

**CASES PROPOSED FOR VOTING
AT THE SEPTEMBER 7, 2005 MEETING**

Case 04-07 Water & Sanitary Sewer Separation

Case 05-02 Miscellaneous Blooper Cases

Case 05-03 Sanitary Sewer Service Line Markings

Case 05-04 Detectable Warnings

Case 04-07 Water & Sanitary Sewer Separation

Revisions for:

Section 610

Section 615

Detail 404

WATER LINE CONSTRUCTION

610.1 DESCRIPTION:

The construction of all water lines shall conform to applicable standard specifications and details, except as otherwise required on the plans or as modified in the special provisions.

610.2 GENERAL:

All pipe shall be delivered, handled and installed in accordance with the manufacturer's recommendations and/or applicable provisions of AWWA standards for installation of the various types of water mains specified, insofar as such recommendations and provisions are not in variance with the standard specifications and details.

Where water lines are to be constructed in new subdivisions or in conjunction with street repaving projects, the streets shall be pre-graded to within 6 inches of the new street subgrade prior to trenching or cut stakes shall be set for trenching.

610.3 MATERIALS:

All pipe for water lines shall be of the classes shown on the plans or as specified below.

(A) The 4 inches through 16 inches diameter pipe may be asbestos-cement or ductile iron, except where a particular material is specified. All pipe shall be minimum 150 P.S.I. design unless otherwise specified.

(B) Pipe 16 inches and larger may be either ductile iron, or concrete pressure pipe-steel cylinder type.

Ductile iron water pipe and fittings - Section 750. Asbestos-cement water pipe and fittings - Section 752. Concrete pressure pipe-steel cylinder type - Section 758.

610.4 CONSTRUCTION METHODS:

All water mains in major streets shall have a minimum cover of 48 inches over the top of the pipe. Water mains in other locations shall have a minimum cover over the top of the pipe as follows:

(A) 36 inches for mains smaller than 12 inches.

(B) 48 inches for mains 12 inches and larger.

Cover for water mains will be measured from existing or proposed finished grade of pavement or from natural ground, whichever is deeper.

No water main shall be deflected, either vertically or horizontally, in excess of that recommended by the manufacturer of the pipe or coupling, without the appropriate use of bends or offsets.

If adjustment of the position of a length of pipe is required after it has been laid, it shall be removed and rejoined as for a new pipe.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. At all times when a pipe laying is not in progress, the open ends of the pipe line shall be closed by a water-tight plug or other means approved by the Engineer.

Where restrained joints are specified on mains sixteen (16) inches in diameter and smaller, ductile iron pipe shall be used with an approved joint restraint method.

On mains sixteen (16) inches in diameter and larger where plans specify welding joints and where ductile iron pipe is furnished, joints shall be restrained by an approved joint restraint method for the distance specified.

Except as otherwise required in this specification, the special provisions, or by the Engineer, trench excavation, backfilling and compaction shall be in accordance with the requirements of Section 601. Backfilling may be accomplished as soon as the pipe line has been installed to the satisfaction of the Engineer, subject to the requirements for testing, as contained below.

Hydrostatic testing shall be in accordance with this specification.

All corporation stops used for testing and chlorination shall be left in the pipe line with the stop closed and all connecting pipe removed.

Curb stops with flushing pipes or fire hydrants shall be installed at the ends of dead-end mains according to standard details.

Thrust blocks shall be installed in accordance with this specification.

Valve boxes and covers shall be according to standard details.

Asbestos-cement pipe shall be installed in accordance with AWWA C-603, except pipe and fittings shall be in accordance with Section 752.

Cast iron pipe shall be installed in accordance with AWWA C-600, except pipe and fittings shall be in accordance with Section 750.

Ductile iron pipe shall be installed in accordance with this specification and pipe and fittings shall be in accordance with Section 750.

610.5 SEPARATION:

610.5.1 General:

Water lines and sewer lines shall be separated to protect water lines from contamination by sewer lines.

The smallest angle of a water line and sewer line crossing shall be limited to between (45) forty-five degrees and (90) ninety degrees.

Separation distances are measured from the outside diameter of the water or sewer line, or the centerline of a manhole.

When water and sewer lines can not meet separation requirements, extra protection is required as described in 610.5.5 and shown in Standard Detail 404.

Extra protection horizontal distances required for line crossings are measured from the closest outside diameter of the sewer or water line.

Water line service connections to individual building supply and distribution plumbing shall not be placed below sewer lines, and shall otherwise comply with the separation requirements of the applicable plumbing code as applied by the Agency (Administrative Authority). Methods described for extra protection do not apply to these service lines.

Water and sewer lines shall not be constructed parallel within a common trench.

610.5.2 Water Line Separation from Gravity Sewer Lines:

Water lines shall not be placed within two (2) feet horizontal and one (1) foot vertical above and two (2) feet vertical below gravity sewer lines.

Extra protection is required where a water line is placed within six (6) feet horizontal and two (2) feet vertical above a gravity sewer line.

Extra protection is required where a water line is placed within six (6) feet horizontal and any distance below a gravity sewer line.

610.5.3 Water Line Separation from Pressurized Sewer Lines:

Water lines shall not be placed within six (6) feet horizontal and two (2) feet vertical below and above a pressurized sewer line.

Extra protection is required where a water line is placed within six (6) feet horizontal and six (6) feet vertical above a pressurized sewer line.

Extra protection is required where a water line is placed within (6) feet horizontal and any distance below a pressurized sewer line.

610.5.4 Water Line Separation from Manholes:

Water lines shall not pass through or come into contact with any part of a sewer manhole and shall be separated six (6) feet horizontal from the center of a sewer manhole.

610.5.5 Extra Protection:

New water lines that require extra protection from new sewer lines, shall have extra protection provided by using ductile iron pipe for both lines. Lines of standard pipe length shall be centered at the point of crossing so that no joints exist within six (feet) horizontal and only restrained or mechanical joints exist within ten (10) feet horizontal.

New water lines that require extra protection from sewer lines, shall have identification wrap and/or tape installed on the water and sewer lines for the horizontal length of each line for that requires extra protection.

New water lines that require extra protection from existing sewer lines shall be constructed using the extra protection specified for new water lines, and the existing sewer line:

1. shall be reconstructed using a standard length of ductile iron pipe centered at the point of crossing so that no joints exist within six (feet) horizontal and only restrained or mechanical joints exist within ten (10) feet horizontal, or
2. shall be encased in 6 inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

Existing water lines that require extra protection from new sewer lines shall provide for extra protection by:

1. constructing the new sewer line and reconstructing the existing water line using ductile iron pipe for both lines with standard pipe lengths centered at the point of crossing so that no joints exist within six (feet) horizontal and restrained or mechanical joints exist within ten (10) feet horizontal, or
2. encasement of both the existing water line and the new sewer line in six (6) inches of concrete for the horizontal distance of the lines that require extra protection but for a distance no less than ten (10) feet horizontal.
3. Extra protection for existing ductile iron water lines can be met by the installation of restrained or mechanical joints on the existing water line within (10) feet horizontal of the crossing and either
 - (A) construction of new sewer line using a standard pipe length of ductile iron pipe centered at the point of crossing so that

- no joints exist within six (feet) horizontal and restrained or mechanical joints exist within ten (10) feet horizontal, or
 (B) encasement of the new sewer line in 6 inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

610.5 610.6 POLYETHYLENE CORROSION PROTECTION:

610.5.1 610.6.1 General: Where called for in the plans and specifications or directed by the Engineer, pipe, valves and fittings shall be protected from corrosion by encasement in a polyethylene protective wrapping referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

610.5.2 610.6.2 Materials: The polywrap shall be of virgin polyethylene, not less than 8 mils in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultra violet light will be less than 48 hours. Otherwise the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers.

The polywrap shall be secured as specified below with 2 inches wide pressure sensitive plastic tape not less than 10 mils thick. Tape shall be Scotchrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex, or approved equal.

The minimum tube size for each pipe diameter shall be per Table 610-1.

TABLE 610-1		
POLYWRAP FLAT TUBE WIDTHS		
Nominal Pipe Diameter (Inches)	Cast Iron Or Ductile Iron With Push-On Joints (inches)	Cast Iron Or Ductile Iron With Mechanical Joints (inches)
4	14	16
6	17	20
8	21	24
10	25	27
12	29	30
14	33	34
16	37	37
18	41	41
20	45	45
24	53	53

610.5.3 610.6.3 Installation: The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. With the pipe suspended from the center the tube shall be slipped over the spigot end and bunched up between the point of support and the spigot end. After the pipe is installed into the bell of the adjacent pipe the pipe shall be lowered to the trench bottom and the supporting sling removed from the center of the pipe. The pipe shall then be raised at the bell end enough to allow the tube to be slipped along the full length of the barrel with enough left at each end to overlap the adjoining pipe about 1 foot. A shallow bell hole must be made at each joint to facilitate installation of the polywrap.

Pull the bunched-up polywrap from the preceding length of pipe, slip it over the end of the new length of pipe, and secure in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. Then slip the end of the polywrap from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Tape it in place.

The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe, and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.

Repair any rips, punctures or other damage to the tube with the adhesive tape or pieces of tube material secured with tape.

Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.

610.5.4 610.6.4 Payment: Payment for this item shall be per the provisions of Subsections 109.4 and 109.5 of the specifications unless this item is specifically called for on the plans or in the supplemental specifications or special provisions as a specific component and pay item for a given project.

610.6 610.7 VALVES:

Valves shall be installed in accordance with AWWA C-600 or AWWA C-603 modified as follows:

All tapping sleeves, gate valves, butterfly valves, air release and vacuum valves and corporation stops shall be in accordance with Section 630.

Just before installation in the trench, valves shall be fully opened and closed to check the action, and a record made of the number of turns required to fully open or close the valve. For valves 16 inches and larger, a member of the water utility shall be present to check the action and record the number of turns. The inside of all valves shall then be thoroughly cleaned and the valve installed.

Valves 12 inches and smaller in size shall be supported by concrete blocks, in accordance with the standard details.

Valves 16 inches and larger in size along with their bypass valves, shall be supported on concrete slabs, and/or concrete piers, as indicated on the plans.

Concrete supports shall be provided under valves in vaults and manholes, and shall be constructed an inch low, then grouted with non-shrink grout. Adjustable pipe supports shall be as indicated on the plans. Buried valves shall be supported on concrete blocks as detailed on the plans.

Valve boxes shall be installed over all buried valves in accordance with standard details.

Standard couplings or matching joints shall be used when more than one length of pipe is required, or when two or more pieces are joined, to form the valve box riser. Install extension stems on all valves where the operating nut is 5 feet or more below grade.

~~610.7~~ 610.8 MANHOLES AND VAULTS:

Construction shall consist of furnishing all materials and constructing manholes or vaults complete in place, as detailed, including foundation walls, cast iron steps, frames, covers, and any incidentals thereto, at location shown on the plans.

Manholes shall be constructed to conform with the requirements of Section 625 and standard details, except the inside diameter shall be 60 inches.

Vaults shall be constructed of reinforced concrete conforming to Section 725 and of concrete pipe conforming to ASTM C-76 Wall A or B. Vaults shall be kept moist for 7 days before backfilling.

~~610.8~~ 610.9 FIRE HYDRANTS:

The Contractor shall furnish all labor, materials, and equipment necessary to install fire hydrants complete in place at locations shown on the plans in accordance with the standard details and special provisions. Fire hydrants furnished by the Contractor shall conform to the requirements of Section 756.

If paint is chipped, scuffed, or otherwise damaged during handling and installation, the Contractor shall touch up such spots as may be designated by the Engineer.

All hydrants must be flushed and left in good working condition with the control valve open.

~~610.9~~ 610.10 CONNECTION TO EXISTING MAINS:

Existing pipe to which connections are to be made shall be exposed by the Contractor as directed by the Engineer, to permit field changes in line, grade or fittings, if necessary.

All connections to existing mains shall be constructed according to the plans.

Valves connecting new work to the existing system shall be kept closed at all times.

Only Agency personnel shall operate existing valves. The Contractor shall not operate valves in the existing system.

After disinfected samples have been taken and the new work passes the bacteriological tests, the new line shall then be turned over to the Contracting Agency with all branch lines and tie-in valves closed.

When shutdown of an existing water main is necessary in order to connect to the new lines, the Contractor shall make application and pay the required charges to the Contracting Agency. A conference between the Contractor's representative, Engineering Inspection, and Water Distribution personnel shall establish the time and procedures to insure that the shutdown will be for the shortest possible time. If necessary to minimize inconvenience to customers, shutdowns may be scheduled during other than normal working hours. The water supply to some customers, such as hospitals, cannot be shut off at any time. Provisions to furnish a continuous supply of water to such establishments will be required. After the procedures and time for a shutdown are agreed upon, it shall be the Contractor's responsibility to notify all customers in advance that the water will be turned off. When possible, customers shall be notified 24 hours in advance and in no case, except in emergency, shall notification be less than 30 minutes. Notification shall be in writing, giving the reason for the shutdown and the time and duration the water service will be shut off.

The Contracting Agency will close existing valves, but will not guarantee a bone-dry shutdown.

~~610.10~~ 610.11 METER SERVICE CONNECTIONS:

All new meters must be installed by the Contracting Agency after the proper application as required by Code with fees paid at prevailing rates.

When plans call for connections from a new water main to an existing water meter, the work shall include new copper pipe and fittings except as follows:

(A) Wrapped galvanized pipe shall be used to connect or extend existing galvanized service pipe. Type K soft copper pipe or tubing shall be used to connect or extend existing copper service pipe except when otherwise called for in the plans.

(B) When the existing main is not abandoned, and the existing meter is to be connected to the new line, the corporation stop at the old main shall be closed and the abandoned service line cut 6 inches from the old main.

(C) Taps and service connections to the new main shall be made prior to testing and disinfection of the new line.

(D) Meter service piping may be installed by drilling in place of open cut construction when approved by the Engineer.

When called for on the plans, the meter and box shall be relocated by the Contractor as directed by the Engineer. Existing meters which are shown on the plans to be relocated shall be located and installed in accordance with standard details.

Water meter boxes which are broken during construction shall be replaced by the Contractor at no additional cost to the Contracting Agency. Existing meter boxes which are already broken prior to start of construction shall be replaced by the Contractor with boxes furnished by the Contracting Agency. Boxes may be picked up by the Contractor after written authorization is received from the Engineer. The written authorization shall include the street address of each broken meter box and the size of meter box required. All water meter boxes shall conform to the standard details.

~~610.11~~ 610.12 FIRE LINE SERVICE CONNECTIONS:

Fire line service connections shall be installed in accordance with standard details.

The fire line from the control valves at the main to the detector check valve shall be constructed of cast iron or ductile iron pipe to Section 750.

~~610.12~~ 610.13 COUPLINGS, JOINTS, GASKETS AND FLANGES:

(A) Couplings: The couplings used to join the pipe to flanged valve adapters shall be Dresser Style 38, Smith-Blair 411 or an approved equal.

(B) Joints: The joints and fitting shall conform to Sections 750 and 752.

(C) Bolts and Nuts:

(1) For pipe 12 inches and smaller: Bolts and nuts for use in field connections or for connecting fittings shall be carbon steel equivalent to ASTM A-307, Grade B, with cadmium plating in accordance with ASTM B-766, except that the minimum thickness of the plating shall be .00020 inches. Cadmium plated bolts shall have Class 2A threads and the nuts used with them shall have Class 2B threads. All bolt diameters shall normally be 1/8 inch smaller than the bolt hole diameter. High strength, heat treated cast iron tee-head bolts with hexagon nuts, all in accordance with the strength requirements of AWWA C-111, may be used in lieu of the cadmium plated bolts and nuts for jointing mechanical joint cast iron or ductile iron pipe and fittings only.

(2) For pipe 16 inches and larger: All bolts and nuts on flanges for valves and flexible couplings shall be carbon steel equivalent to ASTM A-307, Grade B. Bolt diameters shall normally be 1/8 inch

smaller than the bolt hole diameters.

These bolted joints shall be protected as follows: Following installation and before backfilling, all couplings, steel flanges, bolts, nuts, anchor bolts and rods, bolting of all flanged valves, and all exposed steel shall be protected from corrosion by either of the two methods outlined below at the Contractor's option.

(A) Below ground installations shall be coated with NO-OX-ID "A" with a film of not less than 1/32 inch thick and then coated with cement mortar not less than 1 inch thickness before backfilling. Cement mortar shall be composed of 1 part cement, ASTM C-150, Type II, low alkali, to 3 parts sand. Before application of the cement mortar coating the area to be protected shall be covered with a layer of 2 x 2 inch No. 14 gage welded wire fabric, firmly wired in place.

(B) Below ground installations shall be protected by the application of hot coal-tar enamel. The coal-tar enamel shall be in accordance with AWWA C-203 and shall be applied to the top part of the pipe or fittings by daubers for at least 2 coats for a total minimum thickness of 1/16 inch. The coal-tar for under side of the pipe flanges or fittings shall be applied by the pan or cocoon method as described below and in AWWA Manual M-11, Steel Pipe.

Pan Method: The coating pan is securely anchored in place on the underside of the pipe and straddling the connection to be coated. The pan shall be wide enough so that the entire connection will be coated.

Hot coal-tar enamel is poured into the pan, from one side only, until the pan is completely filled. The drain plug or valve, is then opened and the excess coal-tar drained out. The pan can then be removed. Details of the coating pan and corresponding dimensions are given in AWWA Manual M-11.

The upper portion of the connection, and all remaining exposed steel pipe, will then be coated by the use of a dauber. The coal-tar coating shall be applied in at least 2 coats for a minimum thickness of 1/16 inch. The daubers and method of application conform to AWWA C-203. No thinning will be allowed.

Cocoon Method: The cocoon is formed by placing glass fiber cloth or roofing paper, of the proper width, around the underside of the connection and adjacent exposed steel pipe. The edges of the cocoon shall be securely fastened to the pipe. Backfill is lightly placed to the spring line, and the top of the cocoon is opened and layed back on the filled area and hot coal-tar enamel poured, from one side only, until the cocoon is completely filled. The loose backfill prevents rupture of the cocoon. The upper portion of the connection and remaining exposed steel pipe shall be coated as above.

(D) Gaskets: Except as otherwise provided, all gaskets for pipe lines shall be one piece full faced gaskets from one-ply cloth inserted SBR rubber material. Gaskets for flanges 20 inches and smaller shall be from 1/16 inch thick material. Gaskets for flanges 24 inches and larger shall be from 1/8 inch thick material. Gasket material shall be J-M 109 as manufactured by Johns-Manville Corporation or an approved equal. Physical characteristics of the rubber compound shall meet ASTM D-2000, Class 4AA805A13.

(E) Flanges: Cast iron flanges shall conform to AWWA C-110 as to material, diameter, thickness, drilling, etc. Steel flanges shall be ring or hub type, and shall conform to AWWA C-207, Class D. All flanges shall be drilled and have flange diameters and bolt circles conforming to AWWA C-110, except bolt holes will be 1/8 inch larger than the bolts given for the various sizes. All bolts shall be as specified above and all flanges shall have a flat facing.

~~610.13~~ 610.14 BLOCKING:

All pipe lines, valves and fittings 16 inches and smaller in diameter shall be blocked with concrete thrust blocks in accordance with standard details. Thrust block areas for pipe, valves and fittings larger than 16 inches in diameter shall be calculated for each size pipe, valve and fitting to be installed and shown on the plans.

Thrust block areas shall be calculated on the basis of 200 psi test pressure bearing against undisturbed 3,000 psf soil.

If soil or pressure conditions other than those stated above are encountered, the thrust block areas shall be calculated and submitted for approval. The areas stipulated in the standard details are minimum and shall not be decreased.

When restrained/welded joints are specified to resist thrust forces, blocking is not required.

With the Engineers approval, restrained/welded joints may be used in lieu of thrust blocks to resist thrust forces.

610.14 610.15 TESTING:

Water lines, including all fittings and connections to the water mains shall be tested for watertightness by subjecting each section to hydrostatic tests in accordance with applicable provisions or AWWA C-600, except as modified below, and shall consist of pressure test and leakage tests. The Contractor shall provide all vents, piping, plugs, bulkheads, valves, bracing, blocking, pump, including measuring device and all other equipment necessary for making the tests, except pressure gages, and shall pay the Contracting Agency for water used in the tests.

(A) Pressure Tests: Water lines, including all fittings and connections to the water mains shall be tested for watertightness by subjecting each section to pressure test, measured at the lowest end of the section under test. The test pressure shall be at least 200 psi for lines smaller than 16 inches and 150 psi for lines 16 inches or larger unless otherwise noted. The duration of each pressure test shall be at least 2 hours. Each section of a new line between sectionalizing valves or between the last sectionalizing valve and the end of the project shall be tested separately as required in AWWA C-600, and/or as modified in these specifications, except that any such section less than 500 feet in length may be tested with the adjacent section, if both sections of line have the same pipe class rating. No section greater than 1/2 mile in total pipe length shall be tested without special written permission of the Engineer.

The test may be made before or after backfilling. However, if mechanical compaction is to be used in the backfilling operations as spelled out in AWWA C-600, the test shall not be made until the backfilling is completed and compacted. All connections, blowoffs, hydrants and valves shall be tested with the main as far as is practicable.

The test section shall be slowly filled with potable water and all air shall be vented from the line. The rate of filling shall be as determined by the Superintendent of Water Distribution, with at least 24 hour notice required before tests are scheduled. While the test section is under test pressure, a visual inspection for leaks may be made along the pipe line, and all visible leaks repaired. The pressure test shall not begin until the pipe has been filled with water for at least 24 hours to allow for absorption.

(B) Leakage Tests: Leakage tests shall be made after pressure test has been satisfactorily completed and all backfilling and compaction is completed to top of trench. The Contractor shall furnish the necessary apparatus and assistance to conduct the test.

The duration of each leakage test shall be at least 2 hours. To pass the leakage test, the leakage from the pipe line shall not exceed the leakage allowed by the following formula:

$$L \approx \{ND \text{ SQRT } P\} \text{ over } \{4500\}$$

in which

L = allowable leakage in gallon per hour.

N = number of joints in the pipe line being tested, this "N" being the standard length of pipe furnished divided into the length being tested, with no allowance for joints at branches, blowoff, fittings, etc.

D = nominal diameter of pipe in inches.

P = average observed test pressure of the pipe being tested, equal to at least 100 percent of the class rating of pipe being tested, in psi gage, based on the elevation of the lowest point in the line or section under test and corrected to the elevation of the test gage.

Should the test on any section of the pipe line show leakage greater than specified above, the Contractor shall locate and repair the defective pipe, fittings, or joint until the leakage is within the specified allowance of 2 hour duration.

Leakage is defined as the quantity of water necessary to be supplied into the pipe line section under test to maintain the specified leakage test pressure after the pipe line has been filled with water and all air expelled. All repairs and retests, if required, shall be made at the Contractor's expense.

Connections to the existing pipelines or existing valves shall not be made until after that section of new construction has satisfactorily passed the hydrostatic tests.

Cast iron and Ductile pipe used in conjunction with ACP will be tested to the ACP standards, unless otherwise directed by the Engineer. High pressure systems of all cast iron or Ductile iron will be tested in accordance with AWWA C-600, Section 4.1.

Backfill and compaction for the full distance encompassed by restrained\welded joints shall be completed prior to testing.

~~610.15~~ 610.16 DISINFECTING WATER LINES:

After pressure testing and before placing in service, all water lines shall be disinfected. Disinfection shall be accomplished in accordance with Section 611. All valves in the lines being disinfected shall be opened and closed several times during the 24 hour period of disinfection.

~~610.16~~ 610.17 PAVEMENT AND SURFACING REPLACEMENT:

Pavement and surfacing replacement shall be in accordance with the requirements of Section 336.

~~610.17~~ 610.18 CLEANUP:

When testing, chlorination, compaction, and cleanup do not follow pipe laying in an orderly manner, the Engineer reserves the right to close down trenching and pipe laying until these operations are adequately advanced.

~~610.18~~ 610.19 MEASUREMENT AND PAYMENT:

(A) Pipe:

(1) Measurement of all pipe shall be of the linear feet of pipe installed, measured along the centerline of the pipe, through all valves and fittings, from the centerline of the fittings or centerline of valves on ends of pipe to the centerline of fittings, centerline of valves on ends of pipe or to the end of pipe, as the case may be, for all through runs of pipe. Measurement shall be to the nearest 0.1 foot.

Measurement of branch line pipe shall start at the centerline of valve at connection to the main. Branches of tees that are valved and capped will not be measured.

Measurement of meter service pipe shall be from the centerline of the new main to the connection at the meter, along the centerline of service pipe.

(2) Payment will be made at the unit price bid per linear foot of each type and size of pipe called for in the proposal. Such payment shall be compensation in full for furnishing and installing the pipe and fittings, specials, adapters, etc., complete in place, as called for on the plans and/or on the standard details, and shall include all costs of excavation, removal of obstructions, shoring and bracing, bedding, backfilling, compaction, maintenance of traffic, testing, disinfecting, connections to existing lines or works, and all work not specifically covered in other pay items.

A contingent item for cast iron fittings not shown on the plans shall be included in the proposal. Payment will be made at the unit price bid per pound on the theoretical weight of the fittings installed, which shall be compensation in full for furnishing and installing the fittings.

(B) Service Connection To Existing Water Meters:

(1) Measurement shall be of the number of unit connections made for water meter services, as called for in the proposal. Each proposal item unit shall consist of the connection to the water main and to the meter, as required in standard details.

(2) Payment will be made at the unit price bid for each unit water meter service connection and shall be compensation in full for labor materials (other than pipe) equipment, tapping, and all necessary incidentals. Payment for new service pipe required to make the connection will be made separately, as stipulated above.

(C) Relocation of Existing Meters and Boxes: Measurement shall be of the number of meters and boxes moved and reinstalled. Payment will be made at the unit price bid in the proposal for each meter and box relocated and installed.

(D) Permanent Pipe Supports and Encasement of Existing Pipes: Measurement shall be of each unit included in the proposal, and payment shall be compensation in full for supporting or encasing existing pipe, as required on the plans, including excavation, form work, reinforcing, concrete, handling and controlling flows in the existing pipe, removing and replacing existing pipe where necessary, supporting, backfilling and compaction, and pavement and/or surfacing replacement required in excess of pay width(s) allowed in Section 336.

(E) Concrete Thrust Blocks: Concrete thrust blocks and anchors for all pipe 16 inches and larger shall be measured by the cubic yard(s) of concrete placed, as required on the plans and/or as directed by the Engineer. Payment will be made at the unit price bid per cubic yard, and shall be compensation in full for excavation, formwork, placing and finishing concrete, reinforcing, backfilling and compaction, and pavement and/or surfacing replacement required in excess of pay width(s) allowed in Section 336. All thrust blocks and anchors for 12 inches and smaller pipe shall be included in the linear foot cost of the pipe.

(F) Valves: Measurement of and payment for valves, tapping sleeves and valves, and valve boxes shall be for each item furnished and installed, as designated in Section 630.

(G) Fire Hydrants: Measurement shall be the number of fire hydrants installed. Payment will be at the unit price bid for the installation of each fire hydrant complete in place and in operating condition. The 6 inches

cast iron pipe and fittings, required for making the connection from the main to the hydrant, shall be a separate pay item in the proposal as described above.

(H) Pavement and/or Surfacing Replacement: Payment for pavement and/or surfacing replacement will be made as stipulated in Section 336, except as otherwise established in this specification. The cost of pavement and/or surface replacement required for meter service installations shall be included in the price bid for meter service pipe.

SEWER LINE CONSTRUCTION

615.1 DESCRIPTION:

The construction or extension of sewer lines shall conform to the applicable standard specifications and details, except as otherwise required on the plans or as modified in the special provisions.

Concrete pipe shall conform to Section 735. High density polyethylene (HDPE) pipe shall conform to Section 738. Vitrified clay pipe shall conform to Section 743. Polyvinylchloride (PVC) pipe and fittings shall conform to Section 745.

615.2 TRENCHING:

Excavation of trenches shall be accomplished in accordance with Sections 601, and 603 for HDPE pipe. The Engineer shall furnish the Contractor alignment and elevation stakes at agreed-upon intervals and offset together with cut sheets showing the difference in elevation from the top of the stakes to the flow line of the pipe.

The trench shall be dry when the fine grading of the bottom of the trench is accomplished. Before placement of pipe the fine grade shall be carefully checked by use of a string line, laser beam, or other means so that when in final position the pipe will be true to line and grade, ± 0.05 feet for 8 inches through 12 inches, ± 0.10 feet for 15 inches and larger.

For PVC pipe installation the width of trench as listed in Table 601-1 or as given in the contract documents may be increased to provide sufficient space for the installation of fittings or for compaction of the bedding. For HDPE pipe installation, the width of the trench will be per Subsection 603.2. The adjusted maximum width at the top of the pipe must be approved by the Engineer. The adjustment of the trench width to accomplish the above shall be done at no additional cost to the Contracting Agency.

615.3 SEPARATION

To protect water lines from contamination by sewer lines, separation and extra protection shall be in accordance with Section 610.

Sewer lines that are constructed of ductile iron pipe for extra protection shall be internally lined for sewer service.

~~615.3~~ 615.4 LAYING PIPE:

Pipe shall be of the type, class, and size called for on the plans. All pipe shall be protected during handling against impact shocks and free falls. No damaged or defective pipe shall be installed in the work. Pipe shall be kept clean at all times, and as the work progresses, the interior of the pipe shall be cleared of all dirt and superfluous materials of every description.

The laying of the pipe shall be in finished trenches free from water or debris, and shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow. Each pipe shall be laid firmly and true to line and grade, in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flowline. Any adjustment to line and grade shall be made by scraping away or filling in under the body of the pipe, never by wedging or blocking under the pipe ends.

The alignment and grade of each length of pipe shall be checked after setting by measurement from the string line, laser beam target or other means approved by the Engineer.

At all times when work is not in progress, open ends of the pipe and fittings shall be securely closed to the satisfaction of the Engineer, so that no water, earth or other substance will enter the pipe or fittings.

HDPE and PVC pipe and fittings shall be installed in accordance with ASTM D-2321. HDPE pipe bedding shall comply with Subsection 603.4. The PVC pipe bedding shall be placed in two lifts. The first lift will be from the bottom of the trench to the spring line of the pipe. The second lift will be from the spring line to one foot above the top of pipe. Separate inspections will be required on each lift. The Contractor shall place the first lift in a manner that will insure uniform support under the haunches and proper alignment of the pipe.

615.4 615.5 FITTINGS:

All fittings shall conform to the requirements of the pipe specifications and shall be located as shown on the plans, or as directed by the Engineer, in accordance with the standard details.

615.5 615.6 JOINTING:

615.5.1 615.6.1 Rubber Gasket Joints: Prior to making pipe joints, all surfaces of the portions of the pipes to be joined shall be cleaned, dried, and prepared in accordance with the manufacturer's recommendations. The joints shall then be carefully centered and completed.

Trenches shall be kept water-free during the installation of joints and couplings.

The joint and coupling materials will be as specified in the appropriate pipe sections and shall be installed in accordance with the manufacturer's recommendations. Cement mortar joints will NOT be permitted in sanitary sewer construction.

615.5.2 615.6.2 Water Stops: Water stops will be required when connecting HDPE pipe to concrete structures, manholes, etc. The water stop shall comply with Section 738 and will be installed per manufacturer recommendations.

615.6 615.7 SANITARY SEWER SERVICE TAPS:

When the construction of sanitary sewer service taps are called for in the special provisions, they shall be constructed in accordance with standard details for sewer taps except for HDPE pipe.

To maintain structural integrity of the pipe, service taps for HDPE pipe shall be constructed in accordance with the manufacturer's recommendations.

When any damage occurs to the pipe ribs or walls, outside of the tap area, the Contractor shall perform repairs, as recommended by the manufacturer at no cost to the Contracting Agency. Damage to the pipe will include but not be limited to gouging, marring, and scratching forming a clear depression in the pipe.

The location of the service tap for each property shall be in the downstream 1/3 of the lot, or as requested by the property owner. Sewer service taps shall not be covered until they have been plugged and marked in accordance with standard details and their location has been recorded by the Engineer.

615.7 615.8 SANITARY SEWER CLEANOUTS:

The cleanouts shall be constructed at locations shown on the plans, in accordance with the standard details for cleanouts.

615.8 615.9 MANHOLES:

Manholes shall be constructed to conform with the requirements of Sections 625, Section 505 and standard details.

615.9 615.10 BACKFILLING:

Backfilling and compaction shall be done in accordance with Sections 601 and 603, for HDPE pipe.

615.10 615.11 TESTING:

Pressure testing of force mains shall be done in accordance with Section 610.14.

Sewers and pipe lines shall be subject to acceptance testing after backfilling has been completed but prior to the placement of the finished surface material.

The Contracting Agency reserves the right to require testing of the entire installation. Cost of repairs or corrections necessary to conform to the following testing requirements will be borne by the Contractor at no additional cost to the Contracting Agency.

(A) Low Pressure Air Test:

Testing will be accomplished by the means of "Low Pressure Air Testing." Tests may be conducted by the Contractor or an independent testing firm. However, acceptance tests shall be made only in the presence of the Engineer.

Test Procedure:

- (1) Before testing, the pipe shall be thoroughly cleaned.
- (2) The Contractor shall seal off the section of pipe to be tested at each manhole connection. Test plugs *must be securely braced* within the manholes.
- (3) A minimum of two connecting hoses to link the air inlet test plug with an above ground test monitoring panel must be provided.
 - (a) One hose is to induce air through the test plug and into the test chamber.
 - (b) The second hose is for the purpose of monitoring the test pressure from within the enclosed pipe.
- (4) UNDER NO CIRCUMSTANCES ARE WORKERS TO BE ALLOWED IN THE CONNECTING MANHOLES WHILE A PRESSURE TEST IS BEING CONDUCTED.
- (5) Add air slowly into the test section. After an internal pressure of 4.0 psi is obtained, allow internal air temperature to stabilize.
- (6) After stabilization period, adjust the internal air pressure to 3.5 psi, disconnect the air supply and begin timing the test.
- (7) Refer to Table 615-1 to determine the length of time (minutes) the section under test must sustain while not losing in excess of 1 psi as monitored by the test gauge. If the section of line to be tested includes more than one pipe size, calculate the test time for each size and add the test times to arrive at the total test time for the section.
- (8) Sections so determined to have lost 1 psi or less during the test period will have passed the leakage test. Those sections losing in excess of 1 psi during the test period will have failed the leakage test.
- (9) Appropriate repairs must then be completed and the line retested for acceptance.

TABLE 615-1
SANITARY SEWER AIR TEST
Minimum Test Time for Various Pipe Sizes*

Nominal Pipe Size, in.	<i>T</i> (time), min/100 ft.	Nominal Pipe Size, in.	<i>T</i> (time), min/100 ft.
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

* The time has been established using the formulas contained in ASTM C-828, Appendix.

(B) Hydrostatic Test:

Exfiltration Testing (water):

Sanitary sewer testing by means of exfiltration should only be considered when low pressure air testing cannot be used and only with the approval of the Engineer.

Testing Procedure:

- (1) The Contractor shall furnish all equipment for testing.
- (2) Seal off the downstream end of the line and fill with water to a minimum head of 4 feet in a stand pipe at the high end.
- (3) A period of at least one hour will be allowed for absorption time before making the test.
- (4) A suitable meter or method of measuring the quantity of water used is necessary.
- (5) The allowable water loss for sanitary sewers shall not exceed 0.158 gallons per hour per 100 feet of pipe per inch of diameter of pipe under a minimum test head of 4 feet above the top of the pipe at the upper end.

(C) Deflection Test for HDPE and PVC Pipe:

In addition to the tests prescribed above, the Contractor shall perform a deflection test on the system as directed by the Engineer. Any part of the installation which shows deflection in excess of 5% of the nominal inside diameter per Section 738 for HDPE pipe or in excess of 5% of the average inside diameter per ASTM D-3034 for PVC pipe, shall be corrected.

After acceptance but prior to the termination of the warranty period, the Contracting Agency may test the long term deflection of the sewer. If the Contracting Agency determines that the deflection has exceeded 7 1/2% of the average inside diameter, that portion of the installation shall be corrected by the Contractor at no cost to the Contracting Agency.

(D) Closed Circuit T.V. Inspection:

The Contracting Agency reserves the right to visually inspect the interior of the sewer line using a television camera. Any defects in the pipe or construction methods revealed shall be corrected by the Contractor at no additional cost to the Contracting Agency.

The Contracting Agency will pay for the initial T.V. inspection. Any additional inspection(s) required, due to the failure of the initial inspection, shall be paid for by the Contractor.

~~615.11~~ **615.12 PAVEMENT AND SURFACING REPLACEMENT:**

Pavement and surfacing replacement shall be done in accordance with Section 336.

~~615.12~~ **615.13 CLEANUP:**

The Engineer has the right to close down forward trenching and pipe laying where testing, backfill, compaction and cleanup does not follow in an orderly manner.

~~615.13~~ **615.14 MEASUREMENT AND PAYMENT:**

- (A) Sewer Pipe and Fittings: (Vitrified clay, cast iron and other approved types of pipe.)

Measurement will be made horizontally through manholes and fittings and from centerline to centerline of structures, for the various types and sizes of pipe called for on the plans and in the proposal.

Payment for the various sizes and types of pipe will be made at the unit price bid per linear foot, and shall be compensation in full for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, removal of obstructions, backfilling, water settling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.

(B) Sanitary Sewer Service Taps:

Measurement will be the number of taps installed.

Payment will be made at the unit price bid and shall be compensation in full for furnishing and installing pipe and fittings complete in place, as specified and called for on the plans and standard details, including all cost of excavation, removal of obstructions, shoring and bracing, backfilling, compaction, pavement replacement, maintenance of traffic, and all work incidental thereto.

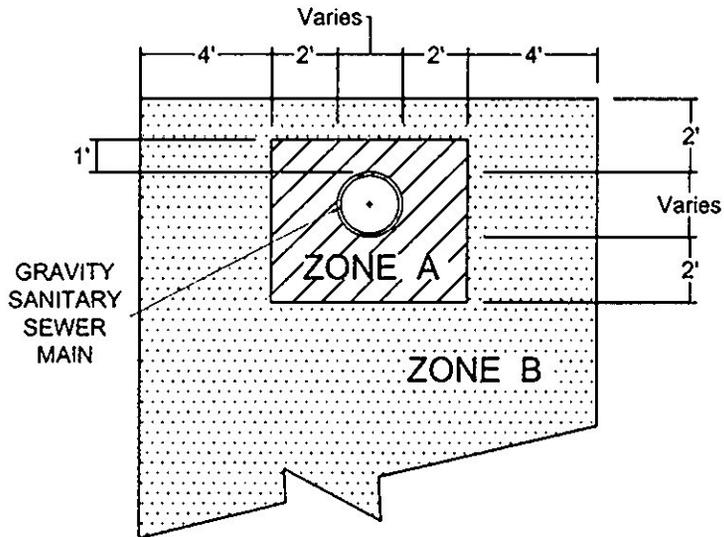
(C) Sanitary Sewer Cleanouts:

Measurement will be the number of cleanouts installed.

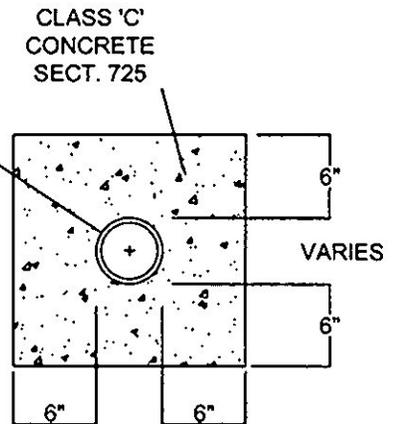
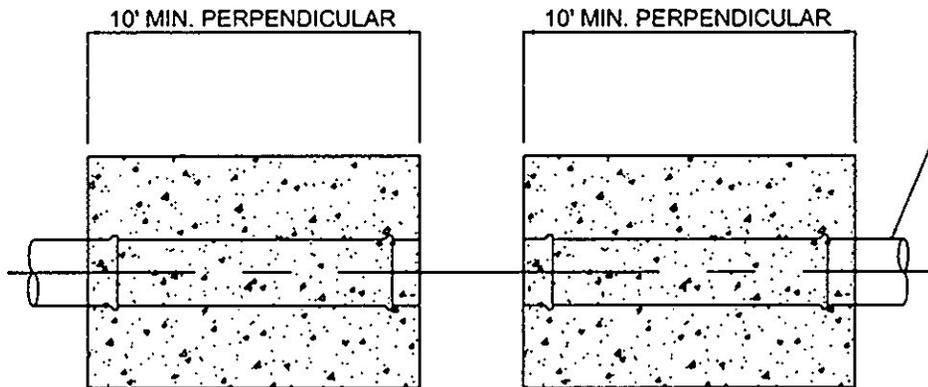
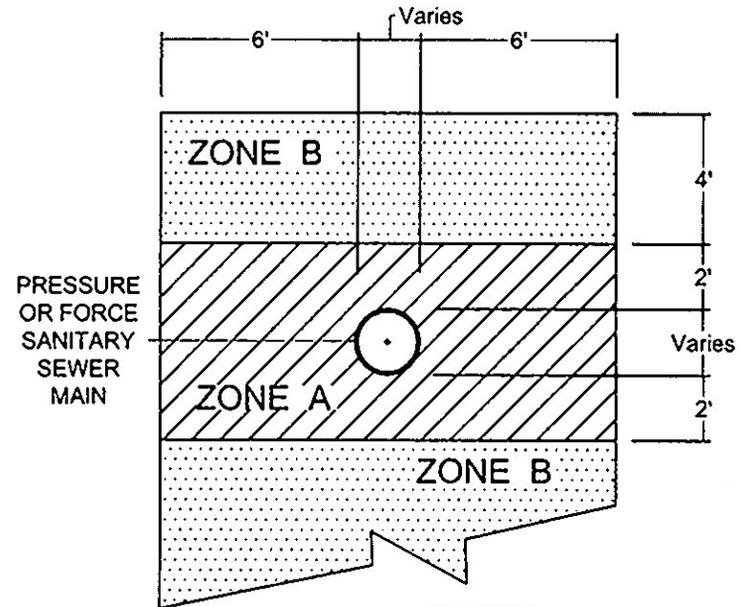
Payment will be made at the unit price bid and shall be compensation in full for furnishing and installing pipe, fittings, and frame and cover as called for on the plans and in accordance with the standard details.

End of Section

CROSS SECTION DETAIL FOR GRAVITY SANITARY SEWER



CROSS SECTION DETAIL FOR PRESSURE OR FORCE SANITARY SEWER



ELEVATION

Case 04-07
END VIEW August 3, 2005

DETAIL NO.
404-1

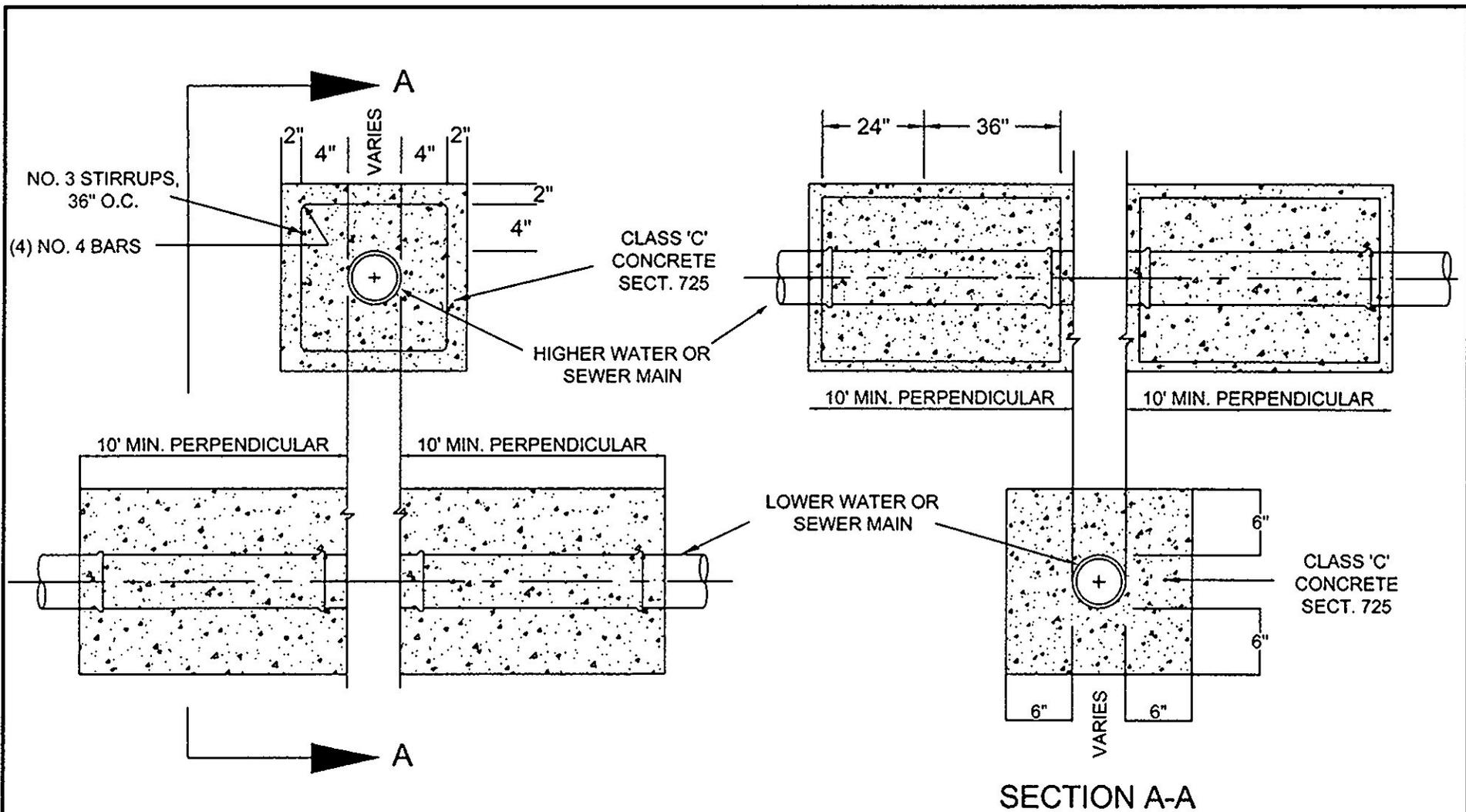


STANDARD DETAIL
ENGLISH

WATER AND SANITARY SEWER
SEPARATION/PROTECTION

REVISED

DETAIL NO.
404-1

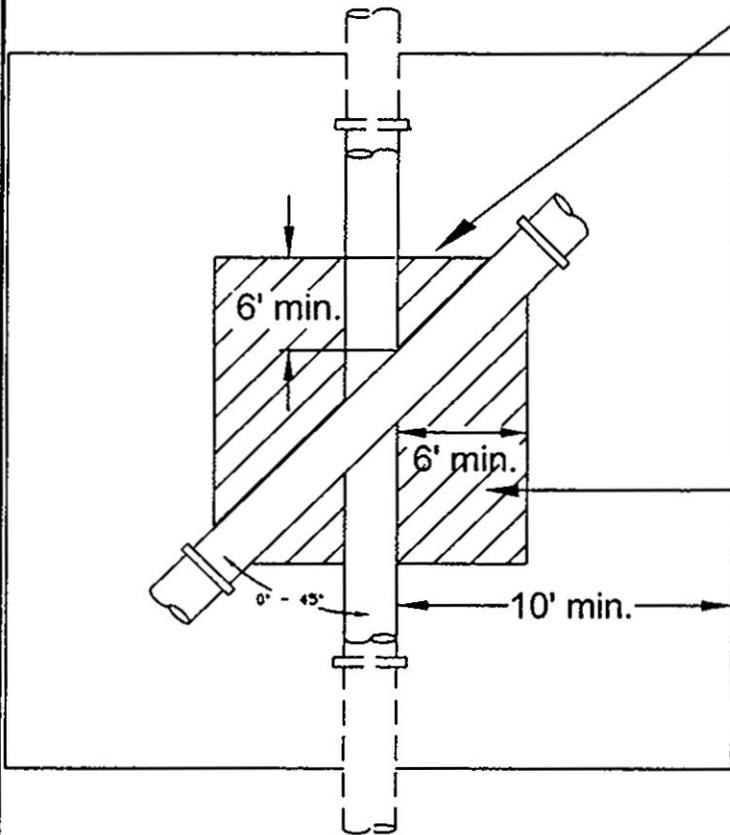


ENCASEMENT FOR PIPE CROSSING

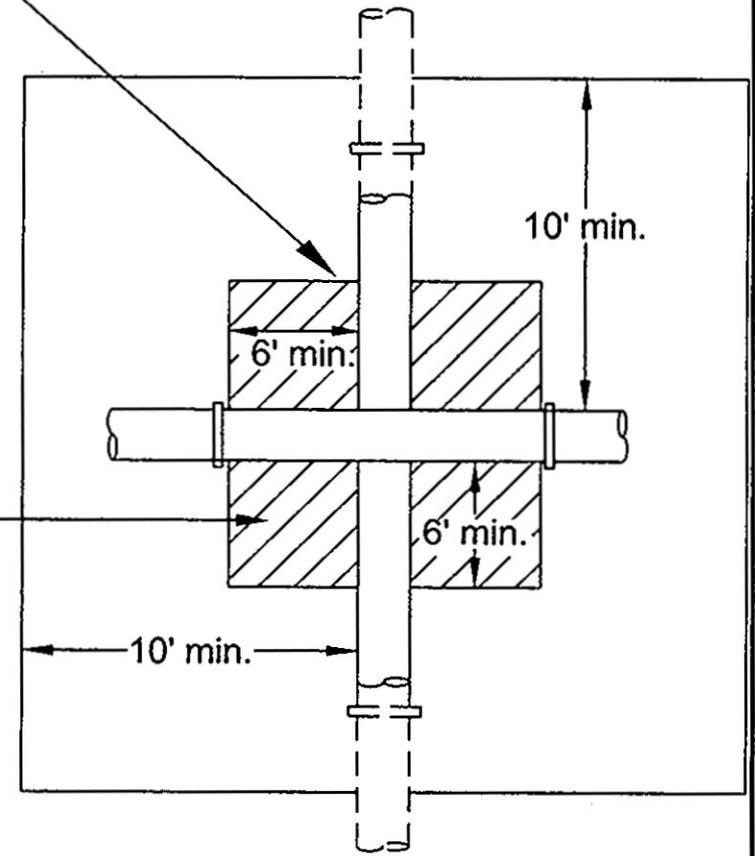
Case 04-07
August 3, 2005

DETAIL NO. 404-2	 MARICOPA ASSOCIATION of GOVERNMENTS	STANDARD DETAIL ENGLISH	WATER AND SANITARY SEWER SEPARATION/PROTECTION	REVISED	DETAIL NO. 404-2
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MECHANICAL OR
RESTRAINED JOINTS
(OR NO JOINTS)



NO
JOINTS
(WITHIN
IDENTIFIED
AREA)



EXTRA PROTECTION DUCTILE IRON PIPE
(GRAVITY OR PRESSURIZED) SEWER LINE

Case 04-07
August 3, 2005

DETAIL NO.
404-3



STANDARD DETAIL
ENGLISH

WATER AND SANITARY SEWER
SEPARATION/PROTECTION

REVISED

DETAIL NO.
404-3

Case 05-02 Miscellaneous Blooper Cases

Case A – Table 602-1 correction

Case B – Section 340.3, add missing comma.

Case C – Section 342.3.4 paragraph 1, Correct referenced Detail 255 to Detail 225.

Case D – Detail 250 drafting corrections

Case E – Detail 260 drafting corrections

SECTION 601

or in the special provisions. Unless otherwise noted, backfill under single curb, curb and gutter, sidewalk, driveways, valley gutters, etc. shall be the same as the adjacent street pavement.

Where water consolidation is used, backfill will be placed in lifts as required in the following table prior to settlement.

Trench Width	Backfill Lifts
18" to 24"	Not to exceed 4'
25" to 36"	Not to exceed 6'
Over 36"	Not to exceed 8'

The above backfill lift limitations are not applicable when water saturation is done by the jetting method.

Where mechanical compaction is used, backfill shall be placed in lifts the height of which shall not exceed that which can be effectively compacted depending on the type of material, type of equipment and methods used, and under no circumstances shall exceed 4 feet.

Backfill, around utilities that are exposed during trench excavation, shall be placed in accordance with the bedding methods.

601.4.4 Compaction Densities: Unless otherwise provided in the plans and/or special provisions, the trench backfill shall be thoroughly compacted to not less than the densities in Table 601-2 when tested and determined by AASHTO T-99 and T-191 or ASTM D-2922 and D-3017. When AASHTO T-99, method A or B, and T-191 are used for density determination, MAG Detail 190 will be used for rock correction.

The density required will depend on the Type shown on the plans and/or called for in the special provisions. Density required for each type shall comply to Table 601-2.

Backfill Type	Location	From Surface To 2 feet Below Surface	From 2 feet Below Surface To 1 foot Above Top of Pipe	From 1 foot Above Top of Pipe to Bottom of Trench
I	Under any existing or proposed pavement, curb, gutter, sidewalk, or such construction included in the contract, or when any part of the trench excavation is within 2' of the above.	100% for granular 95% for non-granular	90%	90%
II	On any utility easement street, road or alley right-of-way outside limits of (I).	85%	85%	90%
III	Around any structures or exposed	95%	* ←	in all cases

Note: The type required will generally be shown on the plans and the plans will govern. Where no type is shown on the plans the type shall comply with Table 601-2. *add word "utilities."* *Delete line.*

A consideration in determining the backfill Types as shown on the plans, is based on the trench widths as shown in the Contract Documents. If these trench widths increase beyond those widths referred to above and fall within the 2-foot limit of paved surfaces and other improvements due to construction exigencies, the backfill designation for that portion within the 2-foot limit of such improvements shall be Type I even though Type II backfill is shown on the plans.

SECTION 340

all expansion joints installed against newly placed concrete, sawcut or other smooth surfaces shall comply with Section 729.1 - Premolded Joint Filler per ASTM D-1751, 1/2 inch, Bituminous Type. Expansion joints installed against existing uneven surfaces shall be per Section 729.2 - Pour Type Joint Filler.

Contraction joints, unless otherwise specified, shall be constructed in accordance with the standard details, and in a straight line and vertical plane perpendicular to the longitudinal line of the sidewalk, sidewalk ramp or curb and gutter, except in cases of curved alignment when they will be constructed along the radial lines of the curb.

Sidewalk or sidewalk ramp score marks, unless otherwise specified, shall be constructed in accordance with the standard detail.

All edges shall be shaped with a suitable tool so formed as to round the edges to a radius as indicated on the standard details.

The front face form shall not be removed before the concrete has taken the initial set and has sufficient strength to carry its own weight, gutter forms and rear forms shall not be removed until concrete has hardened sufficiently to prevent damage to the edges. Special care shall be taken to prevent any damage. Any portion of concrete damaged while stripping forms shall be repaired or if the damage is severe, replaced at no additional cost to the Contracting Agency. The face, top back, and flow line of the curb and gutter shall be tested with a 10-foot straightedge or curve template, longitudinally along the surface. Any deviation in excess of 1/4 inch shall be corrected at no additional cost to the Contracting Agency.

ADD
COMMA

The surface of concrete sidewalk or sidewalk ramp shall be tested with a 5-foot straightedge. Any deviation in excess of 1/8 inch shall be corrected at no additional cost to the Contracting Agency.

When required by the Engineer, gutters having a slope of 0.8 foot per hundred feet or less, or where unusual or special conditions cast doubt on the capability of the gutters to drain, they shall be water tested. Water testing shall consist of establishing flow in the length of gutter to be tested by supplying water from a hydrant, tank truck or other source. One hour after the supply of water is shut off, the gutter shall be inspected for evidence of ponding or improper shape. In the event water is found ponded in the gutter to a depth greater than 1/2 inch, or on the adjacent asphalt pavement, the defect or defects shall be corrected in a manner acceptable to the Engineer without additional cost to the Contracting Agency.

Any section of the work deficient in depth or not conforming to the plans or specifications shall be removed and replaced by the Contractor at no additional cost to the Contracting Agency.

Finishing and curing of the concrete shall be done in the manner specified in Section 505.

The Contractor shall stamp his name and year on all work done by him, on each end of the curb, gutter, sidewalk or sidewalk ramp. The letters shall not be less than 3/4 inch in height.

340.4 BACKFILLING:

Unless otherwise specified the Contractor shall backfill behind the curbs, sidewalk or sidewalk ramps with soil native to the area to the lines and grades shown on the plans.

340.5 MEASUREMENT:

Concrete curbs and gutters of the various types shown on the plans and in the proposal, will be measured along gutter flow line through inlets, catch basins, driveways, sidewalk ramps, etc., by the lineal foot to the nearest foot for each type, complete in place.

Concrete sidewalks, sidewalk ramps, driveways, alley intersections, valley gutters and aprons will be measured to the nearest square foot complete in place. When concrete sidewalk, sidewalk ramps, driveways, alley intersections, valley gutters, and/or aprons are cut during trenching operations, the square foot measurement for payment will be in accordance with Section 336.

340.6 PAYMENT:

Payment for the above named items will be made in accordance with the unit prices or lump sums as set forth in the proposal. Such payment shall include full compensation for furnishing all labor, material, tools and equipment and accomplishing all work in conformance with the contract documents.

End of Section

SECTION 342

342.3 CONSTRUCTION PROCEDURES:

342.3.1 Subgrade: The subgrade shall be constructed true to grades and lines shown on the plans and compacted to a minimum dry density of 95% as specified in MAG Section 301.

342.3.2 Aggregate Base Course: When aggregate base course is specified, the aggregate base course shall be constructed true to grades and lines shown on the plans and compacted to a minimum dry density of 100% per Section 301 with the surface of the aggregate base course not varying by more than +1/8-inch in 10-feet.

342.3.3 Concrete Header and Base Slab: Forms shall be thoroughly cleaned each time they are used, and shall be coated with a light oil, or other releasing agent of a type which will not discolor the Portland Cement concrete.

The Portland Cement concrete shall be thoroughly spaded away from the forms so that there will be no rock pockets next to the forms. Compacted by mechanical vibrators may be used when approved by the Engineer. Tamping or vibrating shall continue until the mortar flushes to the surface, and the coarse aggregate has been tamped below the surface.

All edges shall be shaped with a suitable tool to form a rounded edge of radius as directed in Detail 225.

The Portland Cement concrete header face form shall not be removed before the concrete has taken the initial set and has sufficient strength to carry its own weight. The concrete header outer form shall not be removed until the concrete has hardened sufficiently to prevent any damage to the concrete. Any porting of concrete damaged while stripping forms shall be repaired or if the damage is severe, replaced at no additional cost to the Contracting Agency. The face and top of the concrete header shall be tested with a 10-foot straightedge or curve template, longitudinally along the surface. Any deviation in excess of 1/4-inch in 10-feet shall be corrected at no additional cost to the Contracting Agency.

Any section of the work deficient in depth or not conforming to the plans or specifications shall be removed and replaced by the Contractor at no additional cost to the Contracting Agency.

Finishing and curing of the concrete shall be done in the manner specified in Section 340.

342.3.4 Expansion Joints: Expansion joints shall be constructed to the full depth and width of the concrete with the top of the material one-half inch below the top surface as depicted in Detail 225 unless otherwise specified. After the concrete is cured, the top one-half inch shall be filled to the surface of the concrete with a premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant, ASTM C-920, Type S, Grade NS, Class 25, Sikaflex-1a or equal.

Joints shall be constructed in a straight line and vertical plane perpendicular to the longitudinal line of the concrete header, except in cases of curved alignment when they will be constructed along the radial lines of the header. In the case of base slabs, pavers shall be placed continuously over the expansion joints.

342.3.5 Contraction Joints: Contraction joints shall be constructed in a straight line and vertical plane perpendicular to the longitudinal line of the concrete header, except in cases of curved alignment when they will be constructed along the radial lines of the header. They shall be constructed to a depth of one inch with rounded edges and placed at 10-foot intervals. Contraction Joints shall be filled to the surface of the surrounding concrete with elastomeric sealant specified in 342.3.3.

342.3.6 Sand Laying Course: The maximum thickness of the sand course shall be one-inch. Screeding boards shall be used to ensure a uniform thickness. The sand shall not be compacted, walked on or wet down.

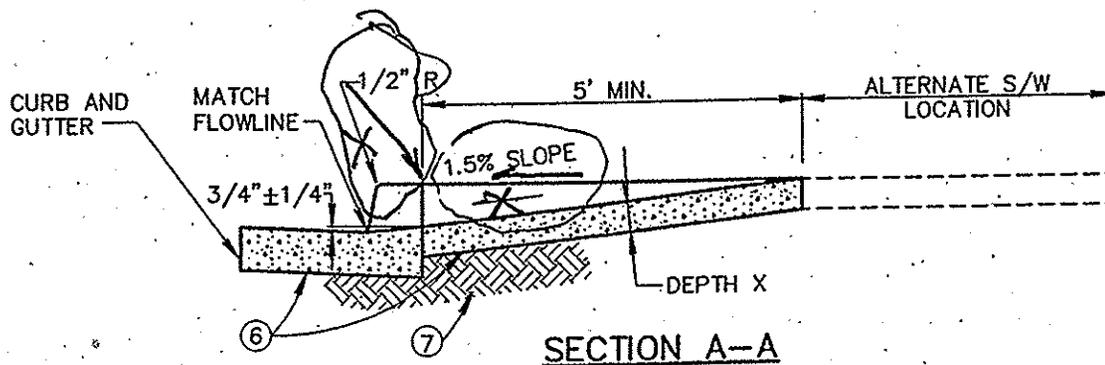
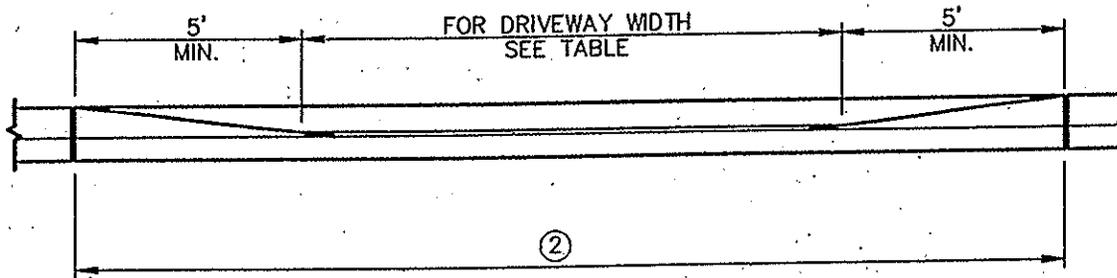
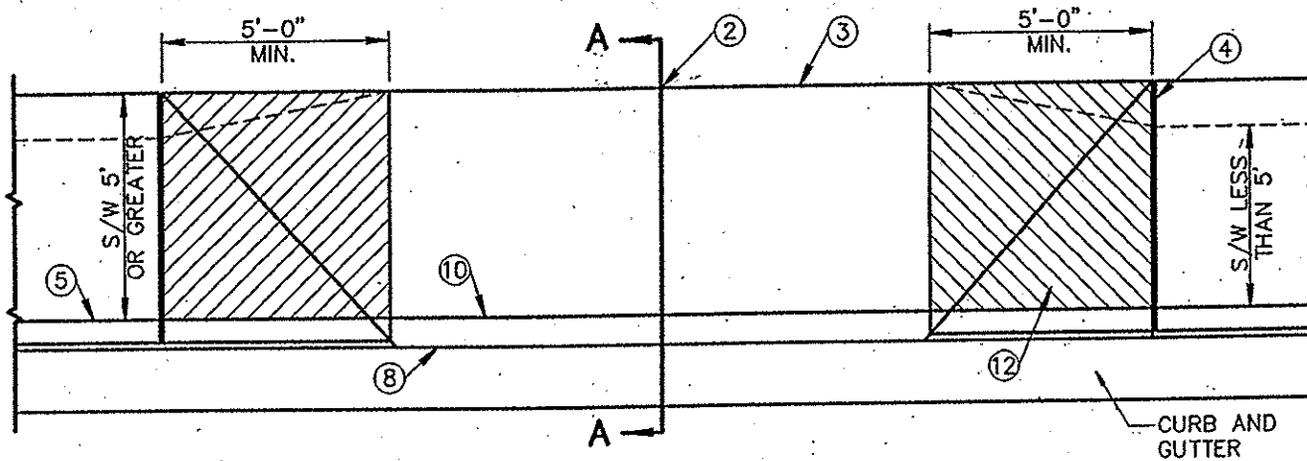
342.3.7 Concrete Paving Stones: The concrete pavers shall be clean and free of foreign materials before installation. Paving work shall be plumb, level and true to line and grade and shall be installed to properly coincide and align with adjacent work and elevations. All edges must be retained to secure the perimeter pavers and the sand laying course. The pavers shall be laid in such a manner that the desired pattern is maintained and joints between the pavers are as tight as possible.

The Contractor shall lay the pavers starting from the longest straight line and from a true 90-degree corner. The pavers shall be installed hand-tight and level on the undisturbed sand course in a manner that eliminates gaps between the stones and the edge retention header. String lines shall be used to hold all pattern lines true. The gaps at the edge of the paver surface shall be filled with pavers cut to fit. Cutting shall be accomplished to leave a clean edge to the traffic (vehicular or pedestrian) surface using a masonry saw cut.

After the pavers are in place, they shall be vibrated into the sand laying course using a vibrator capable of 3,000 to 5,000 pounds compaction force. This will require two passes at 90 degrees to each other. After vibration, approximately 1/4-inch of clean

NOTES:

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
3. BACK OF D/W OR FACE OF FUTURE S/W.
4. EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB - CONSTRUCTION JOINT OR SCORE MARK.
6. CLASS 'B' CONCRETE, SECT. 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A-A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.
11. ROLL TYPE CURB AND GUTTER NOT PERMITTED IN THE CITY OF MESA
12. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1. ON TYPE 'D' RAMP DETAIL NO. 234.



COMMERCIAL AND INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH X
COMMERCIAL	* 16'	40'	B	6"
INDUSTRIAL	* 16'	40'	B	6"
* 24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH X
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
* 16' DESIRABLE				

DETAIL NO.
250

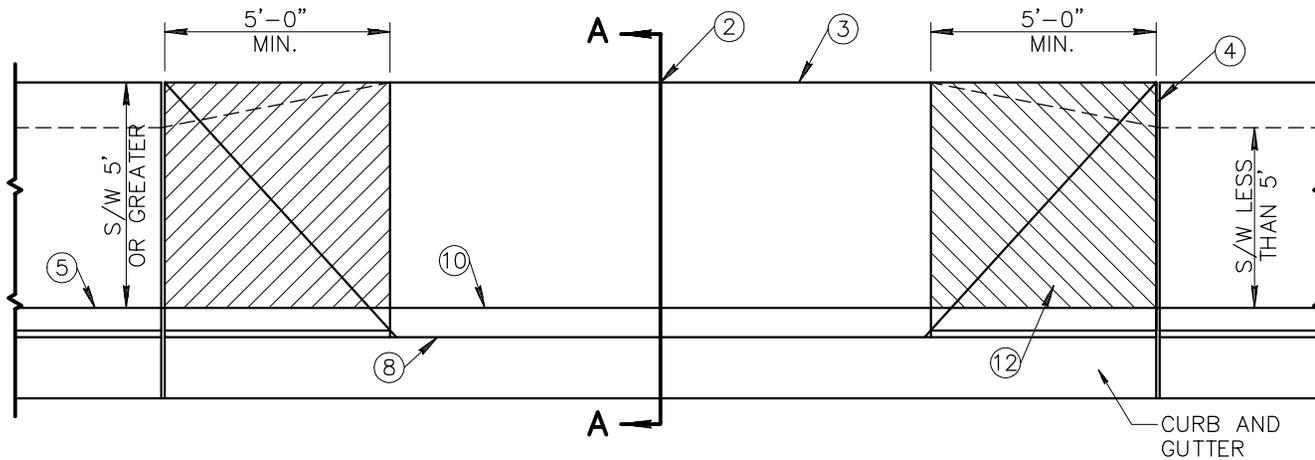


**STANDARD DETAIL
ENGLISH**

DRIVEWAY ENTRANCES

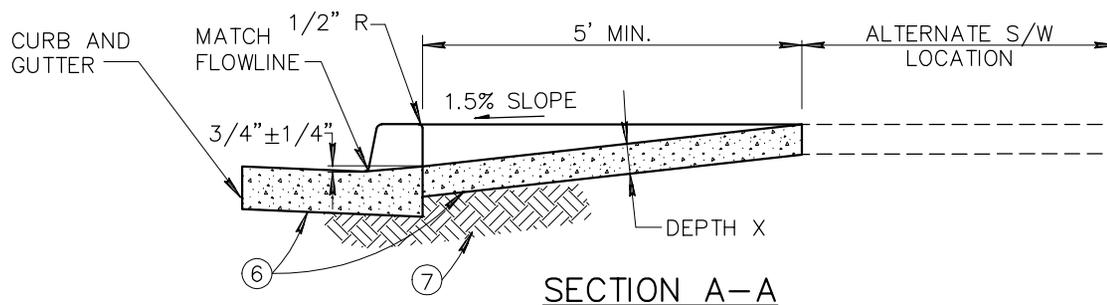
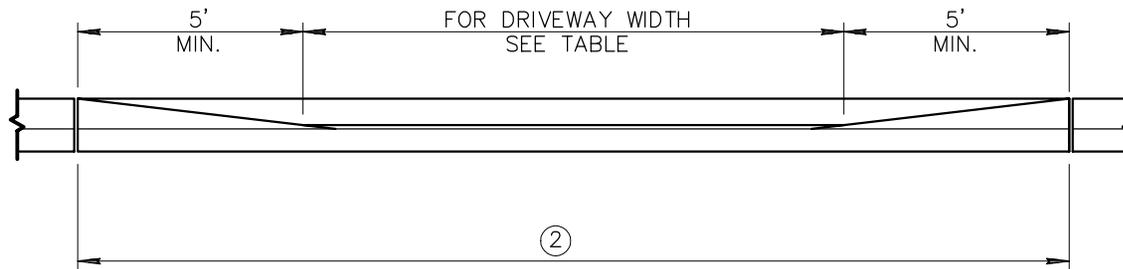
REVISED
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DETAIL NO.
250



NOTES:

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
3. BACK OF D/W OR FACE OF FUTURE S/W.
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6. CLASS 'B' CONCRETE, SECT. 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A-A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.
11. ROLL TYPE CURB AND GUTTER NOT PERMITTED IN THE CITY OF MESA
12. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.



COMMERCIAL AND INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH X
COMMERCIAL	* 16'	40'	B	6"
INDUSTRIAL	* 16'	40'	B	6"
*24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH X
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
*16' DESIRABLE				

DETAIL NO.

250



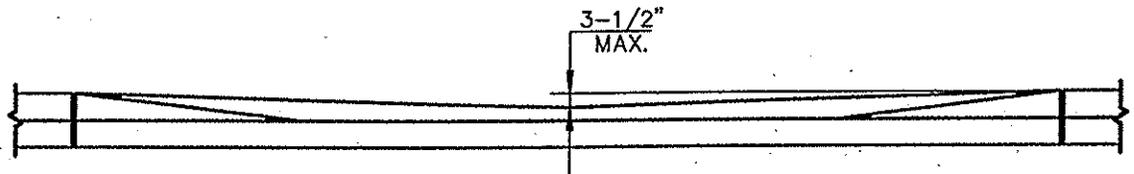
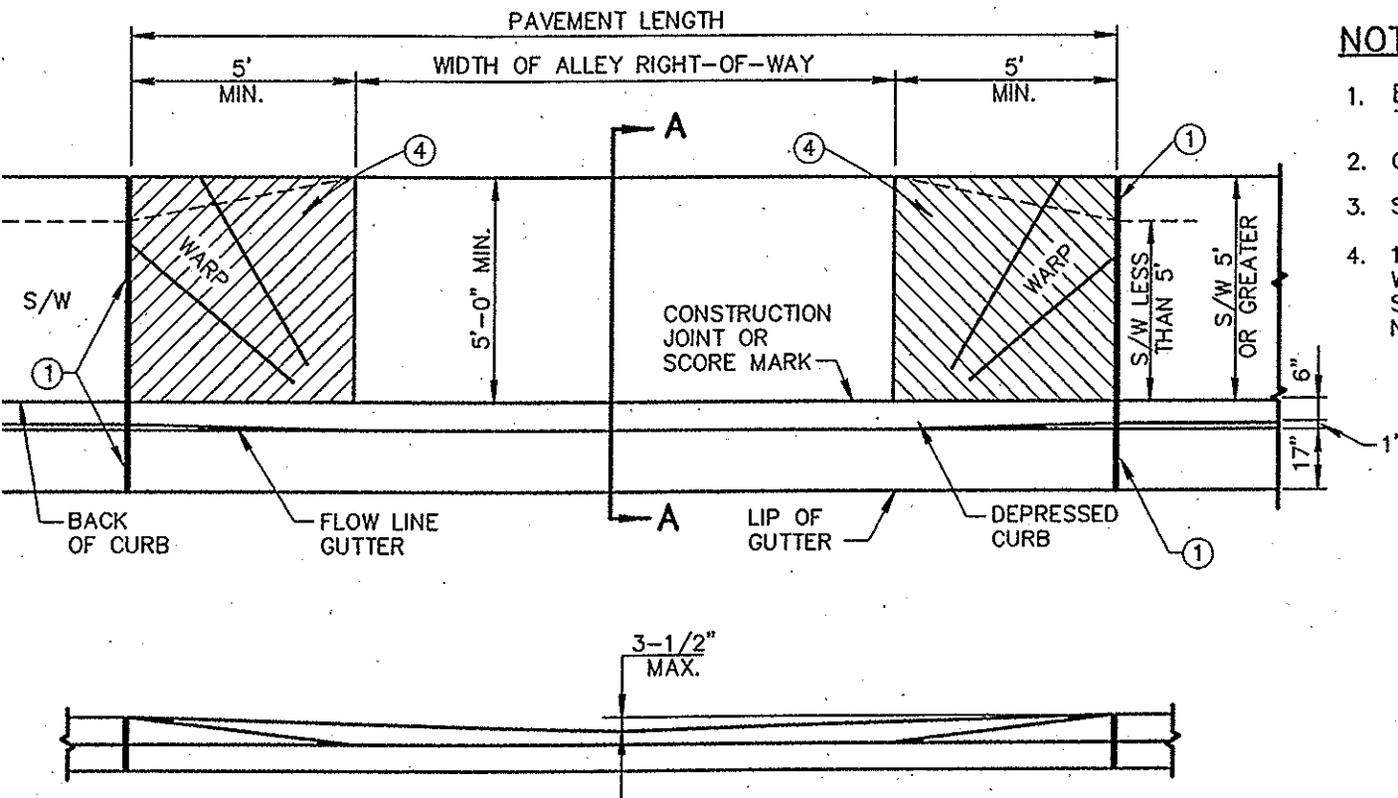
**STANDARD DETAIL
ENGLISH**

DRIVEWAY ENTRANCES

REVISED
DRAFT
08-10-2005

DETAIL NO.

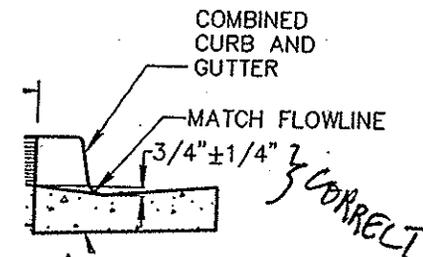
250



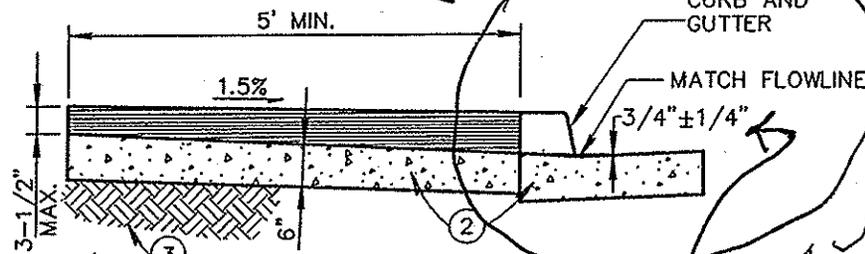
ELEVATION

NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.

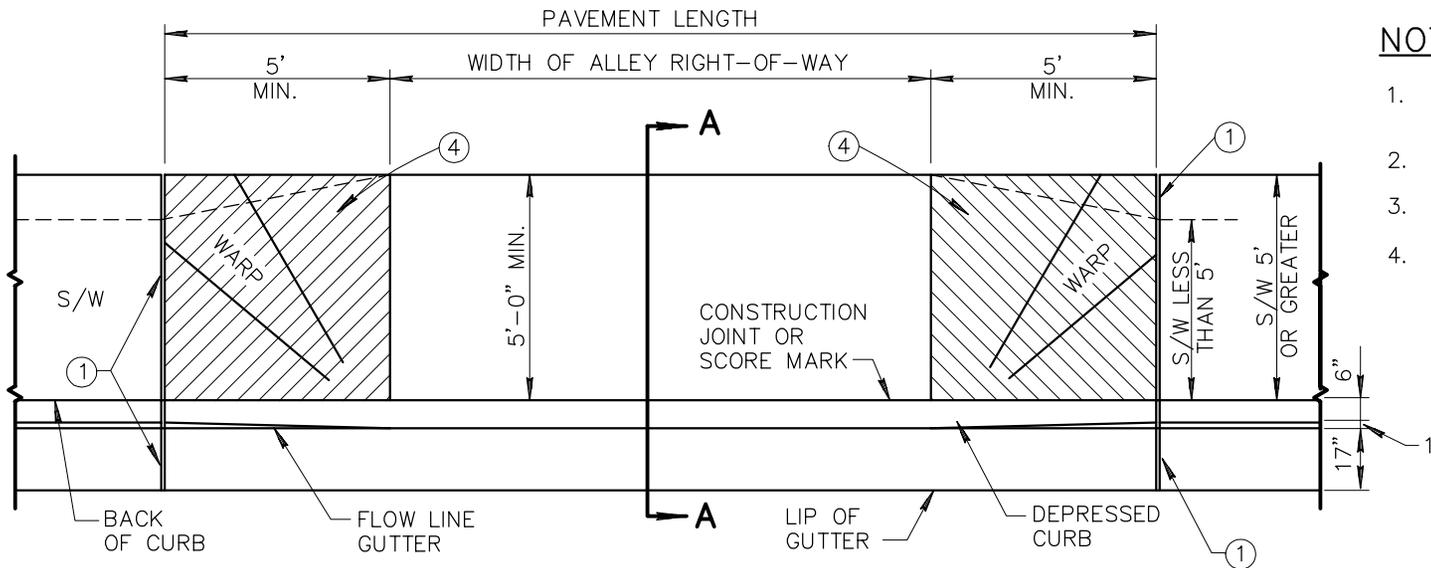


REVISE TO ADD LINE WORK



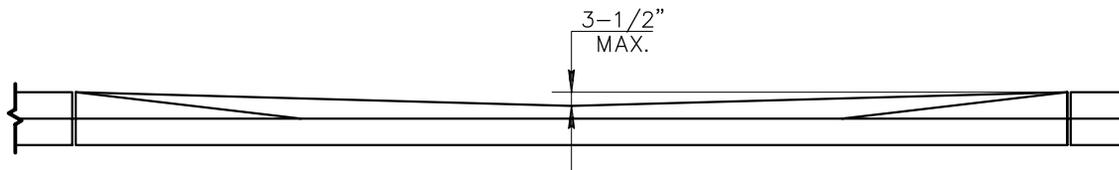
SECTION A-A

REVISE

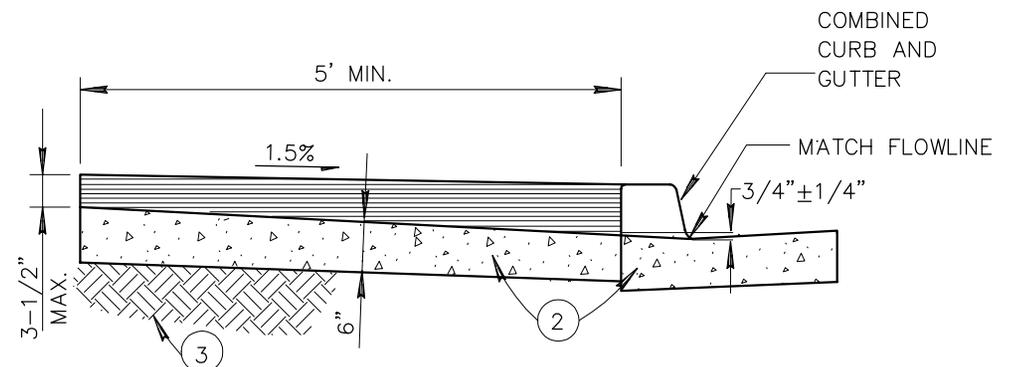


NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. 1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.



ELEVATION



SECTION A-A

DETAIL NO.

260



**STANDARD DETAIL
ENGLISH**

**ALLEY ENTRANCE
(WITH COMBINED CURB AND GUTTER)**

REVISED

DRAFT

08-04-2005

DETAIL NO.

260

Case 05-03 Sanitary Sewer Service Line Markings

Revisions for:

Section 615.6

Detail 440

Reference Information:

Marking Devices

House Bill 2256 (See separate file.)

SECTION 615

615.5 JOINTING:

615.5.1 Rubber Gasket Joints: Prior to making pipe joints, all surfaces of the portions of the pipes to be joined shall be cleaned, dried, and prepared in accordance with the manufacturer's recommendations. The joints shall then be carefully centered and completed.

Trenches shall be kept water-free during the installation of joints and couplings.

The joint and coupling materials will be as specified in the appropriate pipe sections and shall be installed in accordance with the manufacturer's recommendations. Cement mortar joints will NOT be permitted in sanitary sewer construction.

615.5.2 Water Stops: Water stops will be required when connecting HDPE pipe to concrete structures, manholes, etc. The water stop shall comply with Section 738 and will be installed per manufacturer recommendations.

615.6 SANITARY SEWER SERVICE TAPS:

When the construction of sanitary sewer service taps are called for in the special provisions, they shall be constructed in accordance with standard details for sewer taps except for HDPE pipe.

To maintain structural integrity of the pipe, service taps for HDPE pipe shall be constructed in accordance with the manufacturer's recommendations.

When any damage occurs to the pipe ribs or walls, outside of the tap area, the Contractor shall perform repairs, as recommended by the manufacturer at no cost to the Contracting Agency. Damage to the pipe will include but not be limited to gouging, marring, and scratching forming a clear depression in the pipe.

The location of the service tap for each property shall be in the downstream $\frac{1}{3}$ of the lot, or as requested by the property owner. Sewer service taps shall not be covered until they have been plugged and marked in accordance with standard details and their location has been recorded by the Engineer.

615.7 SANITARY SEWER CLEANOUTS:

The cleanouts shall be constructed at locations shown on the plans, in accordance with the standard details for cleanouts.

615.8 MANHOLES:

Manholes shall be constructed to conform with the requirements of Sections 625, Section 505 and standard details.

615.9 BACKFILLING:

Backfilling and compaction shall be done in accordance with Sections 601 and 603, for HDPE pipe.

615.10 TESTING:

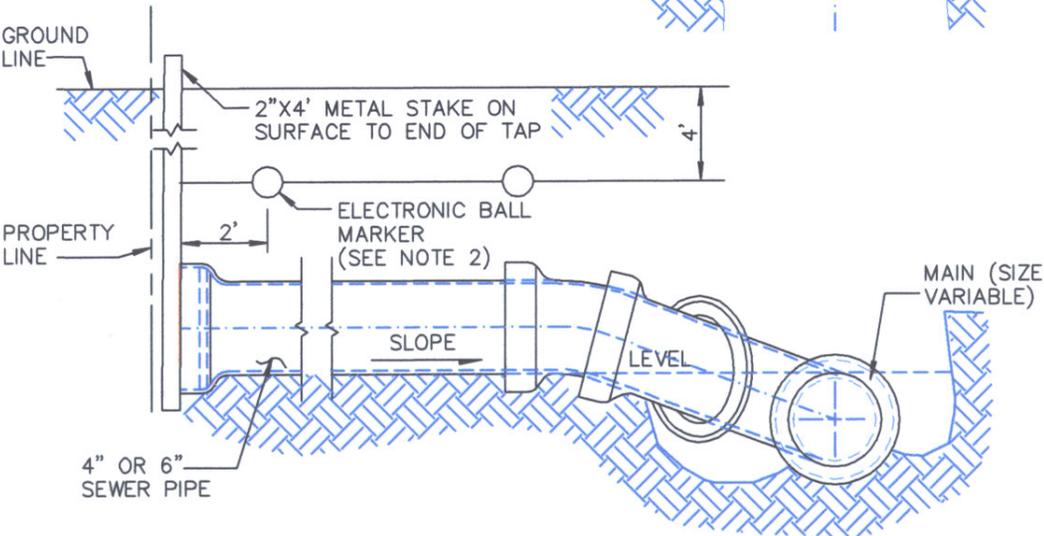
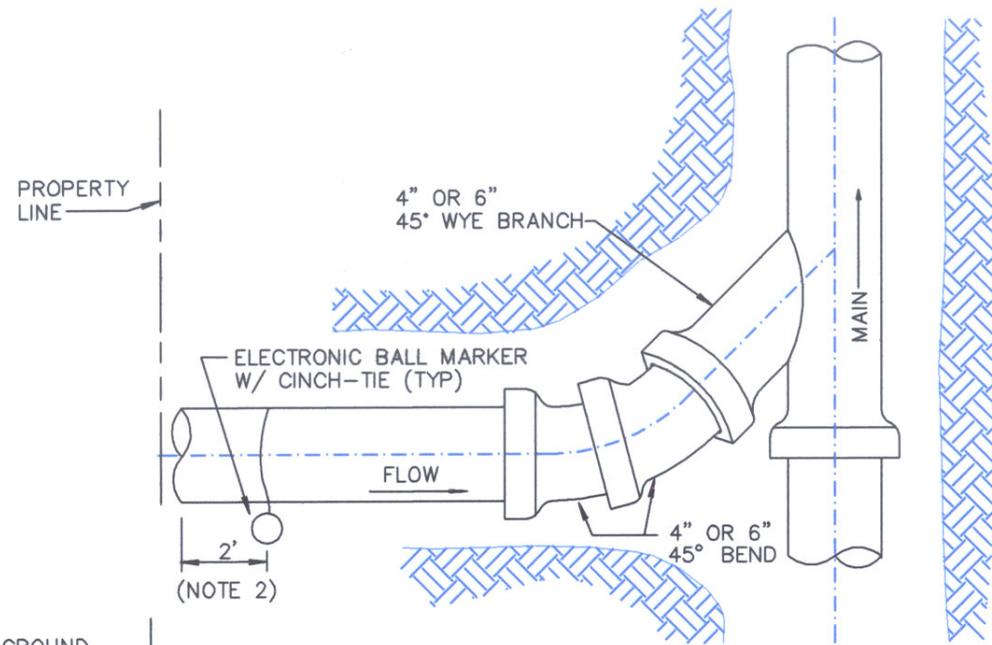
Pressure testing of force mains shall be done in accordance with Section 610.14.

Sewers and pipe lines shall be subject to acceptance testing after backfilling has been completed but prior to the placement of the finished surface material.

The Contracting Agency reserves the right to require testing of the entire installation. Cost of repairs or corrections necessary to conform to the following testing requirements will be borne by the Contractor at no additional cost to the Contracting Agency.

(A) Low Pressure Air Test:

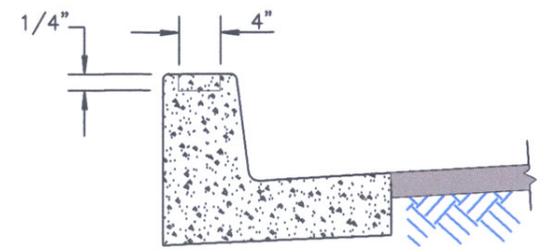
Testing will be accomplished by the means of "Low Pressure Air Testing." Tests may be conducted by the Contractor or an independent testing firm. However, acceptance tests shall be made only in the presence of the Engineer.



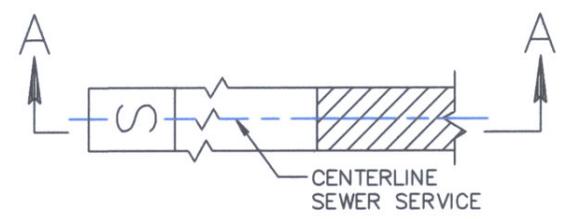
ELECTRONIC MARKER PLACEMENT

NOTES:

1. ELECTRONIC BALL MARKER SHALL BE A 3-M "MID RANGE" GREEN IN COLOR OR 4" DIA. MARKER BALL AS REQUIRED BY LOCAL AGENCY.
2. MARKER SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, 2' BACK FROM THE END OF THE SEWER SERVICE STUB AND AS REQUIRED BY LOCAL AGENCY.
3. MARKER SHALL BE LEFT UNDISTURBED ONCE THE HOUSE SERVICE IS CONNECTED.
4. MARKER SHALL BE USED IN ADDITION TO A 2"x4" STAKE.
5. STAMP TOP OF CURB WITH 4" TALL BY 1/4" DEEP "S" TO DESIGNATE SEWER SERVICE LINE CROSSING LOCATION.



SECTION A-A



CURB STAMP

DETAIL NO.
440-1

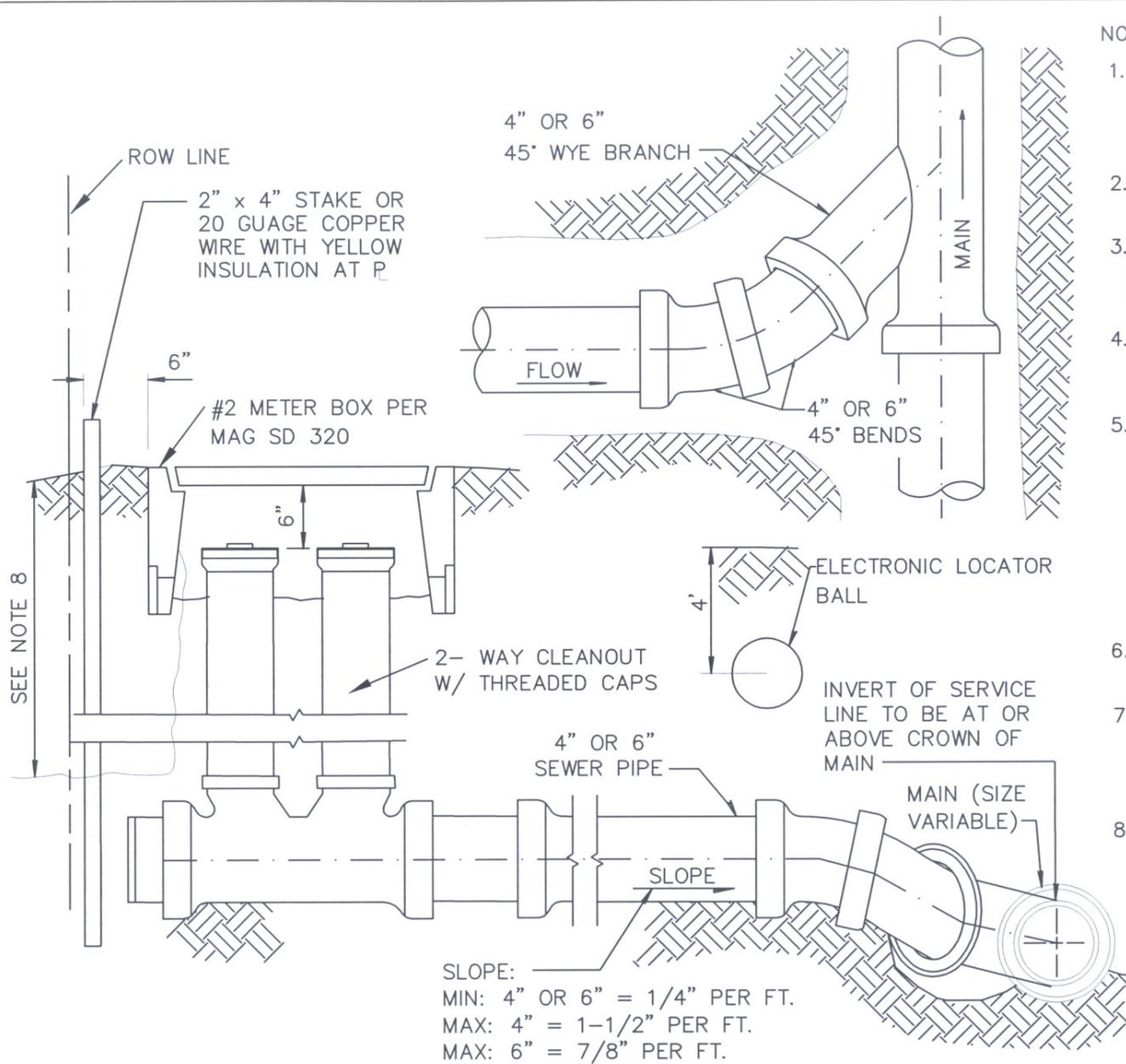


STANDARD DETAIL
ENGLISH

TYPE I - SEWER BUILDING CONNECTION
ELECTRONIC BALL MARKERS (STANDARD)

REVISED
01/02/2006

DETAIL NO.
440-1



- NOTES:
1. CONSTRUCTION DETAIL APPLIES WHERE CONTRACTOR BUILDS HOUSE CONNECTION. TAP EXTENDS TO PROPERTY LINE IN ALLEYS OR STREETS OR TO EASEMENT LINE.
 2. SIZE OF TAP SHALL BE DESIGNATED ON PLANS.
 3. CONSTRUCT TAP AT MINIMUM SLOPE IF COVER WILL BE LESS THAN 5' AT PROPERTY LINE.
 4. IF DEPTH REQUIRES, MINIMUM SLOPE CAN BE REDUCED TO 1/8" PER FOOT PROVIDED STUB IS STAKED TO GRADE.
 5. ALL FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321. THE CONTRACTOR MAY VARY FROM THE DRAWING TO USE THE APPROPRIATE WYES, TEE-WYES AND BENDS TO ENSURE NO MISALIGNMENT OF THE PIPE AND FITTINGS. BLOCK OR BRACE FITTING JOINTS TO ENSURE ZERO DEGREES ANGULAR JOINT DEFLECTION.
 6. END OF TAP TO BE SEALED AND MARKED AS NOTED.
 7. THE ELECTRONIC BALL MARKER SHALL BE 3M 4" Ø SELF LEVELING OR APPROVED MARKER BALL OR EQUAL, GREEN IN COLOR.
 8. # 14 BARE COPPER LOCATOR WIRE ACCESSIBLE AT ROW AND AT PROPERTY OWNER CLEANOUT BOX NO GREATER THAN 4' DEEP.

SLOPE:
 MIN: 4" OR 6" = 1/4" PER FT.
 MAX: 4" = 1-1/2" PER FT.
 MAX: 6" = 7/8" PER FT.

DETAIL NO.
440-2

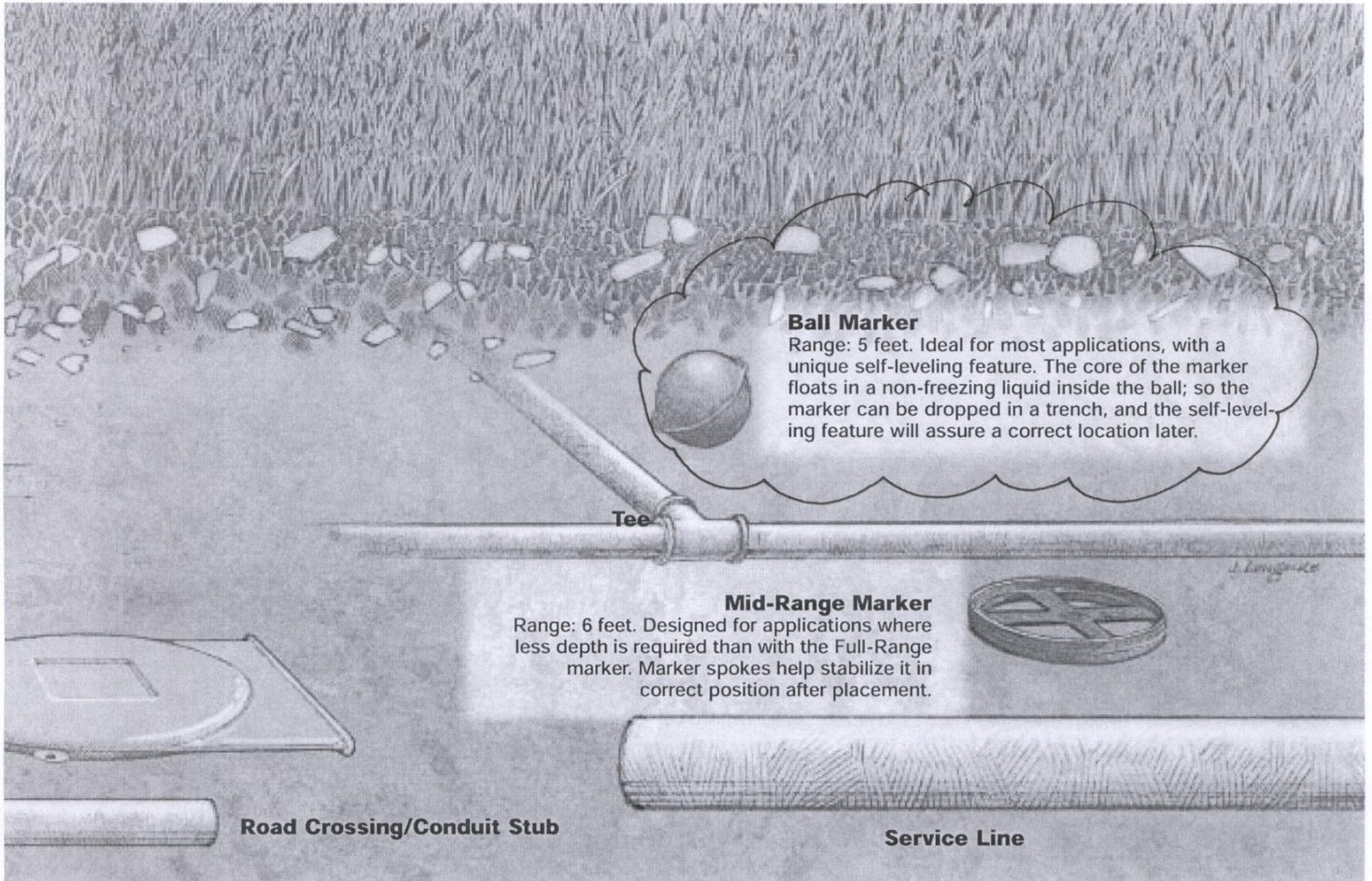


STANDARD DETAIL
ENGLISH

TYPE II - SEWER BUILDING CONNECTION
 TWO-WAY CLEANOUT AND METER BOX AT ROW
 (WHEN SPECIFIED BY LOCAL AGENCY)

REVISED
01/02/2006

DETAIL NO.
440-2



Ball Marker

Range: 5 feet. Ideal for most applications, with a unique self-leveling feature. The core of the marker floats in a non-freezing liquid inside the ball; so the marker can be dropped in a trench, and the self-leveling feature will assure a correct location later.

Mid-Range Marker

Range: 6 feet. Designed for applications where less depth is required than with the Full-Range marker. Marker spokes help stabilize it in correct position after placement.

Road Crossing/Conduit Stub

Service Line

The ScotchMark™ System...on the mark for every application.

Gas

- buried valves
- meter boxes
- service stubs
- tees
- road crossings
- main stubs
- pipeline paths
- snow-covered installations

Water

- valve boxes
- meter boxes
- service stubs
- tees
- road crossings
- main stubs
- pipeline paths
- snow-covered installations

Wastewater

- service stubs
- clean outs
- laterals
- road crossings
- pipeline paths
- snow-covered installations

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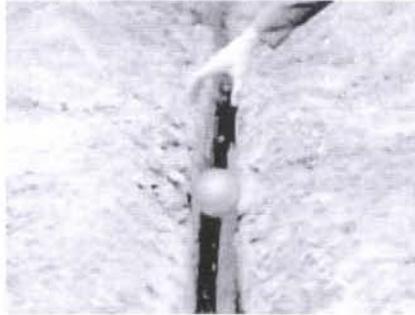
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Product Name:
3M Scotchmark Ball Marker

Product Description:

The 3M Scotchmark Electronic Marker System (EMS) Ball Marker features a self-leveling feature incorporated to eliminate inaccurate location readings. The system is designed to ignore backfill dirt and can be installed simply by tossing the ball into the crack. It contains a passive-tuned antenna, molded inside a plastic disk, which is free-floating inside a water-resistant polyethylene shell. The shell is engineered to be impervious to minerals, chemicals and temperature extremes normally found in underground plant environments.

The unit is buried directly over key underground locations. It can be located using a 3M EMS II Marker Locator that transmits a signal to the buried marker. The marker's location is indicated with both a visual meter reading and an audible tone. The unit has a range of up to four ft from marker to locator. The width allows the marker to be placed in a standard four-in. trench without additional digging and it cannot be inadvertently removed, or worn away by weather.

This system can be used in congested areas and is not affected by metal conduit or pipe, metallic conductors, fences, or AC power. Each marker is tuned to a specific frequency for the individual utility, and the locator is preset only to that frequency.

By: 3M Corrosion Protection Products

REQUEST FREE PRODUCT INFO

Features of 3M™ EMS iD Ball Markers 1400 Series

	TELEPHONE	POWER	CATV	GENERAL PURPOSE	WATER	WASTEWATER	GAS
MODEL	1421-XR/iD	1422-XR/iD	1427-XR/iD	1428-XR/iD	1423-XR/iD	1424-XR/iD	1425-XR/iD
COLOR	orange	red	black/orange	purple	blue	green	yellow
READ RANGE *	5 ft. (1.5 m) from locator probe						
UNIQUE ID NUMBER	10 digits						
MEMORY SIZE	256 bits						
TYPICAL COMPRESSED TEXT LENGTH	7 lines						
MARKER WEIGHT	0.77 lbs. (0.35 kg)						
STANDARD PACKAGE	30/cs.						
SHIPPING WEIGHT	25 lbs. (11.4 kg)						

*Range specifies maximum distance when using 3M™ Dynatel™ Locator 1420. Read range may vary on export models for water and power frequencies.

**Typical compressed text is 6 lines. Each line holds an 8-character subject label and a 13-character description label.

Specifications

PHYSICAL SPECIFICATIONS	
Size	4 in. (10.4 cm) diameter sphere
Marker weight	0.77 lb. (0.35 kg)
Shipping weight	25 lb. (11.4 kg)
Packaging	30 to a case
Frequencies/Models	Telephone, gas, CATV, power, water, wastewater, general-purpose
Range	
Search Mode	5 ft. maximum using any 3M Dynatel locator
Read Mode	5 ft. maximum using Dynatel 1420 or 2200M-iD series locators
Write	1 ft. maximum using Dynatel 1420 or 2200M-iD series locators
Shell	High-density, watertight polyethylene
Contents	Mixture of propylene glycol and water
ID number	Unique 10-digit number (xxx-xxx-xxxx)
Memory size	256 bits
Typical compressed text length	6 lines (each line holds an 8-character subject label and a 13-character description label)

ENVIRONMENTAL SPECIFICATIONS	
Operating temperature	-4° F to 122° F (-20° C to 50° C)
Storage temperature	-4° F to 158° F (-20° C to 70° C)

Case 05-04 Detectable Warnings

Purpose: Add Detectable Warnings to MAG Specifications and Details

Changes: Add Detectable Warning specifications into sections 340.

Add Detectable Warning graphics on curb ramp details 231, 232, 233, and 234.

1. Replace ramp groove with 2' wide Detectable Warning.
2. Replace ramp groove at other locations with "Rough Broom Finish, Use A Ripple Surface Pattern".
3. Add Note: Detectable Warning is to comply with the jurisdictional agency's requirements.

Revised note on driveway details 250, 260, 261, and 262 that referenced the ramp groove detail shown on detail 234.

1. This case replaces the ramp groove detail with Detectable Warning.
2. "ROUGH BROOM FINISH" is proposed to replace "1/4" GROOVES AT 1" O.C."

DETECTABLE WARNINGS

340.2 MATERIALS add the following:

340.2.1 Detectable Warnings

Detectable warnings shall consist of raised truncated domes aligned in a square grid pattern in conformity to the Americans with Disabilities Accessibility Guidelines. Truncated domes shall have the following nominal dimensions: base diameter of 0.9 inches, top diameter of 0.4 inches, height of 0.2 inches, and dome spacing center-to-center spacing of 2.35 inches, measured between the most adjacent domes on the square grid. Detectable warnings shall contrast visually with adjoining surfaces. Visual contrast shall be obtained by color, use safety yellow or other approved color. The color shall be an integral part of the material surface. The material is to be durable with a non-slip surface not subject to spalling, chipping, delamination, or separation. All detectable warnings must be approved by the jurisdictional agency prior to installation.

340.3 CONSTRUCTION METHODS add the following:

340.3.1 Detectable Warnings

Detectable warnings are to be installed at locations that represent potential hazards for pedestrians with vision impairments such locations include walkways that cross roads or railroad tracks. Detectable warnings shall be installed on walkways that adjoin or cross a roadway whenever the walking surface is not separated by curbs, railings or other approved elements. Detectable warnings shall be installed on all sidewalk ramps at street crossings. The detectable warning surface shall be located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum back from the face of curb. Detectable warning surfaces for railroads shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.

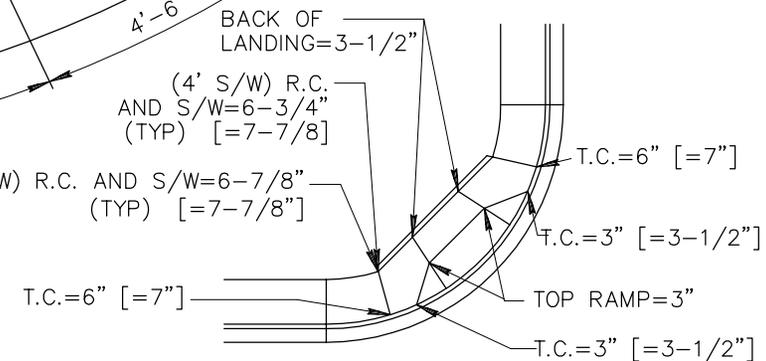
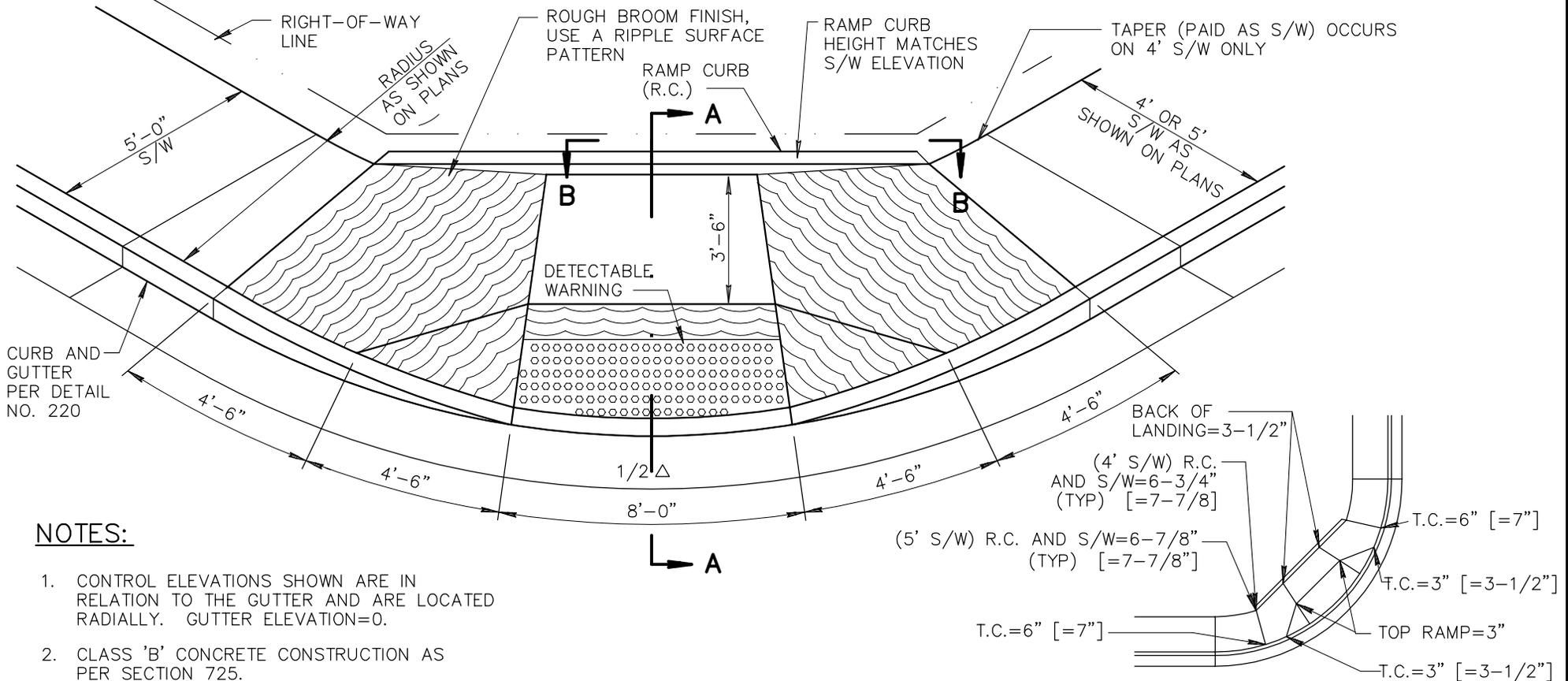
Detectable warnings shall be installed perpendicular to the direction of pedestrian/wheelchair travel and have a minimum width of 24 inches measured perpendicular to the edge of the roadway or rail crossing. The base surface of detectable warnings shall be installed flush with the adjacent walkway surface, the truncated domes shall extend above the walkway surface. The boundary between detectable warnings and the adjacent walkway shall provide a flush uniform surface that will not cause ponding of water nor present a tripping hazard.

Detectable warning installed on sidewalk ramps shall modify the sidewalk concrete thickness at the detectable warning to provide a minimum thickness of four-inches (4"). When detectable warnings are modules inset into the sidewalk ramp, the bottom surface of the sidewalk shall be lowered a distance equal to or greater than the module thickness to maintain the minimum sidewalk thickness. The sidewalk bottom surface

shall have a minimum transition taper length of 12" between the thickened and normal depth sections of sidewalk.

340.5 MEASUREMENT add the following:

Detectable Warning shall not be measured for payment. Detectable warning is considered integral to the walking surface that it forms a part of and its cost is included in the related pay item.

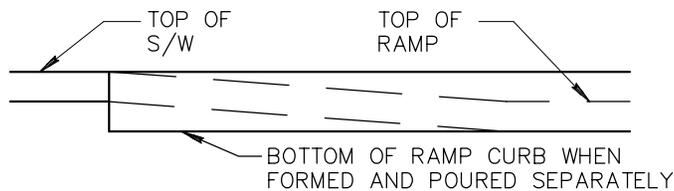


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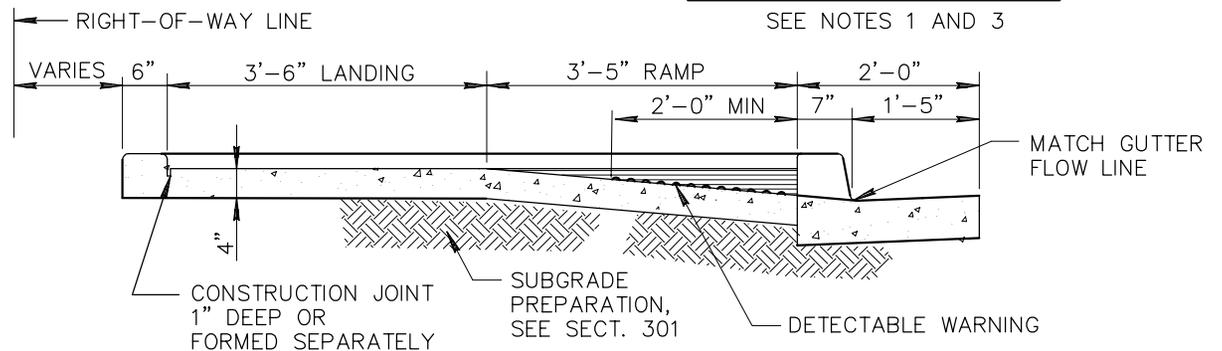
1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN []'S.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.

CONTROL ELEVATIONS

SEE NOTES 1 AND 3



SECTION B-B



SECTION A-A

DETAIL NO.

231



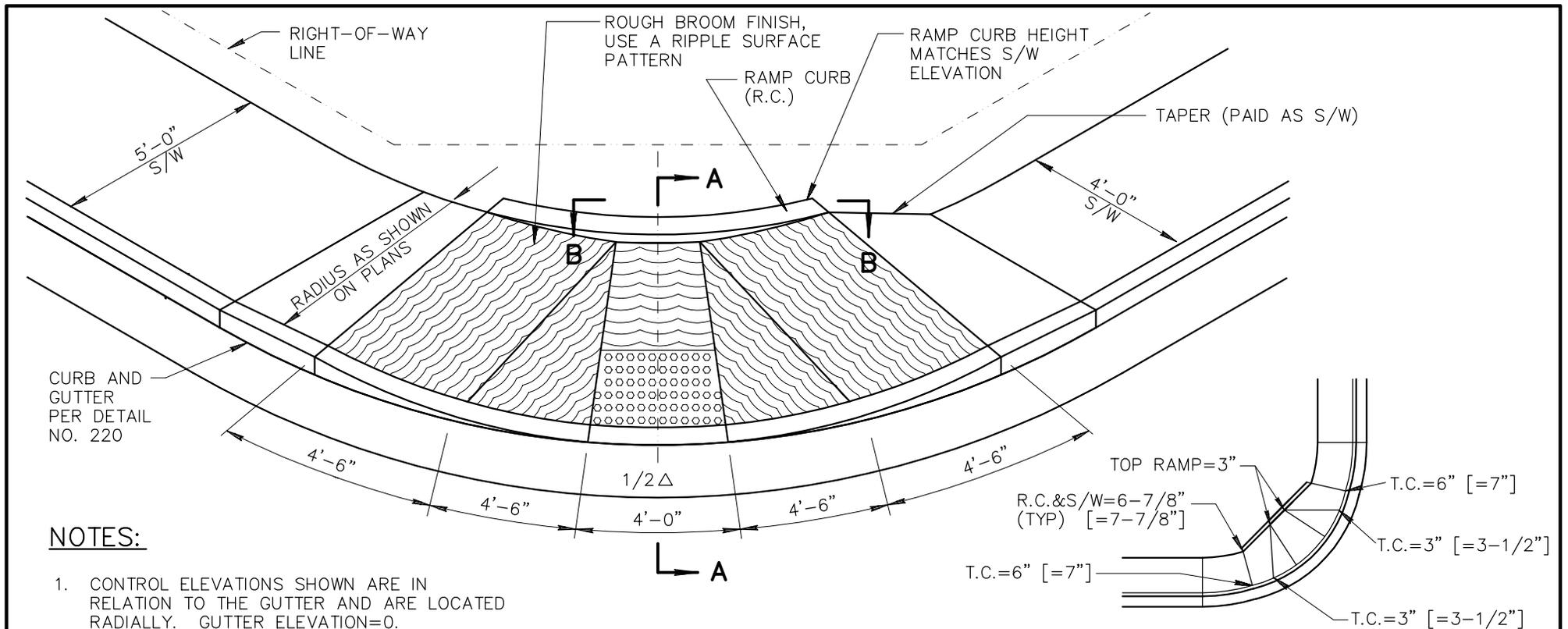
**STANDARD DETAIL
ENGLISH**

SIDEWALK RAMPS - TYPE 'A'

REVISED
DRAFT
08-11-2005

DETAIL NO.

231

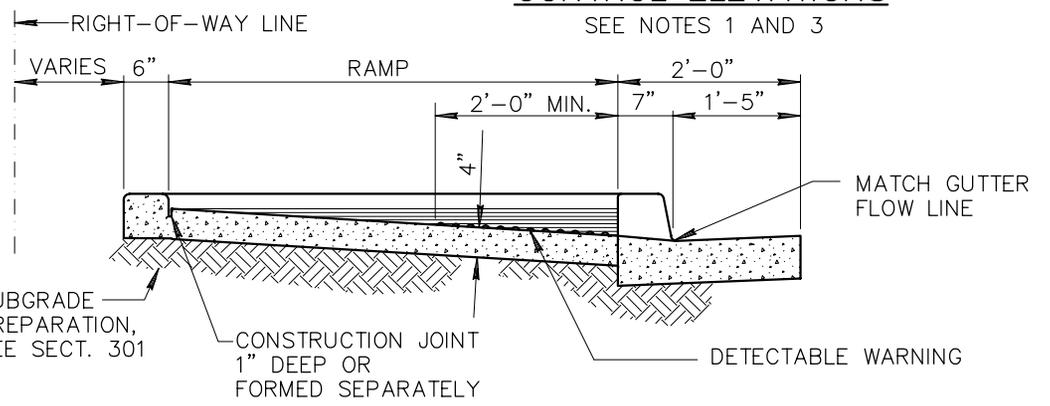


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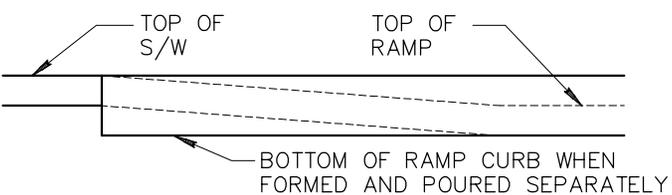
1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECT. 725.
3. WHEN CURB HEIGHTS OF 7" ARE SHOWN ON PLANS, USE DIMENSIONS SHOWN IN []'S.
4. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.

CONTROL ELEVATIONS

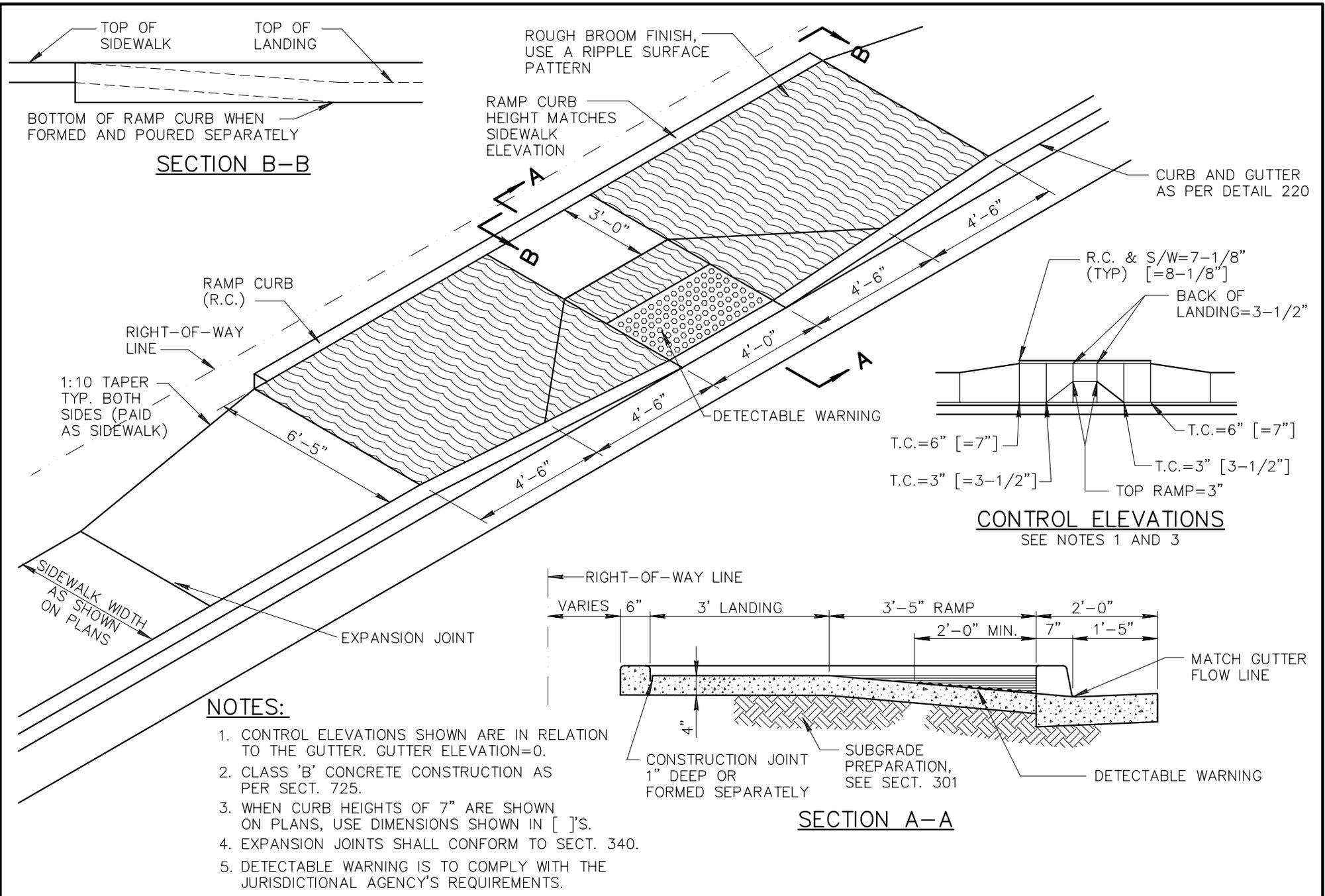
SEE NOTES 1 AND 3



SECTION A-A



SECTION B-B



DETAIL NO.

233



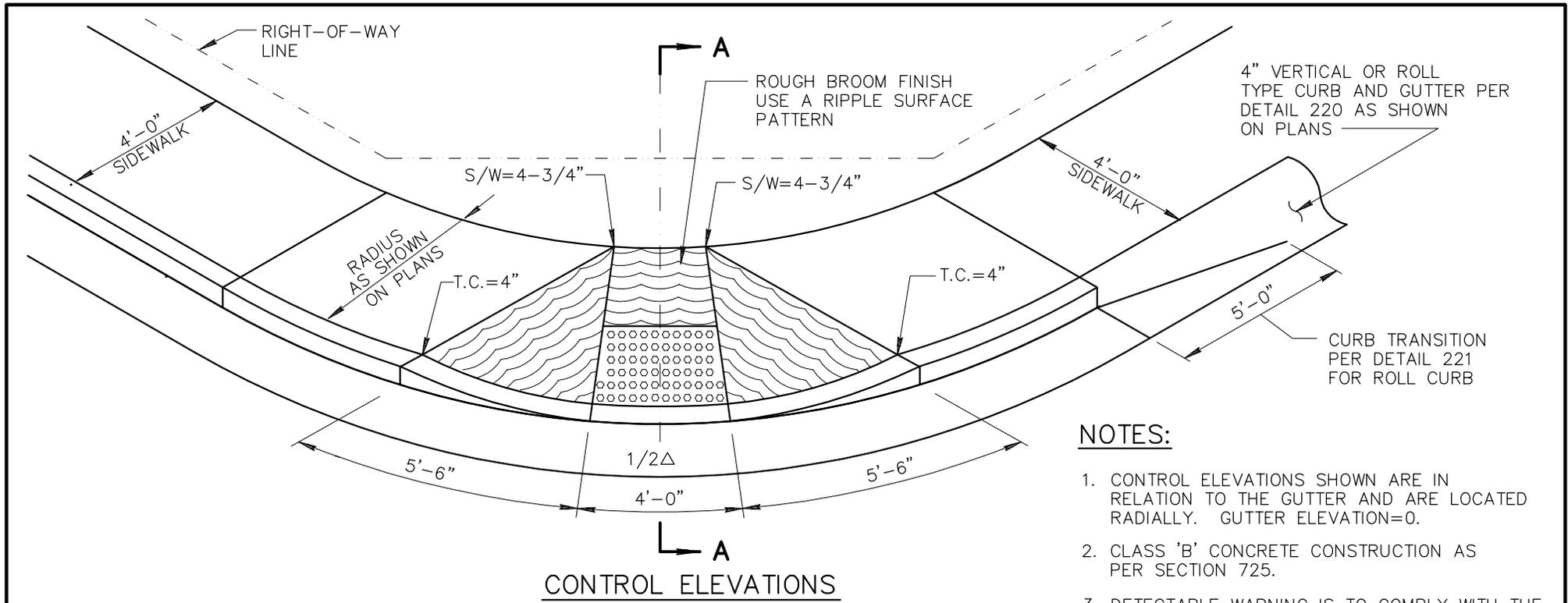
STANDARD DETAIL
ENGLISH

SIDEWALK RAMPS - TYPE 'C'

REVISED
DRAFT
8-11-2005

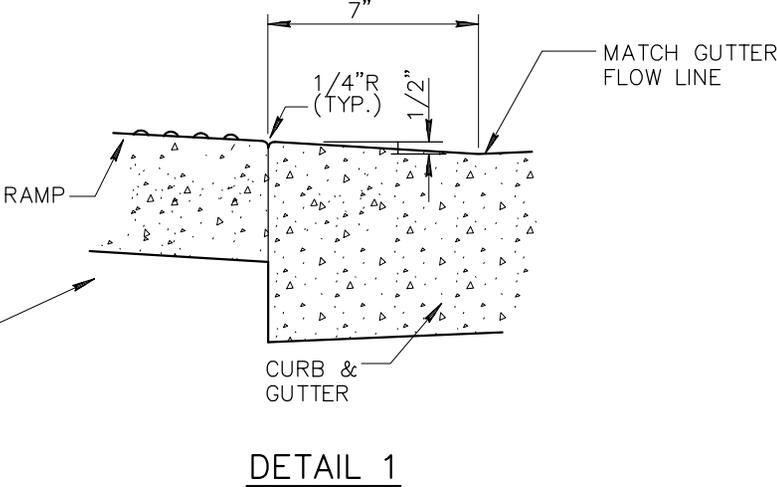
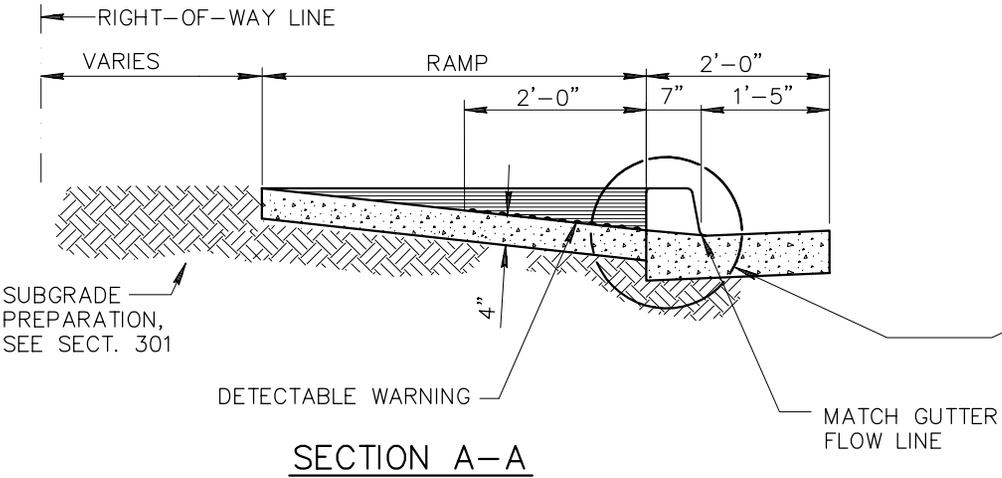
DETAIL NO.

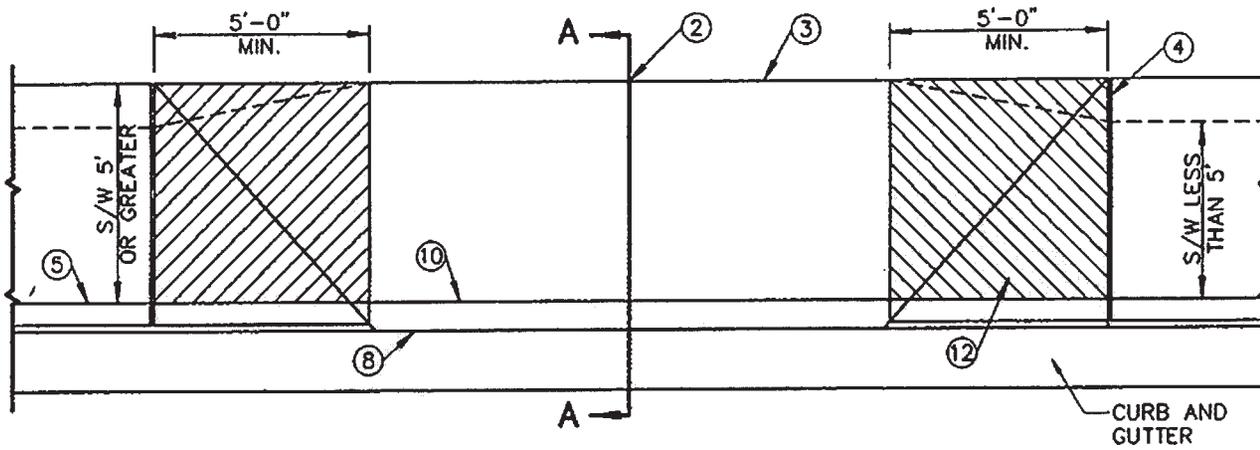
233



NOTES:

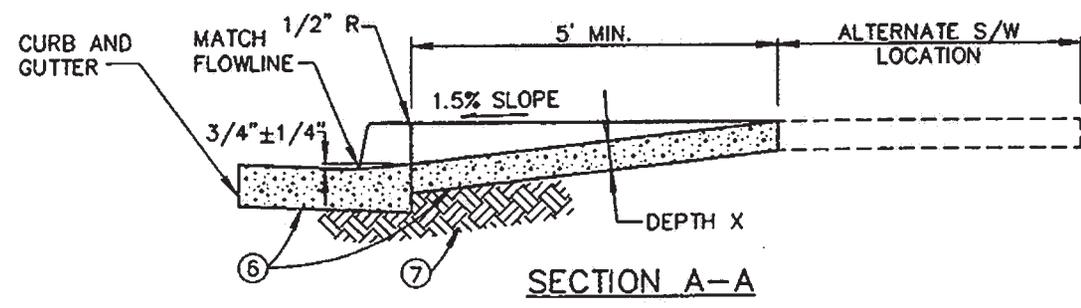
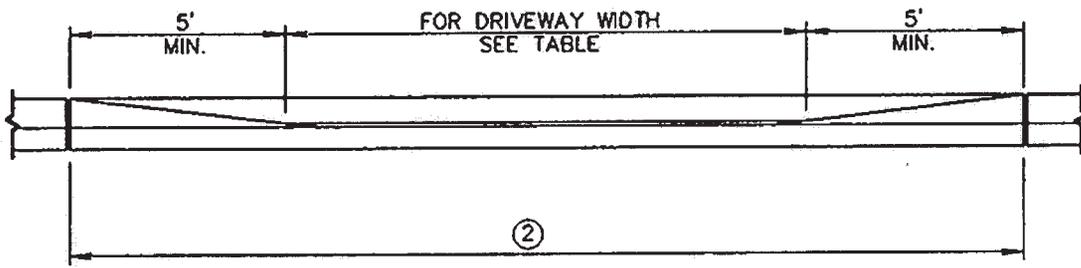
1. CONTROL ELEVATIONS SHOWN ARE IN RELATION TO THE GUTTER AND ARE LOCATED RADIALLY. GUTTER ELEVATION=0.
2. CLASS 'B' CONCRETE CONSTRUCTION AS PER SECTION 725.
3. DETECTABLE WARNING IS TO COMPLY WITH THE JURISDICTIONAL AGENCY'S REQUIREMENTS.





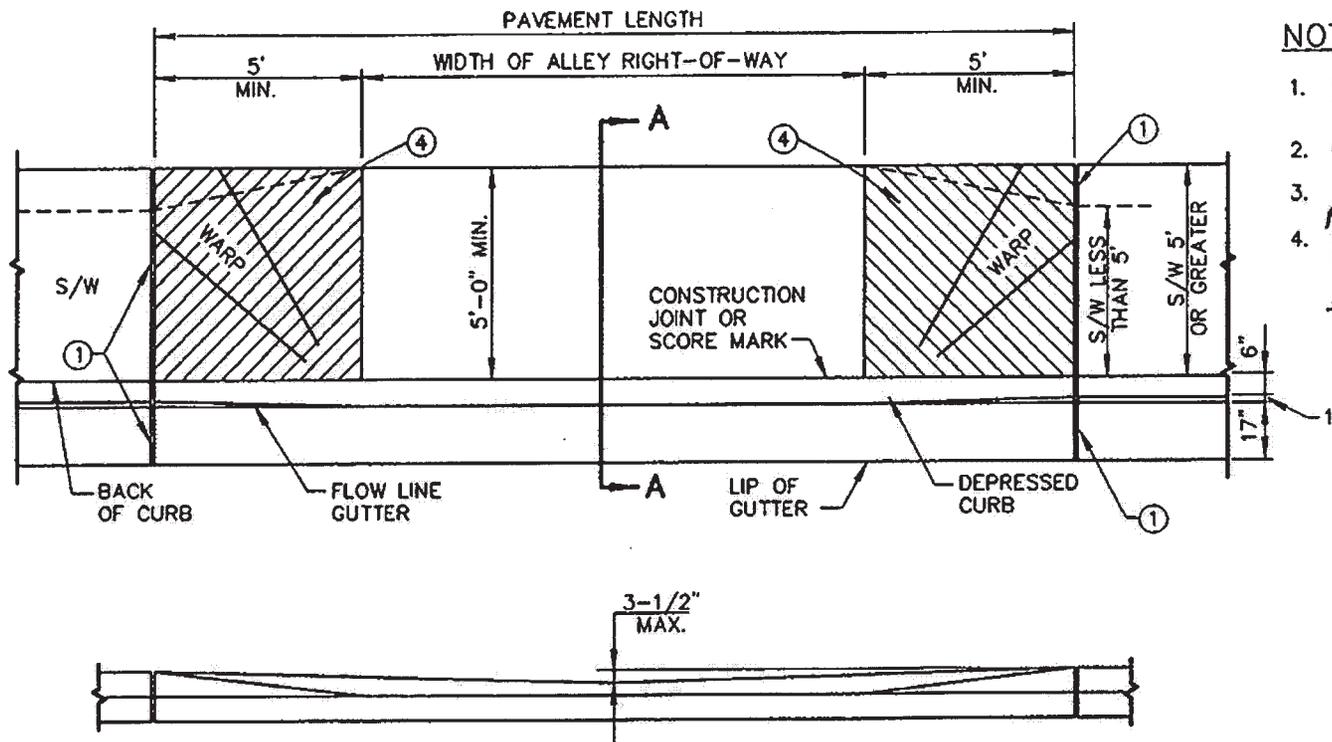
NOTES:

1. DEPRESSED CURB SHALL BE PAID FOR AT THE UNIT PRICE BID FOR THE TYPE OF CURB USED AT THAT LOCATION.
2. WHEN WIDTH EXCEEDS 22' PROVIDE A CONTRACTION JOINT ON D/W CENTERLINE.
3. BACK OF D/W OR FACE OF FUTURE S/W.
4. EXPANSION JOINTS SHALL COMPLY WITH SECTION 340.
5. BACK OF CURB - CONSTRUCTION JOINT OR SCORE MARK.
6. CLASS 'B' CONCRETE, SECT. 725.
7. SUBGRADE PREPARATION, SECT. 301.
8. FLOW LINE OF GUTTER.
9. DEPRESSED CURB.
10. SECT. A-A AND ELEVATION, D/W VERTICAL CURB AND GUTTER OR ROLL TYPE CURB AND GUTTER.
11. ROLL TYPE CURB AND GUTTER NOT PERMITTED IN THE CITY OF MESA
12. ~~1/4\"~~ *ROUGH BROOM FINISH* GROOVES AT 1' O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF DRIVEWAY. SEE DETAIL NO. 1 ON TYPE 'B' RAMP DETAIL NO. 234.



COMMERCIAL AND INDUSTRIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH ^x
COMMERCIAL	* 16'	40'	B	6"
INDUSTRIAL	* 16'	40'	B	6"
* 24' MIN. FOR TWO WAY TRAFFIC				
RESIDENTIAL				
DRIVEWAY WIDTH	MIN.	MAX.	CLASS	DEPTH ^x
MAJOR STREET	16'	30'	B	5"
COLLECTOR STREET	* 12'	30'	B	5"
LOCAL STREET	12'	30'	B	5"
* 16' DESIRABLE				

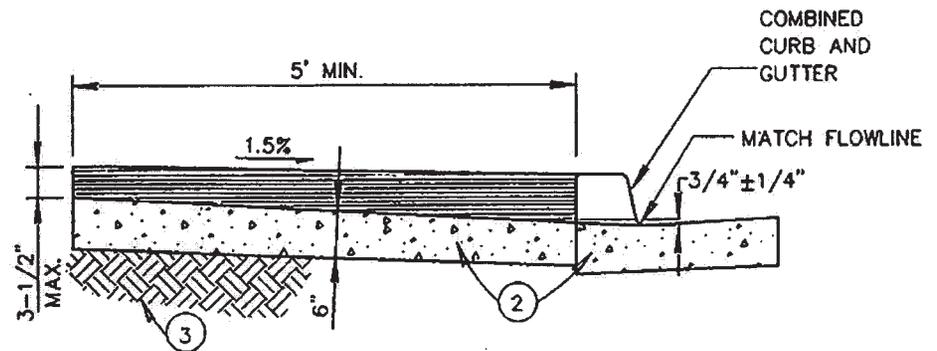
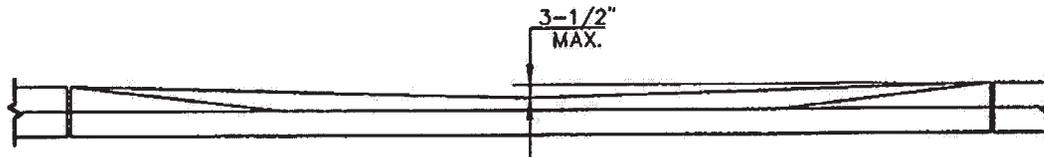
DETAIL NO. 250	STANDARD DETAIL ENGLISH	DRIVEWAY ENTRANCES	REVISED DRAFT 08-04-2005	DETAIL NO. 250
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NOTES:

1. EXPANSION JOINTS SHALL CONFORM TO SECTION 340.
2. CLASS 'B' CONCRETE, PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. ~~1/4" GROOVES AT 1" O.C. FULL WIDTH OF 5' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL NO. 234.~~
ROUGH BROOM FINISH

ELEVATION



SECTION A-A

DETAIL NO.
260



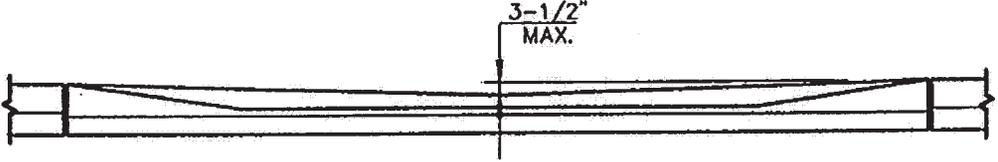
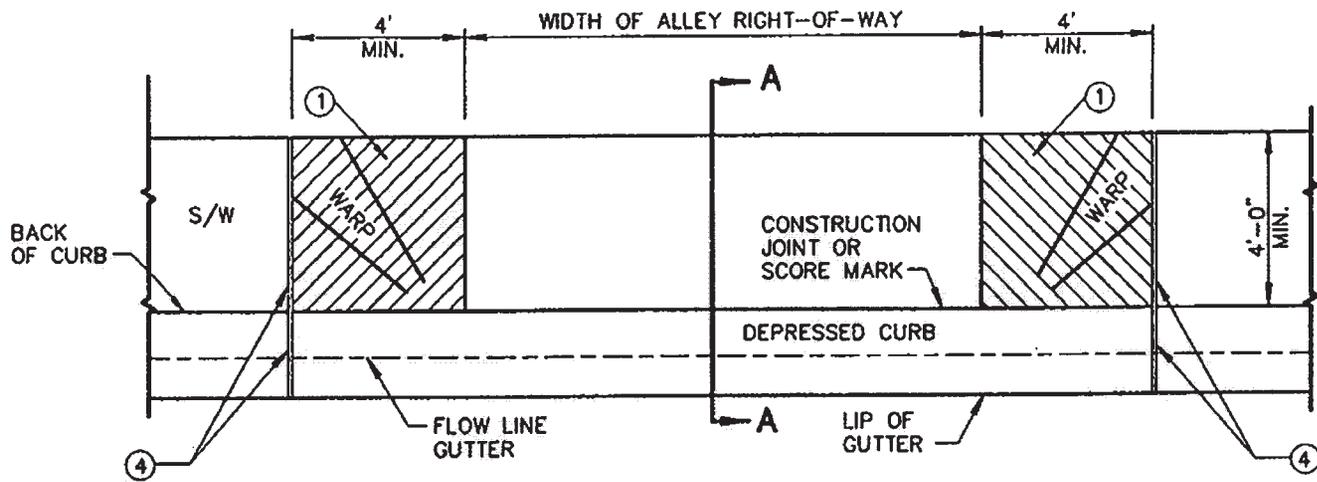
STANDARD DETAIL
ENGLISH

ALLEY ENTRANCE
(WITH COMBINED CURB AND GUTTER)

REVISED
DRAFT
08-04-2005

DETAIL NO.
260

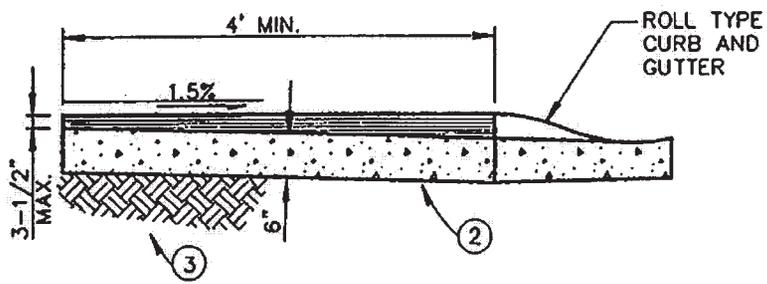
Case 05-04



ELEVATION

NOTES: *ROUGH BROOM FINISH*

1. ~~1/4" GROOVES AT 1" O.C. FULL WIDTH OF 4' WARP SECTION, EACH SIDE OF ALLEY ENTRANCE. -SEE DETAIL NO. 1 ON TYPE 'D' RAMP DETAIL 234.~~
2. CLASS 'B' CONCRETE CONSTRUCTION PER SECT. 725.
3. SUBGRADE PREPARATION, PER SECT. 301.
4. EXPANSION JOINTS SHALL CONFORM TO SECT. 340.



SECTION A-A

DETAIL NO. 261		STANDARD DETAIL ENGLISH	ALLEY ENTRANCE (WITH ROLL TYPE CURB AND GUTTER)	REVISED 01-01-2003	DETAIL NO. 261
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