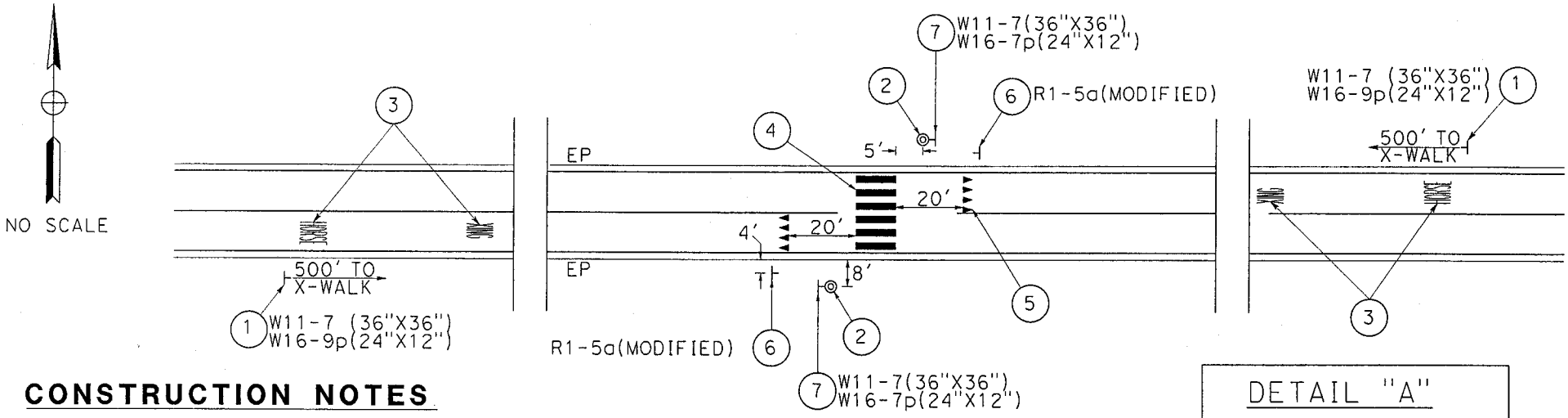
ATTACHMENTS

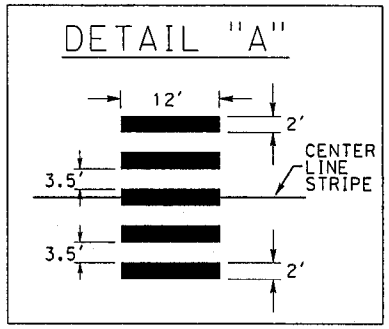
EXHIBIT "A"
PROPOSED TRAFFIC CONTROL FOR EQUESTRIAN CROSSING ON RANCHO CALIFORNIA ROAD



CONSTRUCTION NOTES

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

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



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

SHEET 1 OF 1

500-1.13.6 Installation and Field Inspection. The existing pipeline shall be cleaned of any obstacles and televised per 500-1.1.4 and 500-1.1.5 and proven per 500-1.1.7b) and the condition shall be approved by the Engineer prior to the insertion of the liner pipe. During this phase of operation all service openings shall be precisely located longitudinally and radially, and logged for subsequent reconnection after the insertion of the liner pipe.

Installation of the spiral-wound PVC liner shall be in accordance with ASTM F1741. End seals, between the liner pipe and the existing pipe, shall be installed using a sealing material that is compatible with the liner pipe material.

500-1.13.7 Service Connections and End Seals. Service connections and end seals shall conform to 500-1.1.7.

500-1.13.8 Repair and Rejection. The Contractor shall provide an evaluation and repair specification to the Engineer for approval for any profile strips or liner pipe found to be damaged during or after installation. Any portion of the profile strip damaged in transit or on the project site prior to installation will be marked "Rejected" and that portion shall be removed from the project site. Refer to 500-1.1.8.

500-2 MANHOLE AND STRUCTURE REHABILITATION.

500-2.1 General. This subsection specifies various lining systems for manholes and structures. The types of rehabilitation materials and methods shall be as shown on the Plans and specified in the Special Provisions. Flow control, if required shall also be as shown on the Plans or as specified in the Special Provisions. Unless otherwise specified in the Special Provisions, proof of meeting the Chemical Resistance test per 211-2 shall be submitted to the Engineer per 2-5.3.

As used in this subsection "holiday" shall be defined as any discontinuity, bare or thin section in a lined or coated area.

500-2.2 Requirements.

500-2.2.1 Installer Qualifications. The installer, whether the Contractor or a subcontractor, shall be a certified installer of the lining system. The installer's personnel shall be adequately trained in maintenance and operation of the required installation equipment, as certified by the lining manufacturer. A letter from the manufacturer of the lining system, verifying the certification of the installer required to be on-site during installation, shall be submitted per 2-5.3.

500-2.2.2 Cleaning. Inspection and Surface Preparation. Prior to the installation of the lining system, the host structure shall be prepared to produce a concrete or masonry surface suitable for application and adhesion of the specified lining system. Cleaning and surface preparation shall include the inspection of the host structure for any damage or leaks, and the removal of any protrusions on the surface of the host structure that could interfere with the installation of the lining system. Any damage or leaks shall be reported to the Engineer. Cleaning methods may include high pressure water cleaning at a minimum of 5,000 psi (34.5MPa), abrasive blast, or a method recommended by the manufacturer of the lining system, or another cleaning method submitted to the Engineer for approval per 2-5.3. The Contractor shall protect the host structure from damage by the cleaning equipment, water and air pressure. Flow bypassing, if required by the lining system, shall conform to 7-8.4 and 306-3.3.

Debris from the cleaning operation shall not be allowed to enter the sewer system. The Contractor shall furnish, install and remove any necessary debris containment devices while maintaining sewer flow. The Contractor shall remove and dispose of all debris collected from the cleaning operation. If reinforcing steel is exposed, either before or after removing deteriorated concrete, it shall be thoroughly cleaned to remove all contamination and rust particles. Immediately after the cleaned reinforcing steel is

inspected and accepted by the Engineer, the Contractor shall place a protective coating on the exposed reinforcing steel. The protective coating shall be approved by the Engineer in accordance with the manufacturers' specifications.

Manhole steps, pull rings and lifting eyes shall be installed or removed as shown on the Plans or specified in the Special Provisions.

500-2.3 Repair, Resurfacing and Active Infiltration.

500-2.3.1 General. Repair, resurfacing and active infiltration elimination materials shall be compatible with the lining system. Proof of compatibility shall be submitted to the Engineer per 2-5.3.

500-2.3.2 Repair. Prior to installation, patching or localized repairs shall be performed using rapid setting repair mortars compatible with the lining system. Repair mortars shall be used to fill surface irregularities, voids, and deteriorated surfaces and to repair the host structure to a uniform surface. Manufacturer's specifications shall be followed when performing repairs, material handling, mixing, installation and curing. A copy of the manufacturer's specifications confirming the compatibility of the materials used in the repair shall be submitted to the Engineer per 2-5.3.

500-2.3.3 Resurfacing. Air-placed concrete (APC) materials, if required by the Special Provisions, shall conform to 303-2.3.1. Prior to the application of APC, the structure shall be prepared to produce a concrete or masonry surface that is suitable for application and adhesion of the specified APC. The APC shall be applied in continuous lifts of 1/2 inch (12mm) minimum thickness or as shown on the Plans and/or as specified in the Special Provisions. Containment devices, approved by the Engineer, shall be used to prevent rebound (non-adhering excess APC) from entering the sewer system. Immediately following the APC placement operation, the containment device shall be removed and the structure's cover reinstalled to provide a moist curing environment. Where moist conditions within the structure do not exist, the Contractor shall water cure the APC for a minimum of 24 hours prior to installation of the lining system. All defects in the APC shall be repaired per 303-2 prior to the installation of the liner system.

500-2.3.4 Active Infiltration. Active leaks within the host structure shall be eliminated prior to installation of the liner system. Leaks shall be eliminated by pressure grouting with chemical grout as specified in the Special Provisions and/or the application of hydraulic cement conforming to 201-1.2. Chemical grouts and hydraulic cements shall be compatible with the lining system used. A copy of the manufacturer's specifications confirming the compatibility of the materials used in the repair shall be submitted to the Engineer per 2-5.3. The host structures shall be visibly dry with no active infiltration prior to lining.

500-2.4 Inspection, Testing and Repair of Installed Liner Systems.

500-2.4.1 General. The party performing the following tests shall be as specified in the Special Provisions. If the testing party is to be selected by the Contractor, the name of the testing party and information on the testing instruments to be used for adhesion testing and its calibration shall be submitted to the Engineer per 2-5.3.

500-2.4.2 Spark Test. The cured lining system shall be spark tested for holidays with the high voltage holiday detector instrument specified by the coating manufacturer or as specified in the Special Provisions. The voltage shall be set at a minimum of 15,000 volts. For thicknesses greater than 150 mils (4mm), the voltage shall be set at 100 volts per 1 mil (25μm) of thickness of the applied lining material. Identified holidays shall be marked without contaminating the lining surface and repaired in accordance with 500-2.4.5.

500-2.4.3 Mil Gauge Test. During installation, a mil gauge shall be used to verify that the minimum thickness of the lining meets and/or exceeds the minimum thickness specified herein or specified in the Special Provisions.

500-2.4.4 Adhesion Testing. Adhesion testing shall be performed on a minimum of 1 structure or 15 percent of all rehabilitated structures, whichever is greater, or as shown on the Plans and/or specified in the Special Provisions. Adhesion testing shall be conducted after the liner system has cured in accordance with the manufacturer's specifications. Adhesion testing shall be in accordance with ASTM D4541 as modified herein.

A minimum of one 3/4 inch (19mm) dolly shall be affixed to the lined surface of the host structure at the upper section or cone area, the midsection, and at the bottom, unless otherwise specified in the Special Provisions. Each testing location shall be identified by the Engineer. The adhesive used to attach the dollies to the liner shall be rapid setting with tensile strength in excess of the liner material and permitted to cure in accordance with the manufacturer's specifications. The lining material and dollies shall be prepared to receive the adhesive in accordance with the manufacturer's specifications. Prior to the pull test, the tester shall utilize a scoring device to cut through the coating until the substrate is reached. Failure due to improper dolly adhesive or scoring will require retesting. The pull tests in each area shall meet or exceed 200 psi (1,400KPa) and shall include substrate adhered to the back of the dolly or no visual signs of coating material in the test hole. Pull tests with results between a minimum 150 psi (1,000KPa) and 200 psi (1,400KPa) may be acceptable if more than 50 percent of the substrate adhered to the back of the dolly. A test result may be disregarded, as determined by the Engineer, if there is a valid nonstatistical reason as specified in Sections 8.4 and 8.5 of ASTM D4541. If any test fails, a minimum of 3 additional locations in the section of the failure shall be tested, as directed by the Engineer. If any of the retests fail, all loosely adhered or unadhered liner in the failed area, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. If a host structure fails the adhesion test, one additional host structure or 10 percent of the initial number of host structures selected for testing shall be tested as directed by the Engineer or as specified in the Special Provisions.

500-2.4.5 Liner Repairs. Holidays, uncured lining material, blisters, surface imperfections and damage to the liner resulting from the adhesion test shall be repaired to a point 1 inch (25mm) minimum beyond the limits of the damaged area. The repair shall be 125 mils (3mm) thick or the minimum thickness specified in the Special Provisions. Holidays shall be primed and recoated with the same lining system to a minimum additional thickness of 30 mils (750μm) unless otherwise specified by the liner manufacturer or approved by the Engineer. Blisters, uncured lining and surface imperfections shall be completely removed and the areas recoated with appropriate lining material to 1 inch (25mm) minimum beyond the repair areas at a minimum thickness of 100 mils (500μm). Additional spark testing shall be performed after repairs are completed.

500-2.5 Integral Locking PVC Manhole and Structure Lining System.

500-2.5.1 General. This subsection specifies an integral locking PVC lining system. This system consists of temporarily erecting a form inside an existing structure, installing PVC lining material with integral locking devices and filling the annular space between the erected form and PVC lining material and the walls of the host structure with portland cement concrete resulting in a new PVC-lined, monolithic structure within the host structure.

500-2.5.2 Materials.

500-2.5.2.1 Portland Cement Concrete. Portland cement concrete shall be Class 330-C-23 (560-C-3250) conforming to 201-1.1.2, or as specified in Special Provisions.

500-2.5.2.2 Integral Locking PVC Liner. The liner shall conform to the specifications in 210-2 and be as specified in the Special Provisions. A Certificate of Compliance conforming to 4-1.5 shall be submitted per 2-5.3.

500-2.5.3 Installation and Field Inspection. If existing, steps shall be removed flush with the inside wall of the host structure. Formwork for the lining system shall be installed in a manner that fits the existing walls and creates an equal and approximate 3-inch (75mm) annular space. Portland cement concrete shall be used to fill the annular space. The installation of the liner shall conform to 311-1. Replacement of steps, if required, shall conform to the requirements shown on the Plans and/or specified in the Special Provisions.

Prior to placement of the portland cement concrete, the installer shall connect the existing mainline pipe to the host structure as shown on the Plans and/or as specified in the Special Provisions. Exposed portland cement concrete surfaces within the host structure shall be protected as specified in the Special Provisions.

Field testing shall conform to 210-2.3.4 and 311-1.10 unless otherwise specified in the Special Provisions.

500-2.6 Segmented PVC Lining System.

500-2.6.1 General. This subsection specifies a lining system consisting of PVC liner strips placed so that an annular space is created between the liner and the walls of the host structure. This annular space is then filled with cementitious grout. A Certificate of Compliance conforming to 4-1.5 shall be submitted to the Engineer per 2-5.3 for each material. Surface preparation of the host structure and flow bypass shall conform to 500-2.1.3 unless otherwise specified in the Special Provisions.

500-2.6.2 Materials.

500-2.6.2.1 PVC Liner. PVC liner shall conform to 500-1.5.2 through 500-1.5.5 and Table 207-17.5(A).

500-2.6.2.2 Cementitious Grout. Cementitious grout shall conform to ASTM F1741, Section 6.4 and be submitted to the Engineer for approval per 2-5.3 or be as specified in the Special Provisions.

500-2.6.2.3 Sealant/Adhesive. The sealant/adhesive shall be compatible with the PVC lining material and cementitious grout. A copy of the manufacturer's specifications confirming the compatibility of the sealant/adhesive materials shall be submitted to the Engineer per 2-5.3.

500-2.6.3 Installation and Inspection. Installation shall be performed by either manually spirally winding PVC strips or placing PVC panels and engaging the complementary locks (male/female) at the edges of the strips/panels in a manner that creates an annular space, of 1inch (25mm) minimum thickness, unless otherwise specified in the Special Provisions.

A bead of approved sealant/adhesive shall be applied to the female locking edge of the strip/panel prior to engaging the locking edges. Grouting of the annular space shall be performed in such a manner as to prevent damage or collapse of the liner and completely fill the annular space. Installation shall conform to 500-1.5.6 through 500-1.5.9. Testing shall be performed in accordance with 500-2.4, except 500-2.4.4. Holes in the liner shall be covered with a patch of sealant materials as approved by the Engineer.

500-2.7 Polyurethane and Epoxy Protective Lining System.

500-2.7.1 General. This subsection specifies a polyurethane and epoxy primer protective lining system.

500-2.7.2 Lining Material. Lining material shall consist of 100 percent solid polyurethane material and moisture tolerant epoxy. Polyurethane lining material shall be capable of spray application to 125 mils (3mm) minimum thickness in one continuous coat. Epoxy shall be capable of spray application to 5 mils (127μm) thickness in one continuous coat.

500-2.7.3 Installation and Curing. Lining material shall be applied to all prepared surfaces from 1 inch (25mm) below the low-flow water level to the base of the ring and cover unless otherwise specified in Special Provisions. All termination points of the lining material to the existing subsurface shall be keyed into the subsurface by mechanically scoring a minimum 1/4 inch x 1/4 inch (6mm x 6mm) keyway. Prior to application of the polyurethane, the subsurface shall be primed with the epoxy

primer to a thickness of 3 mils (76μm) minimum to 5 mils (127μm) maximum. Polyurethane shall be applied to a thickness of 125 mils (3mm) immediately prior to the epoxy primer becoming tack-free. Lining material shall be uniform in color, fully cured, free of holidays, surface imperfections, blisters and sags and adequately adhered to the subsurface.

500-2.7.4 Inspection and Testing. The set or cured lining materials shall be tested in accordance with 500-2.4 unless otherwise specified in the Special Provisions.

500-2.7.5 Performance Requirements. The lining system shall meet or exceed the requirements specified in Table 500-2.7.5(A).

TABLE 500-2.7.5 (A)

	Polyurethane	Epoxy Primer
Tensile Strength ASTM D 638, Type IV, psi (MPa) (min)	2,000 (14)	6,000 (41)
Elongation at Break, % ASTM D 638, Type IV	40	5
Wear Resistance, mg. wt. Loss Taber abrasion, ASTM D4060	60[1]	100[1]
Hardness, Shore D, Durometer ASTM D 2240	55	75
Tear Resistance, ppi (kg/mm) ASTM D 624	150 (2.7)	N/A
Peel Strength, Concrete, pli (g/mm) ASTM D 903	7[2] (125)	7[2] (125)
Weight Change[3]	± 1.5%	± 1.5%

1. Abrasive wheel No. CS-17, maximum value.
2. Tested as a system. Test results shall be verified on a per job basis or as specified in the Special Provisions.
3. Tested in conformance with 211-2.

500 - 2.8 Epoxy Lining System.

500-2.8.1 General. This subsection specifies an epoxy lining system.

500-2.8.2 Lining Material. Lining material shall consist of solvent free, high-build epoxy resin capable of spray application to 125mils (3mm) minimum thickness in one continuous coat.

500-2.8.3 Installation and Curing. Lining material shall be applied to all prepared surfaces from 1 inch (25mm) below the low-flow water level to the base of the ring and cover unless otherwise specified in the Special Provisions. Termination points of the lining to the existing subsurface shall be keyed into the subsurface by mechanically scoring a minimum 1/4 inch x 1/4 inch (6mm x 6mm) keyway. Epoxy shall be applied to a thickness of 125 mils (3mm). Lining material shall be uniform in color, fully cured, free of holidays, surface imperfections, blisters and sags and adequately adhered to the subsurface.

500-2.8.4 Inspection and Testing. The set or cured lining materials shall be tested in accordance with 500-2.4 unless otherwise specified in the Special Provisions.

500-2.8.5 Performance Requirements. The lining system shall meet or exceed the specifications in Table 500-2.8.5(A)

TABLE 500-2.7.5 (A)

	Epoxy Liner
Tensile Strength ASTM D 638, Type IV, psi (MPa) (min)	3,000 (21)
Elongation at Break, % ASTM D 638, Type IV	0.9
Wear Resistance, mg. wt. Loss Taber abrasion, ASTM D4060	115[1]
Hardness, Shore D, Durometer ASTM D 2240	80
Weight Change[2]	± 1.5%

1. Abrasive wheel No. CS-17, maximum value.
2. Tested in conformance with 211-2.

500-2.9 Epoxy Mastic and Flexible PVC Liner System.

500-2.9.1 General. This subsection describes the installation of the mastic primer and epoxy mastic that bonds to the cleaned, repaired and prepared interior concrete substrate, then follows with the mechanical locking of the flexible PVC liner into the epoxy mastic. The integral locking extensions in the flexible PVC liner are embedded to their full depth into the epoxy mastic.

500-2.9.2 Materials.

500-2.9.2.1 Plastic Liner. The liner shall be manufactured from a PVC compound in accordance with 210-2. The plastic liner shall be a flexible PVC Liner with a minimum thickness of 1/16 inch (1.65 mm) and conform to 210-2.4.

500-2.9.2.2 Mastic Primer. The epoxy mastic primer shall be a two-part coating that is applied to the prepared concrete substrate.

500-2.9.2.3 Epoxy Mastic. The epoxy mastic shall be a two-part 100 percent epoxy coating for bonding and filling voids in properly prepared concrete substrate.

500-2.9.3 Locking Extensions. All liner to be embedded in the epoxy mastic shall have integral locking extensions and meet the requirements of 210-2.2.4 except for the dimensions requirement. The locking extensions shall have a shape, height, web thickness, and spacing that will allow the liner to be held permanently in place and be able to meet the pull-out requirements of 500-2.4.4.

500-2.9.4 Chemical Resistance and Physical Property Testing. The plastic liner sheet and accessories shall conform to 211-2 and 210-2.4.

500-2.9.5 Preparation and Repair of Substrate. Prior to applying the mastic primer, the structure shall be cleaned and prepared in accordance with 311-1.6 and repaired in accordance with 311-1.9.

500-2.9.6 Installer Qualifications. Applicators and welders of the plastic liner shall be qualified in accordance with 311-1.2.

500-2.9.7 Installation.

500-2.9.7.1 Priming. The mastic primer shall be applied to 76 μm (3 mils) minimum to 5 mils (127 μm) maximum thickness. The primer shall be allowed to dry before applying the epoxy mastic.

500-2.9.7.2 Epoxy Mastic Application. A finishing trowel or other suitable tool shall be used to apply the epoxy mastic to a uniform minimum thickness of 1/4 inch (6.4 mm).

500-2.9.7.3 Plastic Liner Application. The plastic liner shall be placed while the wetting ability of the epoxy mastic is at its optimum, be pressed into the mastic, and rolled to remove any trapped air. The lining system shall be allowed to cure for the amount of time recommended by the lining manufacturer. The average dry film thickness of the cured lining system, including the liner sheets and the applied epoxy mastic, when completed shall not be less than 315 mils (8 mm).

500-2.9.8 Field Jointing of Liner.

500-2.9.8.1 General. The Contractor shall utilize the maximum size plastic liner sheet that is practical and will provide the minimum number of seams. Vertical and horizontal seams shall overlap a minimum of 1/2 inch (13 mm) and shall be welded with 1 inch (25 mm) weld strips. Corner strips may be used at inside and outside corners, or liner may be wrapped around corners. The Contractor shall be allowed to heat the liner to facilitate turning corners. Excessive heating of the liner material to facilitate turning corners shall be avoided.

500-2.9.8.2 Field Joints in Manhole and Structure Rehabilitation. Field joints in the liner shall be Type AL-2 unless AL-1 or AL-3 is approved by the Engineer.

a) Type AL-1 joint shall consist of a 100 mm (4 inch) wide joint strip centered over a 1 inch (25 mm) maximum gap between sheets and securely welded along each edge of adjacent liner with a 1 inch (25 mm) welding strip.

b) Type AL-2 joints shall be made with integral joint flaps with locking extensions removed 1 inch (25 mm) from one side per 210-2.2.6. The flap shall be overlapped a minimum of 1/2 inch (13 mm) and the overlap secured to the adjacent liner by means of a 1 inch (25 mm) welding strip.

c) Type AL-3 joints shall consist of a 1 inch (25 mm) wide weld strip centered over a 1/4 inch (6 mm) maximum gap between sheets and securely welded along each edge of adjacent liner.

500-2.9.8.3 Installation of Welding Strips. Installation of welding strips shall conform to 311-1.5.4.

500-2.9.9 Pull Test for Locking Extensions. Liner locking extensions embedded in epoxy mastic shall withstand a test pull of at least 20 pounds per linear inch (3.5N per linear mm), applied perpendicularly to the concrete surface for a period of 1 minute without rupture of the locking extensions or withdrawal from the epoxy mastic or delaminating of the mastic from the concrete substrate. This test shall be made at a temperature between 70°F to 80°F (21°C to 27°C).

500-2.9.10 Inspection. After installation of the protective lining system, the surface of the liner shall be cleaned and prepared by the Contractor and then inspected by the Engineer. Field testing shall be in accordance with 311-1.10.

500-2.9.11 Repair of Defects and Holidays. The Contractor shall repair all defects and damage in the plastic liner in accordance with 311-1.9.

500-2.10 Measurement and Payment.

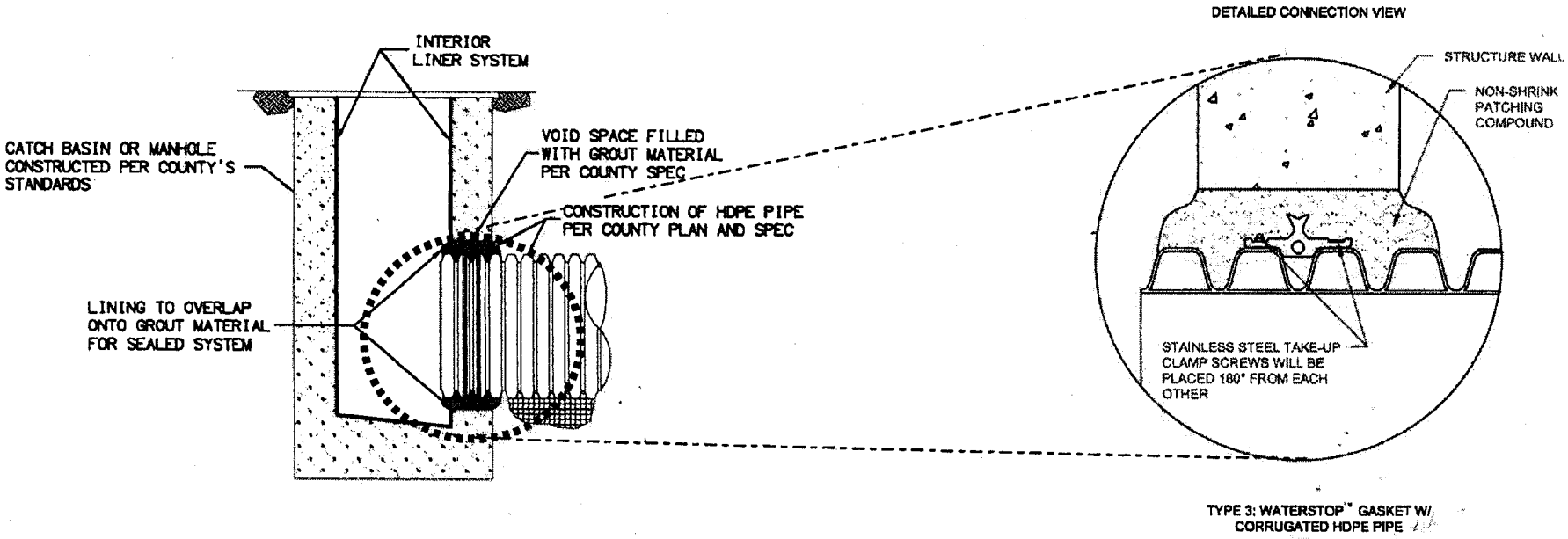
500-2.10.1 Measurement. Manhole and structure rehabilitation shall be measured by each.

500-2.10.2 Payment. Payment for manhole and structure rehabilitation shall be made at the Contract Unit Price or lump sum price in the Bid for each structure. The Bid price shall include the installation of the lining system as well as surface preparation and repairs, and performance of testing, unless otherwise specified in Special Provisions.

500-3 ANNULAR SPACE GROUTING.

500-3.1 Requirements.

500-3.1.1 General. This subsection covers various requirements of continuous annular space grouting of sliplining systems. The annular space (void between the host and liner pipes) shall be completely grouted to support the liner and provide long-term stability. The Contractor shall engage the services of an Agency approved testing laboratory to certify that the proposed materials and methods comply with these requirements. All proposals shall be submitted to the Engineer per 2-5.3, 201-1, and 500-3.1.10.



LIMITS OF LINING AT HDPE PIPE CONNECTION TO MANHOLE/CATCH BASIN STRUCTURE 1/–

NTS

EXHIBIT "C", HDPE PIPE-STRUCTURE WATERSTOP CONNECTION DETAIL Sheet 1 of 1

EXHIBIT D, MWD DETAILS, SHEET 1 OF 5

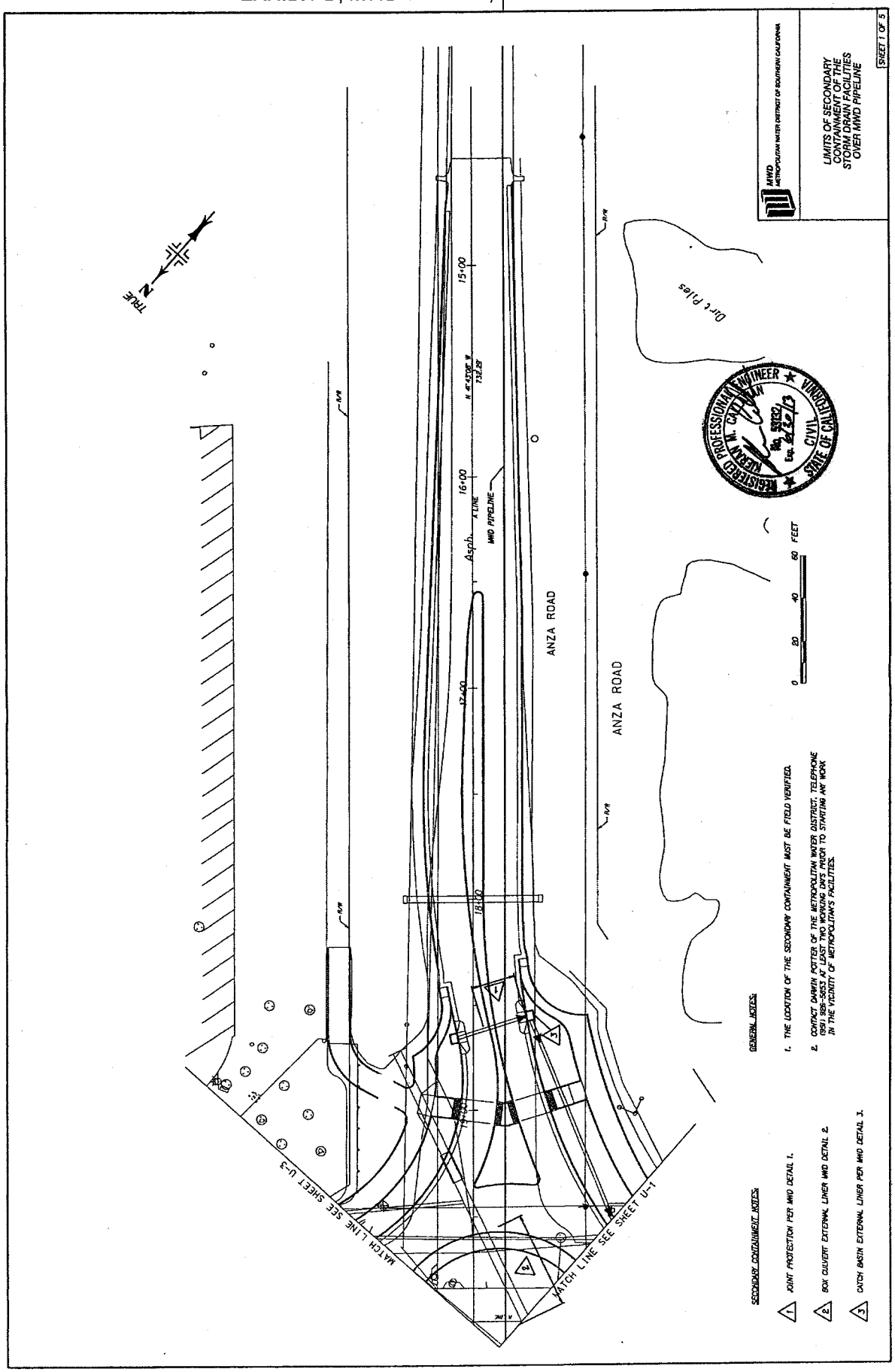
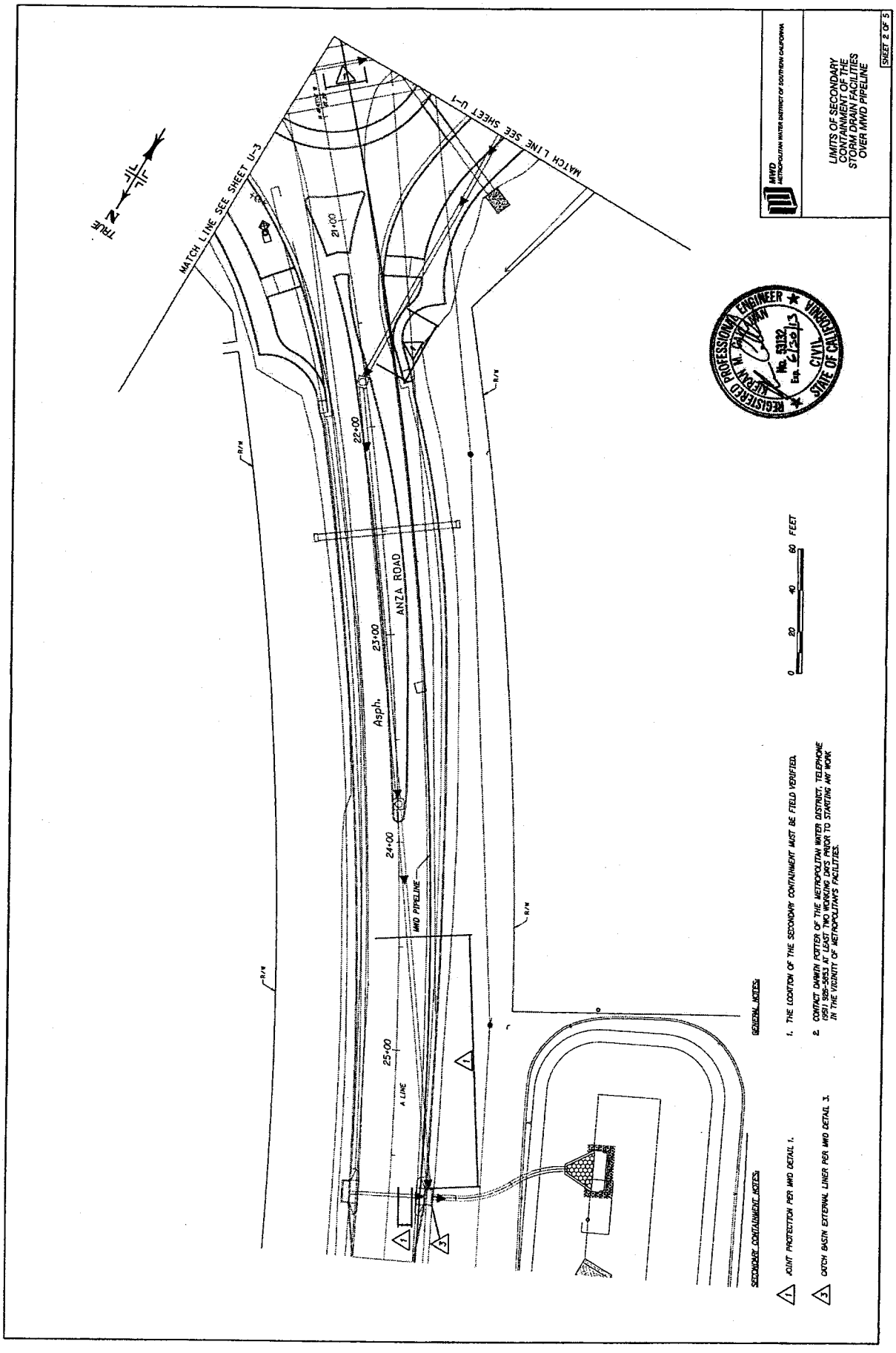
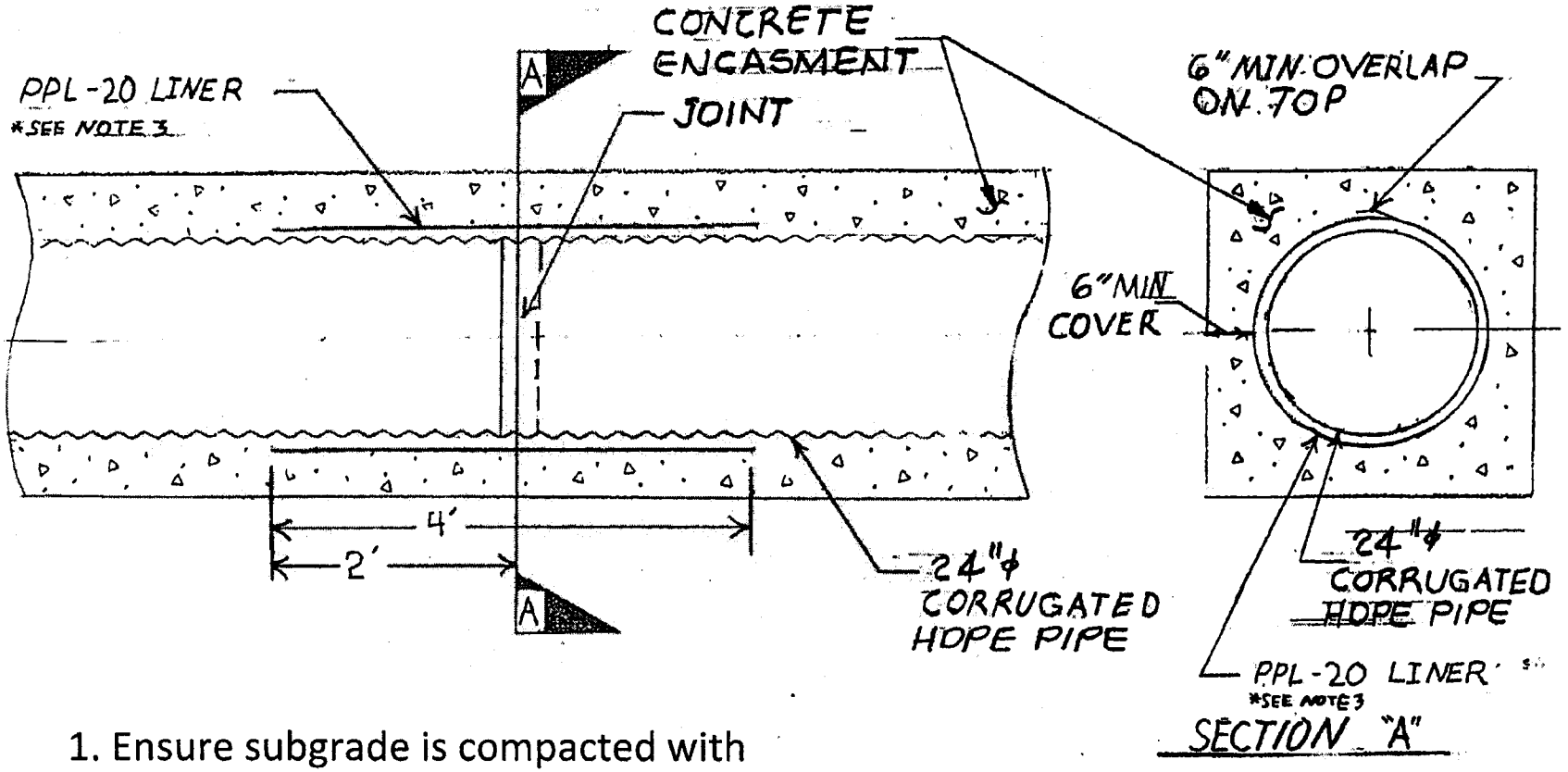


EXHIBIT D, MWD DETAILS, SHEET 2 OF 5





1. Ensure subgrade is compacted with no sharp changes in grade.
2. All surfaces should be free of debris, foreign material, or sharp objects.
3. PPL-20 by BTL Liner, Inc. (800) 280-0712 or approved equivalent.

REGISTERED PROFESSIONAL ENGINEER
KIERAN M. CAHILL
No. 53132
Exp. 6/30/13
CIVIL
STATE OF CALIFORNIA

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

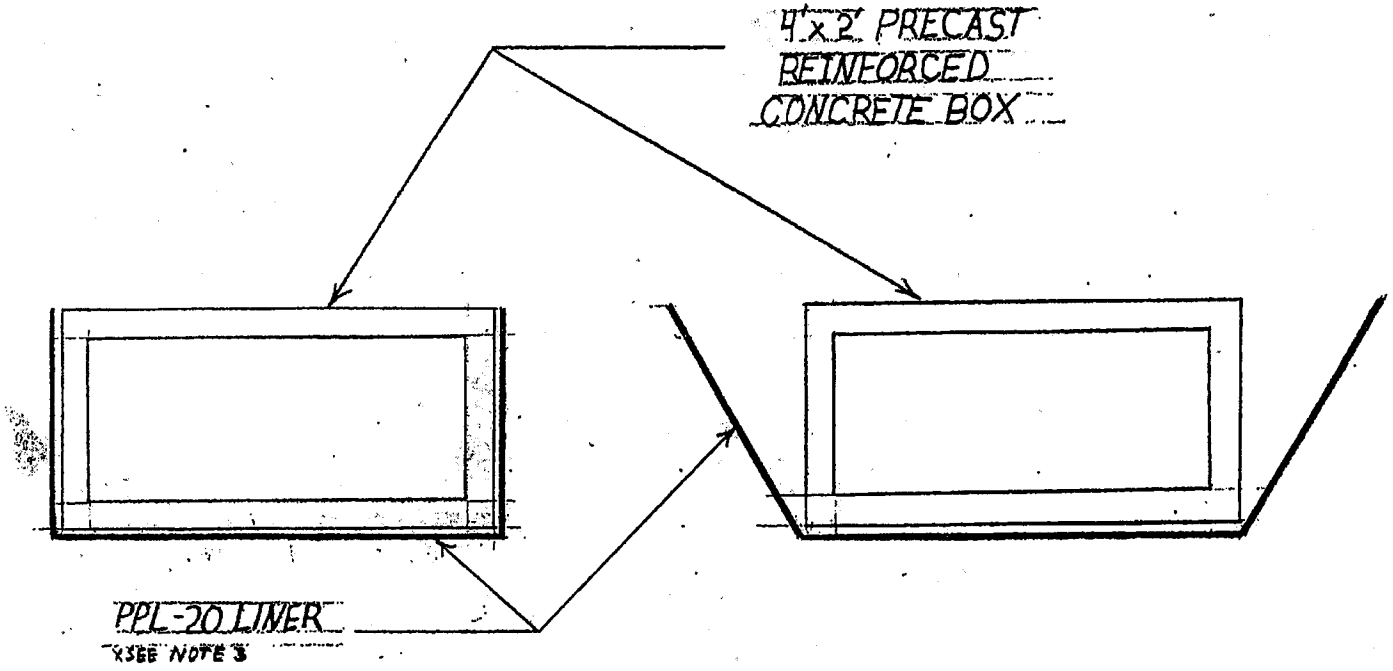
SECONDARY CONTAINMENT DETAILS

MWD DETAIL 1

EXHIBIT D, MWD DETAILS, SHEET 3 OF 5

OPTION 1

OPTION 2



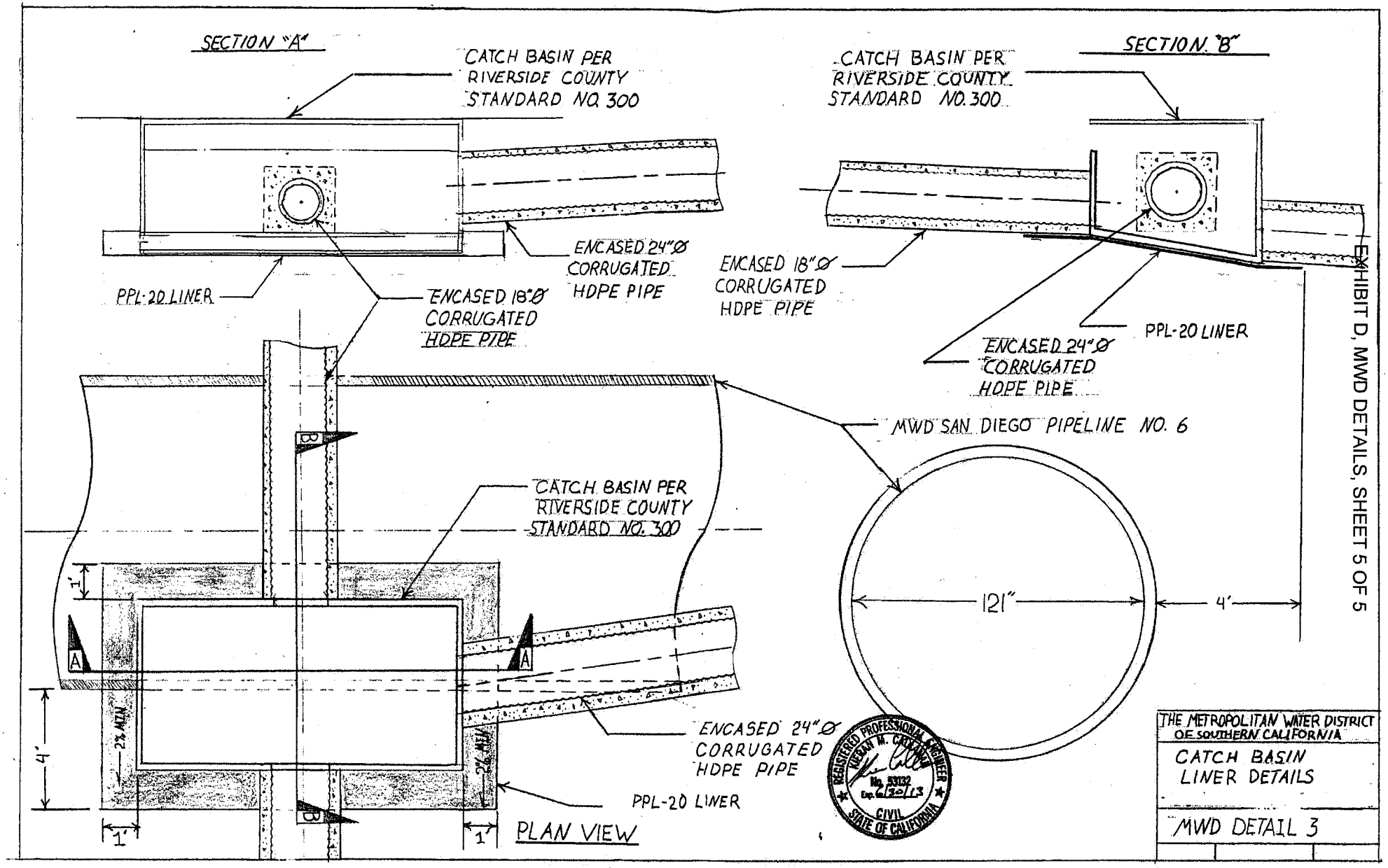
1. Ensure subgrade is compacted with no sharp changes in grade.
2. All surfaces should be free of debris, foreign material, or sharp objects.
3. PPL-20 by BTL Liner, Inc. (800)280-0712 or approved equivalent.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

REINFORCED CONCRETE BOX LINER DETAILS

MWD DETAIL 2

EXHIBIT D, MWD DETAILS, SHEET 4 OF 5

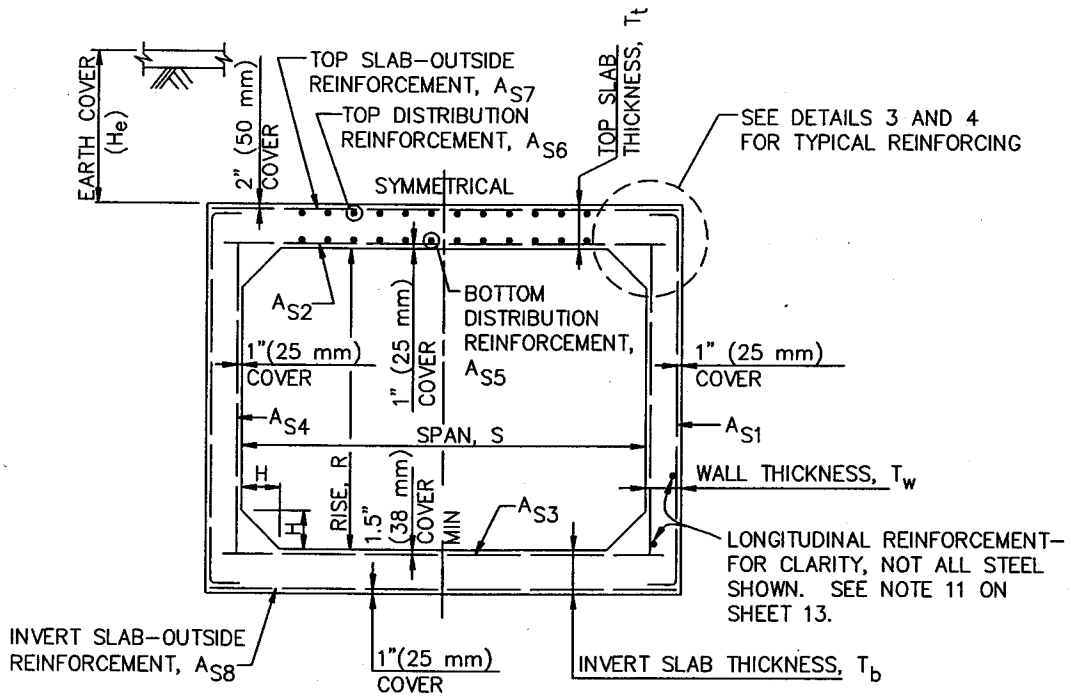


THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

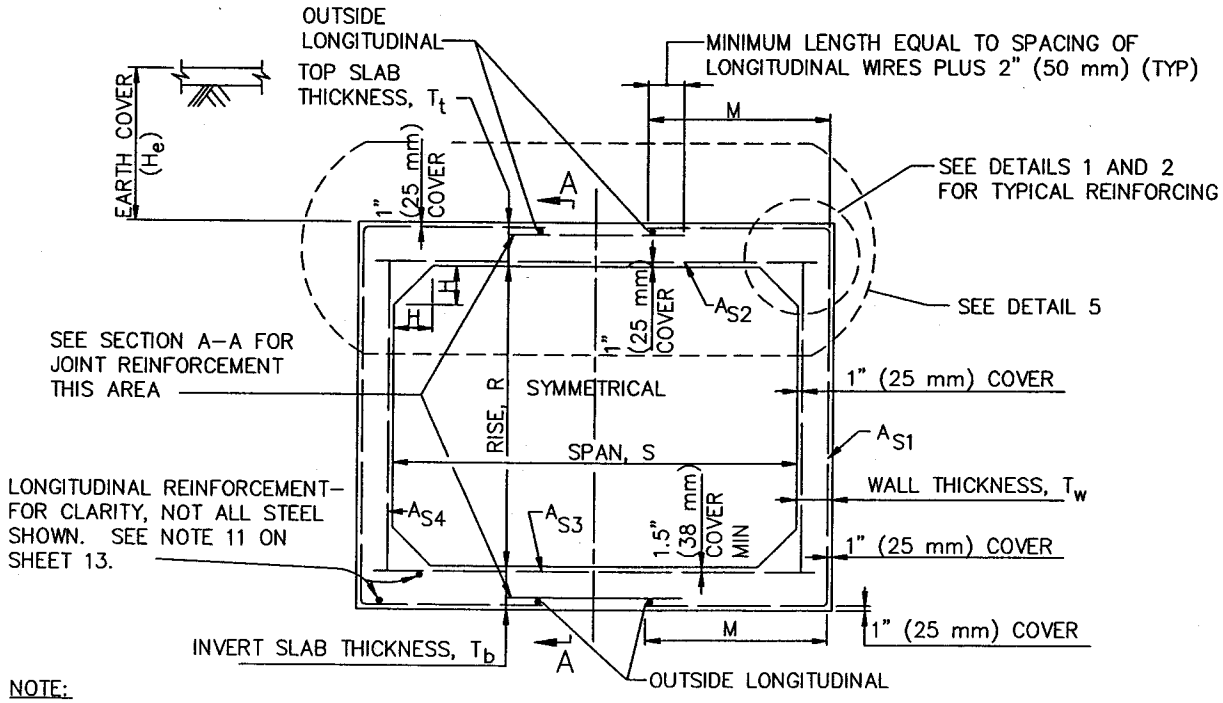
CATCH BASIN LINER DETAILS

MWD DETAIL 3

EXHIBIT D, MWD DETAILS, SHEET 5 OF 5



EARTH COVER LESS THAN 24"(600 mm)



NOTE:
HAUNCH, H = WALL THICKNESS

EARTH COVER 24" (610 mm) AND GREATER

TYPICAL BOX SECTIONS

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

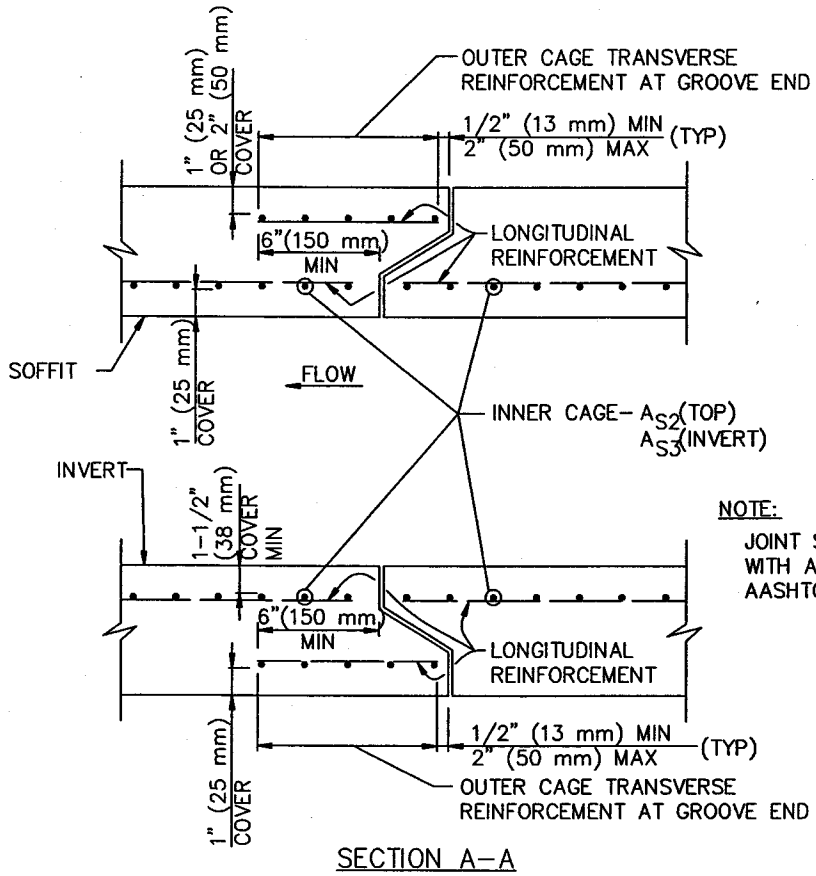
PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE ADOPTED 2008

PRECAST REINFORCED CONCRETE BOX

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390–0

SHEET 1 OF 42

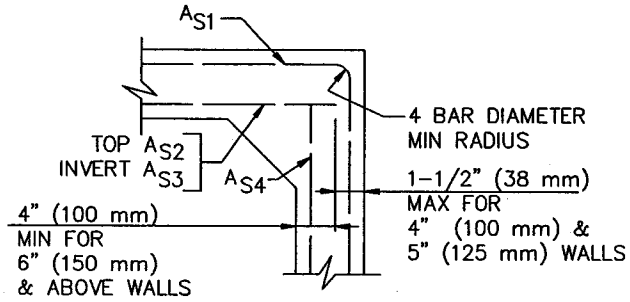


NOTE:

JOINT SHALL CONFORM WITH ASTM C990 OR AASHTO M-198

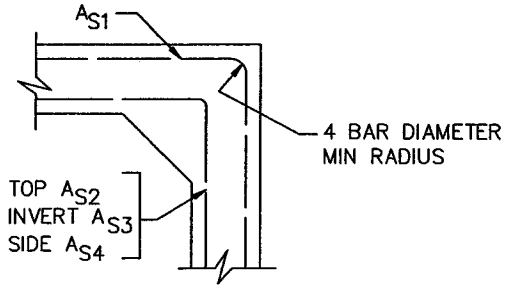
SECTION A-A

TOP AND INVERT SLAB JOINT REINFORCEMENT



DETAIL 1

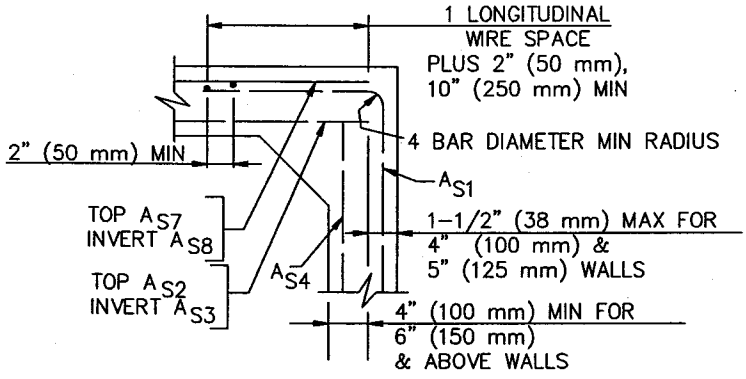
INNER REINFORCEMENT



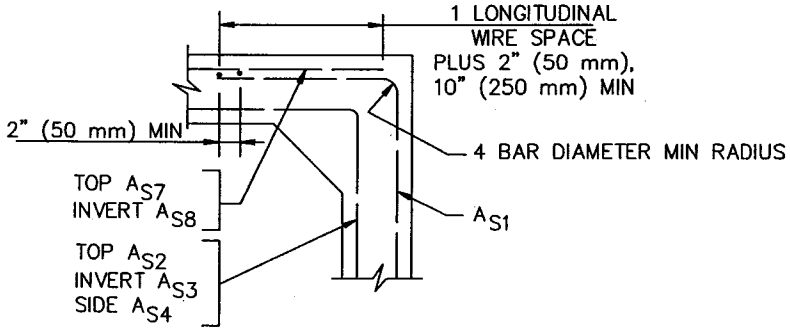
DETAIL 2

OPTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 2 OF 42

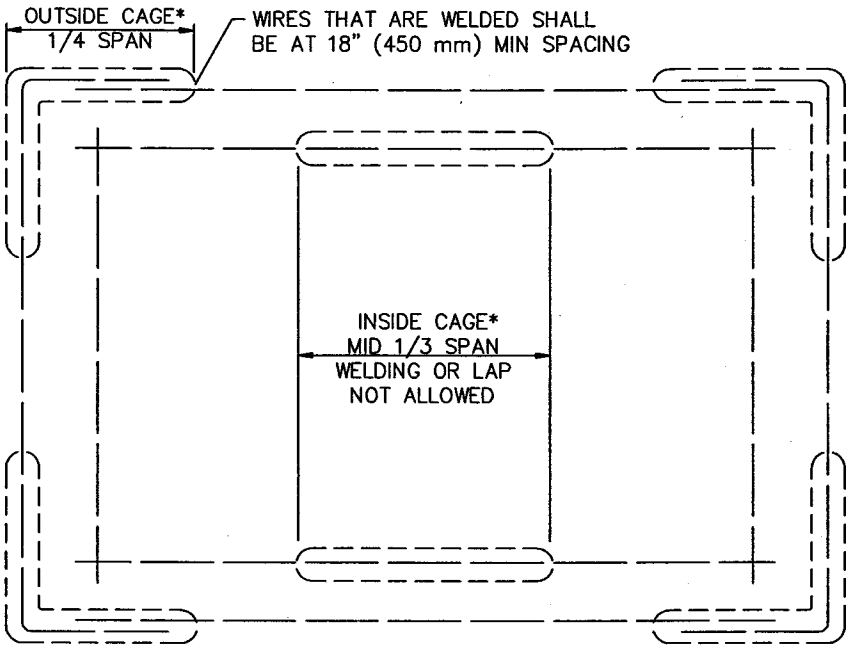


DETAIL 3
REINFORCEMENT ARRANGEMENT



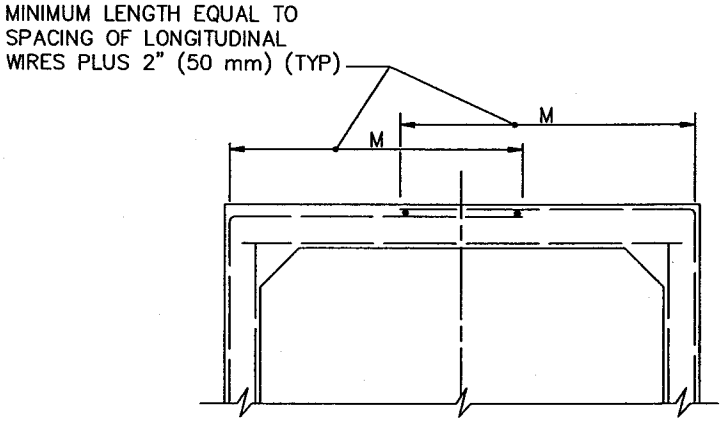
DETAIL 4
OPTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 3 OF 42



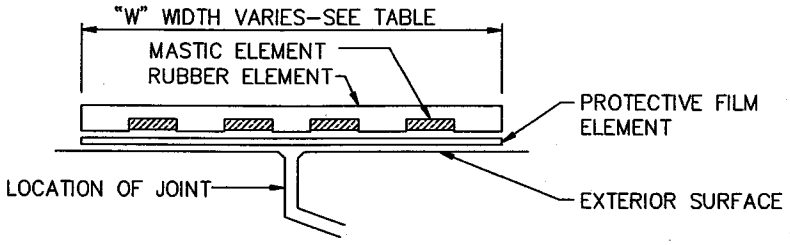
CRITICAL ZONES OF HIGH STRESS
WHERE WELDING IS RESTRICTED

*INDICATES NO-SPLICE ZONES



DETAIL 5
OPTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 4 OF 42

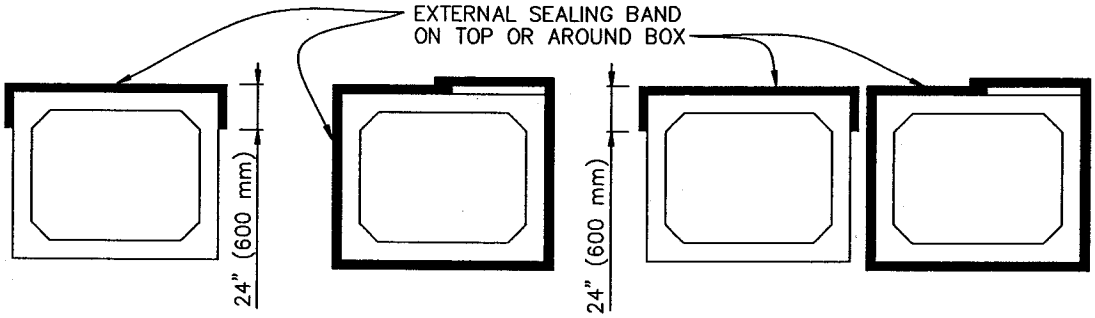


EXTERNAL SEALING BAND SCHEMATIC

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

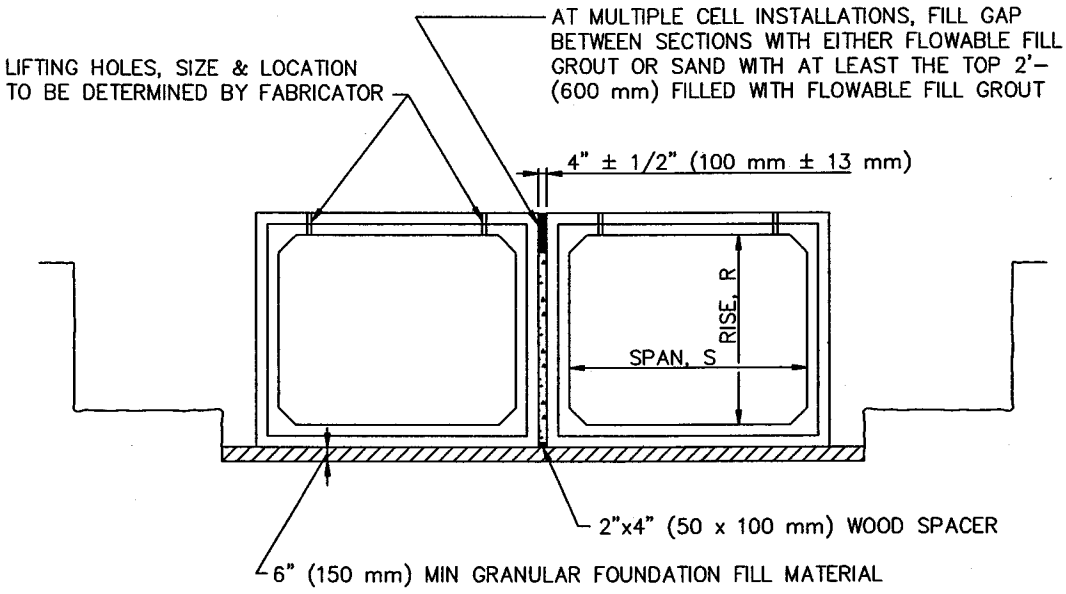
NOTES:

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



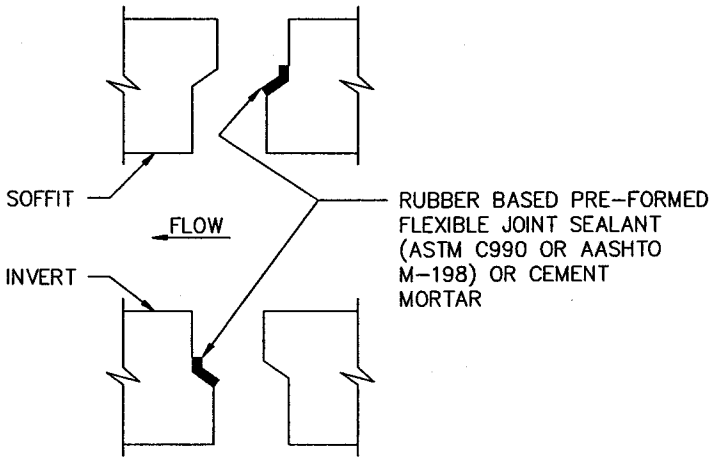
SINGLE BOX

MULTIPLE BOXES



TYPICAL SECTION

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



TYPICAL JOINT DETAIL

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 6 OF 42

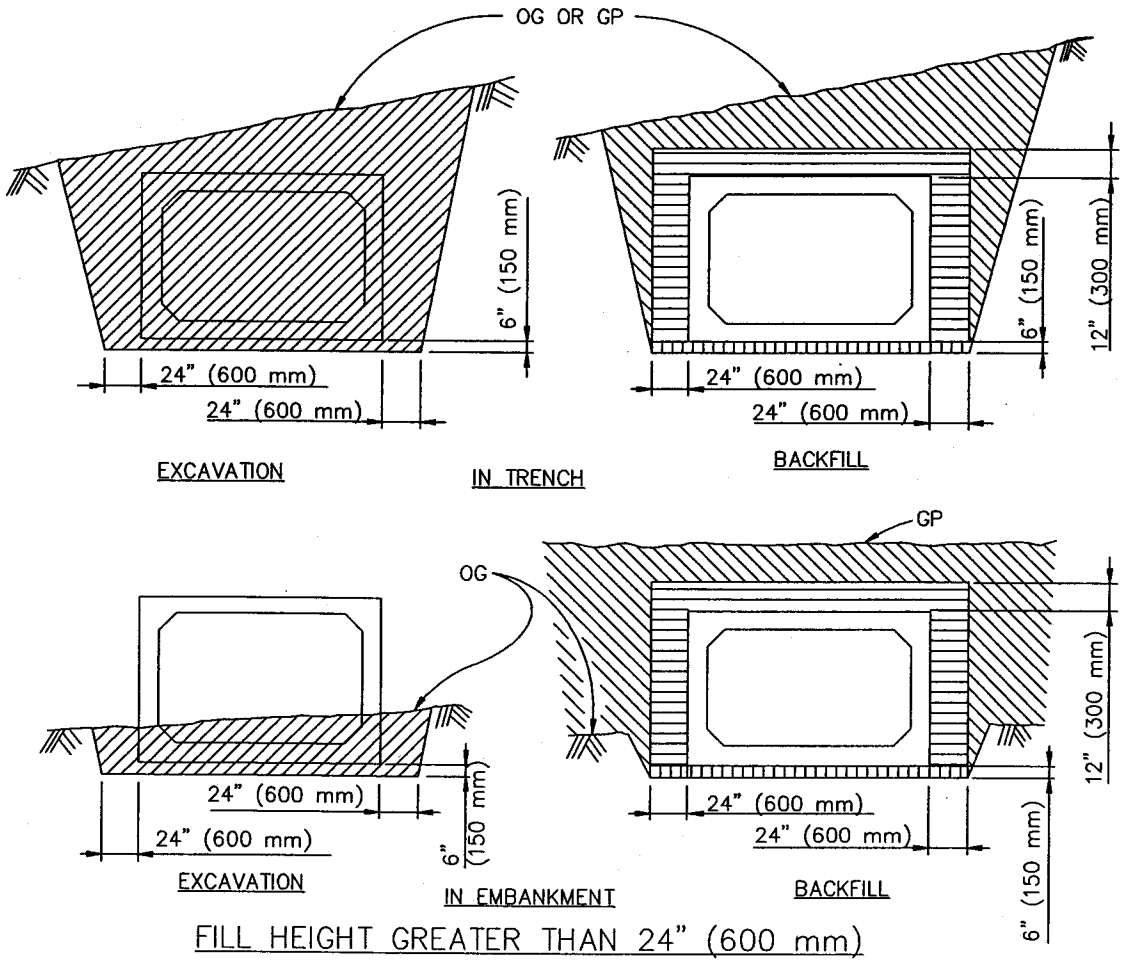
LEGEND

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

TYPICAL NOTES:

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

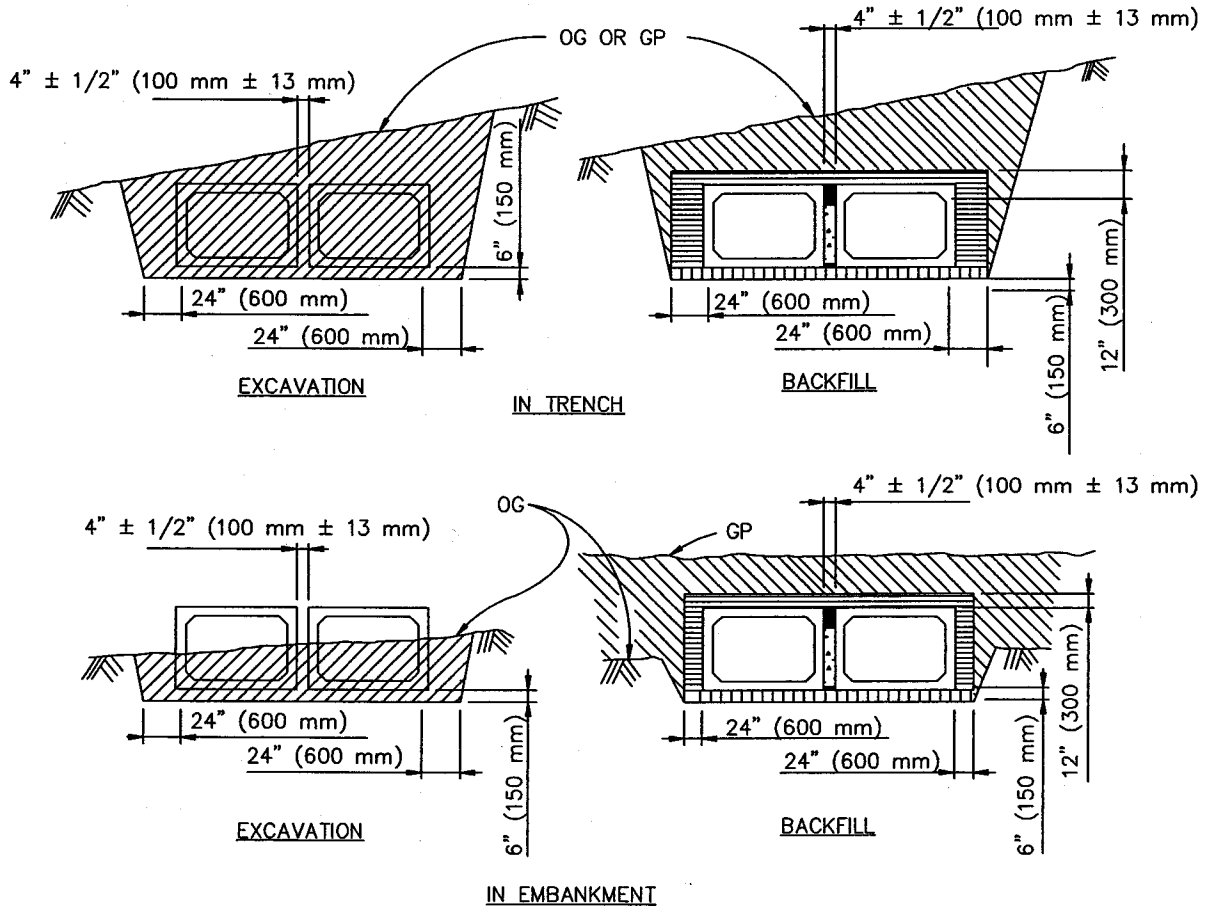
OG = ORIGINAL GROUND GP = GROUND PROFILE



FILL HEIGHT GREATER THAN 24" (600 mm)

EXCAVATION AND BACKFILL DETAILS 1

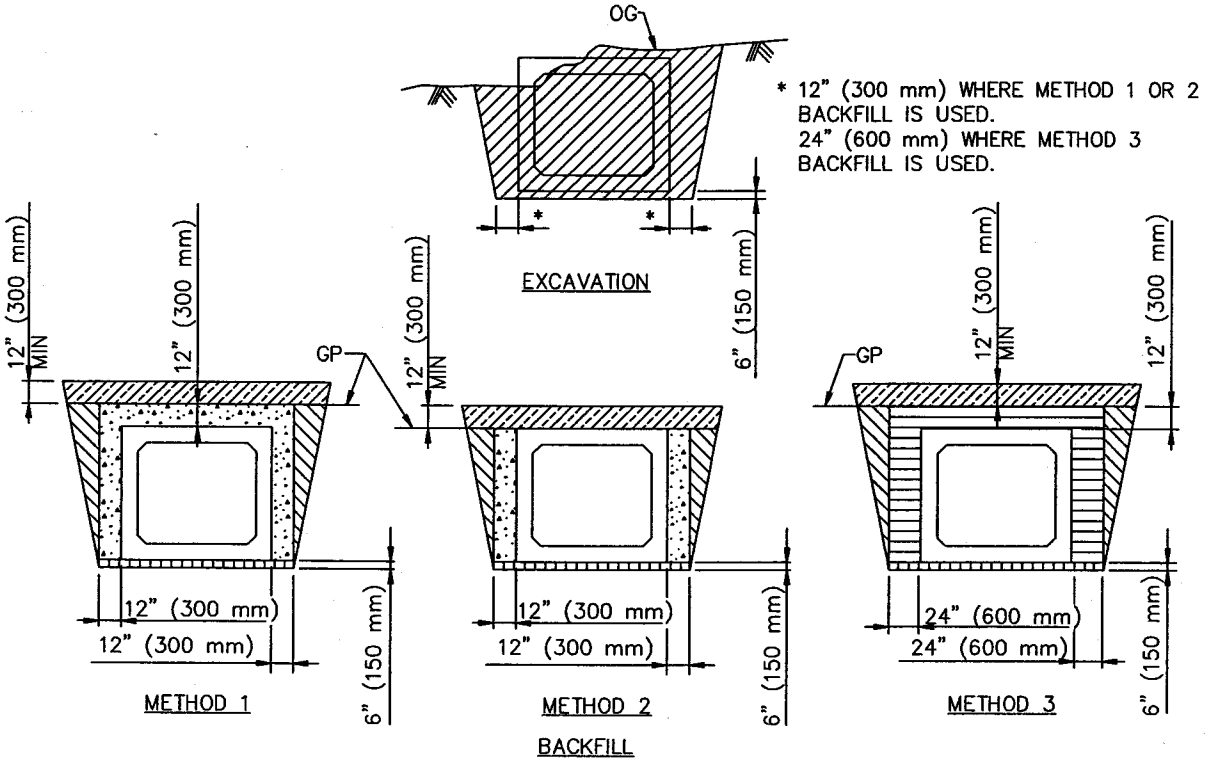
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	**390-0**
	SHEET 7 OF 42



FILL HEIGHT GREATER THAN 24" (600 mm)

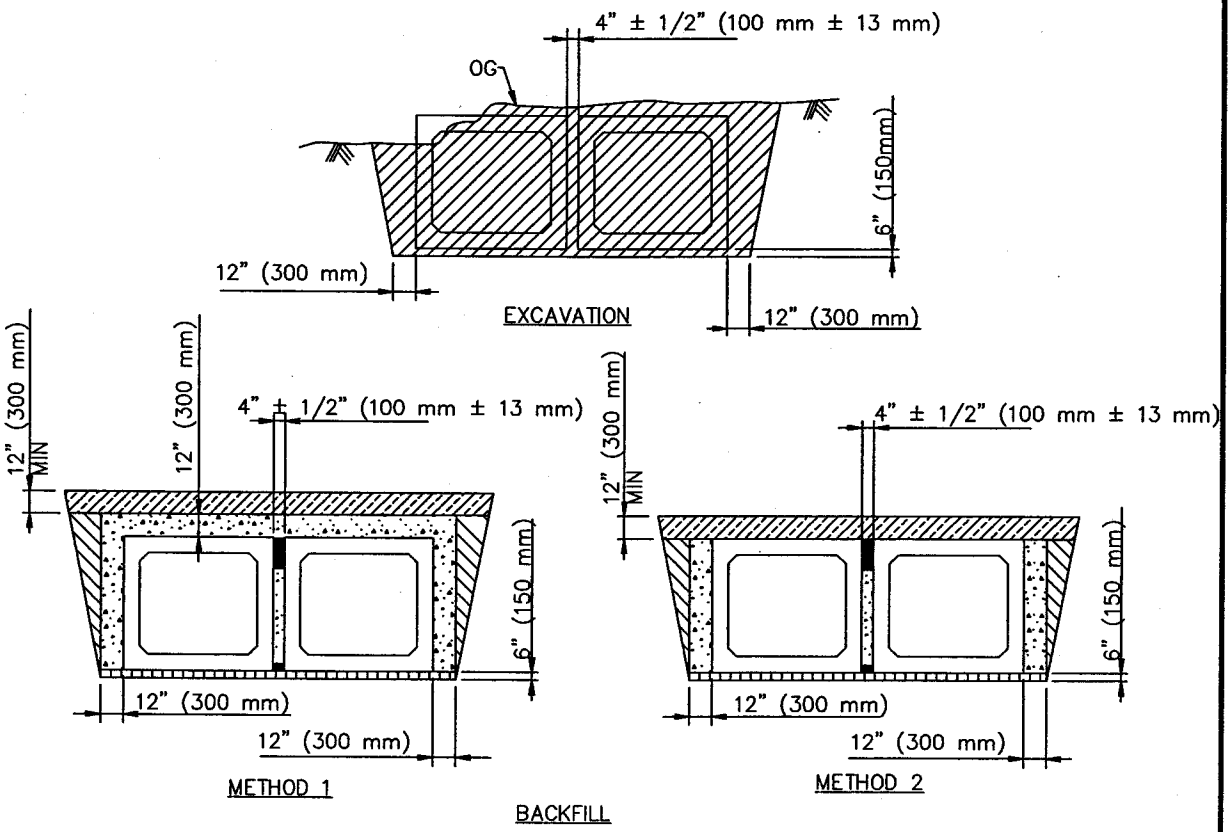
EXCAVATION AND BACKFILL DETAILS 2

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7



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

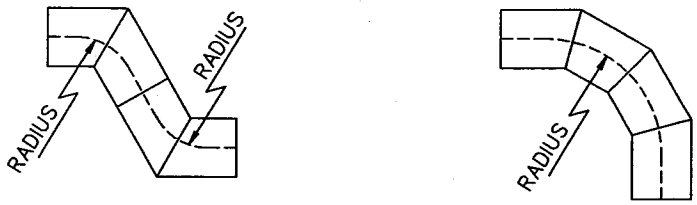
NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7

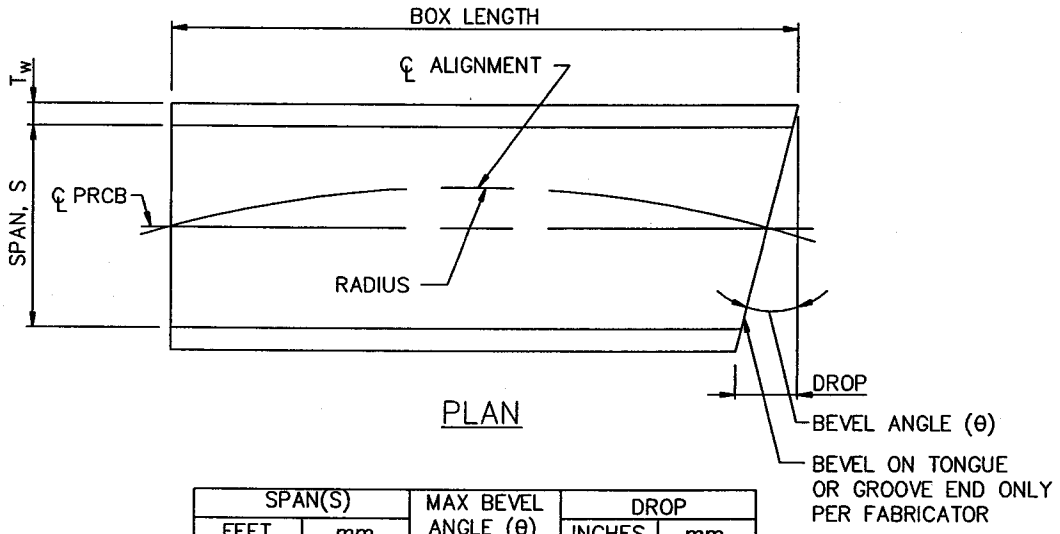


FILL HEIGHT 24" (600 mm) OR LESS
EXCAVATION AND BACKFILL DETAILS 4

NOTE: SEE LEGEND AND TYPICAL NOTES ON SHEET 7

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	**390–0**
	SHEET 10 OF 42



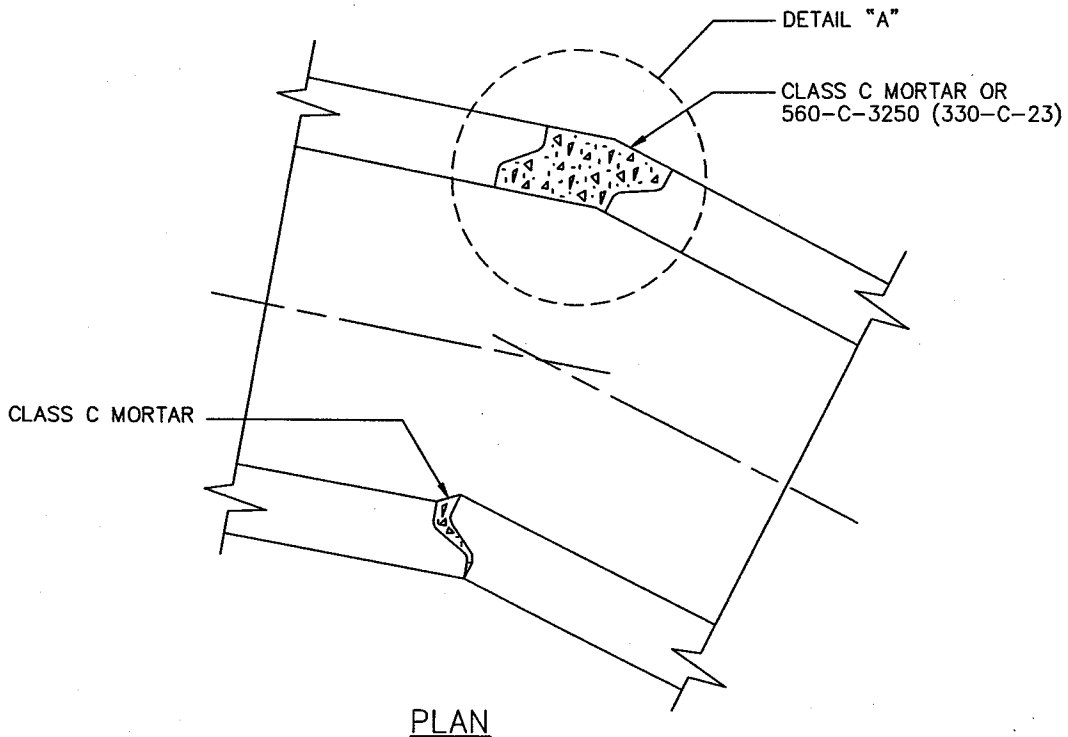


PLAN

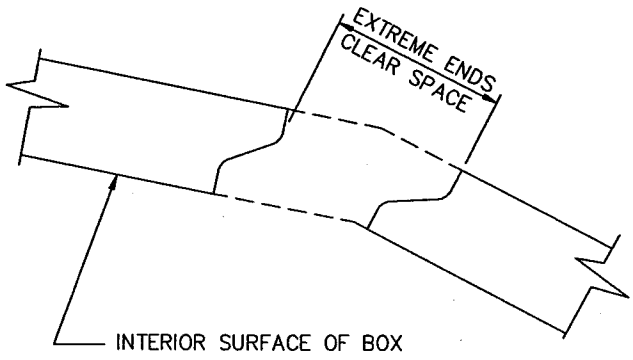
SPAN(S)		MAX BEVEL ANGLE (θ)	DROP	
FEET	mm		INCHES	mm
3	900	5	3.85	97
4	1200	5	5.07	125
5	1500	5	6.30	158
6	1800	5	7.52	188
7	2100	3	5.20	130
8	2400	3	5.87	147
9	2700	3	6.60	165
10	3000	3	7.33	183
11	3300	3	8.07	200
12	3600	3	8.80	220

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

PRECAST REINFORCED CONCRETE BOX BEVELS



PLAN



DETAIL "A"

PRECAST REINFORCED CONCRETE BOX PULLED

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PLAN
PRECAST REINFORCED CONCRETE BOX	390-0
	SHEET 12 OF 42

NOTES:

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

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

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

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

NOTE:

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

SPECIFIC CRITERIA USED FOR TABLES

MATERIAL PROPERTIES:

WELDED WIRE REINFORCEMENT, MINIMUM SPECIFIED YIELD STRESS	65,000 PSI (450 MPa)
DEFORMED BARS, MINIMUM SPECIFIED YIELD STRESS	60,000 PSI (420 MPa)
CONCRETE, MINIMUM SPECIFIED COMPRESSIVE STRENGTH	5,000 PSI (35 MPa)

SOIL DATA:

UNIT WEIGHT	120 lbf/ft^3 (20 kN/m^3)
RATIO OF LATERAL TO VERTICAL PRESSURE FROM WEIGHT TO EARTH	0.50 MAX TO 0.25 MIN
ADDITIONAL LATERAL PRESSURE FROM APPROACHING TRUCK WHEELS	$700/H_e$, lbf/ft^2 ($10/H_e$, kN/m^2) OR 800 lbf/ft^2 (39 kN/m^2) WHEN H_e < 1 FEET (300 mm), WHERE H_e = EARTH COVER, FEET (mm)
EXTERNAL WATER TABLE	BELOW BOX SECTION INVERT
SOIL STRUCTURE INTERACTION FACTOR	1.15

CAPACITY REDUCTION FACTORS (FROM AASHTO BRIDGE SPECIFICATIONS):

SHEAR	0.90
AXIAL COMPRESSION COMBINED WITH BENDING	0.95

LOADING DATA:

LOAD FACTOR = $\delta(\beta_D + \beta_L)$	δ = 1.3 β_D = 1.40 FOR DEAD LOADS β_L = 1.67 FOR LIVE LOADS
TRUCK AXLE LOAD:	
HS20 (MS18)	32,000 lbf (142 kN)
IMPACT (VARIABLE WITH DEPTH)	0 TO 30%

(FROM AASHTO BRIDGE SPECIFICATIONS):

UNIFORM INTERNAL PRESSURE	0.0
DEPTH OF WATER IN BOX SECTION	EQUAL TO INSIDE HEIGHT
EXTERNAL GROUND WATER PRESSURE	0.0

STRUCTURAL ARRANGEMENT:

CONCRETE COVER OVER STEEL	1.0 INCH (25 mm)
TOP SLAB	1.0 INCH (25 mm) FOR FILL HEIGHT 2 FEET (600 mm) AND GREATER, 2.0 INCHES (50 mm) FOR FILL HEIGHTS UNDER 2 FEET (600 mm)
SLAB THICKNESS	FOR FILL HEIGHTS GREATER THAN 2 FEET (600 mm), 1/12 TIMES INSIDE SPAN PLUS 1.0 INCH (25 mm) UP TO 7-FOOT (2100 mm) SPAN, 1/12 INSIDE SPAN ABOVE 7-FOOT (2100 mm) SPAN
SIDE WALL THICKNESS	1/12 TIMES INSIDE SPAN PLUS 1.0 INCH (25 mm) UP TO 7-FOOT (2100 mm) SPAN, 1/12 INSIDE SPAN ABOVE 7-FOOT SPAN (2100 mm)
MINIMUM HAUNCH DIMENSIONS	VERTICAL AND HORIZONTAL DIMENSIONS BOTH EQUAL TO WALL THICKNESS
TRANSVERSE WIRE SPACING	4.0 INCHES (100 mm) MAX
MINIMUM REINFORCING INSIDE FACE SLABS AND SIDE WALLS, OUTSIDE FACE SIDE WALLS AND CORNERS OF SLABS	0.002 x GROSS AREA

SPAN, S	RISE, R	T_t	T_b	T_w	H	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)							
FEET (mm)	FEET (mm)	TOP INCHES (mm)	BOTTOM INCHES (mm)	SIDE INCHES (mm)	HAUNCH INCHES (mm)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}
3 (900)	2 (600)	7 (175)	6 (150)	4 (100)	4 (100)	0.17 (360)	0.38 (804)	0.23 (487)	0.10 (212)	0.22 (466)	0.17 (360)	0.17 (360)	0.14 (296)
3 (900)	3 (900)	7 (175)	6 (150)	4 (100)	4 (100)	0.17 (360)	0.40 (847)	0.25 (529)	0.10 (212)	0.23 (487)	0.17 (360)	0.17 (360)	0.14 (296)
4 (1200)	2 (600)	7.5 (190)	6 (150)	5 (125)	5 (125)	0.18 (381)	0.40 (847)	0.22 (466)	0.12 (254)	0.21 (445)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	3 (900)	7.5 (190)	6 (150)	5 (125)	5 (125)	0.18 (381)	0.45 (953)	0.26 (550)	0.12 (254)	0.23 (487)	0.18 (381)	0.18 (381)	0.14 (296)
4 (1200)	4 (1200)	7.5 (190)	6 (150)	5 (125)	5 (125)	0.18 (381)	0.47 (995)	0.28 (593)	0.12 (254)	0.25 (529)	0.18 (381)	0.18 (381)	0.14 (296)
5 (1500)	3 (900)	8 (200)	7 (175)	6 (150)	6 (150)	0.19 (402)	0.44 (931)	0.24 (508)	0.14 (296)	0.22 (466)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	4 (1200)	8 (200)	7 (175)	6 (150)	6 (150)	0.19 (402)	0.48 (1016)	0.27 (572)	0.14 (296)	0.24 (508)	0.19 (402)	0.19 (402)	0.17 (360)
5 (1500)	5 (1500)	8 (200)	7 (175)	6 (150)	6 (150)	0.19 (402)	0.50 (1059)	0.29 (614)	0.14 (296)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	3 (900)	8 (200)	7 (175)	7 (175)	7 (175)	0.23 (487)	0.45 (953)	0.22 (466)	0.17 (360)	0.22 (466)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	4 (1200)	8 (200)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.49 (1037)	0.25 (529)	0.17 (360)	0.23 (487)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	5 (1500)	8 (200)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.52 (1101)	0.28 (593)	0.17 (360)	0.25 (529)	0.19 (402)	0.19 (402)	0.17 (360)
6 (1800)	6 (1800)	8 (200)	7 (175)	7 (175)	7 (175)	0.19 (402)	0.54 (1143)	0.30 (635)	0.17 (360)	0.26 (550)	0.19 (402)	0.19 (402)	0.17 (360)
7 (2100)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.49 (1037)	0.25 (529)	0.19 (402)	0.23 (487)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	0.23 (487)	0.52 (1101)	0.31 (656)	0.19 (402)	0.24 (508)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	0.21 (445)	0.54 (1143)	0.33 (699)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
7 (2100)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	0.19 (402)	0.56 (1186)	0.36 (762)	0.19 (402)	0.27 (572)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	4 (1200)	8 (200)	8 (200)	8 (200)	8 (200)	0.31 (656)	0.53 (1122)	0.32 (677)	0.19 (402)	0.25 (529)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	5 (1500)	8 (200)	8 (200)	8 (200)	8 (200)	0.28 (593)	0.57 (1207)	0.35 (741)	0.19 (402)	0.26 (550)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	6 (1800)	8 (200)	8 (200)	8 (200)	8 (200)	0.26 (550)	0.59 (1249)	0.37 (783)	0.19 (402)	0.28 (593)	0.22 (466)	0.19 (402)	0.19 (402)
8 (2400)	7 (2100)	8 (200)	8 (200)	8 (200)	8 (200)	0.24 (508)	0.62 (1313)	0.40 (847)	0.20 (423)	0.29 (614)	0.19 (402)	0.19 (402)	0.19 (402)
8 (2400)	8 (2400)	8 (200)	8 (200)	8 (200)	8 (200)	0.22 (466)	0.64 (1335)	0.42 (889)	0.24 (508)	0.30 (635)	0.19 (402)	0.19 (402)	0.19 (402)
9 (2700)	5 (1500)	9 (225)	9 (225)	9 (225)	9 (225)	0.29 (614)	0.53 (1122)	0.33 (699)	0.22 (466)	0.25 (529)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	6 (1800)	9 (225)	9 (225)	9 (225)	9 (225)	0.27 (572)	0.56 (1186)	0.35 (741)	0.22 (466)	0.26 (550)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	7 (2100)	9 (225)	9 (225)	9 (225)	9 (225)	0.25 (529)	0.58 (1228)	0.38 (804)	0.22 (466)	0.27 (572)	0.22 (466)	0.22 (466)	0.22 (466)

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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390–0
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SPAN, S	RISE, R	T_t TOP	T_b BOTTOM	T_w SIDE	H HAUNCH	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)							
FEET (mm)	FEET (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.41 (868)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	0.24 (508)	0.62 (1313)	0.44 (931)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.34 (720)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.37 (783)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.40 (847)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.43 (910)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.46 (974)	0.25 (529)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.49 (1037)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	0.37 (783)	0.44 (931)	0.33 (699)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.36 (762)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.39 (826)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.43 (910)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.46 (974)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.49 (1037)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.52 (1101)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.55 (1164)	0.30 (635)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.58 (1228)	0.38 (804)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)

SHALLOW COVER BOXES – COVER 0' TO 2' (0 TO 610 mm)
STEEL COVER 1.5" (38 mm) AT TOP OF INVERT SLAB

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
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PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 18 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
3' x 2' x 4" (900 x 600 x 100 mm)					
3 (915)	0.13 (275)	0.21 (445)	0.26 (550)	0.10 (217)	31 (775)
5 (1525)	0.10 (217)	0.10 (217)	0.11 (233)	0.10 (217)	31 (775)
10 (3000) *	0.10 (217)	0.11 (233)	0.14 (296)	0.10 (217)	31 (775)
15 (4500) *	0.10 (217)	0.16 (339)	0.20 (423)	0.10 (217)	31 (775)
20 (6000) *	0.12 (254)	0.22 (466)	0.25 (529)	0.10 (217)	31 (775)
25 (7500) *	0.16 (339)	0.28 (593)	0.35 (741)	0.10 (217)	31 (775)
3' x 3' x 4" (900 x 900 x 100 mm)					
3 (915)	0.10 (217)	0.25 (529)	0.31 (656)	0.10 (217)	31 (775)
5 (1525)	0.10 (217)	0.11 (233)	0.12 (254)	0.10 (217)	31 (775)
10 (3000) *	0.10 (217)	0.11 (233)	0.14 (296)	0.10 (217)	31 (775)
15 (4500) *	0.10 (217)	0.16 (339)	0.21 (445)	0.10 (217)	31 (775)
20 (6000) *	0.10 (217)	0.22 (466)	0.28 (593)	0.10 (217)	31 (775)
25 (7500) *	0.11 (233)	0.28 (593)	0.36 (762)	0.10 (217)	31 (775)
4' x 2' x 5" (1200 x 600 x 125 mm)					
3 (915)	0.21 (445)	0.23 (489)	0.23 (489)	0.12 (254)	38 (950)
5 (1525)	0.12 (254)	0.12 (254)	0.13 (275)	0.12 (254)	38 (950)
10 (3000) *	0.12 (254)	0.14 (296)	0.16 (339)	0.12 (254)	38 (950)
15 (4500) *	0.16 (339)	0.20 (423)	0.24 (508)	0.12 (254)	38 (950)
20 (6000) *	0.22 (466)	0.27 (572)	0.32 (677)	0.12 (254)	38 (950)
25 (7500) *	0.28 (593)	0.34 (720)	0.40 (847)	0.12 (254)	38 (950)

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

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 19 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
5' x 4' x 6" (1500 x 1200 x 150 mm)						
3	(915)	0.18 (381)	0.33 (699)	0.28 (593)	0.14 (296)	45 (1125)
5	(1525)	0.14 (296)	0.16 (339)	0.19 (402)	0.14 (296)	45 (1125)
10	(3000)	0.14 (296)	0.20 (423)	0.24 (508)	0.14 (296)	36 (900)
15	(4500)	0.15 (318)	0.29 (614)	0.34 (720)	0.14 (296)	35 (875)
20	(6000)	0.20 (423)	0.39 (826)	0.45 (953)	0.14 (296)	35 (875)
25	(7500) *	0.25 (529)	0.49 (1037)	0.57 (1207)	0.14 (296)	35 (875)
5' x 5' x 6" (1500 x 1500 x 150 mm)						
3	(915)	0.16 (339)	0.35 (741)	0.31 (656)	0.14 (296)	45 (1125)
5	(1525)	0.14 (296)	0.17 (360)	0.20 (423)	0.14 (296)	45 (1125)
10	(3000)	0.14 (296)	0.20 (423)	0.25 (529)	0.14 (296)	45 (1125)
15	(4500)	0.14 (296)	0.29 (614)	0.35 (741)	0.14 (296)	36 (900)
20	(6000)	0.17 (360)	0.39 (826)	0.46 (974)	0.14 (296)	35 (875)
25	(7500) *	0.21 (445)	0.49 (1037)	0.58 (1228)	0.14 (296)	35 (875)
6' x 3' x 7" (1800 x 900 x 175 mm)						
3	(915)	0.24 (508)	0.29 (614)	0.24 (508)	0.17 (360)	43 (1075)
5	(1525)	0.17 (360)	0.17 (360)	0.16 (339)	0.17 (360)	40 (1000)
10	(3000)	0.17 (360)	0.21 (445)	0.25 (529)	0.17 (360)	39 (975)
15	(4500)	0.25 (529)	0.31 (656)	0.36 (762)	0.17 (360)	38 (950)
20	(6000)	0.34 (720)	0.41 (868)	0.47 (995)	0.17 (360)	38 (950)
25	(7500) *	0.44 (931)	0.52 (1101)	0.58 (1228)	0.17 (360)	38 (950)

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
6' x 4' x 7" (1800 x 1200 x 175 mm)						
3	(915)	0.22 (466)	0.33 (699)	0.27 (572)	0.17 (360)	43 (1075)
5	(1525)	0.17 (360)	0.18 (381)	0.21 (445)	0.17 (360)	40 (1000)
10	(3000)	0.17 (360)	0.22 (466)	0.27 (572)	0.17 (360)	39 (975)
15	(4500)	0.21 (445)	0.33 (699)	0.39 (826)	0.17 (360)	38 (950)
20	(6000)	0.28 (593)	0.44 (931)	0.50 (1059)	0.17 (360)	38 (950)
25	(7500) *	0.35 (741)	0.56 (1186)	0.64 (1335)	0.17 (360)	38 (950)
6' x 5' x 7" (1800 x 1500 x 175 mm)						
3	(915)	0.19 (402)	0.36 (762)	0.30 (635)	0.17 (360)	52 (1300)
5	(1525)	0.17 (360)	0.20 (423)	0.23 (487)	0.17 (360)	43 (1075)
10	(3000)	0.17 (360)	0.24 (508)	0.29 (614)	0.17 (360)	39 (975)
15	(4500)	0.18 (381)	0.35 (741)	0.42 (889)	0.17 (360)	38 (950)
20	(6000)	0.24 (508)	0.47 (995)	0.54 (1143)	0.17 (360)	38 (950)
25	(7500) *	0.30 (635)	0.59 (1249)	0.68 (1439)	0.17 (360)	38 (950)
6' x 6' x 7" (1800 x 1800 x 175 mm)						
3	(915)	0.17 (360)	0.38 (804)	0.32 (677)	0.17 (360)	52 (1300)
5	(1525)	0.17 (360)	0.20 (423)	0.24 (508)	0.17 (360)	52 (1300)
10	(3000)	0.17 (360)	0.23 (487)	0.29 (614)	0.17 (360)	43 (1075)
15	(4500)	0.17 (360)	0.34 (720)	0.41 (868)	0.17 (360)	39 (975)
20	(6000)	0.21 (445)	0.46 (974)	0.54 (1143)	0.17 (360)	38 (950)
25	(7500) *	0.27 (572)	0.58 (1228)	0.67 (1418)	0.17 (360)	38 (950)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 20 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 4' x 8" (2100 x 1200 x 200 mm)						
3	(915)	0.24 (508)	0.33 (699)	0.33 (699)	0.19 (402)	47 (1175)
5	(1525)	0.19 (402)	0.21 (445)	0.24 (508)	0.19 (402)	43 (1075)
10	(3000)	0.19 (402)	0.26 (550)	0.31 (656)	0.19 (402)	43 (1075)
15	(4500)	0.28 (593)	0.38 (804)	0.44 (931)	0.19 (402)	41 (1025)
20	(6000)	0.37 (783)	0.51 (1080)	0.57 (1207)	0.19 (402)	41 (1025)
25	(7500) *	0.47 (995)	0.64 (1355)	0.71 (1503)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)						
3	(915)	0.22 (466)	0.36 (762)	0.36 (762)	0.19 (402)	59 (1475)
5	(1525)	0.19 (402)	0.23 (489)	0.26 (550)	0.19 (402)	43 (1075)
10	(3000)	0.19 (402)	0.28 (593)	0.33 (699)	0.19 (402)	43 (1075)
15	(4500)	0.24 (508)	0.41 (868)	0.48 (1016)	0.19 (402)	41 (1025)
20	(6000)	0.32 (677)	0.54 (1143)	0.62 (1312)	0.19 (402)	41 (1025)
25	(7500) *	0.40 (847)	0.68 (1438)	0.76 (1609)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)						
3	(915)	0.20 (423)	0.39 (826)	0.39 (826)	0.19 (402)	59 (1475)
5	(1525)	0.19 (402)	0.24 (508)	0.28 (593)	0.19 (402)	47 (1175)
10	(3000)	0.19 (402)	0.29 (614)	0.35 (741)	0.19 (402)	43 (1075)
15	(4500)	0.21 (445)	0.42 (889)	0.50 (1058)	0.19 (402)	41 (1025)
20	(6000)	0.28 (593)	0.55 (1164)	0.64 (1355)	0.19 (402)	41 (1025)
25	(7500) *	0.35 (741)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 7' x 8" (2100 x 2100 x 200 mm)						
3	(915)	0.19 (402)	0.41 (868)	0.41 (868)	0.19 (402)	59 (1475)
5	(1525)	0.19 (402)	0.25 (529)	0.30 (635)	0.19 (402)	59 (1475)
10	(3000)	0.19 (402)	0.29 (614)	0.36 (762)	0.19 (402)	47 (1175)
15	(4500)	0.20 (423)	0.42 (889)	0.50 (1058)	0.19 (402)	43 (1075)
20	(6000)	0.26 (550)	0.56 (1185)	0.65 (1376)	0.19 (402)	41 (1025)
25	(7500) *	0.32 (677)	0.70 (1482)	0.80 (1693)	0.19 (402)	41 (1025)
8' x 4' x 8" (2400 x 1200 x 200 mm)						
3	(915)	0.32 (677)	0.39 (826)	0.38 (804)	0.19 (402)	50 (1250)
5	(1525)	0.22 (466)	0.26 (550)	0.29 (614)	0.19 (402)	45 (1125)
10	(3000)	0.28 (593)	0.33 (699)	0.39 (826)	0.19 (402)	45 (1125)
15	(4500)	0.42 (889)	0.49 (1037)	0.56 (1185)	0.19 (402)	41 (1025)
20	(6000) *	0.57 (1207)	0.65 (1376)	0.73 (1545)	0.19 (402)	41 (1025)
25	(7500) *	0.73 (1545)	0.83 (1757)	0.92 (1947)	0.19 (402)	41 (1025)
8' x 5' x 8" (2400 x 1500 x 200 mm)						
3	(915)	0.28 (593)	0.42 (889)	0.42 (889)	0.19 (402)	50 (1250)
5	(1525)	0.20 (423)	0.28 (593)	0.33 (699)	0.19 (402)	50 (1250)
10	(3000)	0.25 (529)	0.35 (741)	0.42 (889)	0.19 (402)	45 (1125)
15	(4500)	0.37 (783)	0.52 (1101)	0.60 (1270)	0.19 (402)	41 (1025)
20	(6000) *	0.49 (1037)	0.70 (1482)	0.79 (1672)	0.19 (402)	41 (1025)
25	(7500) *	0.63 (1334)	0.89 (1884)	1.00 (2117)	0.19 (402)	41 (1025)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 21 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)					
3 (915)	0.25 (529)	0.45 (953)	0.45 (953)	0.19 (402)	55 (1375)
5 (1525)	0.19 (402)	0.30 (635)	0.35 (741)	0.19 (402)	50 (1250)
10 (3000)	0.23 (489)	0.37 (783)	0.45 (953)	0.19 (402)	45 (1125)
15 (4500)	0.33 (699)	0.55 (1164)	0.63 (1334)	0.19 (402)	41 (1025)
20 (6000) *	0.44 (931)	0.73 (1545)	0.83 (1757)	0.19 (402)	41 (1025)
25 (7500) *	0.56 (1185)	0.93 (1969)	1.05 (2223)	0.19 (402)	41 (1025)
8' x 7' x 8" (2400 x 2100 x 200 mm)					
3 (915)	0.23 (489)	0.47 (995)	0.49 (1037)	0.19 (402)	66 (1650)
5 (1525)	0.19 (402)	0.31 (656)	0.37 (783)	0.19 (402)	55 (1375)
10 (3000)	0.21 (445)	0.38 (804)	0.46 (974)	0.19 (402)	45 (1125)
15 (4500)	0.30 (635)	0.56 (1185)	0.65 (1376)	0.19 (402)	41 (1025)
20 (6000) *	0.40 (847)	0.75 (1588)	0.86 (1821)	0.19 (402)	41 (1025)
25 (7500) *	0.51 (1080)	0.95 (2011)	1.08 (2286)	0.19 (402)	41 (1025)
8' x 8' x 8" (2400 x 2400 x 200 mm)					
3 (915)	0.22 (466)	0.49 (1037)	0.52 (1101)	0.19 (402)	65 (1625)
5 (1525)	0.19 (402)	0.33 (699)	0.39 (826)	0.19 (402)	65 (1625)
10 (3000)	0.20 (423)	0.39 (826)	0.48 (1016)	0.19 (402)	50 (1250)
15 (4500)	0.29 (614)	0.56 (1185)	0.66 (1397)	0.19 (402)	45 (1125)
20 (6000) *	0.38 (804)	0.75 (1588)	0.87 (1482)	0.19 (402)	45 (1125)
25 (7500) *	0.48 (1016)	0.95 (2011)	1.09 (2308)	0.19 (402)	45 (1125)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
9' x 5' x 9" (2700 x 1500 x 225 mm)					
3 (915)	0.34 (720)	0.44 (931)	0.58 (1228)	0.22 (466)	54 (1350)
5 (1525)	0.24 (508)	0.30 (635)	0.35 (741)	0.22 (466)	49 (1225)
10 (3000)	0.30 (635)	0.38 (804)	0.46 (974)	0.22 (466)	49 (1225)
15 (4500)	0.44 (931)	0.56 (1185)	0.62 (1312)	0.22 (466)	44 (1100)
20 (6000) *	0.59 (1249)	0.75 (1588)	0.85 (1799)	0.22 (466)	44 (1100)
25 (7500) *	0.76 (1609)	0.95 (2011)	1.05 (2223)	0.22 (466)	44 (1100)
9' x 6' x 9" (3300 x 1800 x 225 mm)					
3 (915)	0.37 (783)	0.47 (995)	0.52 (1101)	0.22 (466)	59 (1475)
5 (1525)	0.22 (466)	0.32 (677)	0.37 (783)	0.22 (466)	54 (1350)
10 (3000)	0.24 (508)	0.40 (847)	0.49 (1037)	0.22 (466)	49 (1225)
15 (4500)	0.40 (847)	0.59 (1249)	0.69 (1461)	0.22 (466)	44 (1100)
20 (6000) *	0.53 (1122)	0.79 (1672)	0.89 (1884)	0.22 (466)	44 (1100)
25 (7500) *	0.68 (1438)	1.00 (2117)	1.12 (2371)	0.22 (466)	44 (1100)
9' x 7' x 9" (2700 x 2100 x 225 mm)					
3 (915)	0.28 (593)	0.49 (1037)	0.53 (1122)	0.22 (466)	59 (1475)
5 (1525)	0.22 (466)	0.34 (720)	0.40 (847)	0.22 (466)	54 (1350)
10 (3000)	0.25 (529)	0.42 (889)	0.51 (1080)	0.22 (466)	49 (1225)
15 (4500)	0.36 (762)	0.61 (1291)	0.72 (1524)	0.22 (466)	44 (1100)
20 (6000) *	0.48 (1016)	0.82 (1736)	0.93 (1969)	0.22 (466)	44 (1100)
25 (7500) *	0.61 (1291)	1.04 (2202)	1.17 (2477)	0.22 (466)	44 (1100)

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)	H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}				A_{S1}	A_{S2}	A_{S3}	A_{S4}	
9' x 8' x 9" (2700 x 2400 x 225 mm)							10' x 6' x 10" (3300 x 1800 x 250 mm)						
3	(915)	0.26 (550)	0.51 (1080)	0.57 (1207)	0.22 (466)	72 (1800)	3	(915)	0.35 (741)	0.49 (1037)	0.52 (1101)	0.24 (508)	58 (1450)
5	(1525)	0.22 (466)	0.35 (741)	0.42 (889)	0.22 (466)	59 (1475)	5	(1525)	0.26 (550)	0.34 (720)	0.40 (868)	0.24 (508)	52 (1300)
10	(3000)	0.24 (508)	0.43 (910)	0.53 (1122)	0.22 (466)	54 (1350)	10	(3000)	0.32 (677)	0.44 (931)	0.52 (1101)	0.24 (508)	52 (1300)
15	(4500)	0.34 (720)	0.63 (1334)	0.74 (1566)	0.22 (466)	44 (1100)	15	(4500)	0.47 (995)	0.64 (1355)	0.74 (1566)	0.24 (508)	47 (1175)
20	(6000) *	0.45 (953)	0.83 (1757)	0.95 (2011)	0.22 (466)	44 (1100)	20	(6000) *	0.63 (1334)	0.85 (1799)	0.96 (2032)	0.24 (508)	47 (1175)
25	(7500) *	0.57 (1207)	1.05 (2223)	1.19 (2519)	0.22 (466)	44 (1100)	25	(7500) *	0.80 (1693)	1.07 (2265)	1.18 (2498)	0.24 (508)	47 (1175)
9' x 9' x 9" (2700 x 2700 x 225 mm)							10' x 7' x 10" (3000 x 2100 x 250 mm)						
3	(915)	0.25 (529)	0.53 (1122)	0.60 (1270)	0.22 (466)	72 (1800)	3	(915)	0.32 (677)	0.51 (1080)	0.56 (1185)	0.24 (508)	64 (1600)
5	(1525)	0.22 (466)	0.37 (783)	0.44 (931)	0.22 (466)	72 (1800)	5	(1525)	0.24 (508)	0.36 (762)	0.43 (910)	0.24 (508)	58 (1450)
10	(3000)	0.23 (487)	0.43 (910)	0.54 (1143)	0.22 (466)	59 (1475)	10	(3000)	0.30 (635)	0.46 (974)	0.55 (1164)	0.24 (508)	52 (1300)
15	(4500)	0.32 (677)	0.63 (1334)	0.75 (1588)	0.22 (466)	49 (1225)	15	(4500)	0.43 (910)	0.67 (1418)	0.78 (1651)	0.24 (508)	47 (1175)
20	(6000) *	0.43 (910)	0.84 (1778)	0.96 (2032)	0.22 (466)	49 (1225)	20	(6000) *	0.57 (1207)	0.89 (1884)	1.01 (2138)	0.24 (508)	47 (1175)
25	(7500) *	0.54 (1143)	1.05 (2223)	1.20 (2540)	0.22 (466)	44 (1100)	25	(7500) *	0.73 (1545)	1.12 (2371)	1.24 (2625)	0.24 (508)	47 (1175)
10' x 5' x 10" (3000 x 1500 x 250 mm)							10' x 8' x 10" (3000 x 2400 x 250 mm)						
3	(915)	0.38 (804)	0.46 (974)	0.48 (1016)	0.24 (508)	58 (1450)	3	(915)	0.30 (635)	0.54 (1143)	0.60 (1270)	0.24 (508)	64 (1600)
5	(1525)	0.28 (593)	0.32 (677)	0.37 (783)	0.24 (508)	52 (1300)	5	(1525)	0.21 (445)	0.38 (804)	0.46 (974)	0.24 (508)	58 (1450)
10	(3000)	0.35 (741)	0.41 (868)	0.49 (1037)	0.24 (508)	52 (1300)	10	(3000)	0.28 (593)	0.47 (995)	0.58 (1228)	0.24 (508)	52 (1300)
15	(4500)	0.52 (1101)	0.60 (1270)	0.70 (1482)	0.24 (508)	47 (1175)	15	(4500)	0.40 (868)	0.68 (1439)	0.81 (1715)	0.24 (508)	47 (1175)
20	(6000) *	0.70 (1482)	0.80 (1693)	0.91 (1926)	0.24 (508)	47 (1175)	20	(6000) *	0.53 (1122)	0.91 (1926)	1.04 (2201)	0.24 (508)	47 (1175)
25	(7500) *	0.90 (1905)	1.01 (2138)	1.11 (2350)	0.24 (508)	47 (1175)	25	(7500) *	0.67 (1418)	1.15 (2434)	1.28 (2709)	0.24 (508)	47 (1175)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

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PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

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SHEET 23 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
10' x 9' x 10" (3000 x 2700 x 250 mm)							
3	(915)		0.28 (593)	0.56 (1185)	0.64 (1355)	0.24 (508)	79 (1975)
5	(1525)		0.24 (508)	0.39 (826)	0.48 (1016)	0.24 (508)	64 (1600)
10	(3000)		0.27 (572)	0.48 (1016)	0.60 (1270)	0.24 (508)	58 (1450)
15	(4500)		0.38 (804)	0.69 (1461)	0.83 (1757)	0.24 (508)	47 (1175)
20	(6000)	*	0.50 (1058)	0.92 (1947)	1.06 (2244)	0.24 (508)	47 (1175)
25	(7500)	*	0.63 (1334)	1.16 (2455)	1.31 (2773)	0.24 (508)	47 (1175)
10' x 10' x 10" (3000 x 3000 x 250 mm)							
3	(915)		0.27 (572)	0.57 (1207)	0.68 (1439)	0.24 (508)	79 (1975)
5	(1525)		0.24 (508)	0.41 (868)	0.50 (1058)	0.24 (508)	70 (1750)
10	(3000)		0.26 (550)	0.48 (1016)	0.61 (1291)	0.24 (508)	64 (1600)
15	(4500)		0.36 (762)	0.70 (1482)	0.84 (1778)	0.24 (508)	52 (1300)
20	(6000)	*	0.48 (1016)	0.92 (1947)	1.07 (2265)	0.24 (508)	52 (1300)
25	(7500)	*	0.60 (1270)	1.16 (2455)	1.32 (2794)	0.24 (508)	47 (1175)
12' x 4' x 12" (3600 x 1200 x 300 mm)							
3	(915)		0.50 (1058)	0.44 (931)	0.45 (953)	0.29 (614)	73 (1825)
5	(1525)		0.40 (847)	0.33 (699)	0.38 (804)	0.29 (614)	66 (1650)
10	(3000)		0.51 (1080)	0.42 (889)	0.51 (1080)	0.29 (614)	59 (1475)
15	(4500)		0.76 (1609)	0.61 (1291)	0.72 (1524)	0.29 (614)	59 (1475)
20	(6000)		1.03 (2180)	0.81 (1715)	0.94 (1990)	0.29 (614)	59 (1475)
25	(7500)	*	1.32 (2794)	1.02 (2159)	1.15 (2434)	0.29 (614)	59 (1475)

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 5' x 12" (3600 x 1500 x 300 mm)							
3	(915)		0.47 (995)	0.48 (1016)	0.50 (1059)	0.29 (614)	73 (1825)
5	(1525)		0.37 (783)	0.36 (762)	0.42 (889)	0.29 (614)	66 (1650)
10	(3000)		0.47 (995)	0.46 (974)	0.56 (1186)	0.29 (614)	59 (1475)
15	(4500)		0.69 (1461)	0.67 (1418)	0.79 (1672)	0.29 (614)	59 (1475)
20	(6000)		0.92 (1947)	0.89 (1884)	1.02 (2159)	0.29 (614)	59 (1475)
25	(7500)	*	1.18 (2498)	1.12 (2371)	1.25 (2646)	0.29 (614)	59 (1475)
12' x 6' x 12" (3600 x 1800 x 300 mm)							
3	(915)		0.44 (931)	0.52 (1101)	0.54 (1143)	0.29 (614)	66 (1650)
5	(1525)		0.34 (720)	0.39 (826)	0.46 (974)	0.29 (614)	59 (1475)
10	(3000)		0.43 (910)	0.49 (1037)	0.60 (1270)	0.29 (614)	59 (1475)
15	(4500)		0.63 (1334)	0.72 (1524)	0.85 (1799)	0.29 (614)	53 (1325)
20	(6000)	*	0.84 (1778)	0.95 (2011)	1.09 (2307)	0.29 (614)	53 (1325)
25	(7500)	*	1.07 (2265)	1.20 (2540)	1.34 (2836)	0.29 (614)	53 (1325)
12' x 7' x 12" (3600 x 2100 x 300 mm)							
3	(915)		0.41 (868)	0.55 (1164)	0.59 (1249)	0.29 (614)	66 (1650)
5	(1525)		0.32 (677)	0.41 (868)	0.49 (1037)	0.29 (614)	59 (1475)
10	(3000)		0.40 (847)	0.52 (1101)	0.64 (1355)	0.29 (614)	59 (1475)
15	(4500)		0.58 (1228)	0.76 (1609)	0.89 (1884)	0.29 (614)	53 (1325)
20	(6000)	*	0.77 (1630)	1.00 (2117)	1.15 (2434)	0.29 (614)	53 (1325)
25	(7500)	*	0.97 (2053)	1.26 (2667)	1.41 (2985)	0.29 (614)	53 (1325)

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 8' x 12" (3600 x 2400 x 300 mm)							
3	(915)		0.39 (826)	0.58 (1228)	0.63 (1334)	0.29 (614)	66 (1650)
5	(1525)		0.30 (635)	0.43 (910)	0.52 (1101)	0.29 (614)	59 (1475)
10	(3000)		0.38 (804)	0.54 (1143)	0.67 (1418)	0.29 (614)	59 (1475)
15	(4500)		0.54 (1143)	0.79 (1672)	0.93 (1969)	0.29 (614)	53 (1325)
20	(6000)	*	0.71 (1503)	1.04 (2201)	1.20 (2540)	0.29 (614)	53 (1325)
25	(7500)	*	0.90 (1905)	1.31 (2773)	1.47 (3112)	0.29 (614)	53 (1325)
12' x 9' x 12" (3600 x 2700 x 300 mm)							
3	(915)		0.37 (783)	0.61 (1291)	0.67 (1418)	0.29 (614)	80 (2000)
5	(1525)		0.29 (614)	0.45 (953)	0.55 (1164)	0.29 (614)	66 (1650)
10	(3000)		0.36 (762)	0.56 (1185)	0.70 (1482)	0.29 (614)	59 (1475)
15	(4500)		0.50 (1058)	0.81 (1715)	0.97 (2053)	0.29 (614)	53 (1325)
20	(6000)	*	0.66 (1397)	1.07 (2265)	1.24 (2625)	0.29 (614)	53 (1325)
25	(7500)	*	0.84 (1778)	1.35 (2858)	1.51 (3196)	0.29 (614)	53 (1325)
12' x 10' x 12" (3600 x 3000 x 300 mm)							
3	(915)		0.34 (720)	0.64 (1355)	0.71 (1503)	0.29 (614)	80 (2000)
5	(1525)		0.29 (614)	0.47 (995)	0.58 (1228)	0.29 (614)	66 (1650)
10	(3000)		0.34 (720)	0.57 (1207)	0.72 (1524)	0.29 (614)	59 (1475)
15	(4500)		0.48 (1016)	0.83 (1757)	1.00 (2117)	0.29 (614)	53 (1325)
20	(6000)	*	0.63 (1334)	1.09 (2307)	1.27 (2688)	0.29 (614)	53 (1325)
25	(7500)	*	0.79 (1672)	1.37 (2900)	1.54 (3260)	0.29 (614)	53 (1325)

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 11' x 12" (3600 x 3300 x 300 mm)							
3	(915)		0.35 (741)	0.66 (1397)	0.75 (1588)	0.29 (614)	93 (2325)
5	(1525)		0.29 (614)	0.48 (1016)	0.61 (1291)	0.29 (614)	80 (2000)
10	(3000)		0.33 (699)	0.58 (1228)	0.74 (1566)	0.29 (614)	73 (1825)
15	(4500)		0.46 (974)	0.84 (779)	1.02 (2159)	0.29 (614)	59 (1475)
20	(6000)	*	0.60 (1270)	1.10 (2328)	1.29 (2731)	0.29 (614)	59 (1475)
25	(7500)	*	0.75 (1588)	1.38 (2921)	1.56 (3302)	0.29 (614)	59 (1475)
12' x 12' x 12" (3600 x 3600 x 300 mm)							
3	(915)		0.31 (656)	0.69 (1461)	0.79 (1672)	0.29 (614)	93 (2325)
5	(1525)		0.29 (614)	0.50 (1058)	0.63 (1334)	0.29 (614)	80 (2000)
10	(3000)		0.32 (677)	0.59 (1249)	0.76 (1609)	0.29 (614)	73 (1825)
15	(4500)		0.45 (953)	0.84 (1778)	1.03 (2180)	0.29 (614)	59 (1475)
20	(6000)	*	0.58 (1228)	1.11 (2350)	1.30 (2752)	0.29 (614)	59 (1475)
25	(7500)	*	0.73 (1545)	1.38 (2921)	1.58 (3344)	0.29 (614)	59 (1475)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

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

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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390–0
SHEET 25 OF 42

SPAN, S	RISE, R	T_t	T_b	T_w	H	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)							
FEET (mm)	FEET (mm)	TOP INCHES (mm)	BOTTOM INCHES (mm)	SIDE INCHES (mm)	HAUNCH INCHES (mm)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.48 (1016)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	0.25 (529)	0.62 (1313)	0.54 (1143)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.38 (804)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.42 (889)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.45 (953)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.48 (1016)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.57 (1207)	0.24 (508)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.60 (1270)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	0.40 (847)	0.44 (931)	0.40 (847)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.44 (931)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.49 (1037)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.53 (1122)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.57 (1207)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.60 (1270)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.64 (1355)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.68 (1439)	0.29 (614)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.72 (1524)	0.29 (614)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)

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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390–0
SHEET 26 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m) A_{S1}	A_{S2}	A_{S3}	A_{S4}	M INCHES (mm)
3' x 2' x 4" (900 x 600 x 100 mm)					
3 (915)	0.12 (254)	0.21 (445)	0.33 (699)	0.10 (217)	31 (775)
5 (1525)	0.10 (217)	0.10 (217)	0.17 (360)	0.10 (217)	31 (775)
10 (3000)	0.10 (217)	0.12 (254)	0.24 (508)	0.10 (217)	31 (775)
15 (4500)	0.10 (217)	0.18 (381)	0.33 (699)	0.10 (217)	31 (775)
20 (6000) *	0.13 (275)	0.23 (487)	0.43 (910)	0.10 (217)	31 (775)
3' x 3' x 4" (900 x 900 x 100 mm)					
3 (915)	0.10 (217)	0.25 (529)	0.39 (826)	0.10 (217)	31 (775)
5 (1525)	0.10 (217)	0.12 (254)	0.21 (445)	0.10 (217)	31 (775)
10 (3000)	0.10 (217)	0.13 (275)	0.24 (508)	0.10 (217)	31 (775)
15 (4500)	0.10 (217)	0.18 (381)	0.34 (720)	0.10 (217)	31 (775)
20 (6000) *	0.10 (217)	0.24 (508)	0.43 (910)	0.10 (217)	31 (775)
4' x 2' x 5" (1200 x 600 x 125 mm)					
3 (915)	0.21 (445)	0.23 (489)	0.27 (572)	0.12 (254)	38 (950)
5 (1525)	0.12 (254)	0.13 (275)	0.19 (402)	0.12 (254)	38 (950)
10 (3000)	0.12 (254)	0.15 (318)	0.25 (529)	0.12 (254)	38 (950)
15 (4500)	0.17 (360)	0.21 (445)	0.35 (741)	0.12 (254)	38 (950)
20 (6000)	0.23 (487)	0.28 (593)	0.45 (953)	0.12 (254)	38 (950)
25 (7500) *	0.29 (614)	0.35 (741)	0.56 (1185)	0.12 (254)	38 (950)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m) A_{S1}	A_{S2}	A_{S3}	A_{S4}	M INCHES (mm)
4' x 3' x 5" (1200 x 900 x 125 mm)					
3 (915)	0.16 (339)	0.28 (593)	0.33 (699)	0.12 (254)	38 (950)
5 (1525)	0.12 (254)	0.15 (318)	0.23 (487)	0.12 (254)	38 (950)
10 (3000)	0.12 (254)	0.17 (360)	0.28 (593)	0.12 (254)	38 (950)
15 (4500)	0.12 (254)	0.24 (508)	0.40 (847)	0.12 (254)	38 (950)
20 (6000)	0.16 (339)	0.31 (656)	0.51 (1080)	0.12 (254)	38 (950)
25 (7500) *	0.21 (445)	0.39 (826)	0.62 (1312)	0.12 (254)	38 (950)
4' x 4' x 5" (1200 x 1200 x 125 mm)					
3 (915)	0.13 (275)	0.31 (656)	0.37 (783)	0.12 (254)	38 (950)
5 (1525)	0.12 (254)	0.16 (339)	0.16 (339)	0.12 (254)	38 (950)
10 (3000)	0.12 (254)	0.17 (360)	0.30 (635)	0.12 (254)	38 (950)
15 (4500)	0.12 (254)	0.24 (508)	0.41 (868)	0.12 (254)	38 (950)
20 (6000)	0.13 (275)	0.32 (677)	0.52 (1101)	0.12 (254)	38 (950)
25 (7500) *	0.16 (339)	0.48 (1016)	0.64 (1355)	0.12 (254)	38 (950)
5' x 3' x 6" (1500 x 900 x 150 mm)					
3 (915)	0.21 (445)	0.29 (614)	0.30 (635)	0.14 (296)	45 (1125)
5 (1525)	0.14 (296)	0.17 (360)	0.25 (529)	0.14 (296)	36 (900)
10 (3000)	0.14 (296)	0.20 (423)	0.32 (677)	0.14 (296)	36 (900)
15 (4500)	0.19 (402)	0.29 (614)	0.44 (931)	0.12 (254)	35 (875)
20 (6000) *	0.25 (529)	0.37 (783)	0.57 (1207)	0.12 (254)	35 (875)
25 (7500) *	0.32 (677)	0.47 (995)	0.70 (1482)	0.12 (254)	35 (875)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)	H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
5' x 4' x 6" (1500 x 1200 x 150 mm)						6' x 4' x 7" (1800 x 1200 x 175 mm)					
3 (915)	0.18 (381)	0.33 (699)	0.34 (720)	0.14 (296)	45 (1125)	3 (915)	0.22 (466)	0.33 (699)	0.33 (699)	0.17 (360)	43 (1075)
5 (1525)	0.14 (296)	0.19 (402)	0.29 (614)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.22 (466)	0.31 (656)	0.17 (360)	40 (1000)
10 (3000)	0.14 (296)	0.22 (466)	0.35 (741)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.25 (529)	0.39 (826)	0.17 (360)	39 (975)
15 (4500)	0.15 (318)	0.31 (656)	0.48 (1016)	0.14 (296)	35 (875)	15 (4500)	0.22 (466)	0.32 (677)	0.54 (1143)	0.17 (360)	39 (975)
20 (6000) *	0.20 (423)	0.40 (847)	0.62 (1312)	0.12 (254)	35 (875)	20 (6000) *	0.29 (614)	0.47 (995)	0.69 (1461)	0.17 (360)	38 (850)
25 (7500) *	0.25 (529)	0.50 (1058)	0.75 (1588)	0.12 (254)	35 (875)	25 (7500) *	0.36 (762)	0.58 (1228)	0.85 (1799)	0.17 (360)	38 (850)
5' x 5' x 6" (1500 x 1500 x 150 mm)						6' x 5' x 7" (1800 x 1500 x 175 mm)					
3 (915)	0.16 (339)	0.35 (741)	0.37 (783)	0.14 (296)	45 (1125)	3 (915)	0.19 (402)	0.36 (762)	0.36 (762)	0.17 (360)	52 (1300)
5 (1525)	0.14 (296)	0.21 (445)	0.31 (656)	0.14 (296)	45 (1125)	5 (1525)	0.17 (360)	0.24 (508)	0.35 (741)	0.17 (360)	43 (1075)
10 (3000)	0.14 (296)	0.22 (466)	0.36 (762)	0.14 (296)	36 (900)	10 (3000)	0.17 (360)	0.37 (783)	0.42 (889)	0.17 (360)	39 (975)
15 (4500)	0.14 (296)	0.31 (656)	0.49 (1037)	0.14 (296)	35 (875)	15 (4500)	0.19 (402)	0.37 (783)	0.59 (1249)	0.17 (360)	38 (950)
20 (6000) *	0.17 (360)	0.40 (847)	0.63 (1334)	0.14 (296)	35 (875)	20 (6000) *	0.24 (508)	0.49 (1037)	0.73 (1545)	0.17 (360)	38 (950)
25 (7500) *	0.22 (466)	0.50 (1058)	0.76 (1609)	0.14 (296)	35 (875)	25 (7500) *	0.31 (656)	0.60 (1270)	0.89 (1884)	0.17 (360)	38 (950)
6' x 3' x 7" (1800 x 900 x 175 mm)						6' x 6' x 7" (1800 x 1800 x 175 mm)					
3 (915)	0.24 (508)	0.29 (614)	0.29 (614)	0.17 (360)	43 (1075)	3 (915)	0.17 (360)	0.38 (804)	0.40 (847)	0.17 (360)	52 (1300)
5 (1525)	0.17 (360)	0.19 (402)	0.27 (572)	0.17 (360)	40 (1000)	5 (1525)	0.17 (360)	0.25 (529)	0.37 (783)	0.17 (360)	52 (1300)
10 (3000)	0.19 (402)	0.23 (489)	0.35 (741)	0.17 (360)	39 (975)	10 (3000)	0.17 (360)	0.27 (572)	0.43 (910)	0.17 (360)	43 (1075)
15 (4500)	0.27 (572)	0.32 (677)	0.49 (1037)	0.17 (360)	38 (950)	15 (4500)	0.17 (360)	0.38 (804)	0.58 (1228)	0.17 (360)	39 (975)
20 (6000) *	0.36 (762)	0.42 (889)	0.63 (1334)	0.17 (360)	38 (950)	20 (6000) *	0.22 (466)	0.49 (1037)	0.74 (1567)	0.17 (360)	38 (950)
25 (7500) *	0.45 (953)	0.53 (1122)	0.78 (1651)	0.17 (360)	38 (950)	25 (7500) *	0.27 (572)	0.61 (1291)	0.89 (1884)	0.17 (360)	38 (950)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

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PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 29 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 4' x 8" (2100 x 1200 x 200 mm)					
3 (915)	0.24 (508)	0.33 (699)	0.38 (804)	0.19 (402)	47 (1175)
5 (1525)	0.19 (402)	0.24 (508)	0.24 (508)	0.19 (402)	43 (1075)
10 (3000)	0.21 (445)	0.28 (593)	0.43 (910)	0.19 (402)	43 (1075)
15 (4500)	0.38 (804)	0.52 (1101)	0.76 (1609)	0.19 (402)	41 (1025)
20 (6000)	0.39 (826)	0.52 (1101)	0.76 (1609)	0.19 (402)	41 (1025)
25 (7500) *	0.49 (1037)	0.65 (1376)	0.94 (1990)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)					
3 (915)	0.22 (466)	0.36 (762)	0.42 (889)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.27 (572)	0.38 (804)	0.19 (402)	43 (1075)
10 (3000)	0.19 (402)	0.30 (635)	0.40 (847)	0.19 (402)	43 (1075)
15 (4500)	0.25 (529)	0.43 (910)	0.64 (1355)	0.19 (402)	41 (1025)
20 (6000)	0.33 (699)	0.56 (1185)	0.82 (1736)	0.19 (402)	41 (1025)
25 (7500) *	0.41 (868)	0.69 (1461)	0.99 (2096)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)					
3 (915)	0.20 (423)	0.39 (826)	0.46 (974)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.28 (593)	0.41 (868)	0.19 (402)	47 (1175)
10 (3000)	0.19 (402)	0.32 (677)	0.49 (1037)	0.19 (402)	43 (1075)
15 (4500)	0.22 (466)	0.44 (931)	0.66 (1397)	0.19 (402)	41 (1025)
20 (6000) *	0.29 (614)	0.57 (1207)	0.84 (1778)	0.19 (402)	41 (1025)
25 (7500) *	0.36 (762)	0.71 (1503)	1.03 (2180)	0.19 (402)	41 (1025)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 7' x 8" (2100 x 2100 x 200 mm)					
3 (915)	0.19 (402)	0.41 (868)	0.50 (1058)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.27 (572)	0.44 (931)	0.19 (402)	59 (1475)
10 (3000)	0.19 (402)	0.32 (677)	0.50 (1058)	0.19 (402)	47 (1175)
15 (4500)	0.20 (423)	0.44 (931)	0.68 (1439)	0.19 (402)	43 (1075)
20 (6000) *	0.26 (550)	0.58 (1228)	0.86 (1820)	0.19 (402)	41 (1025)
25 (7500) *	0.33 (699)	0.71 (1503)	1.03 (2180)	0.19 (402)	41 (1025)
8' x 4' x 8" (2400 x 1200 x 200 mm)					
3 (915)	0.31 (656)	0.39 (826)	0.45 (953)	0.19 (402)	50 (1250)
5 (1525)	0.25 (529)	0.31 (656)	0.42 (889)	0.19 (402)	45 (1125)
10 (3000)	0.31 (656)	0.36 (762)	0.54 (1143)	0.19 (402)	45 (1125)
15 (4500)	0.44 (931)	0.51 (1080)	0.75 (1588)	0.19 (402)	41 (1025)
20 (6000) *	0.58 (1228)	0.67 (1418)	0.97 (2053)	0.19 (402)	41 (1025)
25 (7500) *	0.75 (1588)	0.84 (1778)	1.18 (2498)	0.19 (402)	41 (1025)
8' x 5' x 8" (2400 x 1500 x 200 mm)					
3 (915)	0.27 (572)	0.72 (1524)	0.50 (1058)	0.19 (402)	50 (1250)
5 (1525)	0.23 (487)	0.33 (699)	0.46 (974)	0.19 (402)	50 (1250)
10 (3000)	0.27 (572)	0.39 (826)	0.59 (1249)	0.19 (402)	45 (1125)
15 (4500)	0.38 (804)	0.55 (1164)	0.81 (1715)	0.19 (402)	41 (1025)
20 (6000) *	0.51 (1080)	0.72 (1524)	1.04 (2201)	0.19 (402)	41 (1025)
25 (7500) *	0.65 (1376)	0.91 (1926)	1.27 (2688)	0.19 (402)	41 (1025)

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)	H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}				A_{S1}	A_{S2}	A_{S3}	A_{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)							9' x 5' x 9" (2700 x 1500 x 225 mm)						
3	(915)	0.25 (529)	0.45 (953)	0.54 (1122)	0.19 (402)	55 (1375)	3	(915)	0.34 (720)	0.44 (931)	0.54 (1143)	0.22 (466)	54 (1350)
5	(1525)	0.21 (445)	0.36 (762)	0.50 (1058)	0.19 (402)	50 (1250)	5	(1525)	0.28 (593)	0.35 (741)	0.29 (614)	0.22 (466)	49 (1225)
10	(3000)	0.25 (529)	0.41 (868)	0.62 (1312)	0.19 (402)	45 (1125)	10	(3000)	0.33 (699)	0.42 (889)	0.62 (1312)	0.22 (466)	49 (1225)
15	(4500)	0.35 (741)	0.58 (1228)	0.85 (1799)	0.19 (402)	41 (1025)	15	(4500)	0.46 (974)	0.59 (1249)	0.86 (1820)	0.22 (466)	44 (1100)
20	(6000) *	0.45 (953)	0.76 (1609)	1.08 (2286)	0.19 (402)	41 (1025)	20	(6000) *	0.61 (1291)	0.78 (1651)	1.10 (2328)	0.22 (466)	44 (1100)
25	(7500) *	0.57 (1207)	0.95 (2011)	1.32 (2794)	0.19 (402)	41 (1025)	25	(7500) *	0.78 (1651)	0.97 (2053)	1.34 (2836)	0.22 (466)	44 (1100)
8' x 7' x 8" (2400 x 2100 x 200 mm)							9' x 6' x 9" (3300 x 1800 x 225 mm)						
3	(915)	0.23 (489)	0.47 (995)	0.58 (1228)	0.19 (402)	65 (1376)	3	(915)	0.30 (635)	0.47 (995)	0.58 (1228)	0.22 (466)	59 (1475)
5	(1525)	0.19 (402)	0.38 (804)	0.54 (1143)	0.19 (402)	55 (1375)	5	(1525)	0.25 (529)	0.38 (804)	0.53 (1122)	0.22 (466)	54 (1350)
10	(3000)	0.23 (487)	0.42 (889)	0.65 (1376)	0.19 (402)	45 (1125)	10	(3000)	0.30 (635)	0.44 (931)	0.66 (1397)	0.22 (466)	49 (1225)
15	(4500)	0.32 (677)	0.59 (1249)	0.88 (1863)	0.19 (402)	41 (1025)	15	(4500)	0.42 (889)	0.62 (1312)	0.91 (1926)	0.22 (466)	44 (1100)
20	(6000) *	0.42 (889)	0.77 (1630)	1.11 (2350)	0.19 (402)	41 (1025)	20	(6000) *	0.55 (1164)	0.82 (1736)	1.16 (2455)	0.22 (466)	44 (1100)
25	(7500) *	0.52 (1101)	0.97 (2053)	1.35 (2858)	0.19 (402)	41 (1025)	25	(7500) *	0.69 (1461)	1.02 (2159)	1.42 (3006)	0.22 (466)	44 (1100)
8' x 8' x 8" (2400 x 2400 x 200 mm)							9' x 7' x 9" (2700 x 2100 x 225 mm)						
3	(915)	0.22 (466)	0.49 (1037)	0.62 (1312)	0.19 (402)	65 (1625)	3	(915)	0.28 (593)	0.49 (1037)	0.63 (1334)	0.22 (466)	59 (1475)
5	(1525)	0.19 (402)	0.40 (847)	0.57 (1207)	0.19 (402)	65 (1625)	5	(1525)	0.23 (487)	0.41 (868)	0.57 (1207)	0.22 (466)	54 (1350)
10	(3000)	0.22 (466)	0.43 (910)	0.66 (1397)	0.19 (402)	50 (1250)	10	(3000)	0.27 (572)	0.46 (974)	0.70 (1482)	0.22 (466)	49 (1225)
15	(4500)	0.30 (635)	0.59 (1249)	0.89 (1884)	0.19 (402)	45 (1125)	15	(4500)	0.38 (804)	0.65 (1376)	0.95 (2011)	0.22 (466)	44 (1100)
20	(6000) *	0.39 (826)	0.77 (1630)	1.12 (2371)	0.19 (402)	45 (1125)	20	(6000) *	0.50 (1058)	0.85 (1799)	1.21 (2561)	0.22 (466)	44 (1100)
25	(7500) *	0.49 (1037)	0.97 (2053)	1.36 (2879)	0.19 (402)	45 (1125)	25	(7500) *	0.63 (1334)	1.06 (2244)	1.46 (3090)	0.22 (466)	44 (1100)

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN 390-0

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
9' x 8' x 9" (2700 x 2400 x 225 mm)					
3 (915)	0.26 (550)	0.51 (1080)	0.67 (1418)	0.22 (466)	72 (1800)
5 (1525)	0.22 (466)	0.43 (910)	0.61 (1291)	0.22 (466)	59 (1475)
10 (3000)	0.26 (550)	0.47 (995)	0.72 (1524)	0.22 (466)	54 (1350)
15 (4500)	0.36 (762)	0.66 (1397)	0.98 (2074)	0.22 (466)	44 (1100)
20 (6000) *	0.46 (974)	0.86 (1820)	1.23 (2604)	0.22 (466)	44 (1100)
25 (7500) *	0.58 (1228)	1.07 (2265)	1.49 (3154)	0.22 (466)	44 (1100)
9' x 9' x 9" (2700 x 2700 x 225 mm)					
3 (915)	0.25 (529)	0.53 (1122)	0.71 (1503)	0.22 (466)	72 (1800)
5 (1525)	0.22 (466)	0.44 (931)	0.64 (1355)	0.22 (466)	72 (1800)
10 (3000)	0.25 (529)	0.48 (1016)	0.74 (1567)	0.22 (466)	59 (1475)
15 (4500)	0.34 (720)	0.66 (1397)	0.99 (2096)	0.22 (466)	49 (1225)
20 (6000) *	0.44 (931)	0.86 (1820)	1.25 (2646)	0.22 (466)	49 (1225)
25 (7500) *	0.55 (1164)	1.08 (2286)	1.50 (3175)	0.22 (466)	44 (1100)
10' x 5' x 10" (3000 x 1500 x 250 mm)					
3 (915)	0.38 (804)	0.46 (974)	0.57 (1207)	0.24 (508)	58 (1450)
5 (1525)	0.32 (677)	0.38 (804)	0.52 (1101)	0.24 (508)	52 (1300)
10 (3000)	0.39 (826)	0.45 (953)	0.66 (1397)	0.24 (508)	52 (1300)
15 (4500)	0.54 (1143)	0.63 (1334)	0.91 (1926)	0.24 (508)	47 (1175)
20 (6000) *	0.72 (1524)	0.82 (1736)	1.17 (2477)	0.24 (508)	47 (1175)
25 (7500) *	0.91 (1926)	1.03 (2180)	1.42 (3006)	0.24 (508)	47 (1175)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
10' x 6' x 10" (3300 x 1800 x 250 mm)					
3 (915)	0.34 (720)	0.49 (1037)	0.63 (1334)	0.24 (508)	58 (1450)
5 (1525)	0.30 (635)	0.41 (868)	0.56 (1185)	0.24 (508)	52 (1300)
10 (3000)	0.35 (741)	0.48 (1016)	0.71 (1503)	0.24 (508)	52 (1300)
15 (4500)	0.49 (1037)	0.67 (1418)	0.97 (2053)	0.24 (508)	47 (1175)
20 (6000) *	0.65 (1376)	0.88 (1863)	1.24 (2625)	0.24 (508)	47 (1175)
25 (7500) *	0.82 (1736)	1.09 (2307)	1.51 (3196)	0.24 (508)	47 (1175)
10' x 7' x 10" (3000 x 2100 x 250 mm)					
3 (915)	0.32 (677)	0.51 (1080)	0.67 (1417)	0.24 (508)	64 (1600)
5 (1525)	0.28 (593)	0.43 (910)	0.60 (1270)	0.24 (508)	58 (1450)
10 (3000)	0.32 (677)	0.50 (1058)	0.75 (1588)	0.24 (508)	52 (1300)
15 (4500)	0.45 (953)	0.70 (1482)	1.02 (2059)	0.24 (508)	47 (1175)
20 (6000) *	0.59 (1249)	0.91 (1926)	1.29 (2731)	0.24 (508)	47 (1175)
25 (7500) *	0.74 (1567)	1.14 (2413)	1.57 (3323)	0.24 (508)	47 (1175)
10' x 8' x 10" (3000 x 2400 x 250 mm)					
3 (915)	0.30 (635)	0.54 (1143)	0.72 (1270)	0.24 (508)	64 (1600)
5 (1525)	0.26 (550)	0.46 (974)	0.64 (974)	0.24 (508)	58 (1450)
10 (3000)	0.30 (635)	0.52 (1101)	0.78 (1228)	0.24 (508)	52 (1300)
15 (4500)	0.42 (889)	0.72 (1524)	1.05 (2223)	0.24 (508)	47 (1175)
20 (6000) *	0.54 (1143)	0.94 (1990)	1.33 (2815)	0.24 (508)	47 (1175)
25 (7500) *	0.68 (1439)	1.17 (2477)	1.62 (3429)	0.24 (508)	47 (1175)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

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PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 32 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
10' x 9' x 10" (3000 x 2700 x 250 mm)						
3	(915)	0.28 (593)	0.56 (1185)	0.76 (1609)	0.24 (508)	79 (1975)
5	(1525)	0.24 (508)	0.47 (995)	0.68 (1439)	0.24 (508)	64 (1600)
10	(3000)	0.29 (614)	0.53 (1122)	0.81 (1715)	0.24 (508)	58 (1450)
15	(4500)	0.39 (826)	0.73 (1545)	1.08 (2286)	0.24 (508)	47 (1175)
20	(6000) *	0.51 (1080)	0.95 (2011)	1.36 (2879)	0.24 (508)	47 (1175)
25	(7500) *	0.64 (1355)	1.18 (2498)	1.64 (3471)	0.24 (508)	47 (1175)
10' x 10' x 10" (3000 x 3000 x 250 mm)						
3	(915)	0.26 (550)	0.57 (1207)	0.80 (1693)	0.24 (508)	79 (1975)
5	(1525)	0.24 (508)	0.50 (1058)	0.72 (1524)	0.24 (508)	70 (1750)
10	(3000)	0.28 (593)	0.54 (1143)	0.83 (1757)	0.24 (508)	64 (1600)
15	(4500)	0.38 (804)	0.74 (1567)	1.19 (2519)	0.24 (508)	52 (1300)
20	(6000) *	0.49 (1037)	0.95 (2011)	1.38 (2921)	0.24 (508)	52 (1300)
25	(7500) *	0.61 (1291)	1.19 (2519)	1.65 (3493)	0.24 (508)	47 (1175)
12' x 4' x 12" (3600 x 1200 x 300 mm)						
3	(915)	0.31 (656)	0.69 (1461)	0.95 (2011)	0.29 (614)	73 (1825)
5	(1525)	0.46 (974)	0.53 (1122)	0.80 (1693)	0.29 (614)	66 (1650)
10	(3000)	0.56 (1185)	0.46 (974)	0.67 (1418)	0.29 (614)	59 (1475)
15	(4500)	0.80 (1693)	0.64 (1355)	0.92 (1947)	0.29 (614)	59 (1475)
20	(6000)	1.06 (2244)	0.83 (1757)	1.18 (2498)	0.29 (614)	59 (1475)
25	(7500) *	1.35 (2858)	1.03 (2180)	1.44 (2434)	0.29 (614)	59 (1475)

H_e EARTH COVER FT (mm) MAXIMUM		TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
		A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 5' x 12" (3600 x 1500 x 300 mm)						
3	(915)	0.47 (995)	0.48 (1016)	0.61 (1291)	0.29 (614)	73 (1825)
5	(1525)	0.42 (889)	0.52 (1101)	0.57 (1207)	0.29 (614)	66 (1650)
10	(3000)	0.51 (1080)	0.50 (1058)	0.71 (1503)	0.29 (614)	59 (1475)
15	(4500)	0.72 (1524)	0.70 (1482)	1.01 (2138)	0.29 (614)	59 (1475)
20	(6000) *	0.95 (2011)	0.91 (1926)	1.29 (2731)	0.29 (614)	59 (1475)
25	(7500) *	1.21 (2561)	1.14 (2413)	1.57 (3323)	0.29 (614)	59 (1475)
12' x 6' x 12" (3600 x 1800 x 300 mm)						
3	(915)	0.44 (931)	0.52 (1101)	0.66 (1397)	0.29 (614)	66 (1650)
5	(1525)	0.39 (826)	0.45 (953)	0.62 (1312)	0.29 (614)	59 (1475)
10	(3000)	0.47 (995)	0.54 (1143)	0.79 (1672)	0.29 (614)	59 (1475)
15	(4500)	0.66 (1397)	0.75 (1588)	1.08 (2286)	0.29 (614)	53 (1325)
20	(6000) *	0.86 (1820)	0.98 (2074)	1.38 (2921)	0.29 (614)	53 (1325)
25	(7500) *	1.09 (2307)	1.22 (2582)	1.68 (3556)	0.29 (614)	53 (1325)
12' x 7' x 12" (3600 x 2100 x 300 mm)						
3	(915)	0.41 (868)	0.55 (1164)	0.77 (1630)	0.29 (614)	66 (1650)
5	(1525)	0.37 (783)	0.49 (1037)	0.67 (1418)	0.29 (614)	59 (1475)
10	(3000)	0.44 (931)	0.57 (1207)	0.84 (1778)	0.29 (614)	59 (1475)
15	(4500)	0.60 (1270)	0.79 (1672)	1.15 (2434)	0.29 (614)	53 (1325)
20	(6000) *	0.79 (1672)	1.03 (2180)	1.46 (3090)	0.29 (614)	53 (1325)
25	(7500) *	0.99 (2096)	1.28 (2731)	1.77 (3747)	0.29 (614)	53 (1325)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 33 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 8' x 12" (3600 x 2400 x 300 mm)					
3 (915)	0.38 (804)	0.58 (1228)	0.76 (1609)	0.29 (614)	66 (1650)
5 (1525)	0.35 (741)	0.51 (1080)	0.72 (1524)	0.29 (614)	59 (1475)
10 (3000)	0.41 (868)	0.59 (1249)	0.89 (1884)	0.29 (614)	59 (1475)
15 (4500)	0.56 (1186)	0.83 (1757)	1.20 (2540)	0.29 (614)	53 (1325)
20 (6000) *	0.73 (1545)	1.07 (2265)	1.52 (3217)	0.29 (614)	53 (1325)
25 (7500) *	0.92 (1947)	1.34 (2836)	1.84 (3895)	0.29 (614)	53 (1325)
12' x 9' x 12" (3600 x 2700 x 300 mm)					
3 (915)	0.36 (762)	0.61 (1291)	0.81 (1715)	0.29 (614)	80 (2000)
5 (1525)	0.33 (699)	0.54 (1143)	0.76 (1609)	0.29 (614)	66 (1650)
10 (3000)	0.39 (826)	0.61 (1291)	0.92 (1947)	0.29 (614)	59 (1475)
15 (4500)	0.53 (1122)	0.85 (1799)	1.24 (2625)	0.29 (614)	53 (1325)
20 (6000) *	0.68 (1439)	1.10 (2328)	1.57 (3323)	0.29 (614)	53 (1325)
25 (7500) *	0.85 (1799)	1.37 (2900)	1.90 (4022)	0.29 (614)	53 (1325)
12' x 10' x 12" (3600 x 3000 x 300 mm)					
3 (915)	0.34 (720)	0.63 (1334)	0.75 (1588)	0.29 (614)	80 (2000)
5 (1525)	0.31 (656)	0.56 (1185)	0.80 (1693)	0.29 (614)	66 (1650)
10 (3000)	0.37 (783)	0.63 (1334)	0.96 (2032)	0.29 (614)	59 (1475)
15 (4500)	0.50 (1058)	0.87 (1842)	1.27 (2688)	0.29 (614)	53 (1325)
20 (6000) *	0.64 (1355)	1.13 (2307)	1.60 (3387)	0.29 (614)	53 (1325)
25 (7500) *	0.80 (1693)	1.40 (2963)	1.94 (4106)	0.29 (614)	53 (1325)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 11' x 12" (3600 x 3300 x 300 mm)					
3 (915)	0.32 (677)	0.66 (1397)	0.90 (1905)	0.29 (614)	93 (2325)
5 (1525)	0.31 (656)	0.58 (1228)	0.84 (1778)	0.29 (614)	80 (2000)
10 (3000)	0.35 (741)	0.64 (1355)	0.99 (2096)	0.29 (614)	73 (1825)
15 (4500)	0.48 (1016)	0.88 (1863)	1.31 (2773)	0.29 (614)	59 (1475)
20 (6000) *	0.62 (1312)	1.14 (2413)	1.63 (3450)	0.29 (614)	59 (1475)
25 (7500) *	0.77 (1630)	1.41 (2985)	1.96 (4159)	0.29 (614)	59 (1475)
12' x 12' x 12" (3600 x 3600 x 300 mm)					
3 (915)	0.31 (656)	0.65 (1376)	0.95 (2011)	0.29 (614)	93 (2325)
5 (1525)	0.29 (614)	0.60 (1270)	0.88 (1863)	0.29 (614)	80 (2000)
10 (3000)	0.34 (720)	0.65 (1376)	1.01 (2138)	0.29 (614)	73 (1825)
15 (4500)	0.46 (974)	0.89 (1884)	1.33 (2815)	0.29 (614)	59 (1475)
20 (6000) *	0.60 (1270)	1.14 (2413)	1.65 (3493)	0.29 (614)	59 (1475)
25 (7500) *	0.74 (1567)	1.41 (2985)	1.96 (4159)	0.29 (614)	59 (1475)

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

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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390–0
SHEET 34 OF 42

SPAN, S	RISE, R	T_t TOP	T_b BOTTOM	T_w SIDE	H	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)							
FEET (mm)	FEET (mm)	INCHES (mm)	INCHES (mm)	INCHES (mm)	HAUNCH INCHES (mm)	A_{S1}	A_{S2}	A_{S3}	A_{S4}	A_{S5}	A_{S6}	A_{S7}	A_{S8}
9 (2700)	8 (2400)	9 (225)	9 (225)	9 (225)	9 (225)	0.23 (487)	0.60 (1270)	0.54 (1143)	0.22 (466)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
9 (2700)	9 (2700)	9 (225)	9 (225)	9 (225)	9 (225)	0.24 (508)	0.62 (1313)	0.58 (1228)	0.27 (572)	0.28 (593)	0.22 (466)	0.22 (466)	0.22 (466)
10 (3000)	5 (1500)	10 (250)	10 (250)	10 (250)	10 (250)	0.29 (614)	0.51 (1080)	0.45 (953)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	6 (1800)	10 (250)	10 (250)	10 (250)	10 (250)	0.27 (572)	0.53 (1122)	0.49 (1037)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	7 (2100)	10 (250)	10 (250)	10 (250)	10 (250)	0.25 (529)	0.55 (1164)	0.52 (1101)	0.24 (508)	0.25 (529)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	8 (2400)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.57 (1207)	0.57 (1207)	0.24 (508)	0.26 (550)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	9 (2700)	10 (250)	10 (250)	10 (250)	10 (250)	0.24 (508)	0.59 (1249)	0.60 (1270)	0.25 (529)	0.27 (572)	0.24 (508)	0.24 (508)	0.24 (508)
10 (3000)	10 (3000)	10 (250)	10 (250)	10 (250)	10 (250)	0.26 (550)	0.60 (1270)	0.64 (1355)	0.30 (635)	0.28 (593)	0.24 (508)	0.24 (508)	0.24 (508)
12 (3600)	4 (1200)	12 (300)	12 (300)	12 (300)	12 (300)	0.37 (783)	0.44 (931)	0.42 (889)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	5 (1500)	12 (300)	12 (300)	12 (300)	12 (300)	0.35 (741)	0.46 (974)	0.47 (995)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	6 (1800)	12 (300)	12 (300)	12 (300)	12 (300)	0.33 (699)	0.49 (1037)	0.51 (1080)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	7 (2100)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.51 (1080)	0.55 (1164)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	8 (2400)	12 (300)	12 (300)	12 (300)	12 (300)	0.30 (635)	0.52 (1101)	0.60 (1270)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	9 (2700)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.54 (1143)	0.64 (1355)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	10 (3000)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.55 (1164)	0.68 (1439)	0.29 (614)	0.30 (635)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	11 (3300)	12 (300)	12 (300)	12 (300)	12 (300)	0.29 (614)	0.57 (1207)	0.72 (1524)	0.30 (635)	0.31 (656)	0.29 (614)	0.29 (614)	0.29 (614)
12 (3600)	12 (3600)	12 (300)	12 (300)	12 (300)	12 (300)	0.31 (656)	0.58 (1228)	0.76 (1609)	0.38 (804)	0.32 (677)	0.29 (614)	0.29 (614)	0.29 (614)

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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PRECAST REINFORCED CONCRETE BOX

STANDARD PLAN
390–0
SHEET 35 OF 42

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 36 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
3' x 2' x 4" (900 x 600 x 100 mm)					
3 (915)	0.13 (275)	0.21 (445)	0.25 (529)	0.10 (217)	31 (775)
5 (1525) *	0.10 (217)	0.10 (217)	0.22 (466)	0.10 (217)	31 (775)
10 (3000) *	0.10 (217)	0.11 (233)	0.28 (593)	0.10 (217)	31 (775)
3' x 3' x 4" (900 x 900 x 100 mm)					
3 (915)	0.10 (217)	0.25 (529)	0.27 (572)	0.10 (217)	31 (775)
5 (1525) *	0.10 (217)	0.10 (217)	0.23 (487)	0.10 (217)	31 (775)
10 (3000) *	0.10 (217)	0.11 (233)	0.29 (614)	0.10 (217)	31 (775)
4' x 2' x 5" (1200 x 600 x 125 mm)					
3 (915) *	0.19 (402)	0.23 (489)	0.34 (720)	0.12 (254)	38 (950)
5 (1525) *	0.12 (254)	0.12 (254)	0.21 (445)	0.12 (254)	38 (950)
10 (3000) *	0.12 (254)	0.14 (296)	0.28 (593)	0.12 (254)	38 (950)
15 (4500) *	0.16 (339)	0.20 (423)	0.41 (868)	0.12 (254)	38 (950)
20 (6000) *	0.22 (466)	0.27 (572)	0.54 (1143)	0.12 (254)	38 (950)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
4' x 3' x 5" (1200 x 900 x 125 mm)					
3 (915) *	0.17 (360)	0.28 (593)	0.41 (868)	0.12 (254)	38 (950)
5 (1525) *	0.12 (254)	0.12 (254)	0.25 (529)	0.12 (254)	38 (950)
10 (3000) *	0.12 (254)	0.15 (318)	0.32 (677)	0.12 (254)	38 (950)
15 (4500) *	0.12 (254)	0.23 (489)	0.46 (974)	0.12 (254)	38 (950)
4' x 4' x 5" (1200 x 1200 x 125 mm)					
3 (915) *	0.14 (296)	0.31 (656)	0.45 (953)	0.12 (254)	38 (950)
5 (1525) *	0.12 (254)	0.14 (296)	0.26 (550)	0.12 (254)	38 (950)
10 (3000) *	0.12 (254)	0.15 (318)	0.32 (677)	0.12 (254)	38 (950)
15 (4500) *	0.12 (254)	0.22 (466)	0.46 (974)	0.12 (254)	38 (950)
5' x 3' x 6" (1500 x 900 x 150 mm)					
3 (915)	0.21 (445)	0.29 (614)	0.34 (720)	0.14 (296)	45 (1125)
5 (1525)	0.14 (296)	0.15 (318)	0.26 (550)	0.14 (296)	36 (900)
10 (3000)	0.14 (296)	0.18 (381)	0.34 (720)	0.14 (296)	36 (900)
15 (4500)	0.18 (381)	0.27 (572)	0.49 (1037)	0.14 (296)	35 (875)
20 (6000) *	0.25 (529)	0.36 (762)	0.64 (1355)	0.14 (296)	35 (875)
25 (7500) *	0.32 (677)	0.46 (974)	0.80 (1693)	0.14 (296)	35 (875)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 37 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
5' x 4' x 6" (1500 x 1200 x 150 mm)					
3 (915)	0.18 (381)	0.33 (699)	0.39 (826)	0.14 (296)	45 (1125)
5 (1525)	0.14 (296)	0.16 (339)	0.29 (614)	0.14 (296)	45 (1125)
10 (3000)	0.14 (296)	0.20 (423)	0.37 (783)	0.14 (296)	36 (900)
15 (4500)	0.15 (318)	0.29 (614)	0.53 (1122)	0.14 (296)	35 (875)
20 (6000) *	0.20 (423)	0.39 (826)	0.69 (1461)	0.14 (296)	35 (875)
5' x 5' x 6" (1500 x 1500 x 150 mm)					
3 (915)	0.16 (339)	0.35 (741)	0.43 (910)	0.14 (296)	45 (1125)
5 (1525)	0.14 (296)	0.17 (360)	0.31 (656)	0.14 (296)	45 (1125)
10 (3000)	0.14 (296)	0.20 (423)	0.38 (804)	0.14 (296)	45 (1125)
15 (4500)	0.14 (296)	0.29 (614)	0.54 (1143)	0.14 (296)	36 (900)
20 (6000) *	0.17 (360)	0.39 (826)	0.70 (1482)	0.14 (296)	35 (875)
6' x 3' x 7" (1800 x 900 x 175 mm)					
3 (915)	0.24 (508)	0.30 (635)	0.32 (677)	0.17 (360)	43 (1075)
5 (1525)	0.17 (360)	0.17 (360)	0.27 (572)	0.17 (360)	40 (1000)
10 (3000)	0.17 (360)	0.21 (445)	0.36 (762)	0.17 (360)	39 (975)
15 (4500)	0.25 (529)	0.31 (656)	0.52 (1101)	0.17 (360)	38 (950)
20 (6000) *	0.34 (720)	0.41 (868)	0.68 (1439)	0.17 (360)	38 (950)
25 (7500) *	0.44 (931)	0.52 (1101)	0.84 (1778)	0.17 (360)	38 (950)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN²/ FT (mm²/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
6' x 4' x 7" (1800 x 1200 x 175 mm)					
3 (915)	0.22 (466)	0.33 (699)	0.36 (762)	0.17 (360)	43 (1075)
5 (1525)	0.17 (360)	0.18 (381)	0.30 (635)	0.17 (360)	40 (1000)
10 (3000)	0.17 (360)	0.22 (466)	0.39 (826)	0.17 (360)	39 (975)
15 (4500)	0.21 (445)	0.33 (699)	0.57 (1207)	0.17 (360)	38 (850)
20 (6000) *	0.28 (593)	0.44 (931)	0.74 (1567)	0.17 (360)	38 (850)
25 (7500) *	0.35 (741)	0.56 (1185)	0.91 (1926)	0.17 (360)	38 (850)
6' x 5' x 7" (1800 x 1500 x 175 mm)					
3 (915)	0.19 (402)	0.36 (762)	0.41 (868)	0.17 (360)	52 (1300)
5 (1525)	0.17 (360)	0.20 (423)	0.34 (720)	0.17 (360)	43 (1075)
10 (3000)	0.17 (360)	0.24 (508)	0.43 (910)	0.17 (360)	39 (975)
15 (4500)	0.18 (381)	0.35 (741)	0.61 (1291)	0.17 (360)	38 (950)
20 (6000) *	0.24 (508)	0.47 (995)	0.79 (1672)	0.17 (360)	38 (950)
25 (7500) *	0.30 (635)	0.59 (1249)	0.97 (2053)	0.17 (360)	38 (950)
6' x 6' x 7" (1800 x 1800 x 175 mm)					
3 (915)	0.17 (360)	0.38 (804)	0.43 (910)	0.17 (360)	52 (1300)
5 (1525)	0.17 (360)	0.20 (423)	0.35 (741)	0.17 (360)	52 (1300)
10 (3000)	0.17 (360)	0.24 (508)	0.43 (910)	0.17 (360)	43 (1075)
15 (4500)	0.17 (360)	0.34 (720)	0.60 (1270)	0.17 (360)	39 (975)
20 (6000) *	0.21 (445)	0.46 (974)	0.78 (1651)	0.17 (360)	38 (950)
25 (7500) *	0.25 (529)	0.58 (1228)	0.96 (2032)	0.17 (360)	38 (950)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 38 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 4' x 8" (2100 x 1200 x 200 mm)					
3 (915)	0.24 (508)	0.33 (699)	0.41 (868)	0.19 (402)	47 (1175)
5 (1525)	0.19 (402)	0.21 (445)	0.33 (699)	0.19 (402)	43 (1075)
10 (3000)	0.19 (402)	0.26 (550)	0.43 (910)	0.19 (402)	43 (1075)
15 (4500)	0.28 (593)	0.38 (804)	0.62 (1312)	0.19 (402)	41 (1025)
20 (6000) *	0.37 (783)	0.51 (1080)	0.81 (1715)	0.19 (402)	41 (1025)
25 (7500) *	0.47 (995)	0.64 (1355)	1.00 (2117)	0.19 (402)	41 (1025)
7' x 5' x 8" (2100 x 1500 x 200 mm)					
3 (915)	0.22 (466)	0.36 (762)	0.46 (974)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.23 (489)	0.37 (783)	0.19 (402)	43 (1075)
10 (3000)	0.19 (402)	0.28 (593)	0.47 (995)	0.19 (402)	43 (1075)
15 (4500)	0.24 (508)	0.41 (868)	0.67 (1418)	0.19 (402)	41 (1025)
20 (6000) *	0.32 (677)	0.54 (1143)	0.87 (1842)	0.19 (402)	41 (1025)
25 (7500) *	0.40 (847)	0.68 (1438)	1.07 (2265)	0.19 (402)	41 (1025)
7' x 6' x 8" (2100 x 1200 x 200 mm)					
3 (915)	0.20 (423)	0.39 (826)	0.50 (1058)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.24 (508)	0.40 (847)	0.19 (402)	47 (1175)
10 (3000)	0.19 (402)	0.29 (614)	0.49 (1037)	0.19 (402)	43 (1075)
15 (4500)	0.21 (445)	0.41 (868)	0.70 (1482)	0.19 (402)	41 (1025)
20 (6000) *	0.28 (593)	0.55 (1164)	0.90 (1905)	0.19 (402)	41 (1025)
25 (7500) *	0.33 (699)	0.70 (1482)	1.10 (2328)	0.19 (402)	41 (1025)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
7' x 7' x 8" (2100 x 2100 x 200 mm)					
3 (915)	0.19 (402)	0.41 (868)	0.54 (1143)	0.19 (402)	59 (1475)
5 (1525)	0.19 (402)	0.25 (529)	0.42 (889)	0.19 (402)	59 (1475)
10 (3000)	0.19 (402)	0.29 (614)	0.51 (1080)	0.19 (402)	47 (1175)
15 (4500)	0.19 (402)	0.42 (889)	0.71 (1503)	0.19 (402)	43 (1075)
20 (6000) *	0.26 (550)	0.56 (1185)	0.91 (1926)	0.19 (402)	41 (1025)
25 (7500) *	0.32 (677)	0.70 (1482)	1.11 (2350)	0.19 (402)	41 (1025)
8' x 4' x 8" (2400 x 1200 x 200 mm)					
3 (915)	0.32 (677)	0.39 (826)	0.49 (1037)	0.19 (402)	50 (1250)
5 (1525)	0.22 (466)	0.26 (550)	0.41 (868)	0.19 (402)	45 (1125)
10 (3000)	0.28 (593)	0.33 (699)	0.55 (1164)	0.19 (402)	45 (1125)
15 (4500)	0.42 (889)	0.49 (1037)	0.79 (1672)	0.19 (402)	41 (1025)
20 (6000) *	0.57 (1207)	0.65 (1376)	1.03 (2180)	0.19 (402)	41 (1025)
25 (7500) *	0.73 (1545)	0.83 (1757)	1.27 (2688)	0.19 (402)	41 (1025)
8' x 5' x 8" (2400 x 1500 x 200 mm)					
3 (915)	0.28 (593)	0.42 (889)	0.55 (1164)	0.19 (402)	50 (1250)
5 (1525)	0.20 (423)	0.28 (593)	0.46 (974)	0.19 (402)	50 (1250)
10 (3000)	0.25 (529)	0.35 (741)	0.60 (1270)	0.19 (402)	45 (1125)
15 (4500)	0.37 (783)	0.52 (1101)	0.85 (1799)	0.19 (402)	41 (1025)
20 (6000) *	0.49 (1037)	0.70 (1482)	1.11 (2350)	0.19 (402)	41 (1025)
25 (7500) *	0.63 (1334)	0.89 (1884)	1.36 (2879)	0.19 (402)	41 (1025)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 39 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
8' x 6' x 8" (2400 x 1800 x 200 mm)					
3 (915)	0.25 (529)	0.45 (953)	0.59 (1249)	0.19 (402)	55 (1375)
5 (1525)	0.19 (402)	0.30 (635)	0.50 (1058)	0.19 (402)	50 (1250)
10 (3000)	0.23 (489)	0.37 (783)	0.63 (1334)	0.19 (402)	45 (1125)
15 (4500)	0.33 (699)	0.55 (1164)	0.89 (1884)	0.19 (402)	41 (1025)
20 (6000) *	0.44 (931)	0.73 (1545)	1.16 (2455)	0.19 (402)	41 (1025)
8' x 7' x 8" (2400 x 2100 x 200 mm)					
3 (915)	0.23 (489)	0.47 (995)	0.64 (1355)	0.19 (402)	65 (1625)
5 (1525)	0.19 (402)	0.31 (656)	0.53 (1122)	0.19 (402)	55 (1375)
10 (3000)	0.21 (445)	0.38 (804)	0.65 (1376)	0.19 (402)	45 (1125)
15 (4500)	0.30 (635)	0.56 (1185)	0.92 (1947)	0.19 (402)	41 (1025)
20 (6000) *	0.40 (847)	0.75 (1588)	1.19 (2519)	0.19 (402)	41 (1025)
8' x 8' x 8" (2400 x 2400 x 200 mm)					
3 (915)	0.22 (466)	0.49 (1037)	0.68 (1439)	0.19 (402)	65 (1625)
5 (1525)	0.19 (402)	0.33 (699)	0.55 (1164)	0.19 (402)	65 (1625)
10 (3000)	0.20 (423)	0.39 (826)	0.67 (1418)	0.19 (402)	50 (1250)
15 (4500)	0.29 (614)	0.56 (1185)	0.94 (1990)	0.19 (402)	45 (1125)
20 (6000) *	0.38 (804)	0.75 (1588)	1.20 (2540)	0.19 (402)	45 (1125)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
9' x 5' x 9" (2700 x 1500 x 225 mm)					
3 (915)	0.34 (720)	0.44 (931)	0.58 (1228)	0.22 (466)	54 (1350)
5 (1525)	0.24 (508)	0.30 (635)	0.48 (1016)	0.22 (466)	49 (1225)
10 (3000)	0.30 (635)	0.38 (804)	0.63 (1334)	0.22 (466)	49 (1225)
15 (4500)	0.44 (931)	0.56 (1185)	0.89 (1884)	0.22 (466)	44 (1100)
20 (6000) *	0.59 (1249)	0.75 (1588)	1.16 (2455)	0.22 (466)	44 (1100)
25 (7500) *	0.76 (1609)	0.95 (2011)	1.43 (3027)	0.22 (466)	44 (1100)
9' x 6' x 9" (3300 x 1800 x 225 mm)					
3 (915)	0.37 (783)	0.47 (995)	0.71 (1503)	0.22 (466)	59 (1475)
5 (1525)	0.22 (466)	0.32 (677)	0.51 (1080)	0.22 (466)	54 (1350)
10 (3000)	0.27 (572)	0.40 (847)	0.67 (1418)	0.22 (466)	49 (1225)
15 (4500)	0.40 (847)	0.59 (1249)	0.95 (2011)	0.22 (466)	44 (1100)
20 (6000) *	0.53 (1122)	0.79 (1672)	1.23 (2604)	0.22 (466)	44 (1100)
25 (7500) *	0.68 (1438)	1.00 (2117)	1.51 (1080)	0.22 (466)	44 (1100)
9' x 7' x 9" (2700 x 2100 x 225 mm)					
3 (915)	0.28 (593)	0.49 (1037)	0.68 (1439)	0.22 (466)	59 (1475)
5 (1525)	0.22 (466)	0.34 (720)	0.55 (1164)	0.22 (466)	54 (1350)
10 (3000)	0.25 (529)	0.42 (889)	0.70 (1482)	0.22 (466)	49 (1225)
15 (4500)	0.36 (762)	0.61 (1291)	0.98 (2074)	0.22 (466)	44 (1100)
20 (6000) *	0.48 (1016)	0.82 (1736)	1.27 (2688)	0.22 (466)	44 (1100)
25 (7500) *	0.61 (1291)	1.04 (2202)	1.56 (3302)	0.22 (466)	44 (1100)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 40 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
9' x 8' x 9" (2700 x 2400 x 225 mm)							
3	(915)		0.26 (550)	0.51 (1080)	0.73 (1545)	0.22 (466)	72 (1800)
5	(1525)		0.22 (466)	0.35 (741)	0.58 (1228)	0.22 (466)	59 (1475)
10	(3000)		0.24 (508)	0.43 (910)	0.72 (1524)	0.22 (466)	54 (1350)
15	(4500)		0.34 (720)	0.63 (1334)	1.01 (2138)	0.22 (466)	44 (1100)
20	(6000)	*	0.45 (953)	0.83 (1757)	1.30 (2752)	0.22 (466)	44 (1100)
25	(7500)	*	0.57 (1207)	1.05 (2223)	1.59 (3366)	0.22 (466)	44 (1100)
9' x 9' x 9" (2700 x 2700 x 225 mm)							
3	(915)		0.25 (529)	0.53 (1122)	0.77 (1630)	0.22 (466)	72 (1800)
5	(1525)		0.22 (466)	0.37 (783)	0.61 (1291)	0.22 (466)	72 (1800)
10	(3000)		0.23 (487)	0.43 (910)	0.74 (1567)	0.22 (466)	59 (1475)
15	(4500)		0.32 (677)	0.63 (1334)	1.03 (2180)	0.22 (466)	49 (1225)
20	(6000)	*	0.43 (910)	0.84 (1778)	1.31 (2773)	0.22 (466)	49 (1225)
10' x 5' x 10" (3000 x 1500 x 250 mm)							
3	(915)		0.38 (804)	0.46 (974)	0.61 (1291)	0.24 (508)	58 (1450)
5	(1525)		0.28 (593)	0.32 (677)	0.50 (1058)	0.24 (508)	52 (1300)
10	(3000)		0.35 (741)	0.41 (868)	0.66 (1397)	0.24 (508)	52 (1300)
15	(4500)		0.52 (1101)	0.60 (1270)	0.94 (1990)	0.24 (508)	47 (1175)
20	(6000)	*	0.70 (1482)	0.80 (1693)	1.22 (2582)	0.24 (508)	47 (1175)
25	(7500)	*	0.90 (1905)	1.01 (2138)	1.50 (3175)	0.24 (508)	47 (1175)

H_e EARTH COVER FT (mm) MAXIMUM			TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
			A_{S1}	A_{S2}	A_{S3}	A_{S4}	
10' x 6' x 10" (3300 x 1800 x 250 mm)							
3	(915)		0.35 (741)	0.49 (1037)	0.67 (1418)	0.24 (508)	58 (1450)
5	(1525)		0.26 (550)	0.34 (720)	0.54 (1143)	0.24 (508)	52 (1300)
10	(3000)		0.32 (677)	0.44 (931)	0.70 (1482)	0.24 (508)	52 (1300)
15	(4500)		0.47 (995)	0.63 (1334)	1.00 (2117)	0.24 (508)	47 (1175)
20	(6000)	*	0.63 (1334)	0.85 (1799)	1.29 (2731)	0.24 (508)	47 (1175)
25	(7500)	*	0.80 (1693)	1.07 (2265)	1.59 (3366)	0.24 (508)	47 (1175)
10' x 7' x 10" (3000 x 2100 x 250 mm)							
3	(915)		0.32 (677)	0.51 (1080)	0.71 (1503)	0.24 (508)	64 (1600)
5	(1525)		0.24 (508)	0.35 (741)	0.56 (1185)	0.24 (508)	58 (1450)
10	(3000)		0.30 (635)	0.47 (995)	0.75 (1588)	0.24 (508)	52 (1300)
15	(4500)		0.42 (889)	0.65 (1376)	1.02 (2159)	0.24 (508)	47 (1175)
20	(6000)	*	0.54 (1143)	0.84 (1778)	1.28 (2709)	0.24 (508)	47 (1175)
25	(7500)	*	0.68 (1439)	1.04 (2201)	1.56 (3302)	0.24 (508)	47 (1175)
10' x 8' x 10" (3000 x 2400 x 250 mm)							
3	(915)		0.30 (635)	0.54 (1143)	0.77 (1630)	0.24 (508)	64 (1600)
5	(1525)		0.24 (508)	0.38 (804)	0.61 (1291)	0.24 (508)	58 (1450)
10	(3000)		0.28 (593)	0.47 (995)	0.77 (1630)	0.24 (508)	52 (1300)
15	(4500)		0.40 (868)	0.68 (1439)	1.08 (2286)	0.24 (508)	47 (1175)
20	(6000)	*	0.53 (1122)	0.91 (1926)	1.39 (2942)	0.24 (508)	47 (1175)
25	(7500)	*	0.67 (1418)	1.15 (2434)	1.70 (3598)	0.24 (508)	47 (1175)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 41 OF 42

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

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

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
10' x 9' x 10" (3000 x 2700 x 250 mm)					
3 (915)	0.28 (593)	0.56 (1185)	0.81 (1715)	0.24 (508)	79 (1975)
5 (1525)	0.24 (508)	0.39 (826)	0.64 (1355)	0.24 (508)	64 (1600)
10 (3000)	0.27 (572)	0.48 (1016)	0.80 (1693)	0.24 (508)	58 (1450)
15 (4500)	0.38 (804)	0.63 (1334)	1.11 (2350)	0.24 (508)	47 (1175)
20 (6000) *	0.50 (1058)	0.92 (1947)	1.42 (3006)	0.24 (508)	47 (1175)
25 (7500) *	0.63 (1334)	1.16 (2455)	1.73 (3662)	0.24 (508)	47 (1175)
10' x 10' x 10" (3000 x 3000 x 250 mm)					
3 (915)	0.27 (572)	0.57 (1207)	0.86 (1820)	0.24 (508)	79 (1975)
5 (1525)	0.24 (508)	0.41 (868)	0.67 (1418)	0.24 (508)	70 (1750)
10 (3000)	0.26 (550)	0.48 (1016)	0.82 (1736)	0.24 (508)	64 (1600)
15 (4500)	0.36 (762)	0.70 (1482)	1.13 (2392)	0.24 (508)	52 (1300)
20 (6000) *	0.48 (1016)	0.92 (1947)	1.46 (3090)	0.24 (508)	52 (1300)
25 (7500) *	0.60 (1270)	1.06 (2244)	1.74 (3683)	0.24 (508)	47 (1175)
12' x 4' x 12" (3600 x 1200 x 300 mm)					
3 (915)	0.50 (1058)	0.44 (931)	0.58 (1228)	0.29 (614)	73 (1825)
5 (1525)	0.40 (847)	0.33 (699)	0.50 (1058)	0.29 (614)	66 (1650)
10 (3000)	0.51 (1080)	0.42 (889)	0.66 (1397)	0.29 (614)	59 (1475)
15 (4500)	0.76 (1609)	0.61 (1291)	0.94 (1990)	0.29 (614)	59 (1475)
20 (6000)	1.03 (2180)	0.81 (1715)	1.22 (2582)	0.29 (614)	59 (1475)
25 (7500) *	1.32 (2794)	1.02 (2159)	1.50 (3175)	0.29 (614)	59 (1475)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 5' x 12" (3600 x 1500 x 300 mm)					
3 (915)	0.47 (995)	0.48 (1016)	0.64 (1355)	0.29 (614)	73 (1825)
5 (1525)	0.37 (783)	0.36 (762)	0.55 (1164)	0.29 (614)	66 (1650)
10 (3000)	0.47 (995)	0.46 (974)	0.72 (1524)	0.29 (614)	59 (1475)
15 (4500)	0.69 (1461)	0.67 (1418)	1.03 (2180)	0.29 (614)	59 (1475)
20 (6000)	0.92 (1947)	0.89 (1884)	1.33 (2815)	0.29 (614)	59 (1475)
25 (7500) *	1.18 (2498)	1.12 (2371)	1.64 (3471)	0.29 (614)	59 (1475)
12' x 6' x 12" (3600 x 1800 x 300 mm)					
3 (915)	0.44 (931)	0.52 (1101)	0.70 (1482)	0.29 (614)	66 (1650)
5 (1525)	0.34 (720)	0.39 (826)	0.60 (1270)	0.29 (614)	59 (1475)
10 (3000)	0.43 (910)	0.49 (1037)	0.78 (1651)	0.29 (614)	59 (1475)
15 (4500)	0.63 (1334)	0.72 (1524)	1.10 (2328)	0.29 (614)	53 (1325)
20 (6000) *	0.84 (1778)	0.95 (2011)	1.43 (3027)	0.29 (614)	53 (1325)
25 (7500) *	1.07 (2265)	1.20 (2540)	1.75 (3704)	0.29 (614)	53 (1325)
12' x 7' x 12" (3600 x 2100 x 300 mm)					
3 (915)	0.41 (868)	0.55 (1164)	0.75 (1588)	0.29 (614)	66 (1650)
5 (1525)	0.32 (677)	0.41 (868)	0.64 (1355)	0.29 (614)	59 (1475)
10 (3000)	0.40 (847)	0.52 (1101)	0.83 (1757)	0.29 (614)	59 (1475)
15 (4500)	0.58 (1228)	0.76 (1609)	1.17 (2477)	0.29 (614)	53 (1325)
20 (6000) *	0.77 (1630)	1.00 (2117)	1.50 (3175)	0.29 (614)	53 (1325)
25 (7500) *	0.97 (2053)	1.26 (2667)	1.84 (3895)	0.29 (614)	53 (1325)

PRECAST REINFORCED CONCRETE BOX

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 390-0

SHEET 42 OF 42

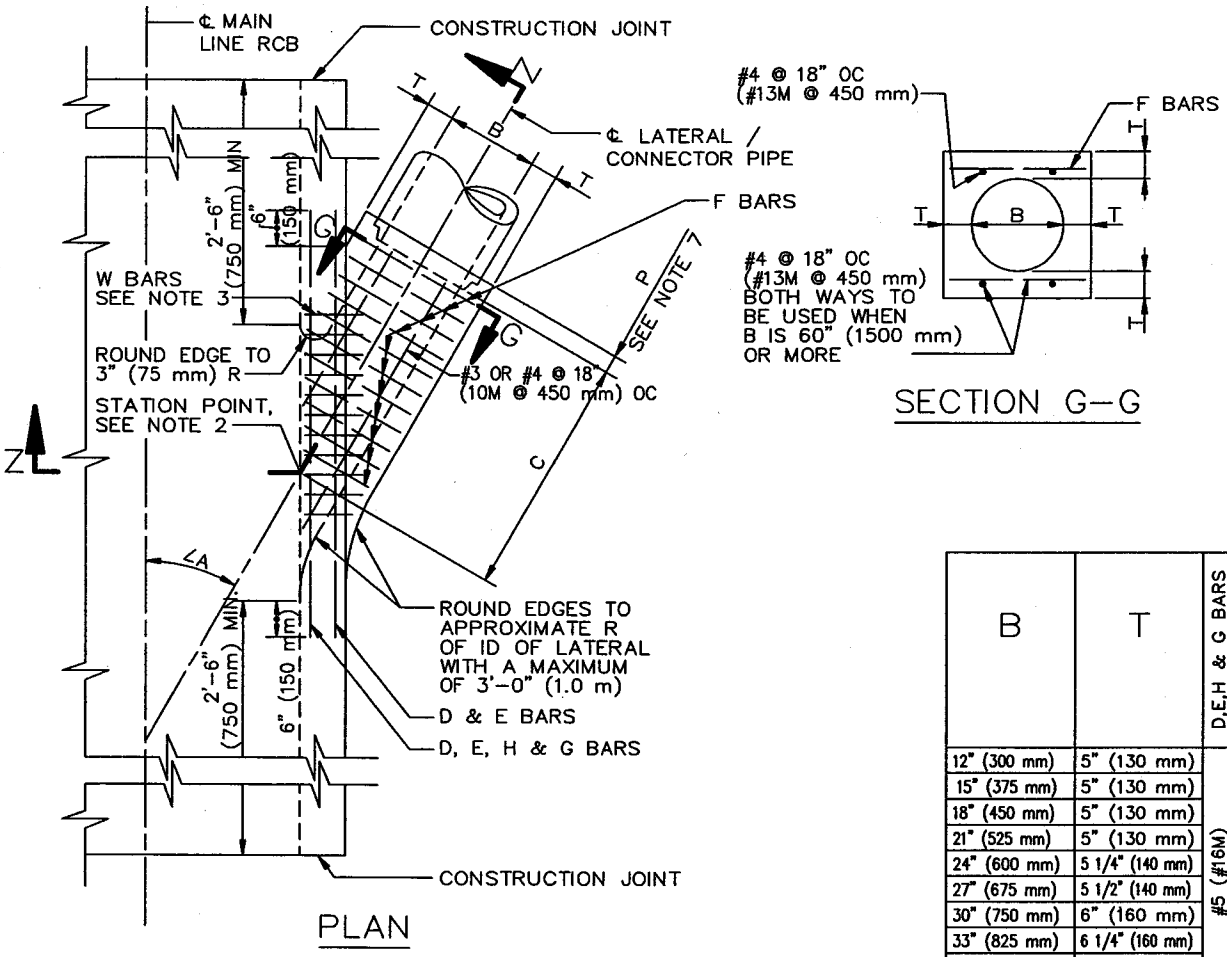
EARTH COVER MORE THAN 2' (610 mm)
STEEL COVER 2.5" (63 mm) AT TOP OF INVERT SLAB

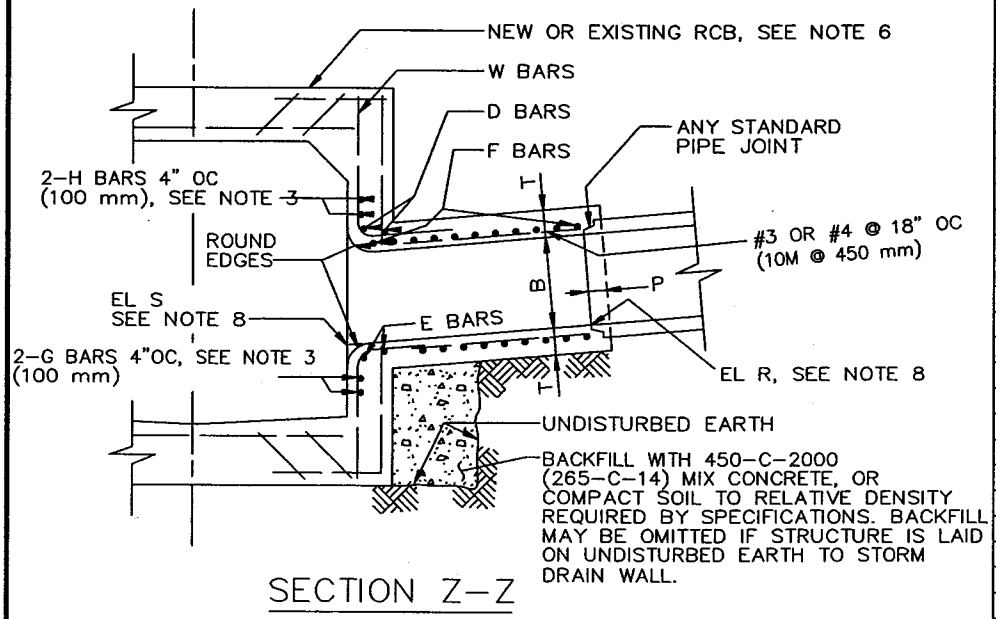
DIMENSIONS SHOWN ARE SPAN x RISE x HAUNCH, WALL AND SLAB THICKNESS

* WHERE NOTED, SUBMIT DETAILS FOR TOP SLAB SHEAR REINFORCEMENT

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 8' x 12" (3600 x 2400 x 300 mm)					
3 (915)	0.39 (826)	0.58 (1228)	0.81 (1715)	0.29 (614)	66 (1650)
5 (1525)	0.30 (635)	0.43 (910)	0.68 (1439)	0.29 (614)	59 (1475)
10 (3000)	0.38 (804)	0.54 (1143)	0.87 (1842)	0.29 (614)	59 (1475)
15 (4500)	0.54 (1143)	0.79 (1672)	1.22 (2582)	0.29 (614)	53 (1325)
20 (6000) *	0.71 (1503)	1.04 (2201)	1.57 (3323)	0.29 (614)	53 (1325)
25 (7500) *	0.90 (1905)	1.31 (2773)	1.91 (4043)	0.29 (614)	53 (1325)
12' x 9' x 12" (3600 x 2700 x 300 mm)					
3 (915)	0.37 (783)	0.61 (1291)	0.86 (1820)	0.29 (614)	80 (2000)
5 (1525)	0.29 (614)	0.45 (953)	0.72 (1524)	0.29 (614)	66 (1650)
10 (3000)	0.36 (762)	0.56 (1185)	0.91 (1926)	0.29 (614)	59 (1475)
15 (4500)	0.50 (1058)	0.81 (1715)	1.26 (2667)	0.29 (614)	53 (1325)
20 (6000) *	0.66 (1397)	1.07 (2265)	1.62 (3429)	0.29 (614)	53 (1325)
25 (7500) *	0.84 (1778)	1.35 (2858)	1.97 (4170)	0.29 (614)	53 (1325)
12' x 10' x 12" (3600 x 3000 x 300 mm)					
3 (915)	0.34 (720)	0.64 (1355)	0.90 (1905)	0.29 (614)	80 (2000)
5 (1525)	0.29 (614)	0.47 (995)	0.76 (1609)	0.29 (614)	66 (1650)
10 (3000)	0.34 (720)	0.57 (1207)	0.94 (1990)	0.29 (614)	59 (1475)
15 (4500)	0.48 (1016)	0.83 (1757)	1.30 (2752)	0.29 (614)	53 (1325)
20 (6000) *	0.63 (1334)	1.09 (2307)	1.65 (3493)	0.29 (614)	53 (1325)
25 (7500) *	0.79 (1672)	1.37 (2900)	2.01 (4255)	0.29 (614)	53 (1325)

H_e EARTH COVER FT (mm) MAXIMUM	TRANSVERSE REINFORCEMENT AREA, IN^2/ FT (mm^2/ m)				M INCHES (mm)
	A_{S1}	A_{S2}	A_{S3}	A_{S4}	
12' x 11' x 12" (3600 x 3300 x 300 mm)					
3 (915)	0.35 (741)	0.66 (1397)	0.95 (2011)	0.29 (614)	93 (2325)
5 (1525)	0.29 (614)	0.48 (1016)	0.79 (1672)	0.29 (614)	80 (2000)
10 (3000)	0.33 (699)	0.58 (1228)	0.97 (2053)	0.29 (614)	73 (1825)
15 (4500)	0.46 (974)	0.84 (779)	1.33 (2815)	0.29 (614)	59 (1475)
20 (6000) *	0.60 (1270)	1.10 (2328)	1.68 (3556)	0.29 (614)	59 (1475)
25 (7500) *	0.75 (1588)	1.38 (2921)	2.04 (4318)	0.29 (614)	59 (1475)
12' x 12' x 12" (3600 x 3600 x 300 mm)					
3 (915)	0.31 (656)	0.69 (1461)	1.00 (2117)	0.29 (614)	93 (2325)
5 (1525)	0.29 (614)	0.50 (1058)	0.83 (1757)	0.29 (614)	80 (2000)
10 (3000)	0.32 (677)	0.59 (1249)	1.00 (2117)	0.29 (614)	73 (1825)
15 (4500)	0.45 (953)	0.84 (779)	1.35 (2858)	0.29 (614)	59 (1475)
20 (6000) *	0.58 (1228)	1.11 (2350)	1.70 (3598)	0.29 (614)	59 (1475)
25 (7500) *	0.73 (1545)	1.38 (2921)	2.05 (4339)	0.29 (614)	59 (1475)





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

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1984 REV. 1996, 2009

JUNCTION STRUCTURE – PIPE TO RCB

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN 333–2

NOTES

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

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

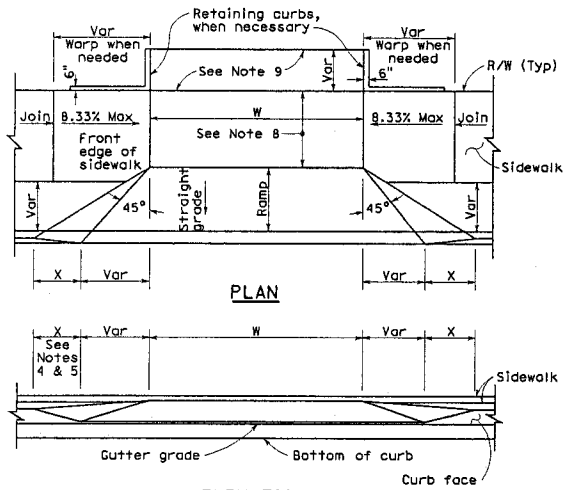
REGISTERED CIVIL ENGINEER

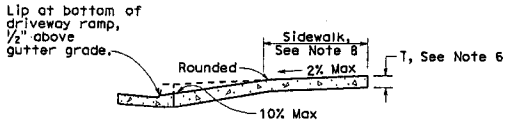
November 17, 2006
PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER — Michael Jonzen — No. 44788 — Exp. 03-31-08 — CIVIL — STATE OF CALIFORNIA

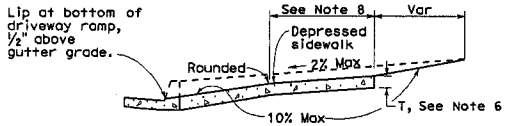
To accompany plans dated _____





CASE A

Typical driveway, sidewalk not depressed



CASE B

Driveway with depressed sidewalk

SECTIONS

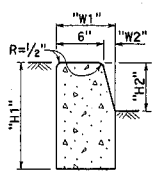
CURB QUANTITIES

TYPE	CUBIC YARDS PER LINEAR FOOT
A1-6	0.02585
A1-8	0.03084
A2-6	0.05903
A2-8	0.06379
A3-6	0.01036
A3-8	0.01435
B1-4	0.02185
B1-6	0.02930
B2-4	0.05515
B2-6	0.06171
B3-4	0.00641
B3-6	0.01074
B4	0.05709
D-4	0.04083
D-6	0.06804
E	0.06661

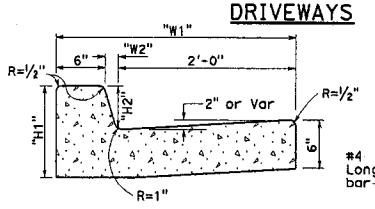
TABLE A

CURB TYPE	DIMENSIONS "H1"	"H2"	"W1"	"W2"
A1-6	1'-2"	6"	7½"	1½"
A1-8	1'-4"	8"	8"	2"
A2-6	1'-0"	6"	2'-7½"	1½"
A2-8	1'-2"	8"	2'-8"	2"
A3-6	6"	5"	7¼"	1¼"
A3-8	8"	7"	7¾"	1¾"
B1-4	1'-0"	4"	7½"	2½"
B1-6	1'-2"	6"	9"	4"
B2-4	10"	4"	2'-7½"	2½"
B2-6	1'-0"	6"	2'-9"	4"
B3-4	4"	3"	7"	2"
B3-6	6"	5"	8½"	3½"
D-4	10"	4"	1'-6"	1'-1"
D-6	1'-0"	6"	2'-2"	1'-8"

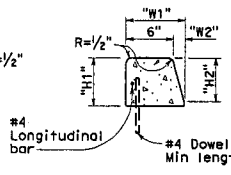
DRIVEWAYS



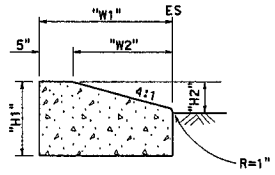
TYPE A1 CURBS
See Table A



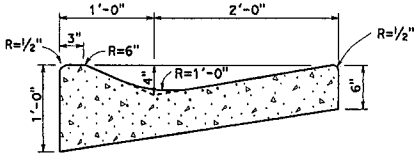
TYPE A2 CURBS
See Table A



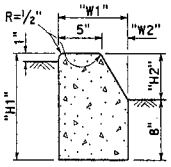
TYPE A3 CURBS
Superimposed on existing pavement
See Table A



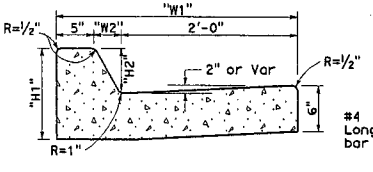
TYPE D CURBS
See Table A



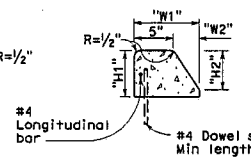
TYPE E CURB



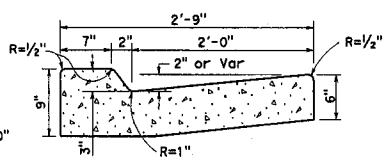
TYPE B1 CURBS
See Table A



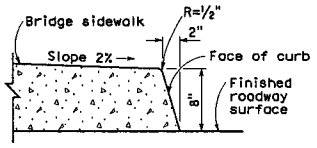
TYPE B2 CURBS
See Table A



TYPE B3 CURBS
Superimposed on existing pavement
See Table A



TYPE B4 CURBS



TYPE H CURB
On Bridges

NOTES:

1. Case A driveway section typically applies.
2. Use Case B driveway section when ramp slopes would exceed 10% in Case A.
3. Use Case B driveway section when sidewalk cross slope would exceed 2% in Case A.
4. X=3'-0" except for curb heights over 10" where 4:1 slopes shall be used on curb slope.

CURBS

5. X is a variable when sidewalk is located where wheelchairs may traverse the surface. Slopes shall not exceed 8.33%.
6. Sidewalk and ramp thickness "T" at driveway shall be 4" for residential and 6" for commercial.
7. Difference in slope of the driveway ramp and the slope of a line between the gutter and a point on the roadway 5'-0" from gutter line shall not exceed 15%. Reduce driveway ramp slope, not gutter slope, where required.
8. Minimum width of clear passageway for sidewalk shall be 4'-0".
9. Retaining curbs and acquisition of construction easement may be necessary for narrow sidewalks or curb heights in excess of 6".
10. Across the pedestrian route at curb ramp locations, the gutter pan slope shall not exceed 1" of depth for each 2'-0" of width.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURBS AND DRIVEWAYS

NO SCALE

RSP A87A DATED NOVEMBER 17, 2006 SUPERSEDES STANDARD PLAN A87A DATED MAY 1, 2006 - PAGE 113 OF THE STANDARD PLANS BOOK DATED MAY 2006.

REVISED STANDARD PLAN RSP A87A

10-25-06

2006 REVISED STANDARD PLAN RSP A87A

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

REGISTERED CIVIL ENGINEER
Dallas Forester
No. C37765
Exp. 12-31-06
CIVIL
STATE OF CALIFORNIA
REGISTERED PROFESSIONAL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

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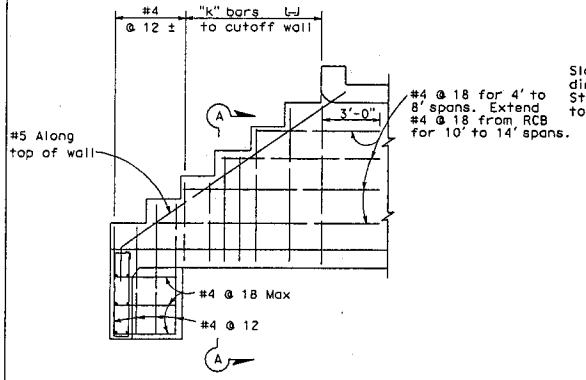
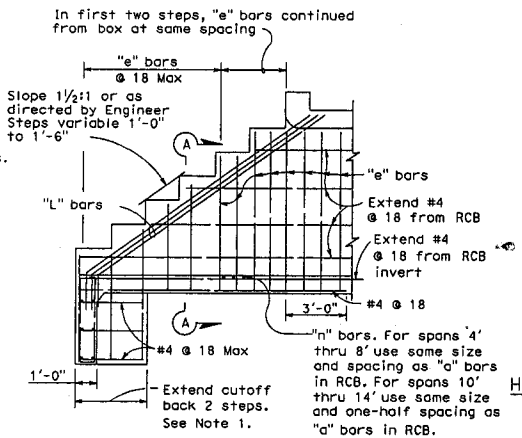
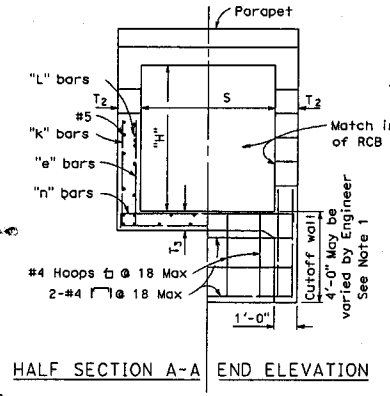


LONGITUDINAL SECTION
Showing reinforcement in outside face

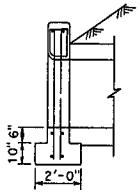


LONGITUDINAL SECTION
Showing reinforcement in inside face

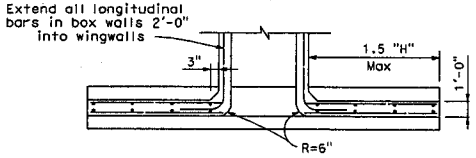


HALF SECTION A-A END ELEVATION

Dimensions S and T_3 to be same as adjacent RCB.
T_2 = Same as adjacent RCB (8" Min).

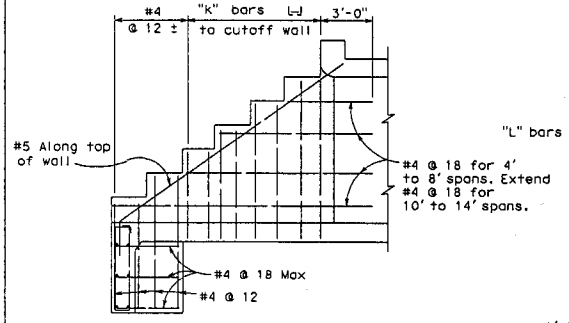


SECTION B-B

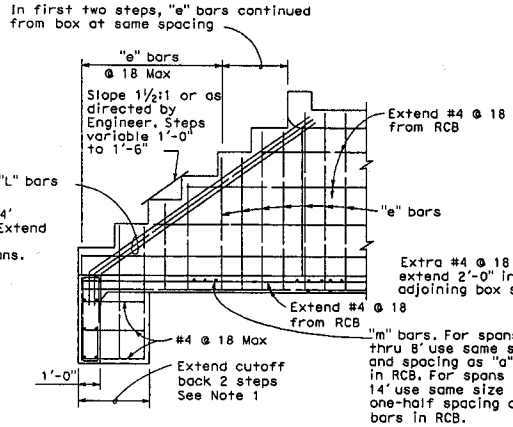


SECTION C-C

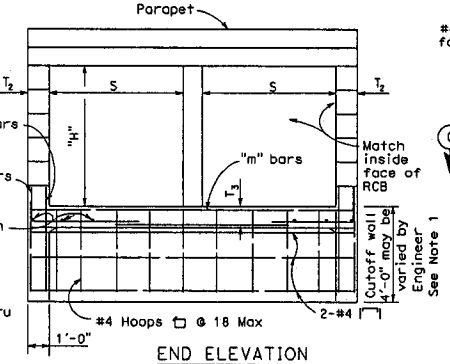
TYPE "E" STEPPED WINGWALL (SINGLE BOX CULVERT)



LONGITUDINAL SECTION
Showing reinforcement in outside face

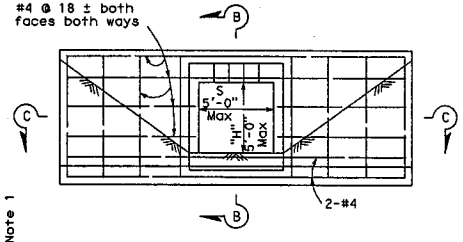


LONGITUDINAL SECTION
Showing reinforcement in inside face



END ELEVATION

Dimensions S and T_3 to be same as adjacent RCB.
T_2 = Same as adjacent RCB (8" Min).



ELEVATION

TYPE "D" STRAIGHT WINGWALL

Details similar for multiple span boxes.
For Parapet Details not shown see Standard Plan D82.

TYPE "E" STEPPED WINGWALL (MULTIPLE BOX CULVERT)

TABLE OF REINFORCEMENT FOR TYPE "E" WINGWALLS										
"H" (See Note 2)		3'	4'	5'	6'	7'	8'	10'	12'	14'
"k" Bars	Bar No.	#4	#4	#5	#5	#5	#5	#5	#5	#5
	Spacing	@ 12	@ 12	@ 12	@ 10	@ 9	@ 8	@ 7	@ 5	@ 4
"L" Bars	Bar No.	#5	#5	#6	#6	#7	#7	#7	#7	#7
	Number each wall	2	2	3	3	3	3	3	3	3

NOTES:

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

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT WINGWALLS TYPES D AND E

NO SCALE

D85

8-8-05

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

REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

Dallas Forester No. C37765 Exp. 12-31-06 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

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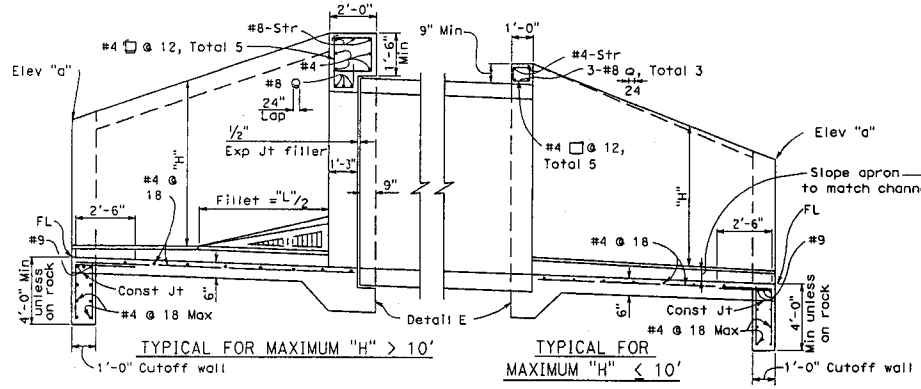
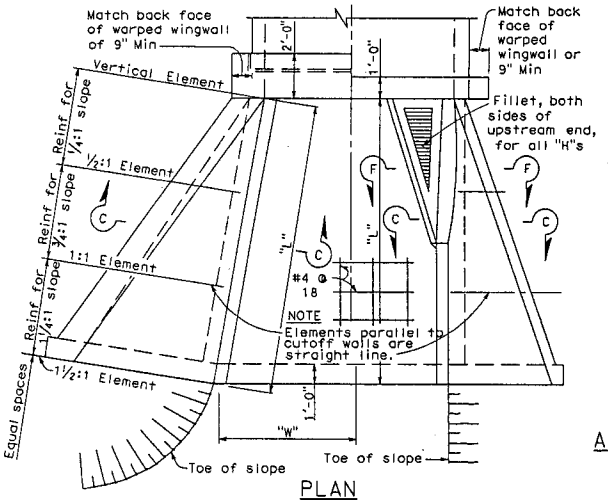


TYPICAL FOR MAXIMUM "H" > 10'

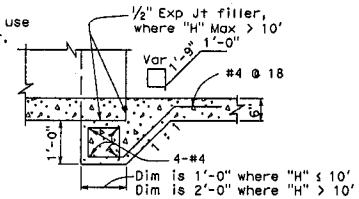
TYPICAL FOR MAXIMUM "H" ≤ 10'

PART LONGITUDINAL SECTION

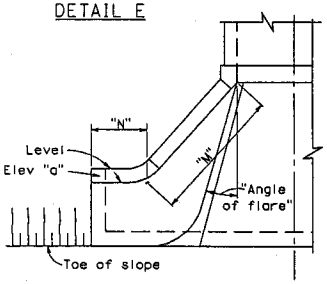
NOTE:
RCP shown. Metal pipe similar except eliminate the expansion joint and use hook bolts @ 1'-7" ± spacing. Size and length provided by manufacturer.



PLAN

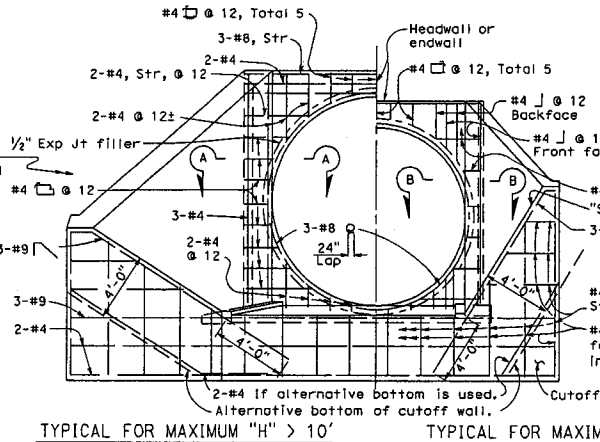


DETAIL E



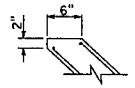
ALTERNATIVE WARPED WINGWALL

Use where additional protection to toe of embankment is required. If at upstream end, fillet is not shown.



TYPICAL FOR MAXIMUM "H" > 10'

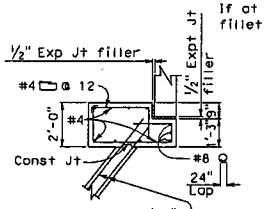
TYPICAL FOR MAXIMUM "H" ≤ 10'



WITHOUT STIFFENING BEAM

END ELEVATION

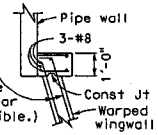
If at upstream end, fillet is not shown.



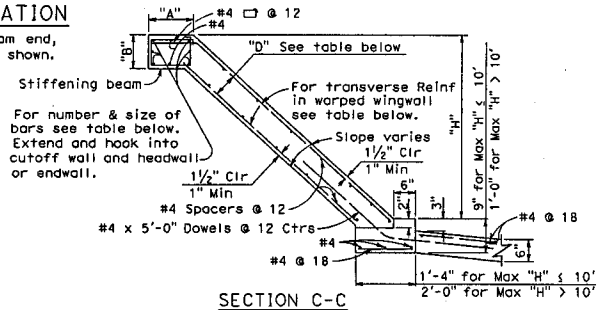
SECTION A-A

Extend wall spacers 2'-0"± into headwall or endwall. Rotate if necessary.

(Near spring-line, eliminate face extension and hook rear extension outward, if possible.)

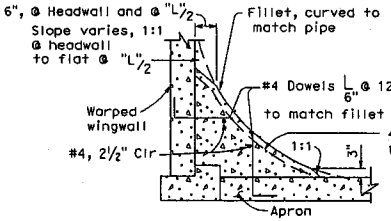


SECTION B-B



SECTION C-C

Where abrasion is anticipated, increase apron thickness to 7" minimum to provide 2" minimum reinforcement coverage.



SECTION F-F

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS

NO SCALE

D86B

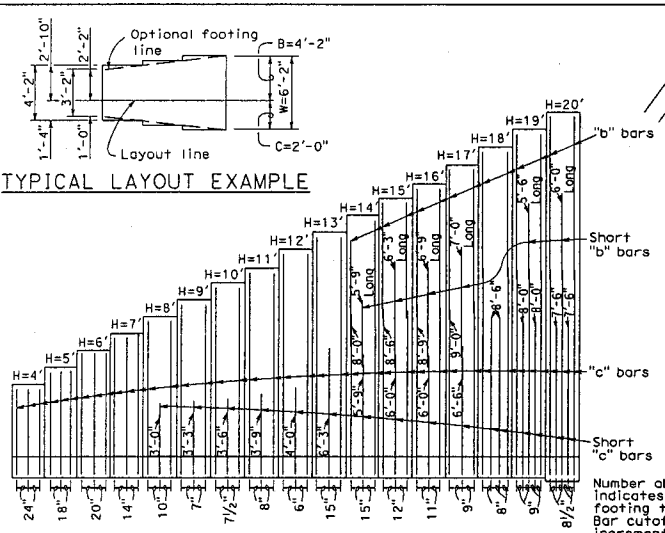
WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING								
Element Slope	"H"	8' or less	10'	12'	14'	16'	18'	20'
¼:1	Front face Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#7 @ 7	#7 @ 6
	Rear face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
¾:1	Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 8	#4 @ 6
	Rear face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 7	#4 @ 6	#5 @ 8
1¼:1	Front face Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
	Rear face Reinf	#4 @ 8	#4 @ 8	#4 @ 5	#5 @ 6	#6 @ 7	#6 @ 6	#7 @ 6
"D" at Cutoff Wall		6"	6"	6"	7½"	8"	9½"	11"
"D" at Culvert		6"	6"	6"	8"	9½"	11"	1'-1"

STIFFENING BEAM DIMENSIONS AND REINFORCING									
"H" Max	"L" 12'	14'	16'	18'	20'	25'	30'	35'	40' or more
6'	No beam. Place 2-#6 in each face along top of wall.								
8'		"A"= 1'-0"							
10'		"B"= 9"							
12'			"A"= 1'-6"						
14'	Total 6-#6		"B"= 1'-0"			"A"= 1'-10"			
16'				"B"= 1'-0"		"A"= 2'-0"			
18'			Total 6-#7		Total 6-#8	"B"= 1'-6"			
20'				Total 8-#9					

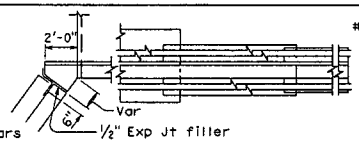
NOTES: Walls designed for 2'-0" surcharge; earth density = 120 LB/CF; equivalent fluid pressure = 36 LB/CF.
Vary "D" of warped wall uniformly from that at cutoff wall to that at headwall or endwall, for maximum "H" > 12'-0".
Dimensions "L", "W", "H", "M", "N", Elevation "a", Angle of flare", and end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

8-8-05

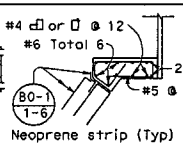


TYPICAL LAYOUT EXAMPLE

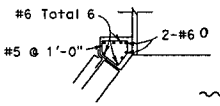
Number above "b" and "c" bars indicates distance from top of footing to upper end of bars. Bar cutoffs may be varied in increments of 6".



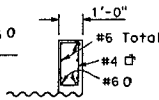
PART PLAN A-A



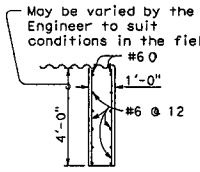
SECTION B-B



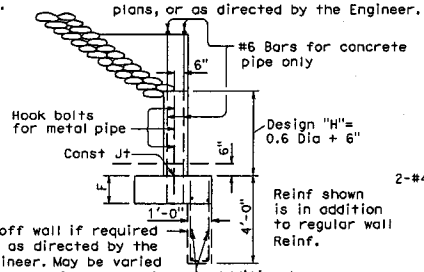
SECTION C-C



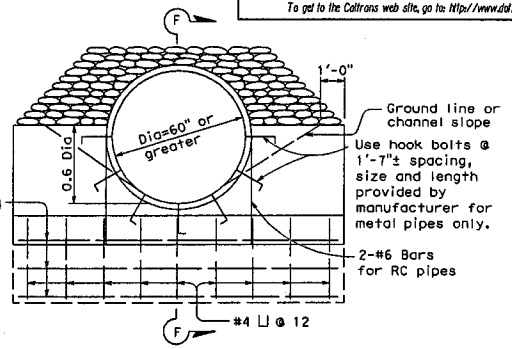
SECTION D-D



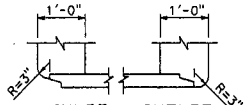
SECTION E-E



SECTION F-F

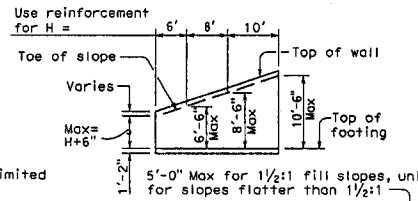


TYPE C WALL



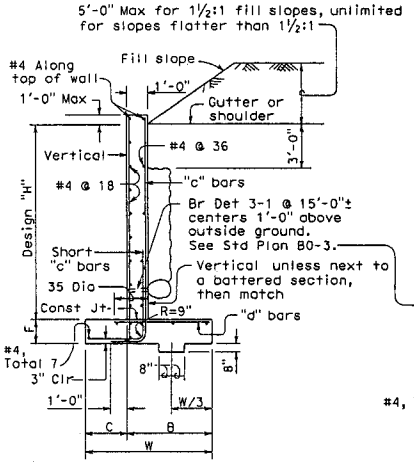
INLET OUTLET

RC PIPE DETAILS

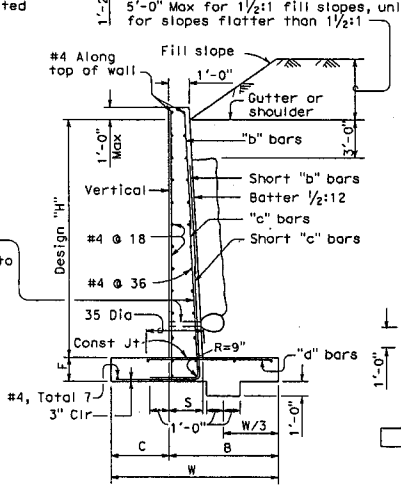


REINFORCED CONCRETE WINGWALLS

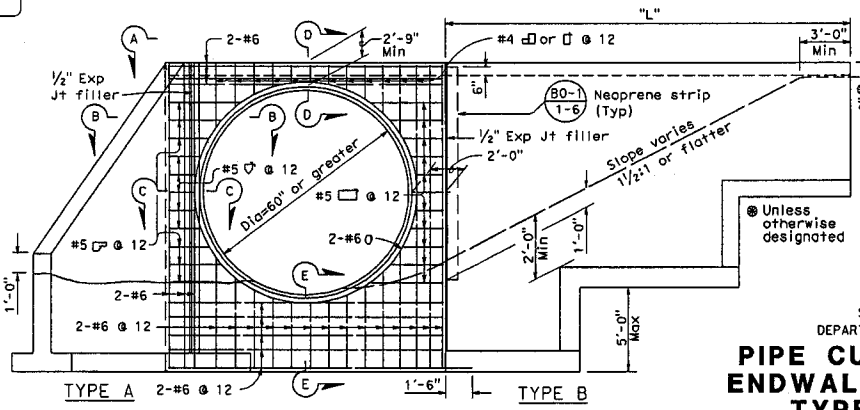
Design "H"	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
W	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	7'-8"	8'-0"	8'-8"	9'-4"	10'-0"	10'-8"	11'-4"	12'-0"
C	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	2'-8"	3'-0"	3'-4"	3'-6"	4'-0"	4'-4"	4'-8"
B	2'-2"	2'-6"	2'-10"	3'-2"	3'-6"	3'-10"	4'-2"	4'-6"	4'-10"	5'-2"	5'-4"	5'-8"	6'-0"	6'-4"	6'-8"	7'-0"	7'-4"
F	1'-2"																1'-4"
Batter	None									½:12							
S	1'-0"									1'-6½"	1'-7"	1'-7½"	1'-8"	1'-8½"	1'-9"	1'-9½"	1'-10"
"b" bars	None										#5 @ 15	#5 @ 12	#5 @ 11	#5 @ 9	#6 @ 24	#6 @ 18	#7 @ 17
"c" bars	#4 @ 24	#4 @ 18	#5 @ 20	#5 @ 14	#5 @ 10	#5 @ 7	#6 @ 7½	#7 @ 8	#7 @ 6	#9 @ 15	#10 @ 15	#10 @ 12	#10 @ 11	#10 @ 9	#10 @ 8	#11 @ 9	#11 @ 8½
"d" bars	#4 @ 24	#4 @ 18	#5 @ 20	#5 @ 14	#5 @ 10	#6 @ 14	#7 @ 15	#8 @ 16	#7 @ 12	#8 @ 15	#9 @ 15	#9 @ 12	#9 @ 11	#9 @ 9	#9 @ 8	#10 @ 9	#10 @ 8½
Conc CY/LF	0.32	0.38	0.44	0.49	0.55	0.61	0.67	0.73	0.79	1.02	1.10	1.18	1.26	1.36	1.45	1.55	1.72
Reinf LB/LF	13	16	19	25	30	37	49	62	76	73	90	104	123	141	170	189	206



TYPICAL SECTION
H=4' THRU 12'



TYPICAL SECTION
H=13' THRU 20'



TYPE A 2-#6 @ 12 — TYPE B

END ELEVATION
STRAIGHT WINGWALLS

For footing step dimensions and reinforcement see "Footing Step" on Std Plan B3-8.

NOTE:

Unit Stresses: f_s = 24,000 psi f_c = 1,300 psi, n = 10 Maximum Toe Pressure = 3.0 ksf. Elevation, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field. Walls designed for 2'-0" live load surcharge, 1½:1 sloping surcharge not to exceed 5'-0" in elevation plus 2'-0" live load surcharge, or unlimited 2:1 surcharge. If 1½:1 slope exceeds 5'-0", use Type 2 retaining wall. Wall height may be exceeded by 6" before going to the next greater "H".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT HEADWALLS, ENDWALLS AND WINGWALLS TYPES A, B AND C

NO SCALE

D90

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

REGISTERED CIVIL ENGINEER
May 1, 2006
PLANS APPROVAL DATE
Dallas Forester No. C37765 Exp. 12-31-06 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

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2006 STANDARD PLAN D90

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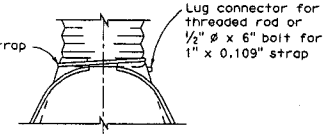
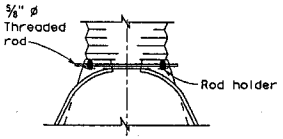
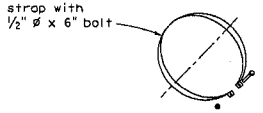
6-8-05



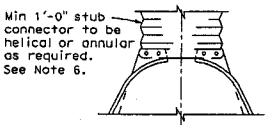
TYPE I



TYPE II



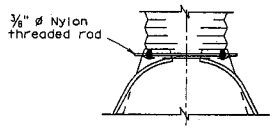
CONNECTOR STRAP DETAIL



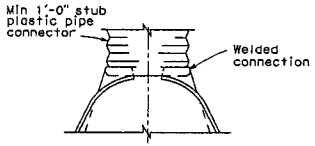
TYPE III

ALTERNATIVE CONNECTIONS FOR PIPE TO METAL FLARED END SECTIONS

See Note 7



TYPE A
12" - 24"



TYPE B
30" - 36"

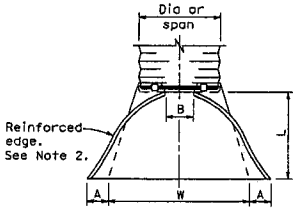
ALTERNATIVE CONNECTIONS FOR PIPE TO PLASTIC FLARED END SECTIONS

CIRCULAR PIPES						
PIPE DIA	END SECTION THICKNESS	DIMENSION				
		A	B	H	L	W
		1"±	Max	1"±	1½"±	2"±
12"*	0.064"	6"	6"	6"	1'-9"	2'-0"
15"*	0.064"	7"	8"	6"	2'-2"	2'-6"
18"*	0.064"	8"	10"	6"	2'-7"	3'-0"
21"	0.064"	9"	1'-0"	6"	3'-0"	3'-6"
24"*	0.064"	10"	1'-1"	6"	3'-5"	4'-0"
30"*	0.079"	1'-0"	1'-4"	8"	4'-3"	5'-0"
36"*	0.079"	1'-2"	1'-7"	9"	5'-0"	6'-0"
42"	0.109"	1'-4"	1'-10"	11"	5'-9"	7'-0"
48"	0.109"	1'-6"	2'-3"	1'-0"	6'-6"	7'-6"
54"	0.109"	1'-6"	2'-6"	1'-0"	7'-0"	8'-6"
60"	0.109"	1'-6"	2'-9"	1'-0"	7'-3"	9'-6"
66"	0.109"	1'-6"	3'-0"	1'-0"	7'-3"	10'-0"
72"	0.109"	1'-6"	3'-3"	1'-0"	7'-3"	10'-6"
78"	0.109"	1'-6"	3'-6"	1'-0"	7'-3"	11'-0"
84"	0.109"	1'-6"	3'-9"	1'-0"	7'-3"	11'-6"

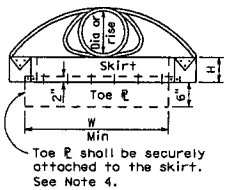
* Equivalent plastic FES to meet AASHTO M-294 and ASTM D-1248 Specifications, and shall conform to all dimensions shown above except for end section thickness, which may be 0.004" thinner.

PIPE-ARCHES							
DESIGNATION		END SECTION THICKNESS	DIMENSION				
			A	B	H	L	W
SPAN	RISE		1"±	Max	1"±	1½"±	2"±
21"	15"	0.064"	7"	10"	6"	1'-11"	3'-0"
24"	18"	0.064"	8"	1'-0"	6"	2'-4"	3'-6"
28"	20"	0.064"	9"	1'-2"	6"	2'-8"	4'-0"
35"	24"	0.079"	10"	1'-4"	6"	3'-3"	5'-0"
42"	29"	0.079"	1'-0"	1'-6"	8"	3'-10"	6'-3"
49"	33"	0.109"	1'-1"	1'-9"	9"	4'-5"	7'-1"
57"	38"	0.109"	1'-6"	2'-2"	1'-0"	5'-3"	7'-6"
64"	43"	0.109"	1'-6"	2'-6"	1'-0"	5'-10"	8'-6"
71"	47"	0.109"	1'-6"	2'-9"	1'-0"	6'-5"	9'-6"
77"	52"	0.109"	1'-6"	3'-0"	1'-0"	6'-5"	10'-6"
83"	57"	0.109"	1'-6"	3'-3"	1'-0"	6'-5"	11'-6"

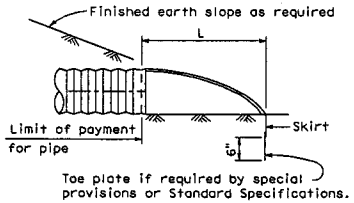
FLARED END SECTIONS FOR CORRUGATED METAL AND PLASTIC PIPE CULVERTS



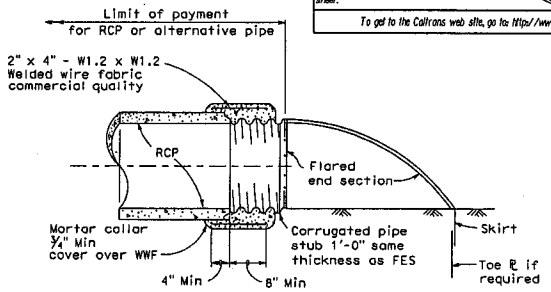
PLAN



ELEVATION



TYPICAL CROSS-SECTION



FLARED END SECTION CONNECTION TO RCP

NOTES:

1. All 3-piece bodies to have 0.109" thick sides and 0.138" thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by rivets or bolts.
2. Reinforced edges to be supplemented with stiffener angles for the 60" thru 84" round, 77" x 52" and 83" x 57" pipe-arch sizes. The angles will be 2" x 2" x ¼" for the 60" thru 72" round, 77" x 52" and 83" x 57" pipe-arch sizes and 2½" x 2½" x ¼" for 78" and 84" round. The angles to be attached by ⅜" ø nuts and bolts.
3. Angle reinforcement shall be placed under the center panel seams on the 77" x 52" and 83" x 57" pipe-arch sizes.
4. Toe plate to be available as an accessory when specified.
5. End of pipe to be finished with annular corrugations to conform flared end section so that minimal leakage results from the connection. Other designs may be used with approval of the Engineer.
6. For 12" thru 24" helical end section connection, a universal coupling band attached to the metal end section by rivets, bolts or 1" long shop tack welds spaced at same intervals as dimples may be used in place of the 12" stub. See Standard Plan D97C.
7. The types of alternative connections for pipe to metal flared end sections shall conform to the following:

   CIRCULAR PIPES -
   12" thru 24" Type I or III
   30" thru 84" Type II or III

   PIPE-ARCHES -
   21" x 15" thru 57" x 38" Type II or III
   64" x 43" thru 83" x 57" Type III

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

REGISTERED CIVIL ENGINEER

May 1, 2006
PLANS APPROVAL DATE

Glenn DeCou
No. C34547
Exp. 9-30-07
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

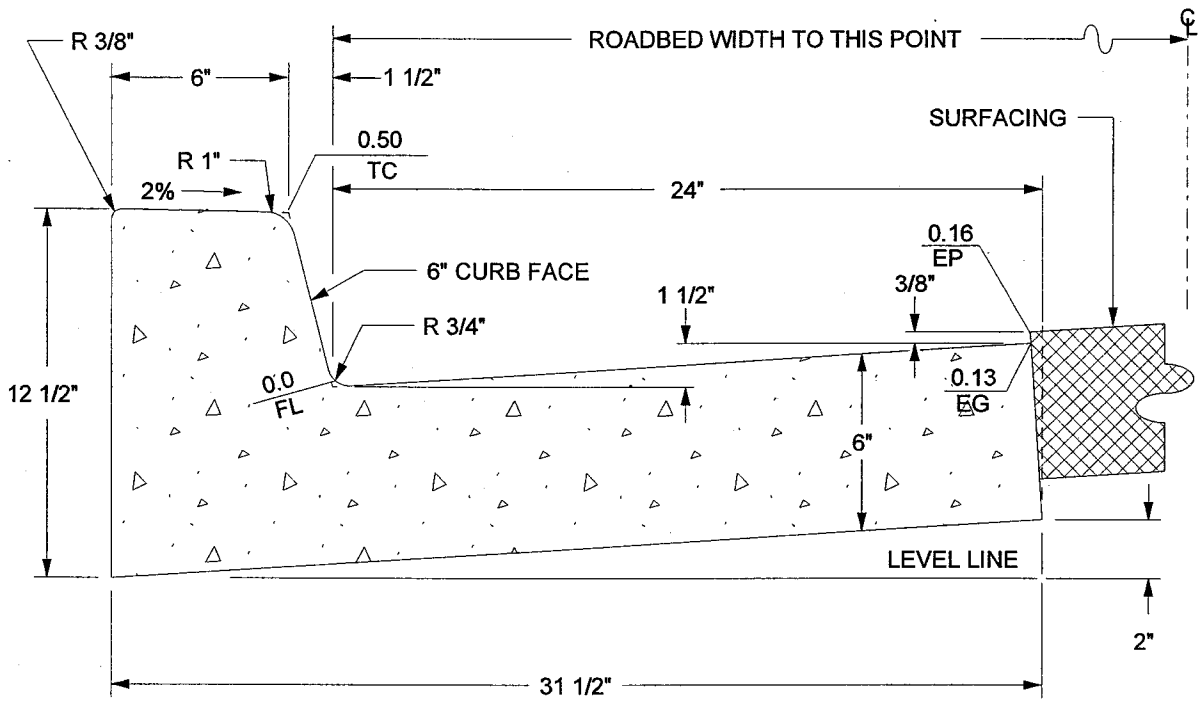
METAL AND PLASTIC FLARED END SECTIONS

NO SCALE

D94A

10-5-05

2006 STANDARD PLAN D94A



CLASS "B" CONCRETE

1.601 CU. FT. / L.F.

1 CU. YD. = 16.86 L.F.

ABBREVIATIONS:

TC = TOP OF CURB
FL = FLOWLINE
EG = EDGE OF GUTTER
EP = EDGE OF PAVEMENT

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

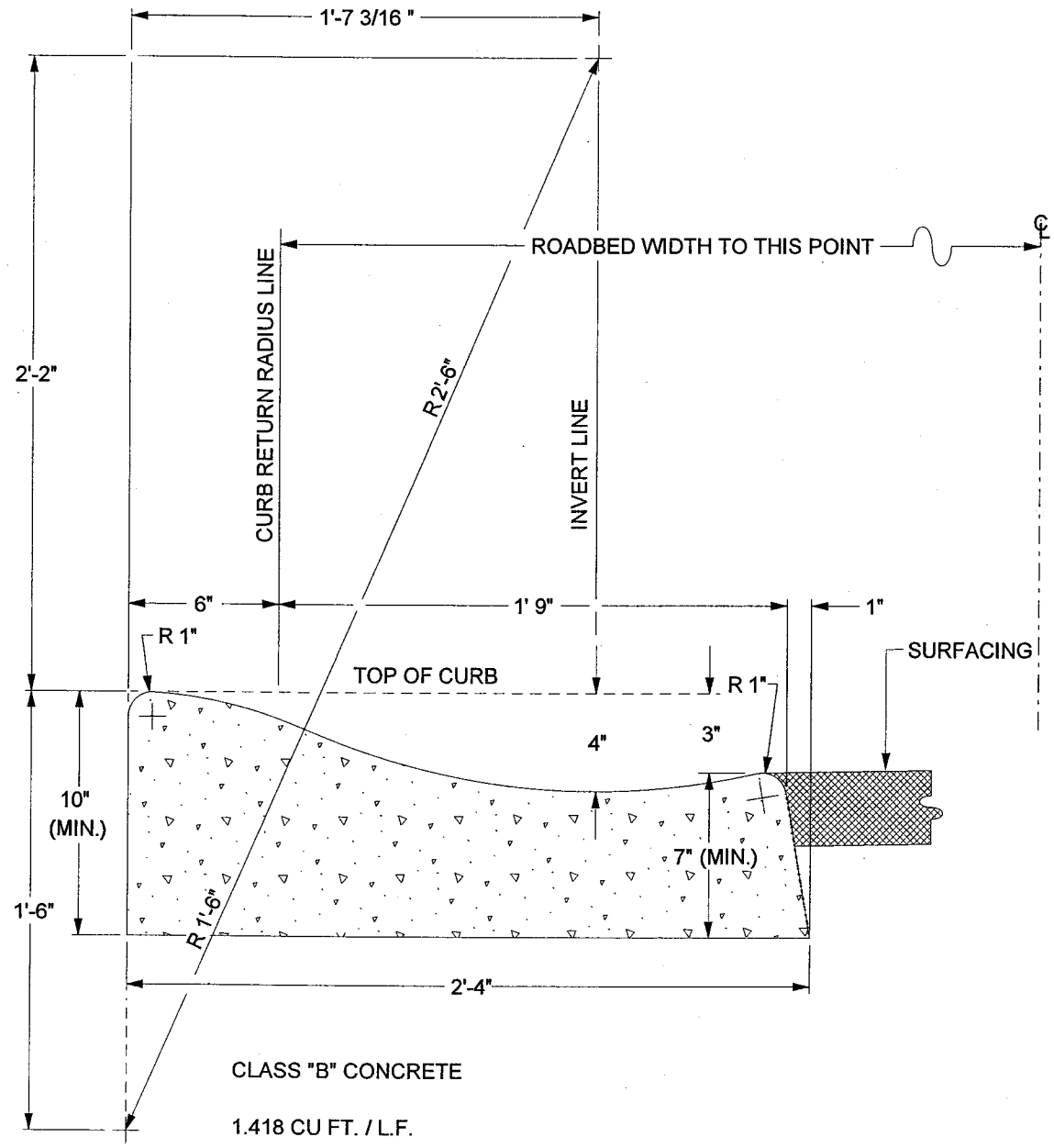
REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

TYPE A-6 CURB

STANDARD NO. 200

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



CLASS "B" CONCRETE

1.418 CU FT. / L.F.

1 CU. YD. = 19.05 L.F.

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

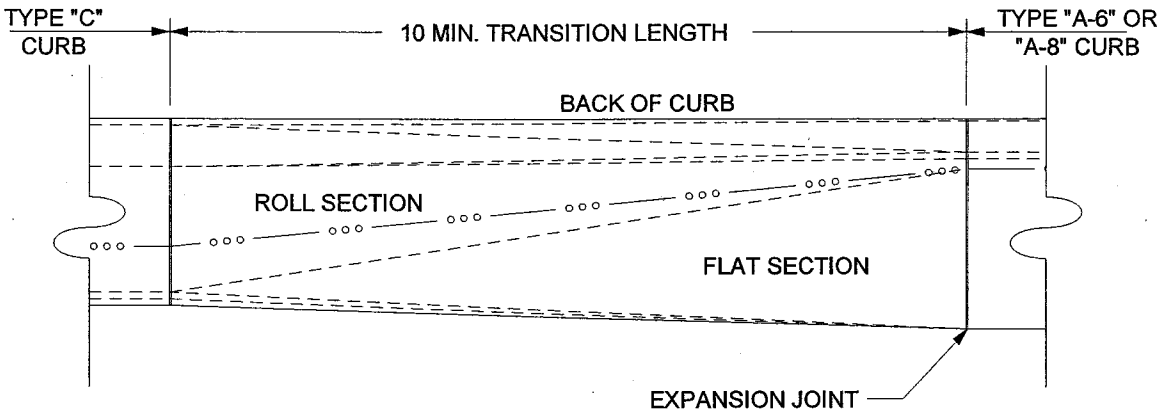
REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

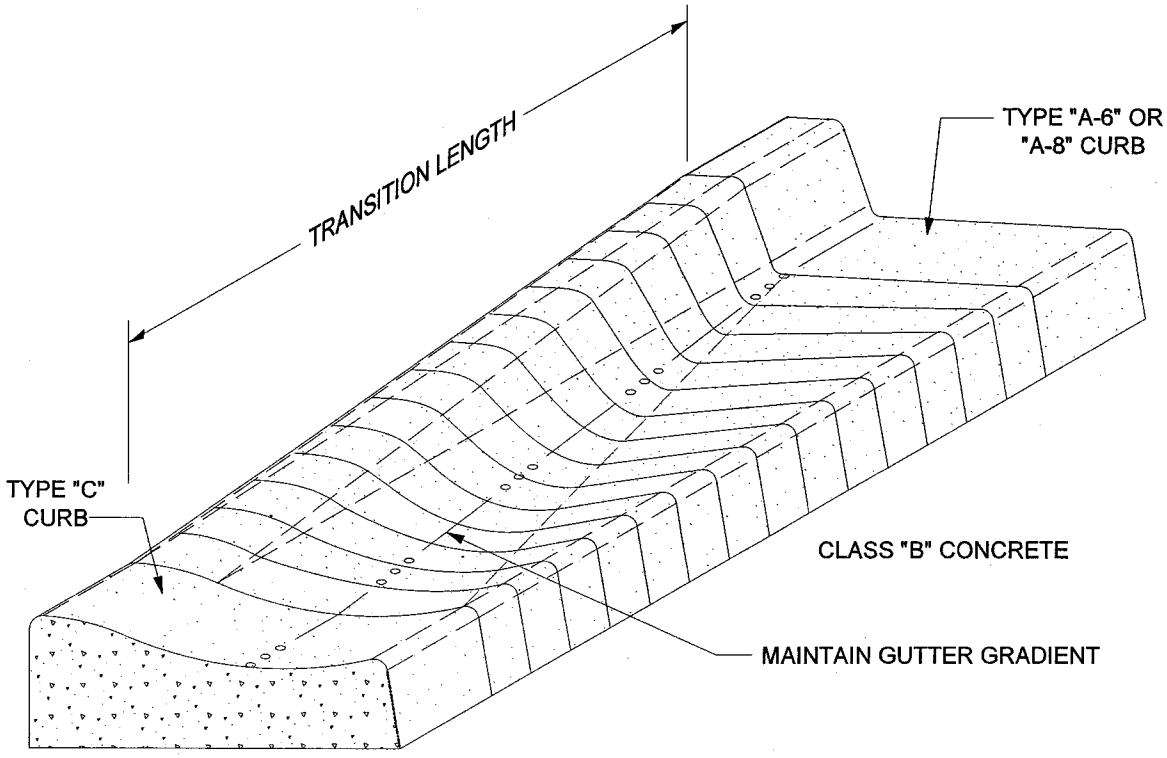
TYPE "C" CURB

STANDARD NO. 202

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



PLAN VIEW



ISOMETRIC VIEW

NOT TO SCALE

APPROVED BY:

George A. Johnson DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

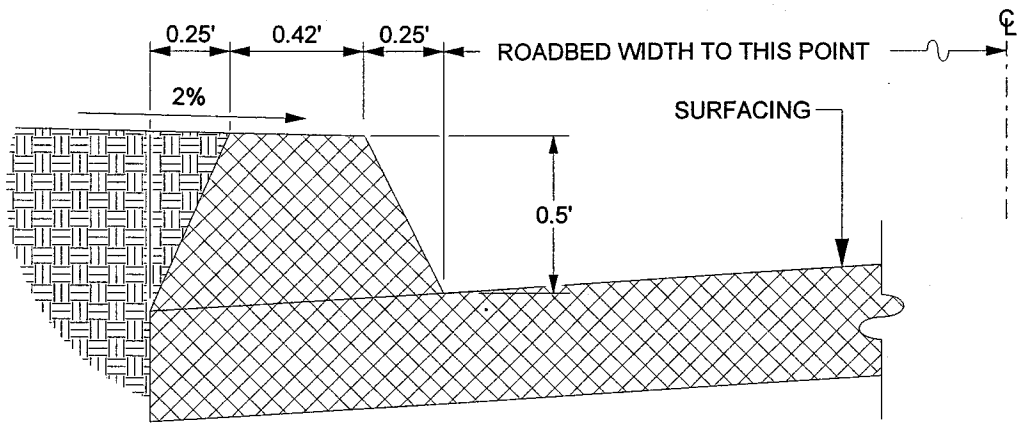
REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

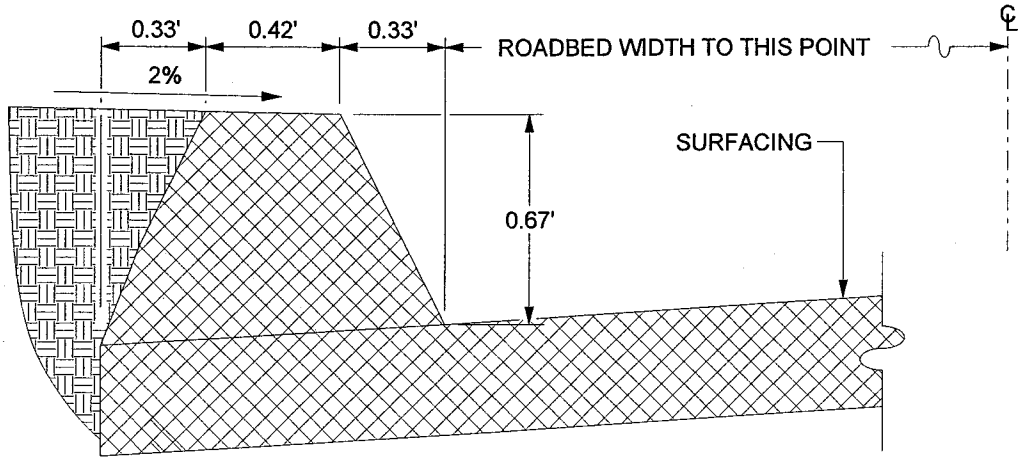
CURB TRANSITION

STANDARD NO. 211

REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-24-71, 6-82		1				4			
		2				5			
		3				6			



6" A.C. DIKE



8" A.C. DIKE

NOT TO SCALE

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

APPROVED BY:

DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

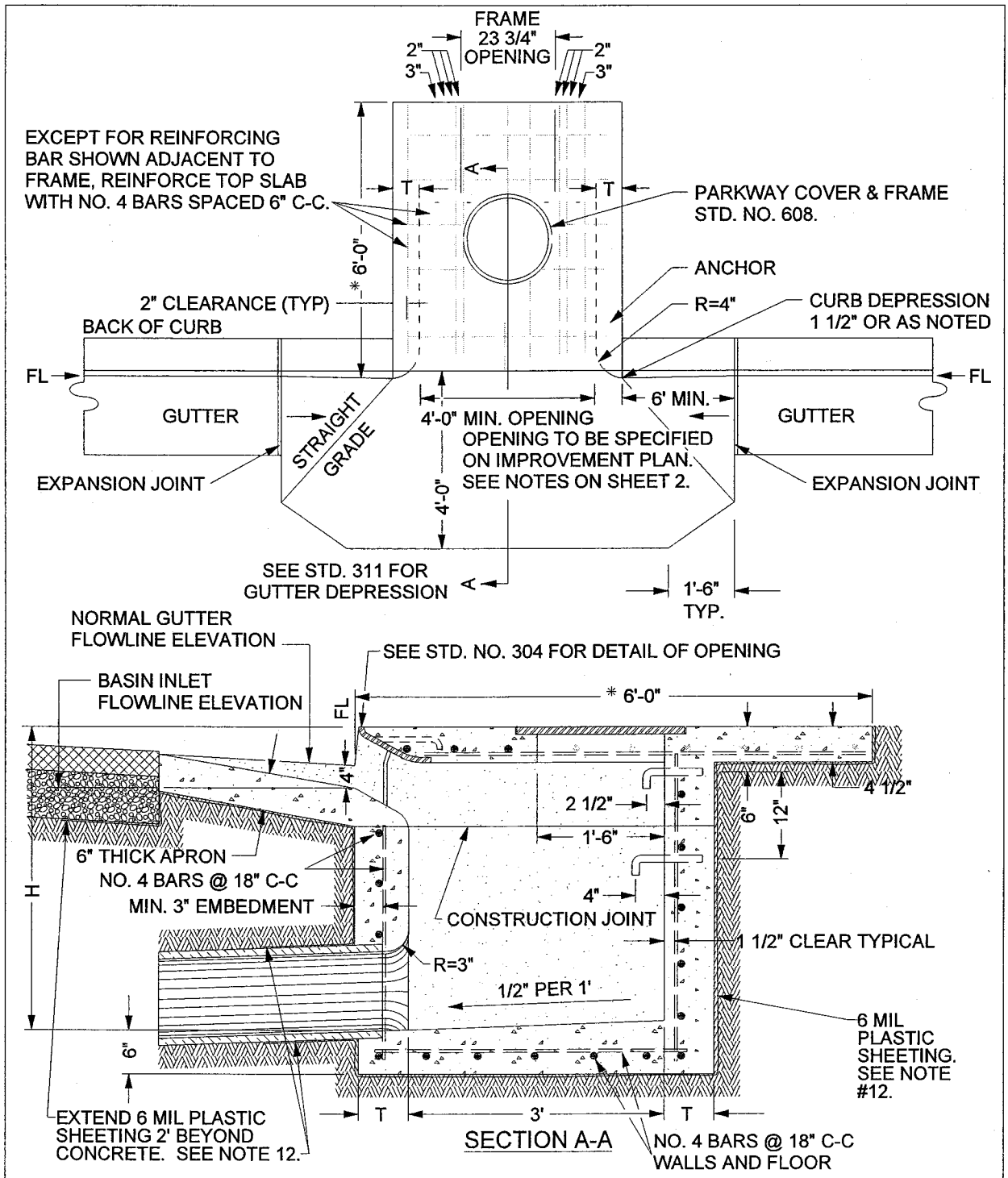
REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

ASPHALT CONCRETE DIKES

STANDARD NO. 212

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



CATCH BASIN SHALL BE CLASS "A" P.C.C.

*TOP OF CATCH BASIN TO BE POURED MONOLITHIC WITH SIDEWALK, 6 FT.

NOT TO SCALE

APPROVED BY:

DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

CURB INLET CATCH BASIN

STANDARD NO. 300 (1 OF 2)

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

1. CONNECTION PIPES MAY BE PLACED ANY POSITION AROUND THE WALLS, PROVIDED THEY POINT IN THE PROPER DIRECTION AND THE POSITION IS OTHERWISE CONSISTENT WITH THE IMPROVEMENT PLAN.
2. CURVATURE OF THE LIP AND SIDEWALLS AT GUTTER OPENING SHALL BE FORMED BY CURVED FORMS AND SHALL NOT BE MADE BY PLASTERING.
3. DIMENSIONS:
   T = 6" IF H IS 8 FEET OR LESS.
   T = 8" IF H IS GREATER THAN 8 FEET AND LESS THAN 20 FEET.
   H = 3 FEET 6 INCHES, UNLESS OTHERWISE SPECIFIED.
4. FLOOR OF BASIN SHALL BE GIVEN A STEEL - TROWELLED FINISH.
5. MANHOLE SHALL BE PLACED AS SHOWN ON STANDARD NO. 300, UNLESS NOTED DIFFERENTLY ON IMPROVEMENT PLANS.
6. OUTLET PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
7. OPENING SHALL BE 4'-0" (MINIMUM) UNLESS OTHERWISE SPECIFIED.
8. REINFORCING STEEL SHALL BE NO. 4 ROUND DEFORMED BARS IN TOP SLAB, AT 18" CENTERS IN THE SIDES AND FLOOR OF THE BOX.
9. 3/4 INCH PLAIN ROUND GALVANIZED STEEL STEPS (ALHAMBRA FDY. A-3320 OR EQUAL) ARE REQUIRED AS FOLLOWS:

   IF H IS 3.5 FEET OR LESS, NO STEPS ARE REQUIRED.
   IF H IS MORE THAN 3.5 FEET, AND NOT MORE THAN 5 FEET, INSTALL 1 STEP 16" ABOVE FLOOR OF THE BASIN.
   IF H IS MORE THAN 5 FEET, INSTALL STEPS 12 INCHES APART, WITH THE TOP STEP 6 INCHES BELOW THE SURFACE OF THE BASIN.
   ALL STEPS SHALL BE 4 INCHES FROM THE WALL, EXCEPT THE TOP STEP, WHICH SHALL BE 2 1/2 INCHES (CLEAR) FROM THE WALL, AND ANCHORED NOT LESS THAN 5 INCHES INTO THE WALL OF THE BASIN.
10. SURFACE OF ALL EXPOSED CONCRETE IN BASIN SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH AND SCORING TO EXISTING OR PROPOSED CURB AND WALL ADJACENT TO THE BASIN.
11. CONCRETE SHALL BE CLASS "A" WHEN THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF A PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH A SIDEWALK. THE TOP OF THE BASIN SHALL BE POURED MONOLITHIC WITH THE SIDEWALK, USING CLASS"A" CONCRETE IN THE SIDEWALK AND THE TOP OF THE CATCH BASIN PER SIDEWALK STANDARDS.
12. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

George A. Johnson DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

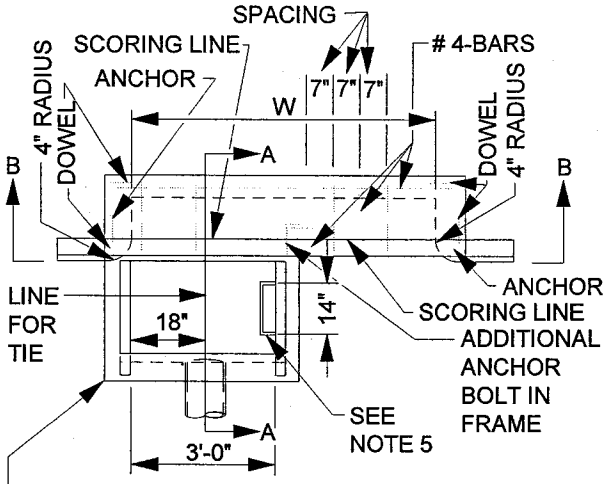
REGISTERED PROFESSIONAL ENGINEER — GEORGE A. JOHNSON — No. CE 42328 Exp. 3-31-08 — CIVIL — STATE OF CALIFORNIA

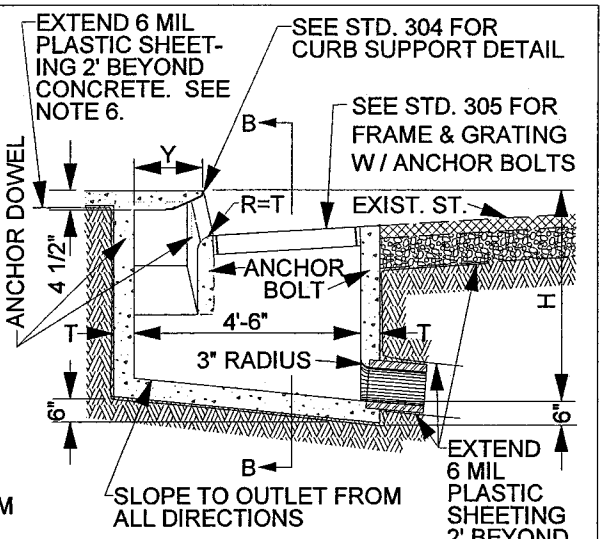
COUNTY OF RIVERSIDE

CURB INLET CATCH BASIN (SPECS)

STANDARD NO. 300 (2 OF 2)

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

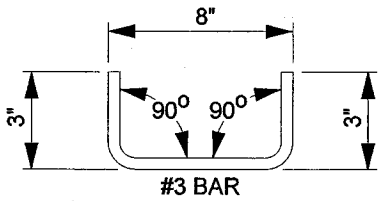




SECTION "A-A"

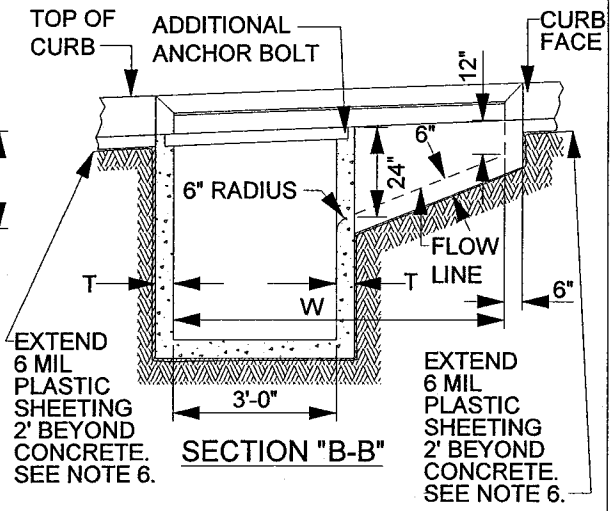
THE OUTER EDGES OF THE WALLS SHALL CONFORM TO THE STREET OR LOCAL DEPRESSION SURFACE. THE GRATING SHALL BE LAID IN THE PLANE OF THIS SURFACE, SEE STD. NO. 312 CASE B FOR GUTTER DEPRESSION.

PLAN



DETAIL OF DOWEL

NOT TO SCALE



SECTION "B-B"

NOTES:

1. DIMENSIONS UNLESS OTHERWISE SPECIFIED✳

Y	W	T	H
2' 3"	7'✳	6"✳	4' 6"✳
		6"	5' OR LESS
		8"	5' TO 8'
		10"	8' OR GREATER

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

APPROVED BY:

George A. Johnson DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

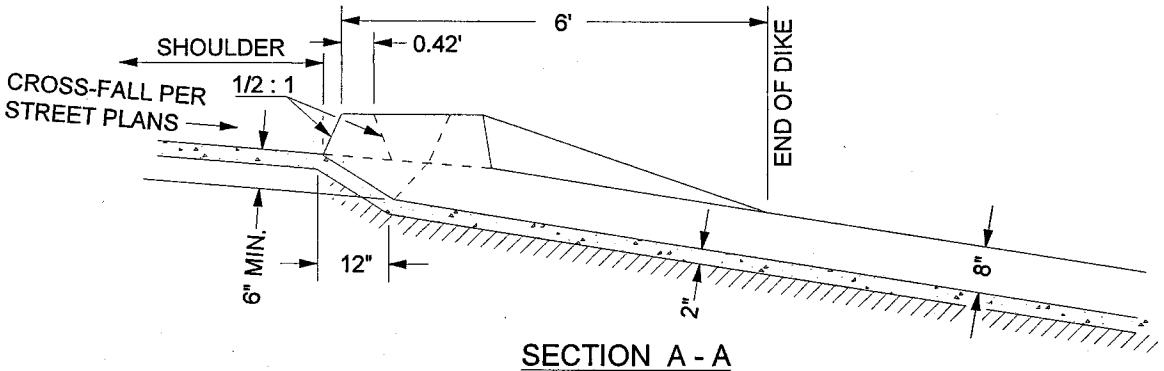
REGISTERED PROFESSIONAL ENGINEER GEORGE A. JOHNSON No. CE 42328 Exp. 3-31-08 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

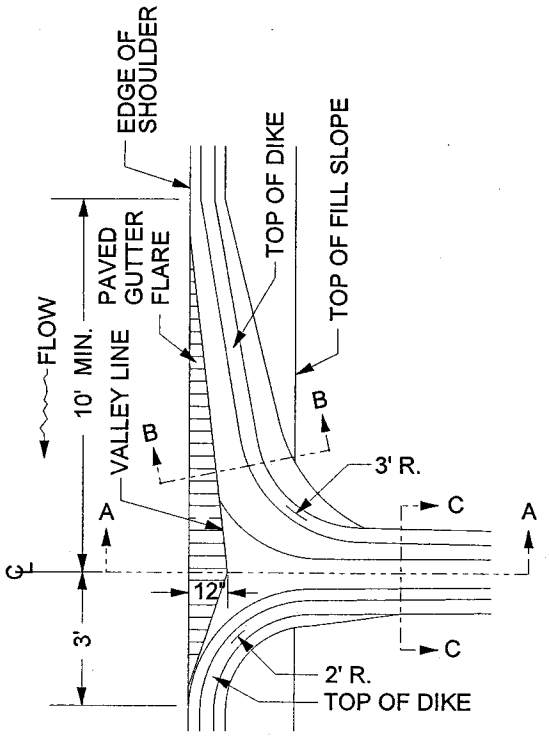
COMBINATION INLET CATCH BASIN NO.1

STANDARD NO. 301

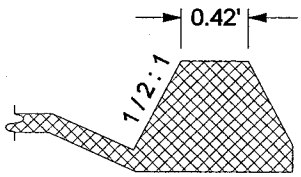
REVISIONS		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE
8-71, 12-97		1				4			
11-04		2				5			
		3				6			



SECTION A - A

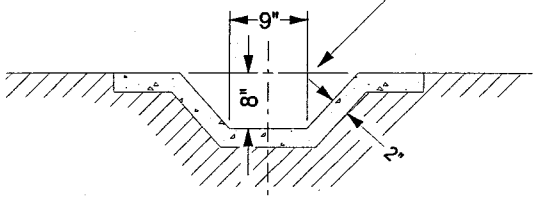


PLAN



SECTION B - B

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



SECTION C - C

NOT TO SCALE

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

APPROVED BY:

DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

ASPHALT CONCRETE OVERSIDE DRAIN

STANDARD NO. 306

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

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

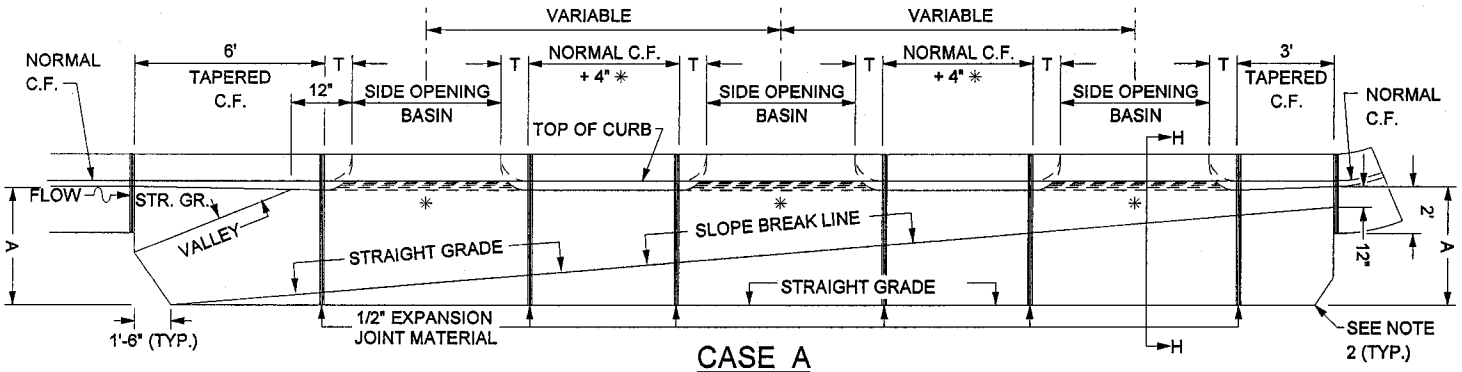
REVISIONS		REV.	BY:	APP'D	DATE	REV.	BY:	APP'D	DATE
11-04		1				4			
		2				5			
		3				6			

REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

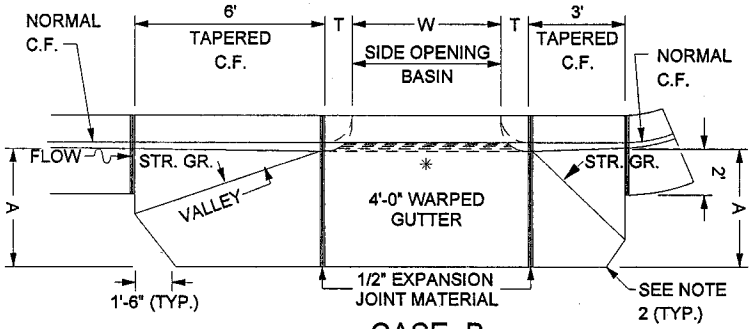
COUNTY OF RIVERSIDE

GUTTER DEPRESSION FOR CURB OPENING CATCH BASIN

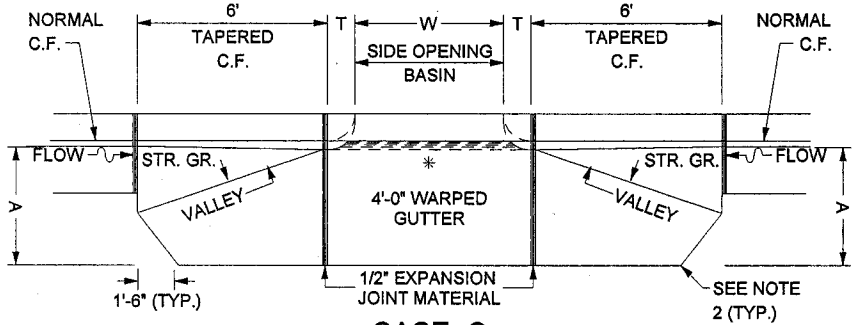
STANDARD NO. 311



CASE A

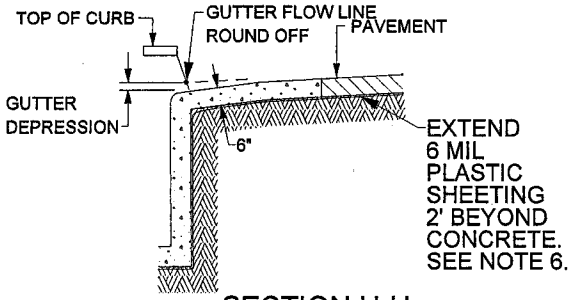


CASE B
(CONTINUOUS GRADE)



CASE C
(SAG)

NOT TO SCALE



SECTION H-H

NOTES:

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

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

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

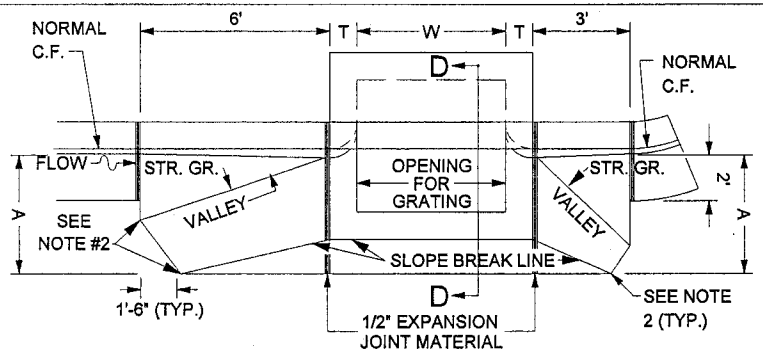
REVISIONS												
11-04												
		REV.	BY:	APR'D	DATE	REV.	BY:	APR'D	DATE			
		1				4						
		2				5						
		3				6						

REGISTERED PROFESSIONAL ENGINEER
GEORGE A. JOHNSON
No. CE 42328
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

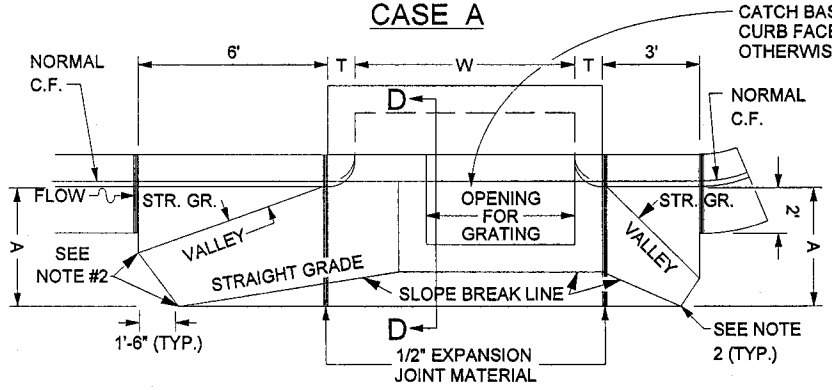
GUTTER DEPRESSION FOR GRATE OPENING CATCH BASIN

COUNTY OF RIVERSIDE

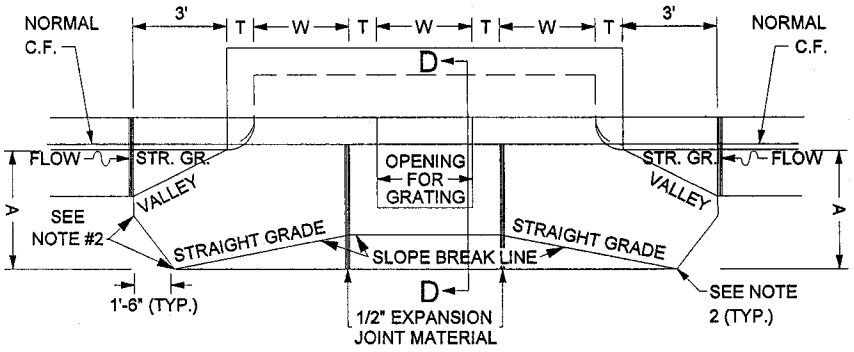
STANDARD NO. 312



CASE A

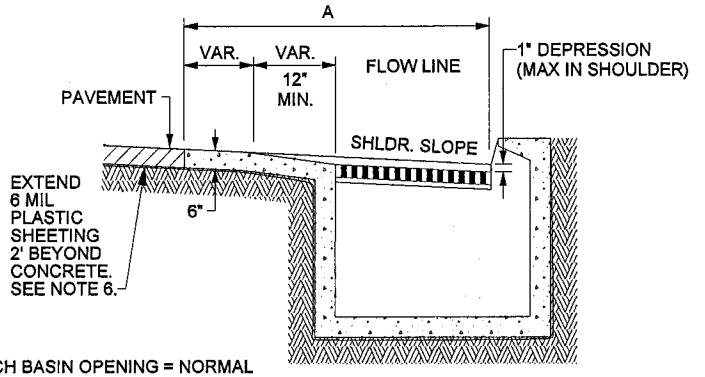


CASE B



CASE C

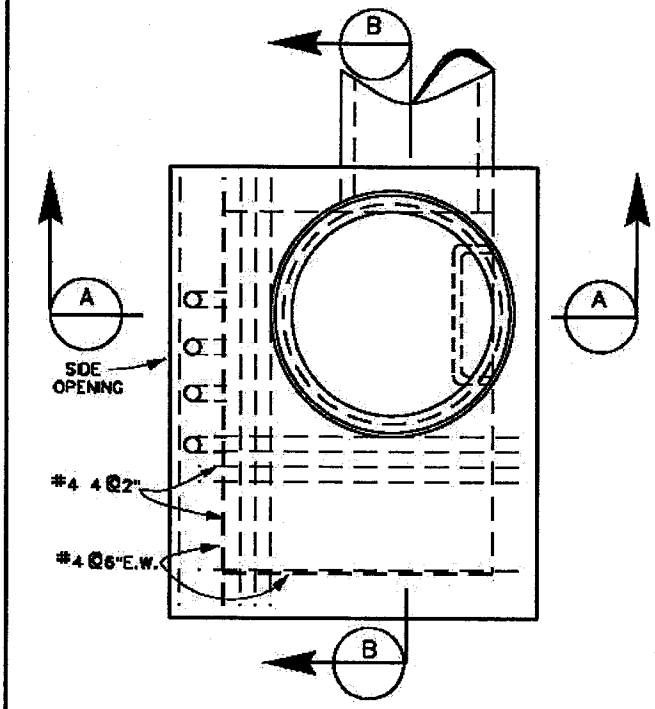
NOT TO SCALE

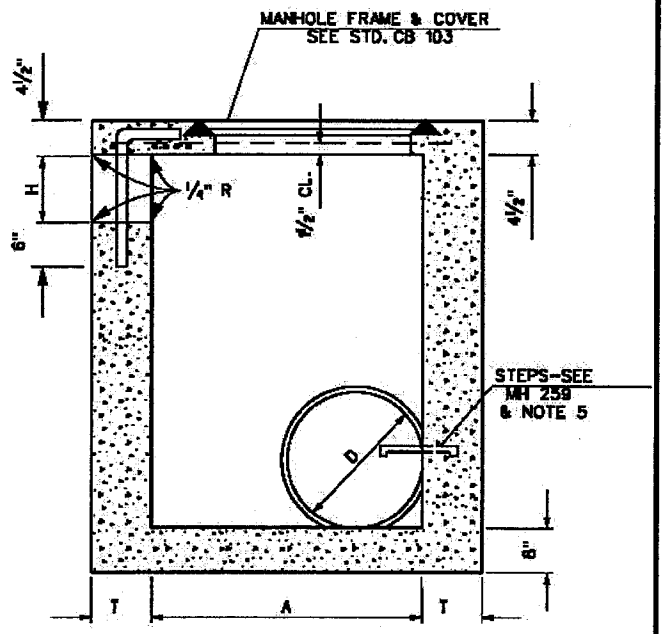


SECTION D-D

NOTES:

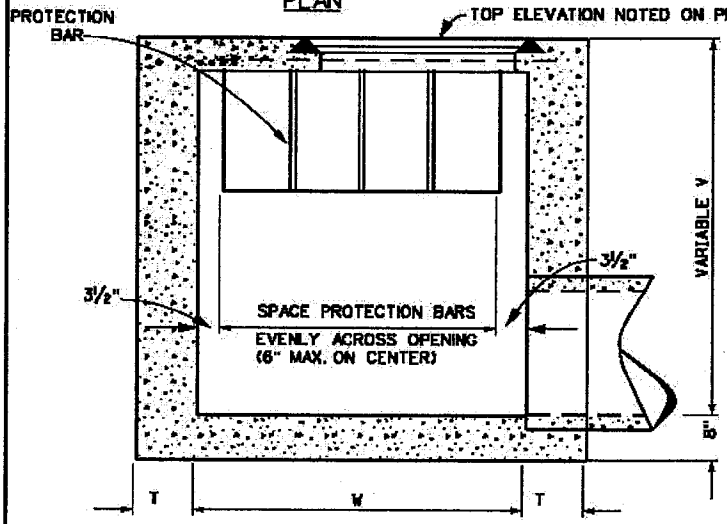
1. GUTTER DEPRESSION SHALL BE:
   (A) CASE "A" SEE STD. NO. 302 COMBINATION CATCH BASIN, UNLESS OTHERWISE SPECIFIED.
   (B) CASE "B" SEE STD. NO. 301 COMBINATION INLET CATCH BASIN, UNLESS OTHERWISE SPECIFIED.
2. ELEVATIONS AT OUTER CORNERS SHOWN ON THE PROJECT DRAWINGS. IF NO ELEVATIONS ARE SPECIFIED,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





SECTION A

PLAN



SECTION B

1. DEMENSIONS:
   H= 9" OR AS NOTED ON PLANS
   V= SHALL BE SHOWN ON THE PLANS (8' MAX.)
   W= SHALL BE 36" OR AS NOTED ON PLANS.
   T= 6" IF V IS 4' OR LESS.
   T= 8" IF V IS 8' OR LESS
   D= 18" UNLESS OTHERWISE SPECIFIED.
   A= 36" UNLESS OTHERWISE SPECIFIED.
2. SEE STANDARD DRAWING CB 106 FOR WALL AND FLOOR STEEL REINFORCING
3. STRUCTURAL CONCRETE SHALL BE CLASS "A".
4. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS. CLEARENCE SHALL BE ½" FROM BOTTOM OF SLAB.
5. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURAVTURE OF THE LIP & SIDEWALLS AT THE SIDE OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE & LENGTH BEFORE THE CONCRETE IS POURED.
6. STEPS: ¾" PLAN ROUND GALVANIZED STEEL STEPS SHALL BE INSTALLED 18" APART WHEN V EXCEEDS 4'-6". THE TOP STEP SHALL BE 8" BELOW THE TOP SURFACE & SHALL BE 2½" CLEAR FROM THE WALL ALL OTHER STEPS SHALL BE 4" CLEAR FROM THE WALL ONLY ONE STEP 12" FROM THE BOTTOM SHALL BE ANCHORED NOT LESS THAN 4" INTO THE WALL OF THE BASIN.
7. PROTECTION BARS ARE PLAIN ROUND STEEL BARS 1" DIAMETER AND SHALL BE INSTALLED WITH ENDS EMBEDDED 6".
8. ALL EXPOSED METAL PARTS SHALL BE GALANIZED.
9. SLOPE BOTTOM TO OUTLET FROM ALL DIRECTIONS.

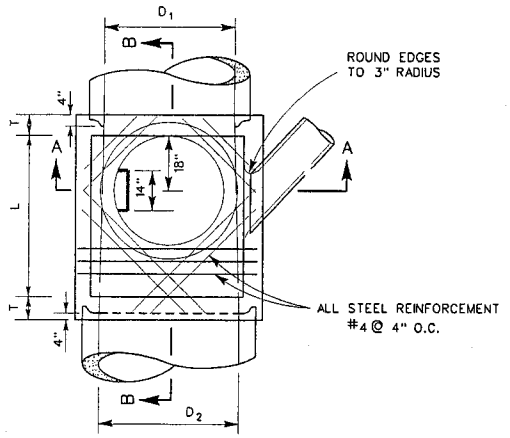
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPROVED BY: _____
CHIEF ENGINEER

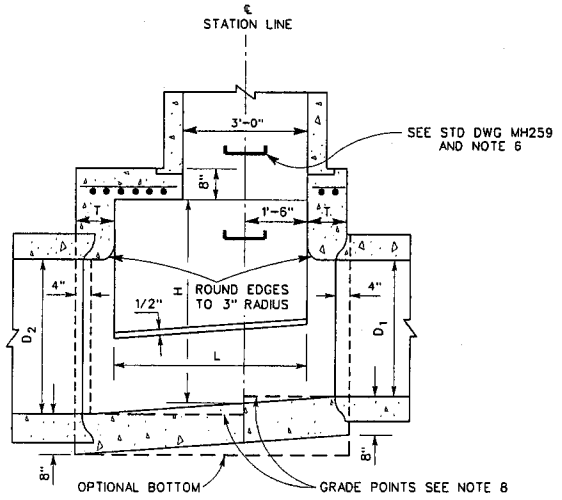
DATE: April 5, 2004 R.C.E. NO. 32336

CONCRETE DROP INLET

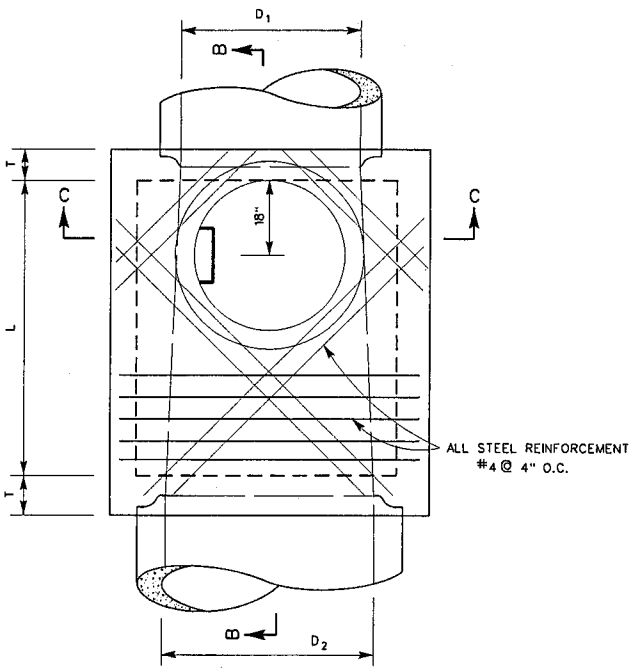
STANDARD DRAWING NUMBER CB110



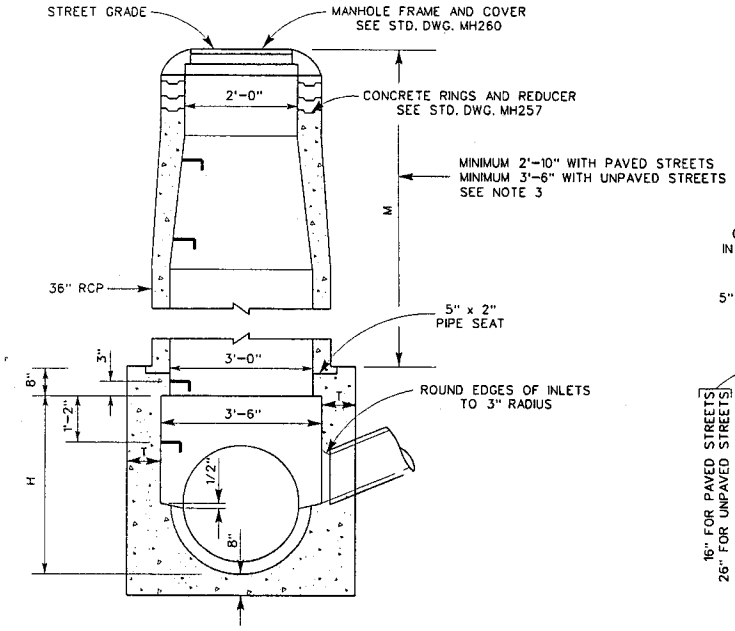
PLAN
(SHAFT NOT SHOWN)



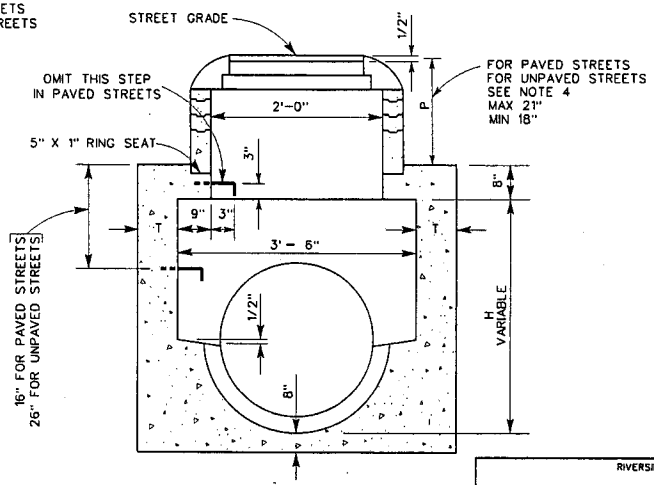
SECTION B-B



DETAIL N PLAN
(SHAFT NOT SHOWN, SEE NOTE 3)



SECTION A-A



SECTION C-C

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

NOTES

1. HEIGHT H SHALL BE NOT LESS THAN 4'-0" BUT MAY BE INCREASED AT OPTION OF CONTRACTOR PROVIDED THAT THE VALUE OF M SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED AND THAT THE REDUCER SHALL BE USED. FOR H (IN SEC. C-C) SEE NOTE 4.

2. LENGTH L SHALL BE 4' UNLESS OTHERWISE SHOWN ON IMPROVEMENT PLAN. L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS, AT THE OPTION OF CONTRACTOR, EXCEPT THAT ANY CHANGE IN LOCATION OF MANHOLE MUST BE APPROVED BY THE ENGINEER.

3. SHAFT SHALL BE CONSTRUCTED AS PER SECTION C-C AND DETAIL N WHEN DEPTH M FROM STREET GRADE TO TOP OF BOX IS LESS THAN 2'-10 1/2" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS.

4. DEPTH P MAY BE REDUCED TO AN ABSOLUTE LIMIT OF 6" WHEN LARGER VALUES OF P WOULD REDUCE H (IN SECTION C-C) TO BE 3'-6" OR LESS.

5. T SHALL BE 8" FOR VALUES OF H UP TO AND INCLUDING 8'.
   T SHALL BE 10" FOR VALUES OF H OVER 8'.

6. STEPS SHALL BE 3/4" ROUND, GALVANIZED STEEL AND ANCHORED NOT LESS THAN 4" IN THE WALLS OF STRUCTURES. UNLESS OTHERWISE SHOWN, STEPS SHALL BE SPACED 16" ON CENTER. THE LOWEST STEP SHALL BE NOT MORE THAN 2' ABOVE THE INVERT.

7. REINFORCING STEEL SHALL BE ROUND, DEFORMED, BARS, NO. 4 AND 1 1/2" CLEAR FROM INSIDE FACE OF CONCRETE.

8. STATIONS REFER TO PLAN AND PROFILE SHEETS. ELEVATIONS AT ℄ AND PROLONGED INVERT GRADE LINE. SEE NOTE 2 FOR SHIFTING LOCATION.

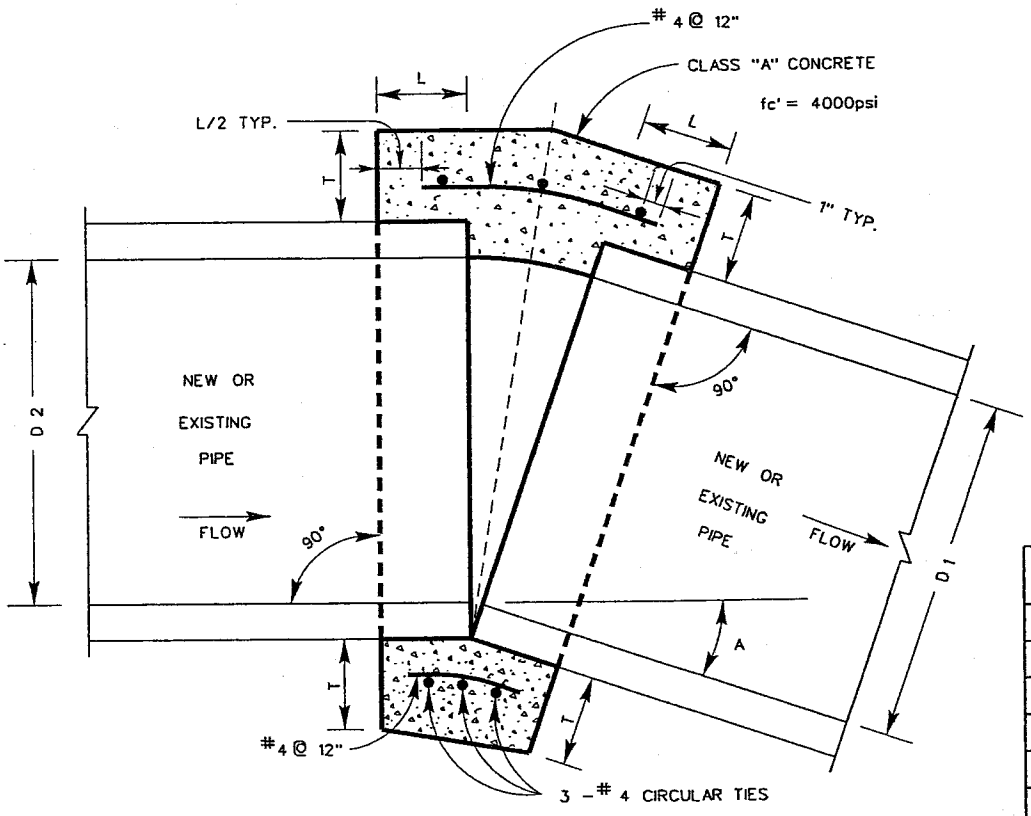
9. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN CEMENT MORTAR AND NEATLY POINTED OR WIPED INSIDE SHAFT.

10. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRINGLINE.

11. CONCRETE SHALL BE CLASS "A".

12. WHERE PRESSURE MANHOLE NO. 1 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH258.

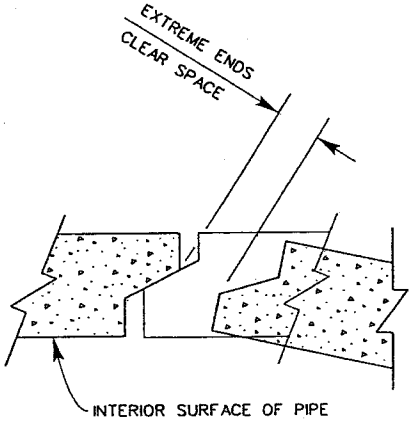
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
RECOMMENDED FOR APPROVAL BY: CHIEF, DESIGN & CONSTRUCTION DATE: JANUARY 2011 R.E. No. 44684	APPROVED BY: CHIEF ENGINEER DATE: JANUARY 2011 R.C.E. NO. 32336	MANHOLE NO. 1 STANDARD DRAWING NUMBER MH251 SHEET 2 OF 2



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

NOTES

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



DETAIL "A"

TYPICAL JOINT FOR
REINFORCED CONCRETE PIPE

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

REGISTERED PROFESSIONAL ENGINEER
WARREN D. WILLIAMS
No. 32336
Exp. 12-31-04
CIVIL
STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY:

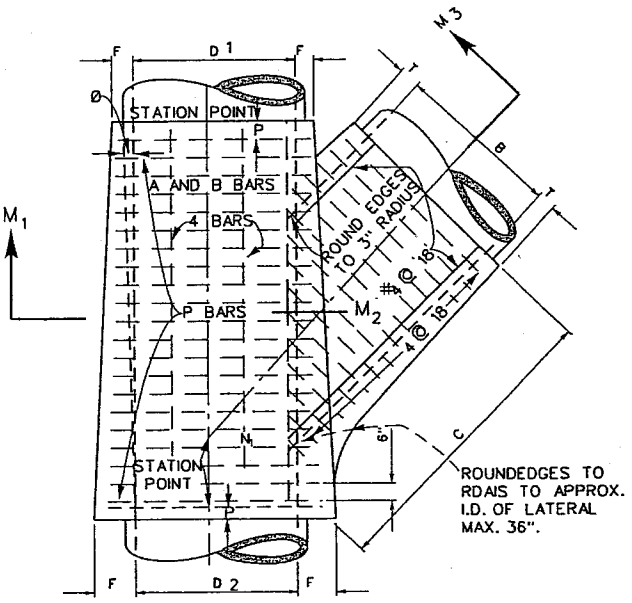
CHIEF ENGINEER

DATE: April 5, 2004

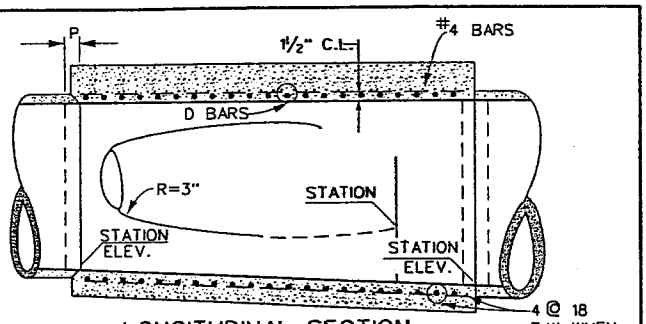
R.C.E. NO. 32336

CONCRETE COLLAR FOR PIPE 12 INCHES THROUGH 66 INCHES

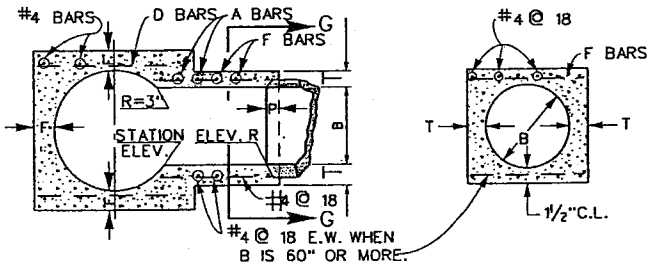
STANDARD DRAWING NUMBER M803



PLAN



LONGITUDINAL SECTION



SECTION M_1, M_2, M_3.

SECT. G

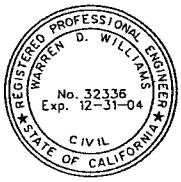
TABLE

×D_2 D_1 OR B	F OR T	A OR B BARS	D OR F BARS	P
12	4	#5 @ 3	#4 @ 6	5"
15	4 1/4			
18	4 1/2			
21	5			
24	5 1/4			
27	5 1/2			
30	6			
33	6 1/4			
36	6 1/2			
39	7			
42	7 1/2	#6 @ 3	#5 @ 6	
45	7 3/4			
48	8			
51	8 1/2			
54	9			
57	9 1/4			
60	9 1/2			
63	10			
66	10 1/4			
69	10¾			
72	11			
78	11 3/4			
84	12 1/2			
90	13 1/4	#7 @ 3	#6 @ 6	8"
96	14			
102	15 1/2			
108	16			
114	16 1/2			
120	17			
126	17			
132	17 1/2			
138	17 1/2			
144	18			

×USE D_2 OR D_1, WHICHEVER IS GREATER, OR B

NOTES

1. THE HORIZONTAL ANGEL OF DIVERGENCE OR CONVERGENCE, Ø, SHALL NOT EXCEED 5° 45'.
2. VALUES FOR A_1, B_1, C_1, D_1, D_2 ELEV. R AND ELEV. S ARE SHOWN ON IMPROVEMENT PLAN. LENGTH OF THE STRUCTURE MAY BE INCREASED TO MEET PIPE ENDS USING D BARS IN EXTENDED PORTION OF SAME DIM. AND SPACING AS APACING AS SPECIFIED.
3. CONC. SHALL BE CLASS A. FLOOR OF THE STRUCTURE SHALL BE STEEL-TROWELED TO SPRINGING LINE. STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRINGING LINE A CONST. JOINT WITH A LONGITUDINAL KEYWAY.
4. REINFORCING STEEL CLEAR COVER SHALL BE 1½" ON INSIDE. TIE BARS SHALL BE NO.4 8 SPACED 18" C/C.
5. WHEN DIM. C IS NOT SPECIFIED THE SPUR SHALL NOT BE CONSTRUCED AND A A & B BARS SHALL BE OMITTED.
6. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25'. IF THE COVER EXCEEDS 25', A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PROJECT DRAWINGS.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPROVED BY:

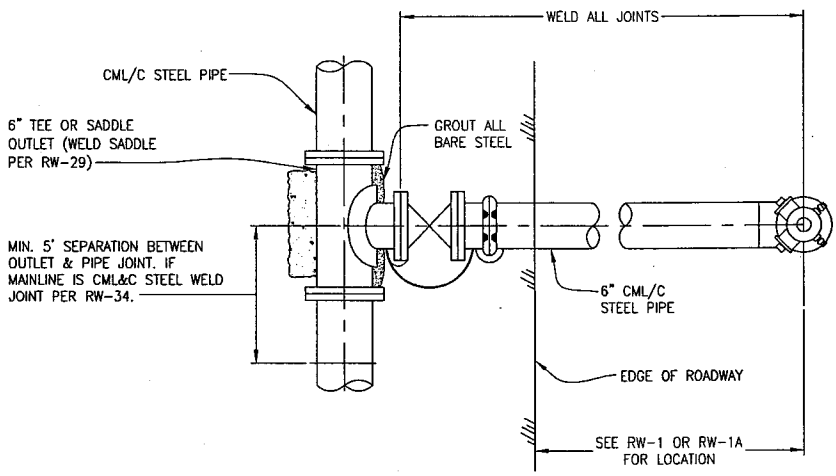
CHIEF ENGINEER

DATE: April 5, 2004

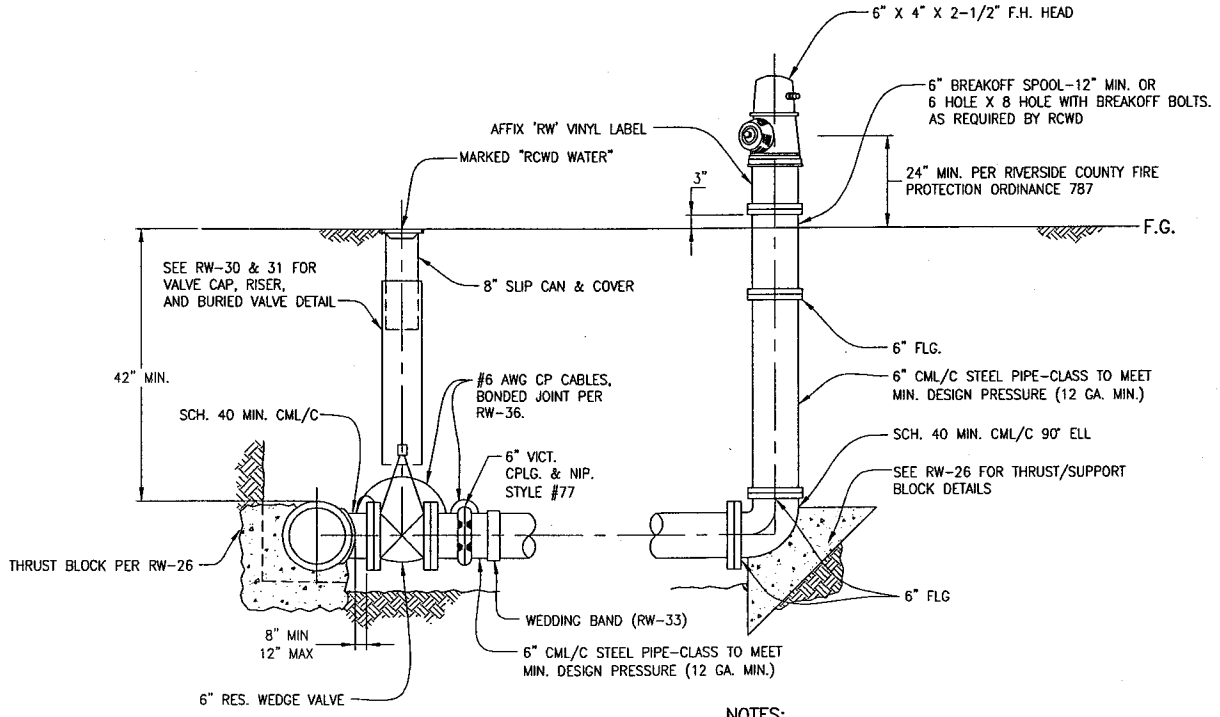
R.C.E. NO. 32336

TRANSITION STRUCTURE NO.3

STANDARD DRAWING NUMBER TS303



PLAN



PROFILE

NOTES:

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

REVISION NO.	DATE
1	1-09

REGISTERED PROFESSIONAL ENGINEER ANDREW WEBSTER No. C47963 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

APPROVED: 3-17-2008

ANDREW WEBSTER
ACTING DISTRICT ENGINEER

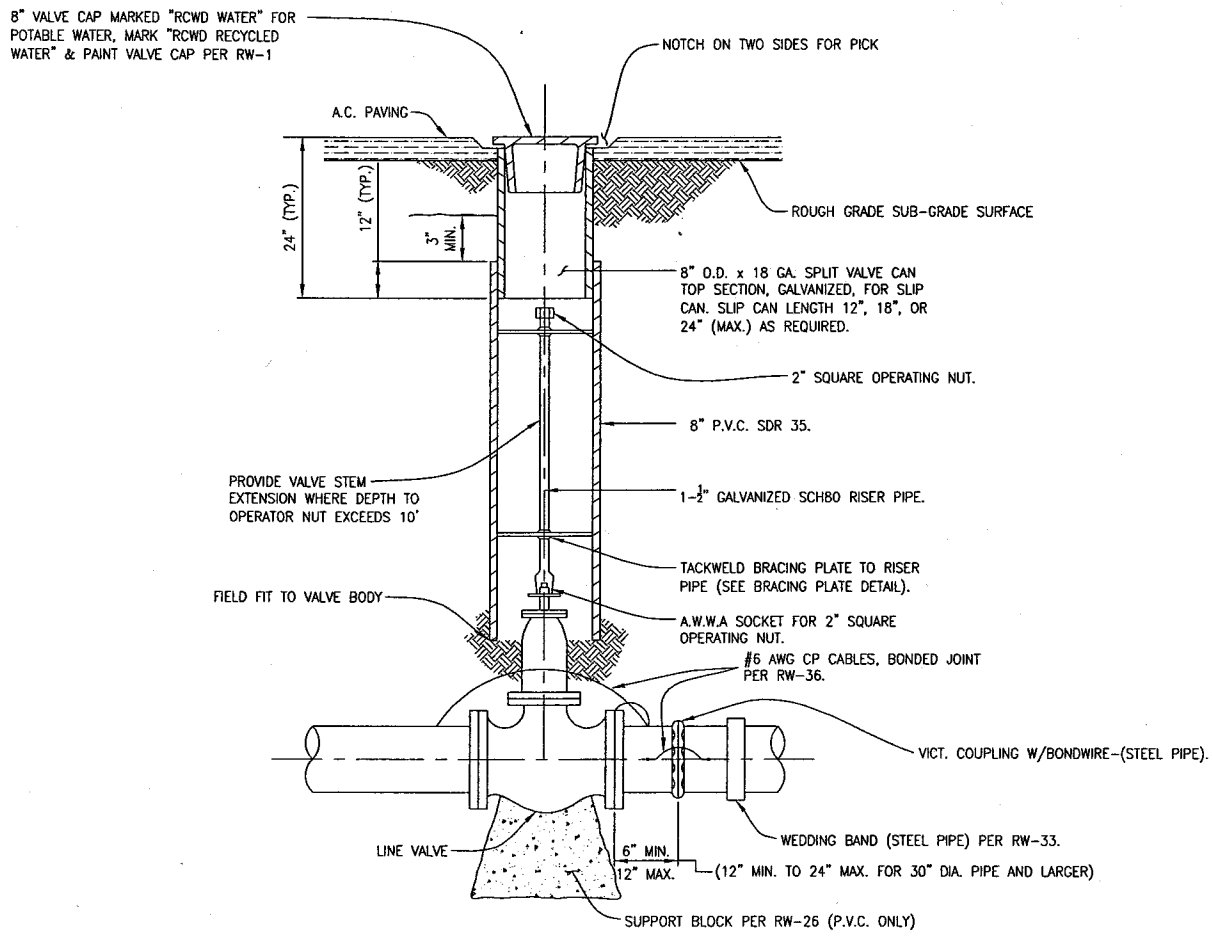
Rancho Water
Rancho California Water District

STANDARD DRAWING

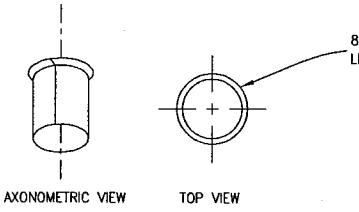
6" F.H. ASS'Y (STEEL PIPE)

SCALE: NTS

DWG. NO. **RW-7**



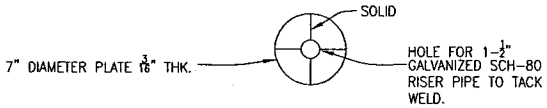
VALVE COVER AND RISER DETAIL



SPLIT SLIP CAN

NOTES

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



BRACING PLATE PLAN VIEW DETAIL

REVISION NO.	DATE
1	1-09

REGISTERED PROFESSIONAL ENGINEER ANDREW WEBSTER No. C47963 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

APPROVED: 3-17-2008

ANDREW WEBSTER
ACTING DISTRICT ENGINEER

Rancho Water
Rancho California Water District

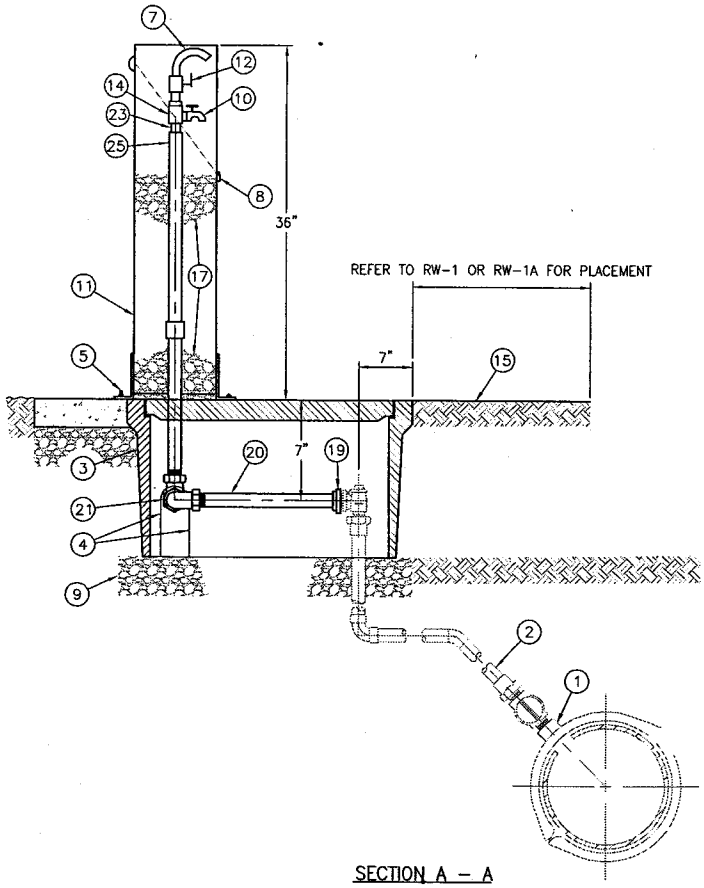
STANDARD DRAWING

VALVE CAP & RISER DETAIL

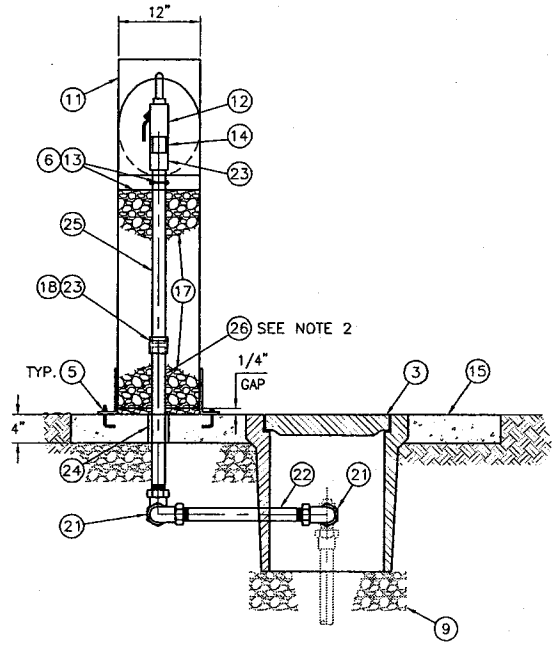
SCALE: NTS

DWG. NO.

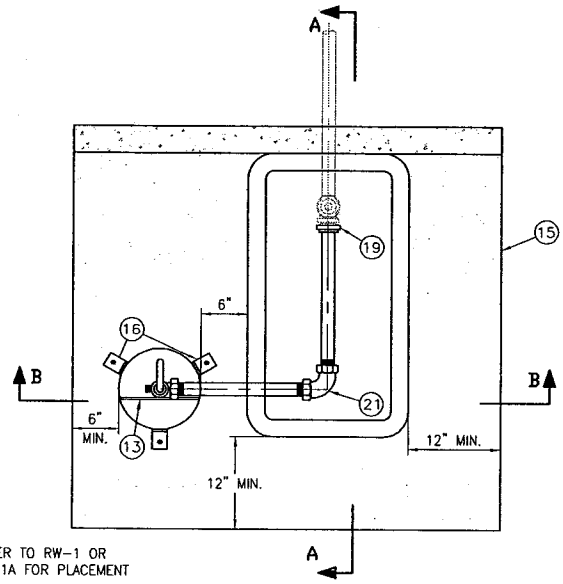
RW-30



SECTION A – A



SECTION B – B



PLAN

NO.	DESCRIPTION	QTY..
1	1" SERVICE CONNECTION PER RW-13	1
2	1" TYPE "K" COPPER TUBING PER RW-13	1
3	CONCRETE METER BOX WITH READING LID (15" x 21" x 12")	1
4	SAWCUT OR CORE DRILL FOR 1" PIPE	1
5	⅜" DIA X 4" LONG STAINLESS STEEL J ANCHOR BOLT CAST IN SLAB (3 EACH AT 120° APART WITH STAINLESS STEEL NUTS AND WASHERS) INSTALL WITH RUBBER GROMMET UNDER ANCHOR CLIPS TO PROVIDE ¼" GAP.	3
6	INTERNAL MOUNT AND STAINLESS STEEL U-BOLT.	1
7	⅜" TYPE "K" SOFT COPPER SPIGOT BEND TO 120° FOR DOWNWARD OPENING.	1
8	LOCKING HASP ASSEMBLY FOR 5H08 PADLOCK	1
9	¾" CRUSHED ROCK PLACE TO DEPTH 6" BELOW CONCRETE METER BOX	–
10	STD. HOSE BIBB	1
11	STD. STEEL PIPE 12" DIAMETER x 36" HIGH. W/ HINGED COVER SEE NOTE 5.	1
12	3/8" STAINLESS STEEL TEFLON SEATED BALL VALVE, F.I.P.T. x F.I.T.P. (ORIENT VALVE HANDLE TOWARD FRONT OF SAMPLE STATION).	1
13	1 3/4" WIDE x 3/16" THICK STEEL FLAT BAR, WELDED TO INTERIOR OF SAMPLE STATION.	1
14	1" BRASS TEE (M.I.D.T.) W/ 1" x 3/8" BRASS REDUCING BUSHING (TOP).	1 1
15	4" THICK CLASS "B" CONCRETE.	3
16	ANCHOR CLIPS WITH ½" HOLES AT 120° SPACING WELD TO WATER SAMPLE STATION COVER.	–
17	½" PEA GRAVEL.	1
18	1" PVC SCH. 80 COUPLING, F.I.P.T. x F.I.T.P.	1
19	1" METER NUT BY F.I.P.T. ADAPTER.	1
20	1" RED BRASS NIPPLE, T.B.E. 6" LONG.	2
21	1" BRASS 90° BEND F.I.P.T. x F.I.P.T.	1
22	1" RED BRASS NIPPLE, T.B.E. 18" LONG.	2
23	1" WROT COPPER SLIP BY M.I.P.T. ADAPTER.	1
24	2" SCH. 80 PVC SLEEVE.	–
25	1" TYPE "K" RIGID COPPER PIPE.	1
26	1" RED BRASS NIPPLE, T.B.E. 10" LONG.	

NOTES

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

REVISION NO.	DATE
1	1-09

REGISTERED PROFESSIONAL ENGINEER ANDREW WEBSTER No. C47963 Exp. 12-31-09 STATE OF CALIFORNIA CIVIL

APPROVED: 3-17-2008

ANDREW WEBSTER
ACTING DISTRICT ENGINEER

Rancho Water
Rancho California Water District

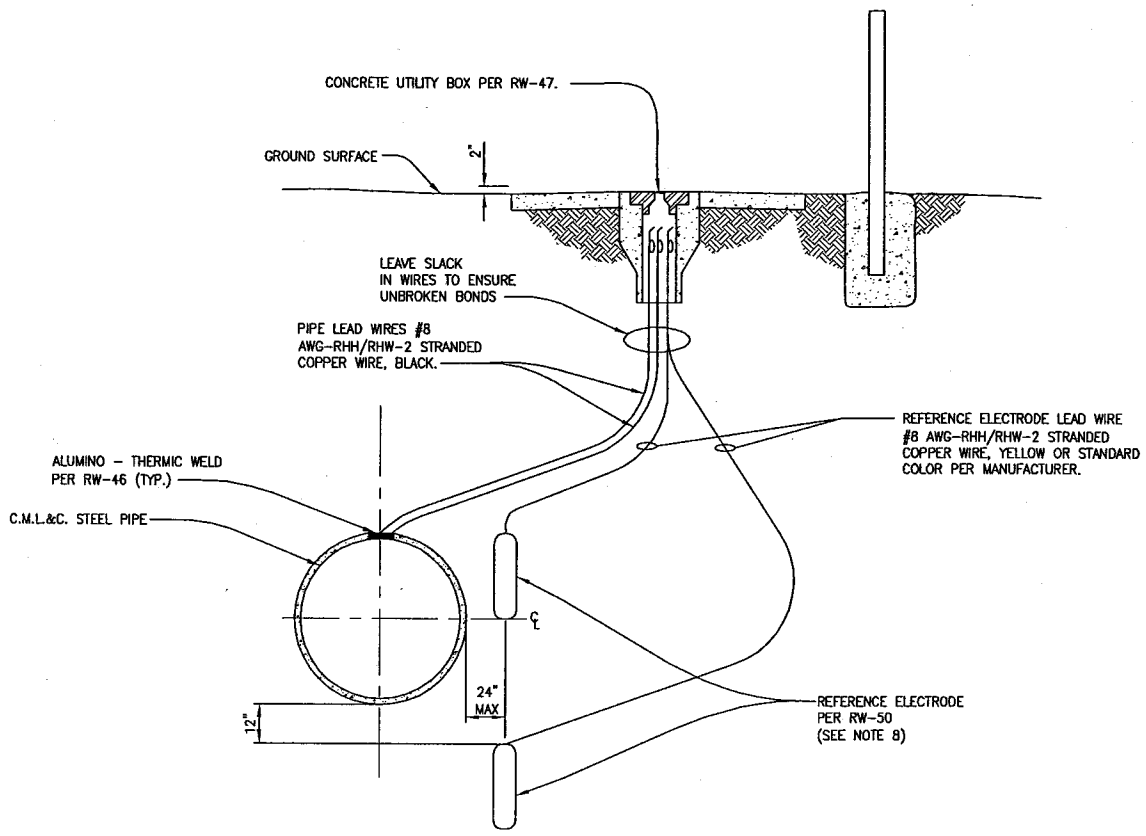
STANDARD DRAWING

WATER QUALITY SAMPLE STATION

SCALE: NTS

DWG. NO.

RW-38



NOTES:

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

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

REGISTERED PROFESSIONAL ENGINEER ANDREW WEBSTER No. C47963 Exp. 12-31-09 CIVIL STATE OF CALIFORNIA

APPROVED: 3-17-2008

ANDREW WEBSTER
ACTING DISTRICT ENGINEER

Rancho Water
Rancho California Water District

STANDARD DRAWING
CATHODIC PROTECTION TEST STATION W/ REFERENCE CELL

SCALE: NTS
DWG. NO.
RW-40A

ATTACHMENT C
RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

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

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

   a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

   b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

   c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

   d. Cover waste disposal containers at the end of every business day and during a rain event.

   e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

   f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

   g. Implement procedures that effectively address hazardous and non-hazardous spills.

   h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

      i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

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

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.

2. Risk Level 1 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

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

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

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

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

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

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

1. Construction Site Monitoring Program Requirements

a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. Objectives

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

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

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and

d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):

i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 1 – Visual Observation Exemptions**

a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. **Risk Level 1 – Monitoring Methods**

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

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

a. Visual Monitoring Requirements:

i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

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

a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

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

f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[2]

h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

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

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

9. **Risk Level 1 – Records**

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

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

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

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).

i. Visual observation and sample collection exception records (see Section I.4 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

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10/17/2011	I00638941-10092011	NOTICE INVITING BIDS County of River	Press-Enterprise	3 x 41 LI	123	1	1.20	147.60	147.60
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I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper in general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

10/09, 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18/2011

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

Date: October 18, 2011
At: Riverside, California

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RIVERSIDE, CA 92502

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NOTICE INVITING BIDS

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

RANCHO CALIFORNIA ROAD AT ANZA ROAD
ROUNDABOUT PROJECT
IN THE COUNTY OF RIVERSIDE
PROJECT No. B9-0957

Proposal shall be delivered to the Riverside County Transportation Department, 14th Street Annex, 3525 14th Street, Riverside, California 92501, telephone (951) 955-6780 not later than 2:00 p.m., on Wednesday, October 26, 2011, to be promptly opened in public at said address. Each proposal shall be in accordance with plans, specifications, and other contract documents, dated September 2011, and prepared by County of Riverside, whose address is same as the above, from whom they may be obtained upon deposit of $45 per set, plus mailing. No refund. Prospective bidders may preview the plans, specifications and other contract documents, at no charge prior to purchase, at the above noted location.

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

Engineering Estimate

Option 1		Option 2	
Alternate 1A:	$1,024,000-$1,195,000	Alternate 2A:	$823,450 - $960,700
Alternate 1B:	$ 23,850 - $ 27,800	Alternate 2B:	$ 19,800 - $ 23,100
Alternate 1C:	$ 30,510 - $ 35,600	Alternate 2C:	$ 25,400 - $ 29,700
Alternate 1D:	$ 6,500 - $ 7,580	Alternate 2D:	$ 4,900 - $ 5,700
Alternate 1E:	$ 24,000 - $ 28,000	Alternate 2E:	$ 15,400 - $ 18,000
Alternate 1F:	$ 10,000 - $ 11,800	Alternate 2F:	$ 6,300 - $ 7,400
Alternate 1G:	$ 7,100 - $ 7,500	Alternate 2G:	$ 4,800 - $ 5,500
Bid Bond:	10%	Bid Bond:	10%
Performance Bond:	100%	Performance Bond:	100%
Payment Bond:	100%	Payment Bond:	100%
Working Days:	81 Calendar Days	Working Days:	33 Calendar Days

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Dated: October 6, 2011
Kecia Harper-Ihem, Clerk of the Board
By: Cecilia Gil, Board Assistant

10/9 - 10/18