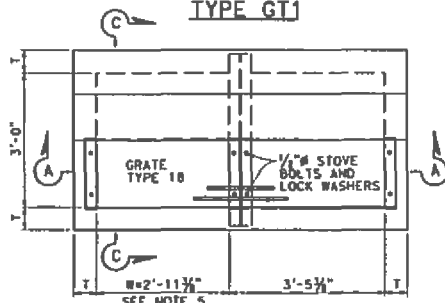
RSP D73B DATED JULY 21, 2017 SUPERSEDES RSP D73B DATED JULY 15, 2016 THAT SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2015.

REVISED STANDARD PLAN RSP D73B

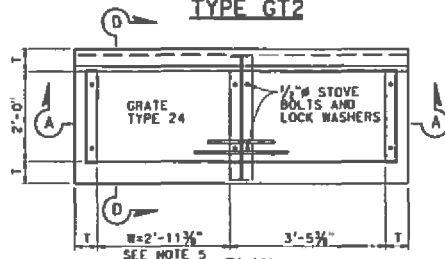
2015 REVISED STANDARD PLAN RSP D73B



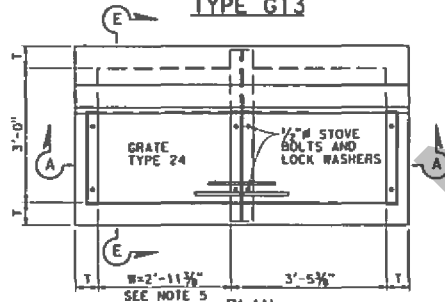
PLAN  
TYPE GT1



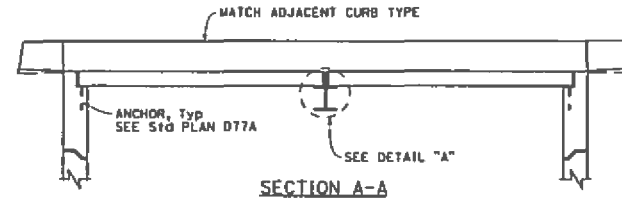
PLAN  
TYPE GT2



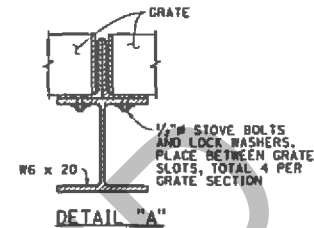
PLAN  
TYPE GT3



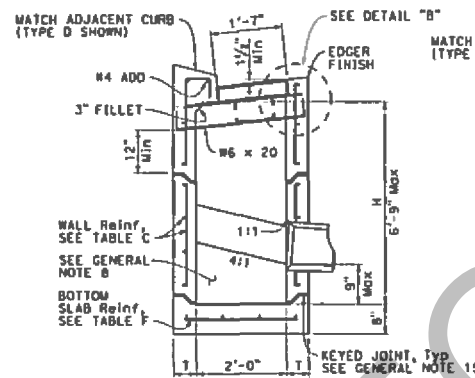
PLAN  
TYPE GT4



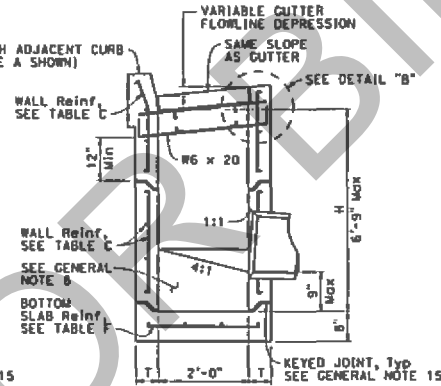
SECTION A-A



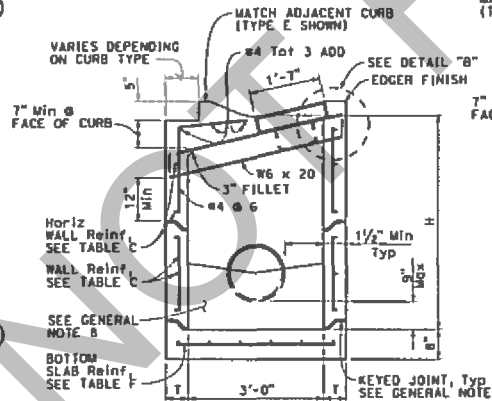
DETAIL "A"



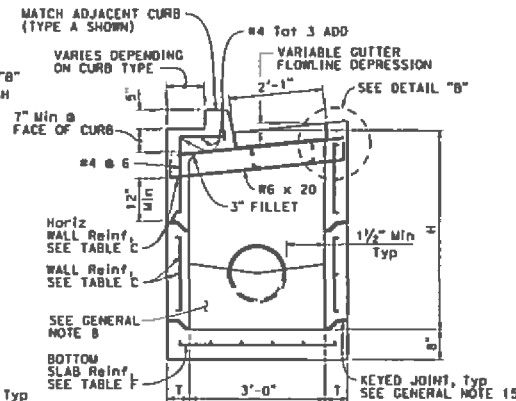
SECTION B-B



SECTION D-D



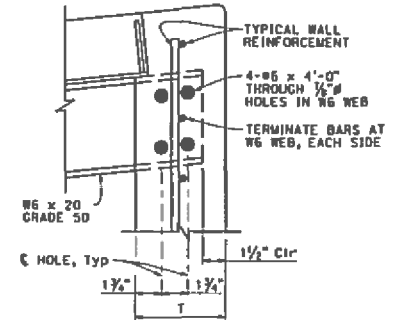
SECTION C-C



SECTION E-E

NOTES:

1. See Revised Standard Plan RSP D73F for General Notes and additional details. See Revised Standard Plan RSP D73G for tables, wall thickness "T" and quantities.
2. W=2'-11 3/4" for one grate. Add 3'-5 1/2" for additional grates in tandem.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
5. Overall interior length of lower sections may be 6'-6" provided top section conforms to the requirements for frame and grate types on Standard Plan D77A. The wall thickness of top sections may transition from "T" to "T+1/2" to meet this requirement. Minimum height of thickened wall shall = "T".



DETAIL "B"  
(SIMILAR OPPOSITE END OF #6)

STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
**PRECASYS  
DRAIN A GE INLETS  
TYPES GT1, GT2,  
GT3 AND GT4**

NO SCALE

RSP D730 DATED JULY 15, 2016 SUPPLEMENTS THE STANDARD PLANS BOOK DATED 2015.  
**REVISED STANDARD PLAN RSP D730**



SHEET	COUNTY	ROUTE	POST MILES	SHEET	TOTAL
1				1	1

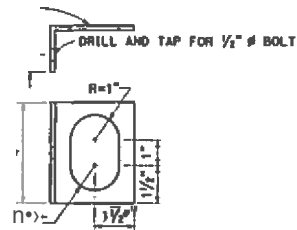
REGISTERED CIVIL ENGINEER

October 30, 2015

PLANS APPROVAL DATE

ONE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF REPRODUCED COPIES OF THIS PLAN SHEET.

STANDARD



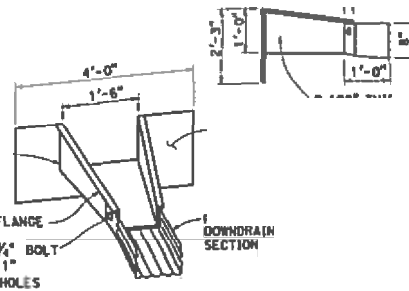
ALTERNATIVE CLIP  
BRACKET DETAIL

PAVED CUTTER  
FLARE,  
SEE NOTE A

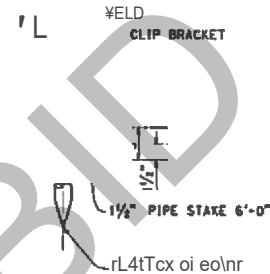


NOTE A

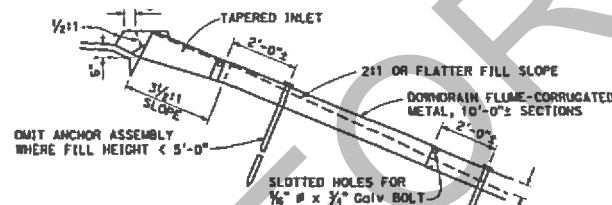
10'-0" FLUME SECTION



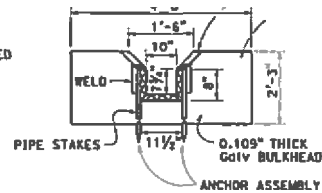
TAPERED INLET



PIPE STAKE ANCHOR DETAIL

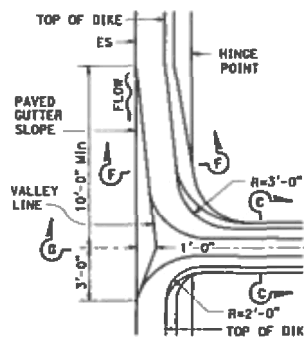


SECTION A-A



SECTION B-B

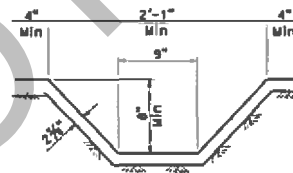
TAPERED INLET AND FLUME DOWNDRAIN



PLAN

OUNTABLE DIKE

HOT MIX ASPHALT OVERRIDE DRAINS

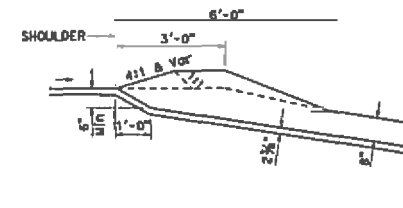


SECTION C-C

1. Cross section of slope ditch may be semicircular, vee or trapezoidal.



SECTION F-F



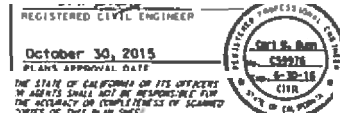
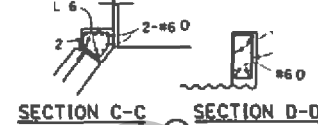
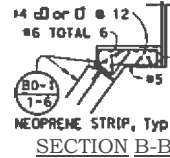
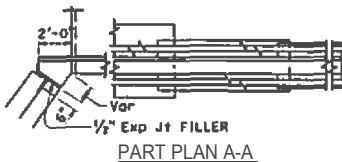
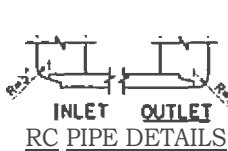
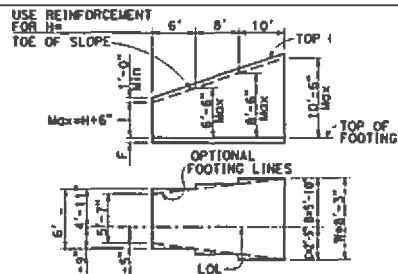
SECTION G-G

OF CALIFORNIA TMENT  
OF TRANSPORTATI

OVER

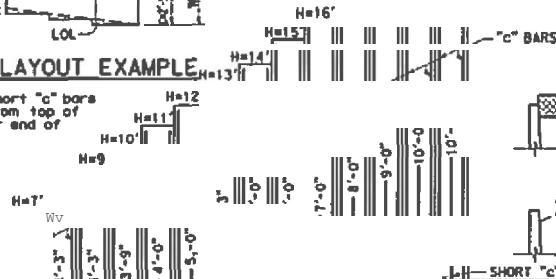
RAINS

sex

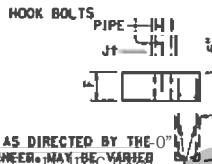
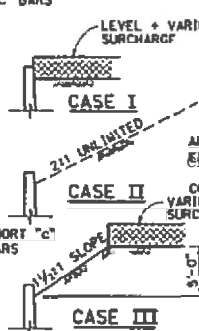


### TYPICAL LAYOUT EXAMPLE

The length of short "c" bars in the figure from top of footing to upper end of short "c" bars.



protection details are as shown on the Project Plans, or as directed by the Engineer.



DESIGN "H" =

USE HOOK BOLTS @ 1'-7" SPACING, G.E. SIZE AND LENGTH

BY THE ENGINEER  
MMT BE YXIED  
IN TK FJCLD.

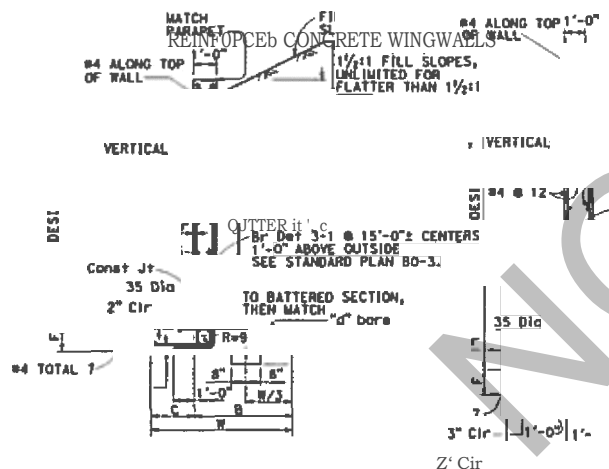
### SECTION E-E

	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
REINFORCED CONCRETE WINGWALLS	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"	9'-8"	10'-2"	10'-8"	11'-2"	11'-8"	12'-2"	12'-8"	13'-2"
"H"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"	9'-8"	10'-2"	10'-8"	11'-2"	11'-8"	12'-2"	12'-8"	13'-2"
"B"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"	9'-8"	10'-2"	10'-8"	11'-2"	11'-8"	12'-2"	12'-8"	13'-2"
"F"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"	9'-8"	10'-2"	10'-8"	11'-2"	11'-8"	12'-2"	12'-8"	13'-2"
"D"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"	9'-8"	10'-2"	10'-8"	11'-2"	11'-8"	12'-2"	12'-8"	13'-2"
BATTER	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
"S"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
"C" BARS	#4@12	#4@10	#5@11	#5@9	#6@9	#6@8	#6@8	#7@8	#6@11	#6@12	#10@10	#10@10	#10@10	#10@9	#11@9
"d" BARS	#5@12	#5@10	#6@11	#6@9	#6@8	#6@8	#7@8	#6@11	#6@12	#10@10	#10@10	#10@10	#10@10	#10@9	#11@9
* Conc CY/ LF	0.459	0.522	0.58	0.635	0.69	0.742	0.797	0.879	0.995	1.247	1.365	1.448	1.611	1.772	1.865
* Reinf LB/ LF	26	32	41	50	59	70	81	95	102	99	120	136	171	181	190
* Conc cu (cu) (cu) (ft)	3.75	2.24	3.66	2.89	3.59	3.18	3.56	3.49	3.57	3.89	4.29	3.69	4.44	3.77	4.77
* Conc cu (cu) (cu) (ft)	1.16	5.54	9.33	6.12	1.51	6.53	1.89	6.88	1.88	7.16	2.04	7.33	2.29	7.60	2.50
* Conc cu (cu) (cu) (ft)	1.26	5.44	9.36	5.97	1.49	6.44	1.79	6.83	1.95	7.08	2.11	7.33	2.26	7.50	2.57
* Soil pressure shown in the table is the equivalent uniform pressure per AASHTO LRFD = 11.6, 3.2															

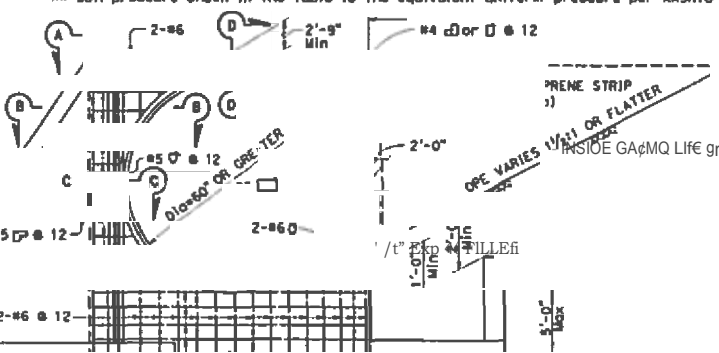
### DETAIL OF DESIM LOADING CASES

1/2:1 FILL SLOPES, UNLIMITED FOR FLATTER THAN 1/2:1

B=B-(2) eccentricity, B' is the effective footing width.  
\* Quantities include 1'-0" extension above the design "H" limit.  
\*\* Soil pressure shown in the table is the equivalent uniform pressure per AASHTO LRFD = 11.6, 3.2



GUTTER OR SHOULDER BATTER 1/2:1



Unit Stresses: fy = 60,000 psi  
f'c = 3,600 psi  
Earth density: 120 pcf  
Equivalent fluid pressure: 36 pcf  
Elevation, length and angle of flare of wings may be varied by the Engineer, to suit conditions encountered in the field. Wall height may be exceeded by 6" before going to the next greater "H".

### END ELEVATION STRAIGHT WINGWALLS

For footing step dimensions and reinforcement see "Footing Step" on Std Plan 83-1

### PIPE CULVERT HEAD WALLS, ENDWALLS AND WINGWALLS TYPES A, B AND C

140 SCALE

5 S NDARD PLAN D90

TYPICAL SECTION  
H=4' THRU 12'

TYPICAL SECTION

H=3' THRU 10'

TYPE A I-... .. \*

TYPE B

NOT FOR BID

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

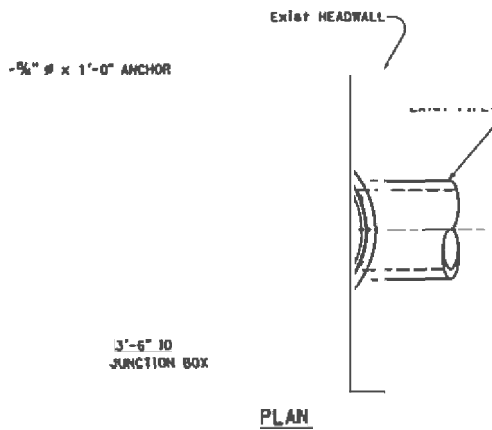
REGISTERED CIVIL ENGINEER

October 30, 2015

PEAK APPROVAL DATE

THE STATE OF CALIFORNIA ON ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

Professional Engineer Seal: State of California, License No. 61157, Exp. 8-30-17



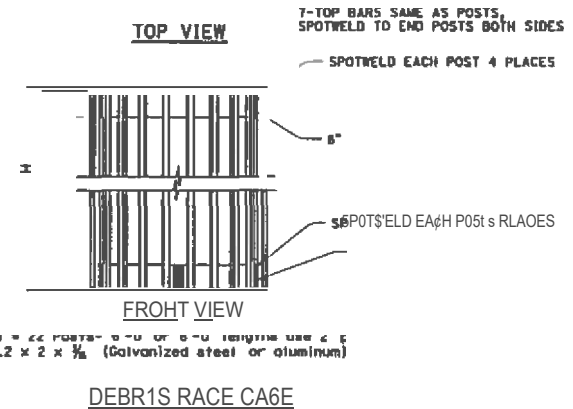
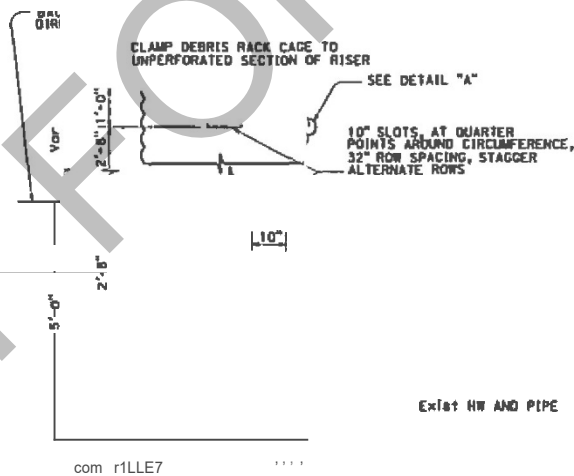
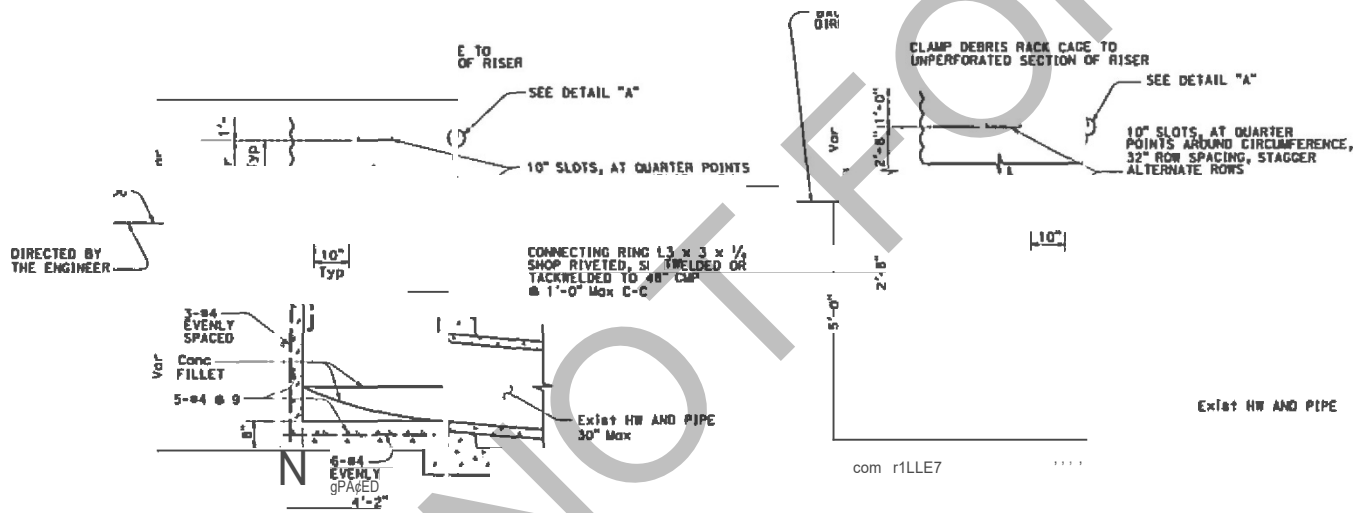
ExGet I+EA0YGLL

2" x 8" BOARD  
PROPERLY BRACED

FILL WITH CONCRETE

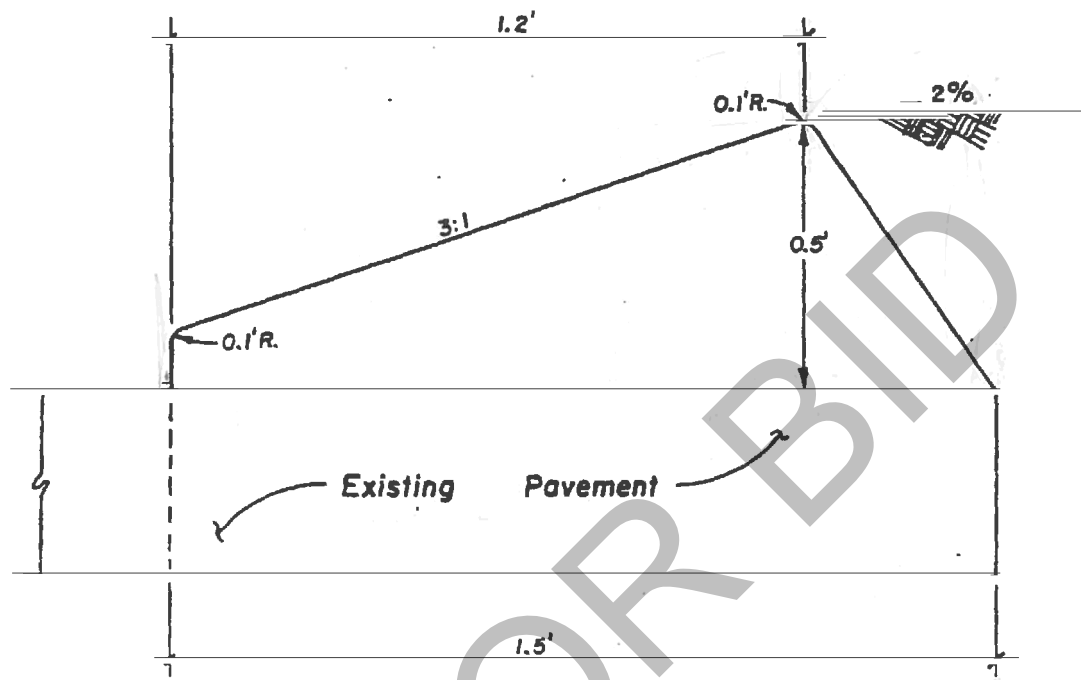
DETAIL "1"

PLAN



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
DEBRIS RACK CAGE  
NO SCALE

DCC



### TYPICAL SECTION

#### NOTES:

1. Dike Shall Be Constructed Of Type A pholt Concrete.
2. Point Bifider Shall Be Ploed On Existing A• yholt Concret4 PQV0M!+! Prior To The Insto ttotioff Of The Dike•

SAN BERNARDINO COUNTY TRAN. DEPT.]

I&»- •J' \*\*

XEN A. MILLER

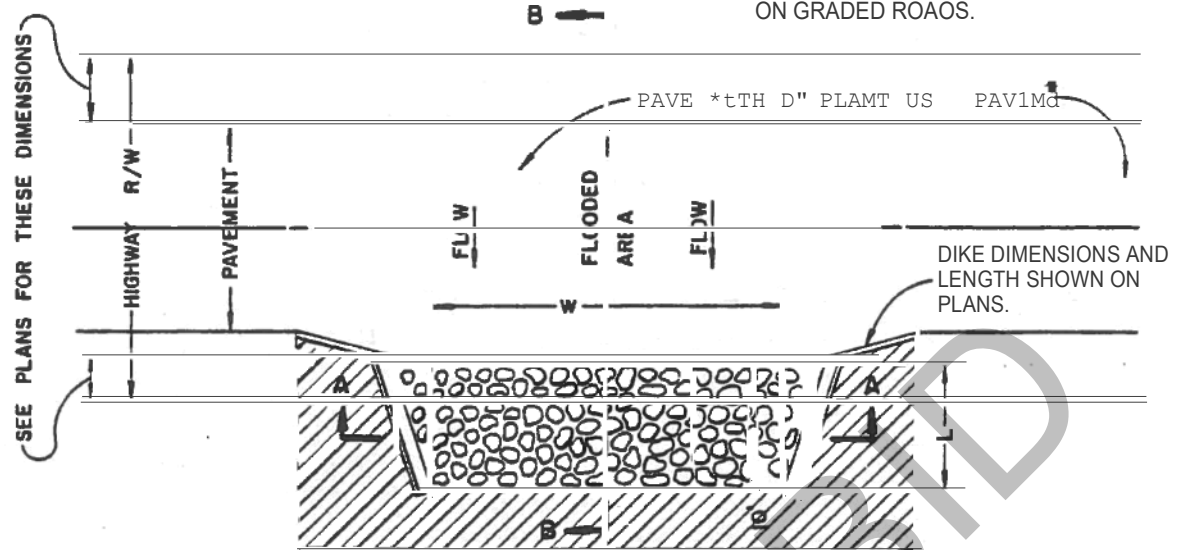
TRAVERSABLE DIKE

117a

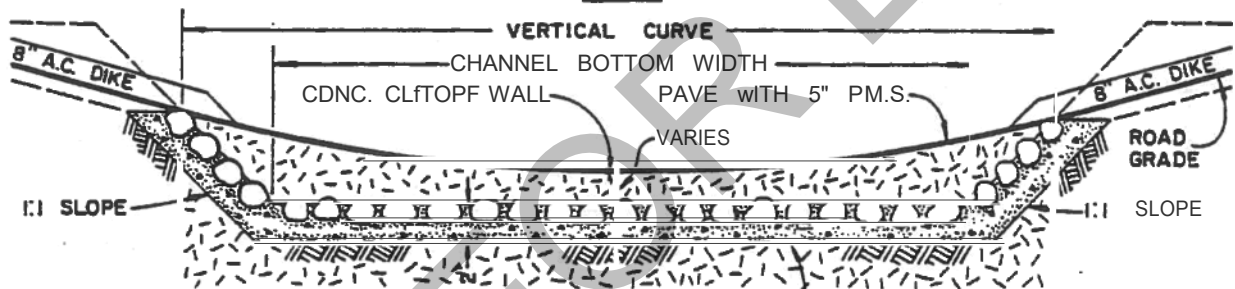
Director of TransP«r!«! >



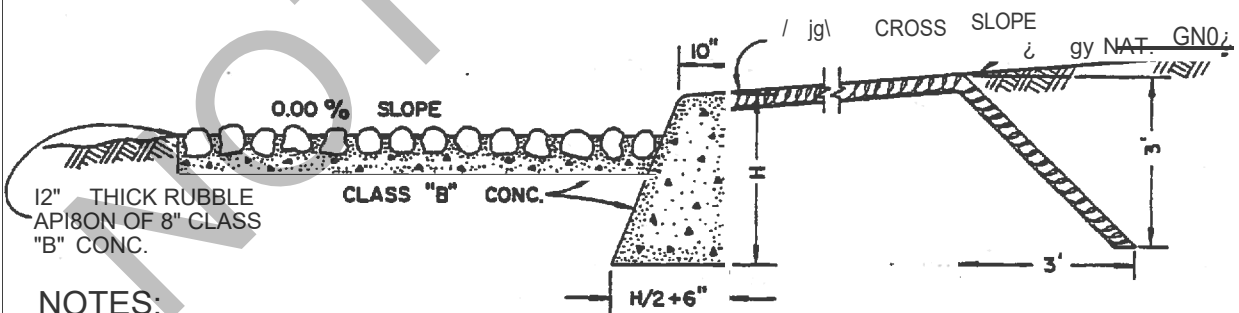
"NOTE: 12" OF AGGREGATE BASE REQUIRED ON GRADED ROADS.



PLA31



SECTION A-A



SECTION B-B

NOTES:

1. ALL CONCRETE TO BE CLASS "B".
2. L = SHOWN ON PLANS, H ≤ 3' MIN., 6' MAX.
3. DRAINAGE EASEMENT REQUIRED.
4. AREA SHOWN THUS SHALL BE COMPACTED TO 90% RELATIVE DENSITY PER STANDARD SPECIFICATION 3.04 03.
6. REINFORCED BLOCK WALL AND FOOTING PERMITTED.

SAN BERNARDINO COUNTY ROAD DEPARTMENT

DATE: J.E.M. 7-66

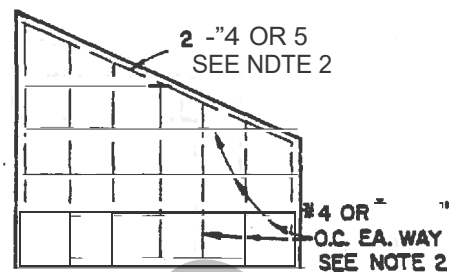
M. A. Nicholas  
COUNTY ENGINEER

CUTTOP WALL FOR  
DRAINAGE CHANNEL

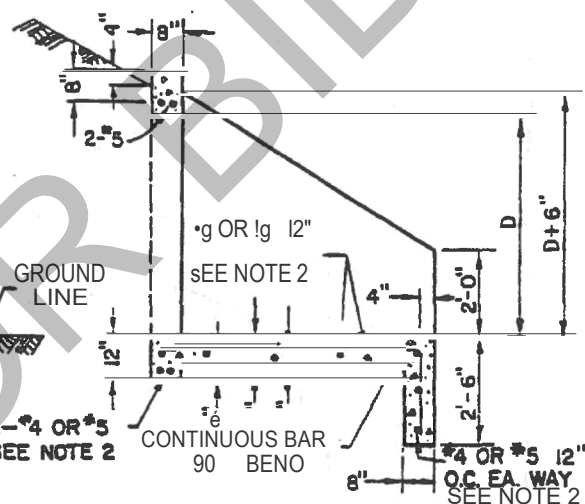
TOO



## PLAN



## REINFORCING DETAIL



## ELEVATION

SECTION A-A

NOTES:

DIMENSIONS				
PIPE DIAM	L	E	F	W
es"	<-s"	z'-a"	<-o"	z'-s"
30" 15'	5'-5"	3'-d'	4'-6"	5'-0"
36"	6'-0"	3'-4"	5'-0"	3'-8"
42"	6'-7"	3'-8"	5'-6"	4'-2"
8"	7'-1"	4'-0"	6'-0"	4'-0"
54"	8'-2"	4'-6"	6'-9"	5'-4"

1. HEADWALL SHALL BE CONSTRUCTED OF CLASS A CONCRETE .
2. REINFORCING STEEL SHALL BE NO. 4 BARS FOR "6" UP TO 60". ABOVE "60" - 6Q' fiiO . 5 BARS SHALL BE u5E0. 2" MIN CLEARANCE, 30 DIAMETER LAP , ALL STEEL .
3. ADJACENT SLOPES SHALL BE 1 TO 1 OR FLATTER .
4. MULTIPLE PIPES TO BE SET WITH 12" TYPICAL CENTERS 12/3 DIAMETERS APART.
5. ALL EXPOSED CORNERS (0 B<sub>2</sub> ROUNDED 3/4" RADUS
6. € INCREASED WHEN MULTIPLE PIPES OR PIPES ON SKEW ARE USED.

**SAN BERNARDINO COUNTY ROAD DEPARTMENT**

*M.A. Nicholas*  
COUNTY ENGINEER

I-iZADWAI  
~~WING - TYPE~~

PO