

APPENDIX “J”

PLACER COUNTY GENERAL SPECIFICATIONS

SECTION 71: SEWERS

INCLUDES APPROPRIATE PLATES

General Specifications

August 2005



Department of Public Works

SECTION 71: SEWERS

71-1.00 DEFINITION OF SEWER

Any conduit intended for the reception and transfer of sewage and fluid industrial waste.

71-1.01 DESCRIPTION

This work shall consist of laying sewer pipe and constructing sewer structures as shown on the plans, in accordance with these specifications, the special provisions and as directed by the Engineer. The specifications set forth in this section shall be adhered to in the construction of all sewer systems except where a local sewer district or a controlling agency has a higher standard, in which case their requirements shall take precedence. In the case of conflict with the specifications in this section and those of other sections of these General Specifications, the most restrictive specification shall apply.

The type of sewer pipe and sewer structures will be designated in the contract items.

71-1.02 MATERIALS

IDENTIFICATION MARKS

All pipe and fittings shall be clearly marked with the name or trademark of the manufacturer, the location of plant, and strength.

Portland cement used in the production of concrete products set forth in this Section 71-1.02 shall conform to the provisions in Section 90, "Portland Cement Concrete."

71-1.02A Clay Sewer Pipe

Clay sewer pipe shall conform to the specifications for extra strength vitrified clay pipe of ASTM Designation C700 except that plain end pipe otherwise complying in all respects with the said specification may be used. See Plate U-30 for strength and cover requirements.

The requirements in the specification for scoring of the ends of the pipe; for the shape of the socket; and for the minimum dimensions for the inside diameter of the socket may be waived with the approval of the Engineer when such waiver is conducive to the proper application of the joint to be used.

The ends of the pipe shall be so formed that, when the pipes are laid together and jointed, the pipe will form a continuous line with a smooth interior

surface.

At the option of the Contractor, clay sewer pipe shall conform either to the absorption requirements of ASTM C700 or to the permeability requirements as specified and as determined by California Test 672.

Joints For Vitrified Clay Pipe

Joints for vitrified clay pipe and fittings shall be factory applied, mechanical, flexible-compression type and shall conform to ASTM C425.

Fittings

Fittings shall be made to such dimensions as will accommodate the joint system specified. Wye-branch fittings shall be furnished with spurs securely fastened by the manufacturer to the barrel of the pipe. There shall be no projection on the inner surface of the barrel.

Loading Tests

The loading tests shall be documented in accordance with ASTM C301 for 3 edge bearing. VCP pipe shall withstand the minimum following loads:

MINIMUM TEST LOADS

<u>Nominal Size</u> <u>inches</u>	<u>Load</u> <u>lb./linear ft.</u>	<u>Nominal Size</u> <u>inches</u>	<u>Load</u> <u>lb./linear ft.</u>
4	2000	24	4800
6	2000	27	5200
8	2200	30	5500
10	2400	33	5800
12	2600	36	6300
15	3100	39	6600
18	3600	42	7000
21	4200		

71-1.02B

Ductile Iron Sewer Pipe

Ductile iron pipe shall be class 50 and comply with ANSI A 21.51 (AWWA C151). Pipe joints shall comply with the following:

Type of Joint

Rubber Gasket Push-on Joint
Mechanical Joint
Flanged Joint

Specifications

ANSI A21.11 (AWWA C111)
ANSI A21.11 (AWWA C111)
ANSI B16.1, B.16.2, and
A21.10 (AWWA C 110)
ANSI B2.1.

Flanged Joint (Threaded Flanges)

(1) Fittings

All rubber gasket, push-on, mechanical and flanged joint fittings for cast iron or ductile iron sewer pipe shall be manufactured in accordance with ANSI A21.10 (AWWA C110).

(2) Lining and Coating

When specified, the internal surfaces of ductile iron pipe and fittings shall be lined with a uniform thickness of cement mortar then sealed with a bituminous coating in accordance with ANSI A21.4 (AWWA C104). The outside surfaces of ductile iron pipe and fittings for general use shall be coated with a bituminous coating 1 mil thick in accordance with ANSI A21.6 or ANSI A21.51.

(3) Inspection and Certification

The manufacturer shall furnish a certified statement that the pipe has been manufactured and tested in accordance with these specifications.

(4) Polyethylene Encasement For External Corrosion

Protection

When loose polyethylene encasement for the protection of ductile pipes, fittings, valves, and appurtenances is specified in the Plans or in the Specifications, it shall be furnished and installed in accordance with the requirements of ANSI A21.5 (AWWA C105).

(5) Cast Iron Soil Pipe and Fittings

Cast iron soil pipe and fittings shall comply with ASTM A74.

71-1.02C

Polyvinyl Chloride Sewer Pipe (PVC)

Polyvinyl Chloride Sewer Pipe shall conform to the requirements of ASTM D 3034, SDR 26 pipe (SOLID WALL).

All services and cleanout bends shall be long sweep.

71-1.02D

Force Mains

Force mains shall be constructed of Polyvinyl Chloride (PVC) Pressure Pipe.

(1) Small Diameter PVC

Polyvinyl Chloride (PVC) Pressure Pipe, 4" - 12", shall conform to current AWWA C900 and have Underwriters' Laboratories, Factory Mutual and NSF approval. All parts of C900 not in conflict with these specifications shall apply in full force. PVC pipe shall be dimension ratio (DR) 18, class 150 for internal working pressures up to 130 psi and use DR 14, class 200 for internal working pressures between 130 and 180 psi. For internal working pressures greater than 180 psi, the pipe DR and class shall be determined by the Engineer.

(2) Large Diameter PVC

PVC pipe in sizes 14" through 36", shall be manufactured to AWWA C905 standards. Use dimension ratio (DR) 25, pressure rating (PR) 165 for internal working pressures up to 130 psi and use DR 21, PR 200 for internal working pressures between 130 psi and 180 psi. For internal working pressures greater than 180 psi, the pipe DR & PR shall be determined by the Engineer.

(3) Joints

Lengths of PVC shall be joined by a locked-in flexible elastomeric gasket coupling with bell and spigot configuration. Lubricants intended for use with PVC pipe shall be compatible with the plastic material and not adversely affect the quality of the sewage being transported. Joints between PVC pipe and

fittings shall be slip-on type or mechanical type as shown on the plans. Slip-on type joints shall be sealed by means of rubber rings designated for use with the type of pipe being installed.

Joints between PVC pipe and other types of pipe shall be made by means of the proper sized compression type adaptor.

(4) **Fittings**

Fittings shall be cast or ductile iron fittings, or fusion epoxy lined and coated fabricated steel fittings.

71-1.02E

Cement Mortar

Cement mortar shall conform to the provisions in Section 65-1.06, "Joints".

71-1.02F

Resilient Joint Material

Flexible compression joints in clay pipe and resilient joint materials to be used therein shall conform to the requirements of ASTM Designation: C 425.

71-1.02G

Miscellaneous Iron and Steel

Miscellaneous iron and steel items shall conform to the provisions in Section 75, "Miscellaneous Metal."

71-1.02H

Reinforcement

Reinforcement shall conform to the provisions in Section 52, "Reinforcement".

71-1.02I

Concrete

Concrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 90, "Portland Cement Concrete."

71-1.02J

Material Submittals and Certificates Of Compliance

Material submittals and certificates of compliance shall be submitted by the contractor to the Engineer for all materials incorporated into the work.

71-1.03

Excavation and Backfill

Excavation and backfill for all sewers shall conform to the provisions of Section 19-3.01, "DESCRIPTION", 19-3.01A, "Trench Excavation", Section 19-3.06A(1), "Trench Bedding and Initial Backfill", and 19-3.06A(2), "Trench Intermediate Backfill", of the General Specifications.

If the trench is constructed in unsuitable material, as determined by the Engineer, the minimum trench width for PVC pipe shall be the outside diameter of the pipe plus 2.5 pipe diameters on either side of the pipe.

The pipe shall be laid in a trench excavated to the lines and grades designated by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling in with approved initial backfill material under the body of the pipe, and not by wedging or blocking. Shovel slicing is the preferred method of insuring that adequate initial backfill will support the bottom of the pipe.

Pipe may be laid in open trenches or in sections of open trenches connected by tunnels, as permitted by the Engineer.

The excavation shall be supported so that it will be safe, and that the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

Trench bedding and initial backfill for P.V.C. gravity sewer pipes shall consist of crushed rock, conforming to the following grading: (See Section 19-3.06A(1))

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
3/4"	100%
(No. 4)	0-5%

The crushed rock shall have a fractured face. Trench bedding and initial backfill for sewer forcemains shall be select material of sand or decomposed granite with 90% passing the 3/4" sieve, and 100% passing the 1" sieve and having a sand equivalent of 20. It shall be free of clay or organic material and

shall be placed at 90% compaction. Backfill shall be placed to about the same elevation on both sides of the pipe to prevent unequal loading and displacement of the pipe and then tamped on both sides to obtain compaction.

71-1.04

EXISTING MANHOLES & FACILITIES

Existing manholes shall be adjusted to grade, remodeled or abandoned as shown on the plans and in accordance with the provisions in Section 15, "Existing Highway Facilities."

When designated on the plans, or directed by the Engineer, existing manhole frames and covers shall be reset on new structures.

71-1.04A

Remodeling Existing Sewer Facilities

Where the Plans indicate construction involving existing sewer facilities, the Contractor shall provide temporary seals, enclosures, forced ventilation or other devices as may be necessary to prevent odor nuisance during construction. Sewers shall be open to the atmosphere only for a reasonable time necessary for construction.

Where a manhole bottom is to be remodeled on an existing sewer, the portion to be remodeled shall be removed to a minimum depth of 3 inches to permit construction of new channels and shelves. Sewage in new and remodeled manholes shall be controlled across the manhole in such a manner that sewage does not flow over concrete channels until they have cured for 24 hours. The controls shall prevent backup of sewage upstream from the manhole unless otherwise approved by the Engineer.

Where required by the Plans or Specifications, the Contractor shall submit shop drawings for control operations in accordance with section 5-1.02, "PLANS AND WORKING DRAWINGS", of the STANDARD SPECIFICATIONS.

71-1.04B

Existing Facilities Containing Asbestos

Care shall be given in handling, working with, removing, disposing, or abandoning existing pipe and facilities containing asbestos such as asbestos cement pipe (transite pipe). Current federal and State laws and regulations govern how such pipe can be handled and disposed of during construction procedures. The contractor shall follow all applicable federal, state and Cal OSHA regulations while handling the pipe, and it will be his sole responsibility to adhere to these regulations. Only appropriately licensed hazardous waste contractors and subcontractors may do said asbestos work if the asbestos material is friable. The contractor will notify the county prior to doing this work and provide documentation that the material has been properly disposed of.

If any asbestos material is to be removed from the ground for disposal, it shall be considered a hazardous waste, and it shall be properly disposed of in accordance with all current federal, state, and local regulations.

71-1.05

PIPE LAYING

Pipe shall be protected during handling against impact shocks and free fall.

When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe, unless otherwise permitted by the Engineer.

Whenever the sewer line horizontal radius is less than 400 feet, the Contractor shall use pipe lengths of 12 linear feet or less in order to have sufficient joints to make up the curve.

The Contractor (including all corporate officers) and employees shall not enter existing Placer County facilities requiring confined space entry unless all such entries comply with applicable U.S. and California OSHA confined space requirements. All entries into active sanitary sewer manholes are considered confined space entries. The Contractor is responsible to ensure that their personnel engaged in confined space entries are adequately trained for this procedure. The Entry Supervisor shall complete a Confined Space Entry Permit prior to confined space entry, and shall provide a copy of each completed Confined Space entry Permit to the ENGINEER upon

demand. Information regarding training for this procedure, certification of entry Supervisor, and the Confined Space Entry Permit can be obtained by calling the Sacramento District Office of CalOSHA at (916) 263-0704 or visiting their web site at www.dir.ca.gov.

All joints shall be cleaned and then sealed with the type of materials specified or required by the local municipality, utility, or owner. In the absence of such requirements the pipe shall be jointed with materials recommended by the pipe manufacturer for the purposes intended, and approved by the Engineer, in order to obtain a watertight joint against leakage and infiltration under all conditions of expansion, contraction, and settlement.

Whenever the work ceases for any reason, the end of the pipe shall be securely closed with a tight fitting plug or cover so as to prevent infiltration of water.

Whenever existing pipes are to be cut or abandoned, the open end of said pipes shall be securely closed by a permanent tight fitting plug and held in place by a wall of concrete plug not less than 1.0-foot thick.

Stoppers for pipes and branches left unconnected shall be made of the same material as the pipe or of resilient joint material conforming to Section 71-1.02G, "Resilient Joint Material", of the General Specifications. After placing the stopper, it shall be covered with a layer of sealant. The sealant shall be sufficiently fluid to insure free flow around the stopper.

The pipe shall be laid in conformity to the prescribed line and grade, with grade stakes set and each pipe length checked to grade lines. Three consecutive points shown on the same rate of slope shall be used in common, in order to detect any variation from a straight grade. In case any such discrepancy exists, the work shall be stopped and immediately corrected by the Contractor to the satisfaction of the Engineer. In addition, a string line, laser or other method approved by the Engineer shall be used to insure a straight alignment of pipe between manholes.

(1) Horizontal Alignment & Grade Tolerance

The horizontal alignment of the pipe shall be laid such that any point shall not vary more than 0.10 foot from the design alignment established by the Engineer. Note that no section of pipe may vary more than 0.50 degree (30 minutes) of arc in any

direction from the engineered design alignment. Immediately prior to back filling the trench the pipe flowline at any point shall not vary more than 0.05 foot above or 0.05 foot below the grade established by the Engineer.

Pipe shall be laid continuously upgrade with the bell of the pipe forward. Each length of pipe shall be laid on a firm bed and shall have a true bearing for the entire length between bell holes. No wedging or blocking up of the pipe will be permitted. Both bell and spigot and inside of pipe shall be clean before the joint is made and care shall be taken that nothing but the joint-making material enters the joints. Each section of pipe shall be laid true to line and grade in such a manner as to form a watertight, concentric joint with the adjoining pipe.

When, for any reason, pipe laying is discontinued for an hour or more, the open end of all lines shall be closed with a close fitting stopper.

All pipe jointing shall be of an approved type and shall be in accordance with accepted best practice and/or recommendations of the manufacturer and as approved by the Engineer. Chipped or cracked pipes shall be rejected.

(2) Locator Tape and Wire

Locator tape, as approved by the Engineer, will be placed above the pipe once the pipe and trench bedding and initial backfill have been placed. An American Public Works Association (APWA) detectable locator tape or "Alarm Tape" (2 inches minimum width) shall be positioned continuously at a minimum of 1 foot above the top of all types of gravity and pressure sewer pipe, including service sewers. For force mains or low pressure sewer pipe, both a locating wire and the locator tape are required. The locator wire, No. 10, direct burial, insulated copper cable, shall be taped continuously to the top of the pipe and accessible at all manholes and valve boxes. A continuity test shall be performed before project acceptance.

71-1.05A

Connections To Existing Systems

No new sewer line shall be connected to an existing sewer system until the new sewer lines are balled, flushed and satisfactorily tested in accordance with Section 71-1.08, "Testing Sewers," of the General Specifications, unless, due to construction problems, it is necessary that such connection be made during construction. Should a construction connection be necessary a plug shall be placed at the connection to prevent water or debris from entering the existing sewer system. The plug

shall remain in place until construction is completed, and the Engineer has authorized its removal.

All debris and testing water shall be removed from the system prior to its entrance into the existing system. Should this not be possible, removal shall be at the nearest clean-out facility of the existing system.

71-1.05B

Boring and Jacking

Where specified or permitted the sewer pipe shall be placed in a conductor pipe, which shall have been previously placed under a roadway, railroad, or other obstruction by boring and jacking. The equipment and method of operation shall be approved by the Engineer before proceeding with the work.

Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing and shoring shall be adequate to protect workers and any adjacent structures or roadbed.

(1) Installation Of Conductor

The conductor shall closely follow the boring operation. The bored hole shall not be more than 0.1 foot larger in diameter than the outside diameter of the conductor. Guide rails shall be accurately set to line and grade to insure installation of the conductor within allowable limits. The conductor diameter shall be sufficient to allow adjustment of line and grade of the sanitary sewer pipe to meet allowable tolerances and to allow sand to be placed between the conductor and sewer pipe. Tunnel liner ribs shall have a minimum of 3 inches clearance from the sanitary pipe.

(2) Placing Sewer Pipe In Conductor

If necessary to establish correct line and grade, cement mortar shall be placed on the invert of the conductor. Sewer pipe, of which any part of the joint is larger in diameter than the barrel of the pipe, shall be strapped to 2 redwood or plastic skids with steel straps every five feet. The skids shall adequately support the center of each pipe section and shall be large enough to prevent any part of the joint from bearing on the conductor.

Sewer pipe with joints not larger than the pipe barrel shall be laid into place on 2 skids which have been securely fastened to the invert of the conductor or strapped to the barrel of the pipe. In lieu of skids, pipe with joints smaller than the pipe barrel shall be placed on a cement mortar bed which has been shaped to hold the pipe on correct line and grade.

Pipe section shall be joined outside the conductor and then slid into place.

The space between the sewer pipe and conductor shall be completely filled with clean dry sand blown into place, or sand which has been sluiced into place. The method of placing sand shall be subject to the Engineer's approval. The ends of the conductor pipe shall then be sealed, to prevent loss of the sand, by a method approved by the engineer.

(3) Filling Of Voids

Whenever in the opinion of the Engineer, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the conductor than herein allowed, as determined by the Engineer, the Contractor shall take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the conduit and project not more than 1/2 inch beyond the conduit's out surface. Excavation shall not be made in advance of this jacking head.

Voids greater than allowable, as determined by the Engineer, shall be filled with sand, soil cement, or grout as directed by the Engineer. Where voids are suspected, the Engineer may direct the Contractor to drill the conduit, to pressure inject grout to refusal and then to repair the drilled hole. Grouting pressure shall not exceed 50 PSI at the nozzle.

When tunnel liner is used as the conductor, the space between the outer earth and the tunnel liner shall be pressure grouted to fill all voids. Grout shall consist of 1 part Portland Cement to 3 parts clean sand, by volume, and sufficient water to make it workable, all injected at a pressure as approved by the Engineer.

(4) Tolerances

Extreme care shall be exercised by the Contractor to maintain line and grade during jacking operations. Maximum deviation from stated line and grade of tunnel liner or conductor pipe shall be such that the sanitary sewer pipe can be adjusted a sufficient amount within the conductor pipe or tunnel liner to achieve the line and grade shown on the plans. This adjustment shall be made to all pipe deviating from line and grade and not merely to the sections of pipe nearest the end of the conductor or tunnel liner.

Directly jacked conductors will be allowed a maximum deviation of 0.25% (0.25 feet per 100 feet) from

intended line and grade unless more stringent tolerances are shown on the plans or indicated by the Engineer.

71-1.05C

Service Sewers

Commercial and residential service sewers shall be constructed as shown on Plate U-17 of the Placer County Land Development Manual, and at the locations shown on the plans. Unless otherwise specified, they shall be 4 inches in diameter and constructed to the property line or 24 inches behind the utility trench adjoining and furthest from the right-of-way or easements, or the right-of-way or easement lines which provide the greatest length of sewer service. A regular manufactured wye fitting shall be used in the lateral sewer for each service sewer and shall be inclined upwards at a minimum angle of 30 degrees from the horizontal. The ends of all service sewers shall be securely sealed by stoppers in such a manner that the stoppers can be removed for extending the line without damage to the pipe. Service sewers shall be flushed and televised.

The depth of cover of the service sewer at the easement or property line shall be as noted on the plans.

An elevation given on the plans with a service sewer represents the invert elevation at the easement or property line. The elevation given shall be the maximum allowable elevation, and the minimum slope of the service shall be 2% (1/4 inch per foot). If the service is to be bored, the tolerance of the operation shall be within these limits.

Service sewers entering a manhole shall be set to an invert to crown match with the outgoing pipe or higher in the manhole with an inside drop connection. New service sewers shall not connect into existing sewers greater than 10 inches. They shall be connected to an existing or new manhole, or a new parallel sewer line will be constructed and the sewer service connected to the parallel line.

71-1.05D

Curb Mark & Service Marker

Where concrete curb and/or gutter exists, or is to be constructed concurrently with the sewer facilities, the location of each service sewer shall be permanently indicated by inscribing the letter "S" in the face of the curb directly above the line when the service is perpendicular to the street centerline. Otherwise, the "S" mark for a skewed or angling service shall be placed at a right angle to the end of the service. When service sewers are installed in an existing street, the curb mark shall be placed at the time the service is installed to

assure proper location. In new subdivisions when the service sewers are installed before the curb is constructed, it shall be the Contractor's responsibility to establish the exact location of each service sewer and the curb and gutter Contractor's responsibility to place the "S" in the curb after it is poured. Rebar shall be placed at the end of the service as shown on Plate U-17 of the Placer County Land Development Manual.

71-1.06

CONCRETE PIPE ENCASEMENT, PIPE REINFORCEMENT & BACKFILL

Where shown on the plans or directed by the Engineer, sewer pipe shall be encased in concrete, reinforced concrete, or backfilled with concrete in accordance with the details shown on the plans.

Concrete for pipe encasement, pipe reinforcement, and backfill shall conform to provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that the minor concrete shall contain not less than 470 pounds of cement per cubic yard.

71-1.06A

Bracing and Shoring

As required by the "Trench Construction Safety Orders" of the California Construction Safety Orders of the Division of Occupational Safety and Health, bracing and shoring shall be installed in trenches of five feet or greater depth to insure the safety of workers and to protect and facilitate the work.

Bracing and shoring shall comply with Sections, 5-1.02A, "Trench Excavation Safety Plans", AND 7-1.01E, "Trench Safety", of the Standard Specifications.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

All support shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the side of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

71-1.07

SEWER STRUCTURES

New manholes and flushing branches for sewers shall be constructed in accordance with the details shown on the plans, as specified in this Section 71-1.07 and as directed by the Engineer.

Precast concrete pipe manholes shall conform to the provisions in Section 70, "Miscellaneous Facilities," except for measurement and payment.

Concrete for sewer structures shall be Six sack mix unless otherwise shown on the plans.

When the manhole is located in the pavement area, it shall not be constructed to final grade until the pavement has been completed.

The inside bottoms of existing manholes, where new connections are made, and of new manholes shall be shaped to provide channels conforming to the size and shape of the lower portion of the inlets and outlets of the manholes. The channels shall vary uniformly in size and shape from inlet to outlet.

No pipe shall project more than 50 mm (0.17-foot) into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

All concrete shall be cured for a period of not less than ten days after being placed and shall be protected from damage.

71-1.07A

Manholes

Manholes shall be water-tight structures constructed by placing precast concrete sections on a poured concrete base or a precast manhole base. Precast manhole bases shall only be allowed where precast direction geometry matches all incoming and outgoing lines by +/- 4 degrees. When coating of the inside of manholes is specified by the project plans and specifications, the coating material chosen from a pre-approved list, shall be applied according to the manufacture's specifications. When manhole coatings are used, the coating manufacturer may require grouting under the coating be an epoxy sand grout. Regular non-shrink grout may not be compatible.

71-1.07B

The poured concrete base shall be made of Six sack mix with 1-1/2 inch maximum size aggregate.

All manholes shall be constructed on a non-yielding firm bed. The base of a manhole constructed in an engineered fill section shall either extend to one

foot below original ground, or a minimum of 95% relative compaction shall be obtained beneath the manhole. Cast-in-place manhole bases shall have an outside form and the concrete shall be vibrated. All precast manhole bases shall be constructed on a minimum of 8 inches of class 2 AB compacted to 95%. When water is encountered, or in the opinion of the Engineer, existing conditions are such that the excavated ground at the base of any manhole is not firm, additional baserock will be required prior to manhole base construction. The first manhole barrel shall be placed before the poured concrete base has set. Backfill around the outside of manholes shall be considered structural backfill and compacted to 95%.

71-1.07C

All precast manhole barrels and cones shall conform to ASTM Specification C-478.

All precast sections shall be joined together with pre-formed plastic gaskets.

Pre-formed plastic gaskets shall be equal to "Ram-Nek" and shall comply with the requirements of Federal Specification SS-S--210 "Sealing Compound, Pre-formed plastic for Pipe Joints", Type I, Rope Form.

71-1.07D

Where sewer lines pass through cast in place manholes, the pipe shall be laid continuously as a whole pipe. After the manhole base and precast sections have been placed and sufficient time has elapsed to allow all concrete and grout to set, the top half of the pipe within the manhole shall be carefully cut off and the sides mortared, as shown on Plate U-12 of the Placer County Land Development Manual. All channels so formed shall be checked with a template and shall form a smooth flowing channel at all flow depths.

In sewers of uniform size passing through cast in place manholes without a major change in direction or slope, the pipe shall be carried through the manhole on a uniform slope.

To provide flexibility for pipes entering and leaving a manhole, standard couplings shall be placed within the walls of the concrete base. The couplings are to be inspected and approved prior to backfilling. Flexible pipe to manhole connectors may be allowed when the connector is approved by the Engineer.

Lift holes shall be packed and sealed with Ram-Nek or Kent-Seal gasket material or equal. Before backfilling, all joints and lift holes must be grouted with non-shrink grout on the inside and outside of the manhole three inches on either side of

the joint. In addition, the manhole interior face shall be grouted with mortar such that all joints and edges are smooth. The exterior manhole face shall have a minimum thickness of 1/2 inch of mortar at the joint, and the grout shall be tapered to the face of the manhole three inches above and below the joint.

Cast in Place manhole bases shall cure a minimum of 14 days prior to any loading being placed on them unless provisions are made to shorten the cure time with add mixtures. The manufacturer of pre-cast manhole bases shall provide certification that the bases have cured longer than 28 days prior to their installation.

71-1.07E Temporary covers of 3/8 inch steel plate of sufficient size to adequately cover the opening shall be placed on the cone until the pavement is completed. Suitable locating ribs shall be welded to the underside of the cover to hold it in place during the grading and paving operations. The top of the temporary cover shall have a skid proof surface as determined by the Engineer.

71-1.07F The throat of the manhole (i.e. the top of the manhole cone to the manhole casting) shall be made of precast concrete rings of the proper inside diameter. For new construction the maximum depth of throat permitted shall be 12 inches excluding the frame.

71-1.07G Manhole frame and covers shall conform to Plates U-10.1, U-13, and U-14 of the Standard Drawings of the Placer County Land Development Manual. When adjusting the manhole frame and covers to grade, the frame shall be wired to a straight edge of sufficient length to span the excavation, and the throat completed to the proper level. Whenever the space between the bottom of the frame and top of a ring is less than 3 inches, the void may be filled with concrete, poured against a suitable form on the inside of the structure.

In snow areas the grade of the manhole cover shall be 1/2 to 1 inch below pavement grade.

When the manhole is in the shoulder area or a paved taper, the pavement shall be extended 25 feet to each side of the manhole to meet the existing pavement and the manhole shall be 1/2 inch below finished grade.

Manholes, located in off-road easements shall be a minimum of twelve inches above the natural ground surface, and above anticipated high water levels.

71-1.07H When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame

to the bottom of the throat exceeds 24 inches, the upper portion of the manhole shall be removed to the first full size manhole section. The upper portion shall then be reconstructed to grade as outlined above in Sections 71-1.07F and 71-1.07G.

71-1.07I

Before any work is started on adjusting or repairing a manhole, the channels in the base shall be covered with strips of wood and the entire base covered with a heavy piece of canvas. This cover shall be kept in place during all work. Upon completion of the work the wood strips and the canvas shall be removed from the manhole allowing no debris to fall or remain in the manhole.

71-1.07J

Any new structure to be placed or existing structure to be adjusted shall be temporarily covered with a heavy steel plate below the grading plane before subsequent layers are placed thereon. After completion of paving the structure shall be raised to grade.

71-1.08

TESTING SEWERS

All sewers and sewer services shall be tested by the Contractor and observed by the Engineer for obstructions and leakage as provided for in the General Specifications. Forty-eight (48) hours notice shall be given to the Engineer prior to all sewer and manhole testing. The amount of leakage shall not exceed the rate allowed by the General Specifications. Where the leakage of the sewer exceeds the above amount, it shall be corrected immediately and the amount of leakage reduced to a quantity within the specified amount. In any case, the Contractor shall stop any individual leaks that may be observed.

Testing of the sewer lines for obstructions and leakage shall take place as required in Section 71-1.08A, "Tests for Obstructions" and 71-1.08B, "Tests for Leakage", of the General Specifications.

Testing of manholes shall take place after the manholes have been set to grade and are complete in place. Additional testing may be required by the Engineer.

In addition to testing as required in Section 71-1.08, "Testing Sewers", of the General Specifications the following will be required for Polyvinyl Chloride (PVC) sewer pipe only:

After balling and flushing and prior to acceptance of the project by the County, the Contractor shall pull a deflection gage or mandrel through each section of pipe. The gage shall be designed to resist movement through the pipe when a deflection of 3 percent of the base inside diameter of the pipe is reached as shown in the following table:

Pipe Sizes	Mandrel Diameter
<u>Inches</u>	<u>Inches</u>
6	5.60
8	7.50
10	9.37
12	11.15
15	13.65

Pipe Sizes	Mandrel Diameter-Inches
	<u>SDR 26</u>
6	5.444
8	7.263
10	9.062
12	10.769
15	13.168

71-1.08A

Tests For Obstructions

After construction to subgrade and after manholes are raised to grade all sewer lines shall be cleaned by balling and flushing. The ball shall be controlled by a tag line or rope, or sewer rods, and permitted to move slowly through the sewer. The ball shall be of the inflatable grooved type and inflated to have a snug fit in the pipe.

A swivel will be placed between the rope and the ball in order to allow the ball to rotate and cause the proper flushing action.

In lieu of balling and flushing, the contractor can use a high pressure sewer cleaning machine to clean the new sewer lines provided the cleaning head is approved for PVC pipe and the hose is retracted no faster than one foot per second.

Any obstructions or irregularities shall be removed or repaired by the Contractor. All testing, cleaning, and repairing shall be done to the satisfaction of the Engineer. The Contractor shall provide all necessary labor, materials, and equipment for the test and shall dispose of all waste, including water.

Tests For Leakage

After laying, backfilling, and compaction to subgrade in accordance with General Specifications and Special Provisions, all sewers shall be tested for leakage. Testing will be done as determined by the Engineer and in accordance with the provisions of these General Specifications. The Contractor shall furnish all labor, tools, and equipment necessary to make the tests and to perform any work incidental thereto. The Contractor shall take all necessary precautions to prevent any joints from drawing while the pipelines or their appurtenances are being tested. He shall correct any excess leakage and repair any damage to the pipe and its appurtenances or to any structures indicated by or resulting from one of the following tests:

(1) Air Test For Leakage

The Contractor shall test all sewers by means of the air test specified herein unless otherwise directed by the Engineer. The length of line tested at one time shall be limited to the length between adjacent manholes or flushing branches. The pressure gauge used shall be supplied by the Contractor, shall have a minimum division of 0.25 PSI, and shall have an accuracy of 0.10 PSI. Accuracy and calibration of the gauge shall be certified by a reliable testing firm at six month intervals or when requested by the Engineer. In addition, the Engineer may compare the Contractor's gauge with County owned gauge at any time.

Air test procedures shall be as follows:

Pressurize the test section to 3.5 PSI and hold above 3.0 PSI for not less than five minutes. Add air if necessary to keep the pressure above 3.0 PSI. At the end of this five minute saturation period, note the pressure (must be 3.0 PSI min.) and begin the time period. During this period the airline between the air supply and the gasket shall be bled off or disconnected from the air supply.

If the pressure drops 0.5 PSI in less than the time given in the following table the section of pipe shall not have passed the test.

<u>LATERAL SIZE</u> <u>INCHES</u>	<u>MINIMUM TIME</u> <u>IN SECONDS</u>
4	122
6	184
8	245
10	306
12	367
15	460

For larger diameter pipe, use the following formula: Minimum time in seconds = 370 x pipe diameter in feet.

When the prevailing ground water is above the sewer being tested, air pressure shall be increased 0.43 PSI for each foot the water table is above the outlet flowline of the downstream sewer manhole. The elevation of the water table will be taken as the highest water table elevation along the section of pipe being tested. If the time for the pressure to drop 0.5 PSI is 125 percent or less of the time given in the table, the line shall immediately be repressurized to 3.0 PSI and the test repeated.

For 8 inch and smaller pipe only, if, during the 5 minute saturation period, pressure drops less than 0.5 PSI after the initial pressurization and air is not added, the section undergoing the test shall have passed.

If the test is not passed, all leaks shall be found and repaired to the satisfaction of the Engineer.

Sewer Services shall be considered part of the lateral to which they are connected and no adjustment of the test shall be allowed to compensate for the smaller diameter.

(2) **Hydrostatic Test**

For gravity sewers, the hydrostatic test may be used in lieu of the air test only when authorized by the Engineer.

All sections of sewer shall be tested by inserting stoppers in the lower end of the sewer, the inlet sewer of the upper manhole, and any side sewers at intervening manholes, and filling the pipe and manholes with water to a point in the upper manhole not less than 5 feet above the invert of the pipe or prevailing ground water elevation, whichever is higher. The maximum length of section tested shall be 1,000 feet.

The line shall be filled approximately 4 hours

prior to testing. It shall be tested for at least 2 hours, maintaining the head specified above by measured additions of water. The sum of these additions shall be the leakage for the test period.

Maximum allowable head of water above any portion of sewer being tested shall be 15 feet. Where the difference in elevation between successive manholes exceeds 15 feet, a test tee shall be installed between manholes, and testing shall be carried on between the tee and the manhole.

The allowable leakage shall not exceed 240 milliliters per minute, per 0.066 gallon per minute, per inch diameter, per 1,000 feet of main line sewer being tested. This is equivalent to 500 gallons per day, per inch diameter, per mile.

Where the actual leakage in a section tested exceeds the allowable, the Contractor shall remedy it before the sewer is accepted. If the leakage is less than allowable and leaks are observed, such leaks shall be repaired.

When underground overflow tanks are constructed as part of a sewage lift station, the tanks shall be tested in accordance with the hydrostatic test procedures noted above. Leakage shall not exceed

71-1.08C

Force Mains and Low Pressure Sewers

Each section of pipe to be tested shall be slowly filled with water and all air expelled from the pipe. After the pipe has been filled, it shall be allowed to set for a period of not less than 24 hours.

The pipe shall then be refilled to the original water level and subjected to a pressure of not less than 100 pounds per square inch or the service pressure plus 50 pounds per square inch, whichever is greater, for a period of two hours.

All exposed joints, bends, angles, and fittings shall be closely examined during the test. Any part of the line which proves to be defective shall be replaced and the line retested.

The maximum allowable leakage shall not exceed 30 gallons per 24 hours per mile of pipe per inch of nominal diameter.

71-1.08D

Manholes

Manholes shall be tested for leakage by the following vacuum procedure:

- (1) The test shall be done after assembly of the manhole, but before backfill.
- (2) All lift holes shall be filled with non-shrink grout.
- (3) All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.
- (4) The test head shall be placed inside the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations. The pressure gage shall be located can be easily read by the inspector without entering the excavation.
- (5) A vacuum of 10" of mercury (approx. 5 PSI) shall be drawn and the vacuum pump shut off with the valves closed. The time shall be measured for the vacuum to drop to 9". The manhole shall pass if the time is greater than 60 sec. for a 48" manhole, 75 sec. for a 60" and 90 sec. for a 72".
- (6) If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.
- (7) The contractor is to perform the test and supply all test equipment.
- (8) After passing tests, the manhole joints shall then be mortared inside and out.

71-1.08E

TV Inspection

All sewer pipes, service sewers (from the property line cleanout to the wye) and all manholes shall be inspected, after backfill, by means of an inline sewer TV camera. The TV camera used shall have VHS color with a 270 degree articulating lens. All sewer services shall be inspected from the public sewer line to the property line cleanout for detecting defects such as offset joints, sags, etc. Care shall be taken to make sure that the channel of all manholes are televised as well as the first few feet of the sewer pipe leaving the manhole.

The costs of providing this inspection shall be the responsibility of the Contractor and the work shall

be done by private forces, not Placer County. All records and video tapes are to be turned in to and become the property of the Department of Facility Services. The tapes must be compatible with the Department's viewing equipment. Any irregularities in construction or grade shall be corrected prior to acceptance of the project. In addition all sewer lines are subject to viewing with a TV camera by Department of Facility Services personnel.

Prior to televising sewer pipes, service sewers and manholes, sufficient clean water will be placed into the pipes to fill all sags and dips. A water stream shall be placed into the pipe until it enters the next downstream manhole. During the televising of the pipes a weighted target, of known size, shall be fixed in front of the TV camera to allow the measurement of the depth of any standing water.

Any deviations from the plans or specifications noted by such viewing shall be corrected by the Contractor at his expense.

In no event will sags or dips in the pipe or manholes creating standing water deeper than 0.05 ft. be considered an acceptable deviation. Offset joints due to rubber "band" couplings which are greater than one half the pipe wall thickness will also be considered an unacceptable deviation.

71-1.09

TRENCH RESURFACING

Trenches shall be resurfaced in accordance with Plates U-26.1, U-26.2 and U-27 through U-29 of the Placer County Land Development Manual.

71-1.09A

Clean Up

During the progress of the work, the Contractor shall keep the entire job site in a clean and orderly condition. Excess or unsuitable backfill material, broken pipe, or other waste material shall be removed from the job site. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the Contractor. All gutters and roadside ditches shall be kept clean and free from obstructions. Any deviation from this practice shall have prior approval from the Engineer.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

**STANDARD SANITARY SEWER
MANHOLE NOTES**

DATE: JULY, 2005 NTS PLATE U-10.2

APPROVED: 
DIRECTOR OF PUBLIC WORKS

NOTES:

1. TWO FLEX JOINTS REQUIRED FOR VCP. ONLY ONE FLEX JOINT REQUIRED FOR PVC & DIP.
2. ON PRE-CAST MANHOLE BASES, THE BUILT IN JOINT CAN BE USED FOR THE FIRST FLEX JOINT.
3. ALL MANHOLE BARRELS AND CONES SHALL BE ASTM C-478.
4. FOR MANHOLES LARGER THAN 48" IN DIAMETER, ADDITIONAL REDUCING CONE SECTIONS ARE REQUIRED.
5. NEW CHANNELS IN THE MANHOLE BASES SHALL BE CONSTRUCTED IN THE FIELD USING NON-SHRINK GROUT AND THE FOLLOWING REQUIREMENTS AT A MINIMUM:
 - A. CHANNEL SURFACES SHALL BE FINISHED WITH A SMOOTH FINISH AND BLEND INTO THE EXISTING BASE IN A MANNER ACCEPTABLE TO THE ENGINEER.
 - B. THE EXISTING MANHOLE BASE SHALL BE BUSH-HAMMERED IN THE AREA OF THE NEW CHANNELS PRIOR TO THE CONSTRUCTION OF THE CHANNELS.
 - C. A CONCRETE BONDING AGENT SHALL BE USED IN THE AREA OF THE NEW CHANNELS TO ENSURE PROPER BONDING BETWEEN THE NEW NON-SHRINK GROUT CHANNELS AND THE EXISTING BASE.
 - D. CONTRACTOR SHALL SUBMIT SPECIFICATION SHEETS FOR REVIEW AND APPROVAL BY THE ENGINEER FOR ALL MATERIALS TO BE USED IN THE CONSTRUCTION OF THIS SPECIFIC CHANNEL. ALL SUBMITTALS MUST BE SUBMITTED THROUGH THE PROJECT DESIGN ENGINEER.
6. BACKFILL MATERIAL AROUND SEWER MANHOLES AND OTHER SANITARY SEWER STRUCTURES THAT MUST REMAIN WATERTIGHT SHALL BE COMPACTED WITH RAMMER COMPACTORS ("WHACKER" TYPE). HEAVY EQUIPMENT SHALL NOT BE USED TO COMPACT AROUND THESE STRUCTURES UNLESS SPECIFICALLY APPROVED BY THE ENGINEER IN WRITING. BACKFILL SHALL BE PLACED UNIFORMLY AROUND THE CIRCUMFERENCE OF THE STRUCTURE IN 8-INCH LIFTS. PRIOR TO INSTALLATION OF ANY SANITARY SEWER FACILITIES THE CONTRACTOR SHALL PROVIDE TO THE DESIGN ENGINEER FOR REVIEW AND APPROVAL MATERIAL SUBMITTALS FOR THE COMPONENTS VERIFYING THAT THEY MEET PLACER COUNTY REQUIREMENTS AND SPECIFIC PROJECT REQUIREMENTS. THE MATERIAL SUBMITTALS SHALL INCLUDE, BUT NOT BE LIMITED TO, MANHOLES, PIPING, LIFT STATION COMPONENTS, UNDERGROUND STORAGE TANKS AND APPURTENANCES, ETC. THEY SHALL PROPERLY IDENTIFY WHICH FACILITY THE ITEM PERTAINS TO ON THE PROJECT PLANS (E.G. MANHOLE BY STATION AND NUMBER) AND SHALL INCLUDE SHOP DRAWINGS AS REQUIRED (E.G. FROM THE PRECAST MANUFACTURER FOR ALL PRECAST MANHOLE BASES). AFTER DESIGN ENGINEER REVIEW AND APPROVAL OF THE SUBMITTALS A COPY SHALL BE SENT TO THE ENGINEER FOR FINAL REVIEW AND ACCEPTANCE. ONCE ACCEPTED, COPIES SHALL BE RETURNED TO THE CONTRACTOR. THE CONTRACTOR SHALL NOT START INSTALLATION OF THE APPLICABLE SANITARY SEWER FACILITIES UNTIL THE COUNTY INSPECTOR HAS VERIFIED ALL COMPONENTS DELIVERED TO THE PROJECT SITE CONFORM TO THE APPROVED MATERIAL SUBMITTALS.
8. PRECAST MANHOLE BASES WILL BE ALLOWED ONLY WHEN THE HORIZONTAL ALIGNMENT OF A SEWER LINE AT THE MANHOLE EXACTLY MATCHES THE PRECAST BASE WITHIN A TOLERANCE OF ± 4 DEGREES.

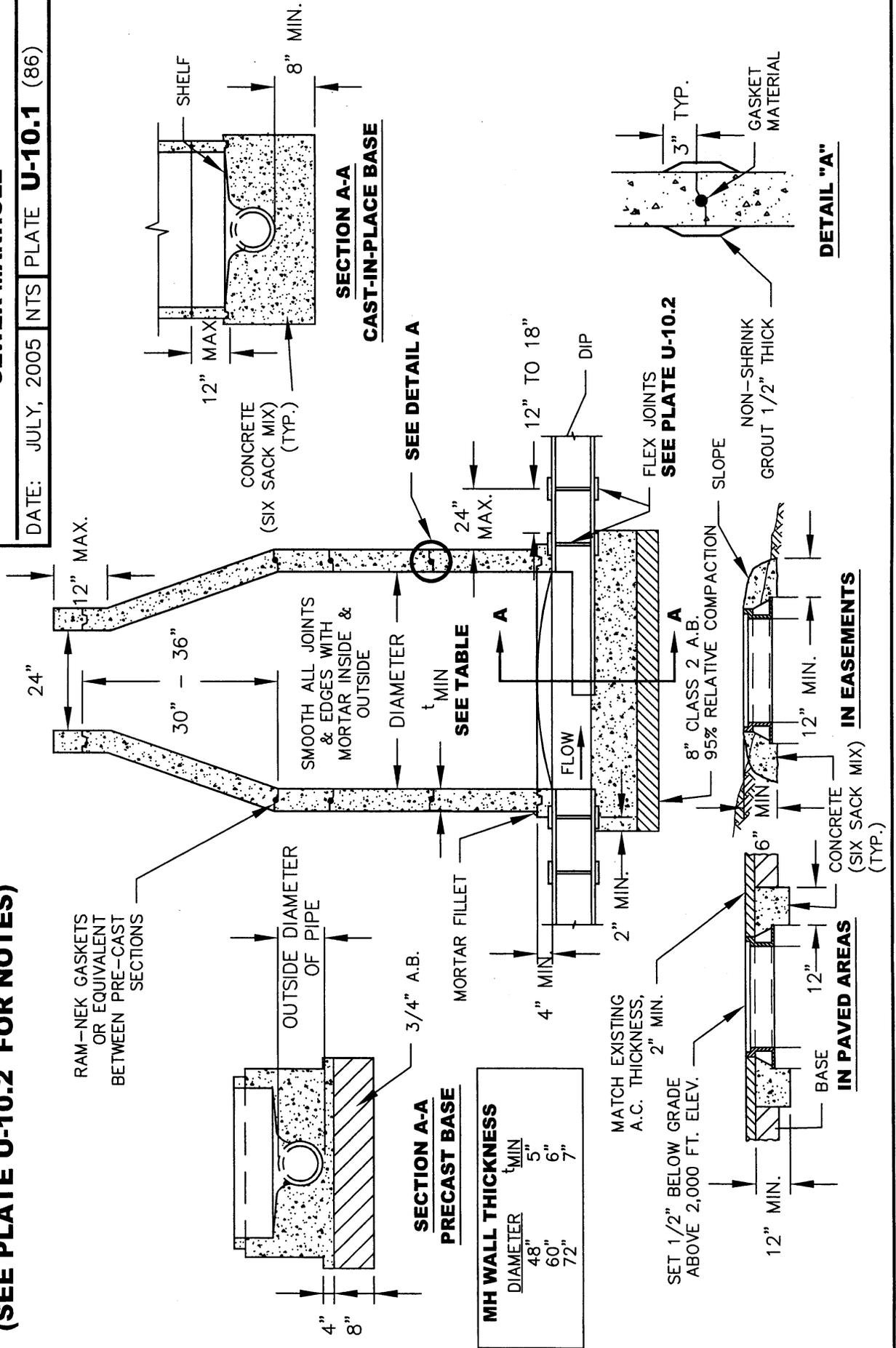
**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

**STANDARD SANITARY
SEWER MANHOLE**

DATE: JULY, 2005 NTS PLATE **U-10.1** (86)

APPROVED: *Joni Hackworth*
DIRECTOR OF PUBLIC WORKS

(SEE PLATE U-10.2 FOR NOTES)



NOTES:

1. 48 IN. DIAMETER MANHOLE SHOWN.
2. ECCENTRIC CONE NOT AVAILABLE FOR 60 IN. DIA. MANHOLE.
3. ALL SECTIONS TO BE ASTM C-478.
4. REFER TO PLATES U-10.1, U-10.2 AND U-12 FOR ADDITIONAL DETAILS.
5. TO BE USED ONLY WITH ENGINEER'S APPROVAL.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS
PRECAST SANITARY SEWER MANHOLE
WITH ECCENTRIC CONE**

DATE: JULY, 2005 NTS PLATE U-9 (85)

APPROVED: *Janie Haddock*
DIRECTOR OF PUBLIC WORKS

STD RING & COVER

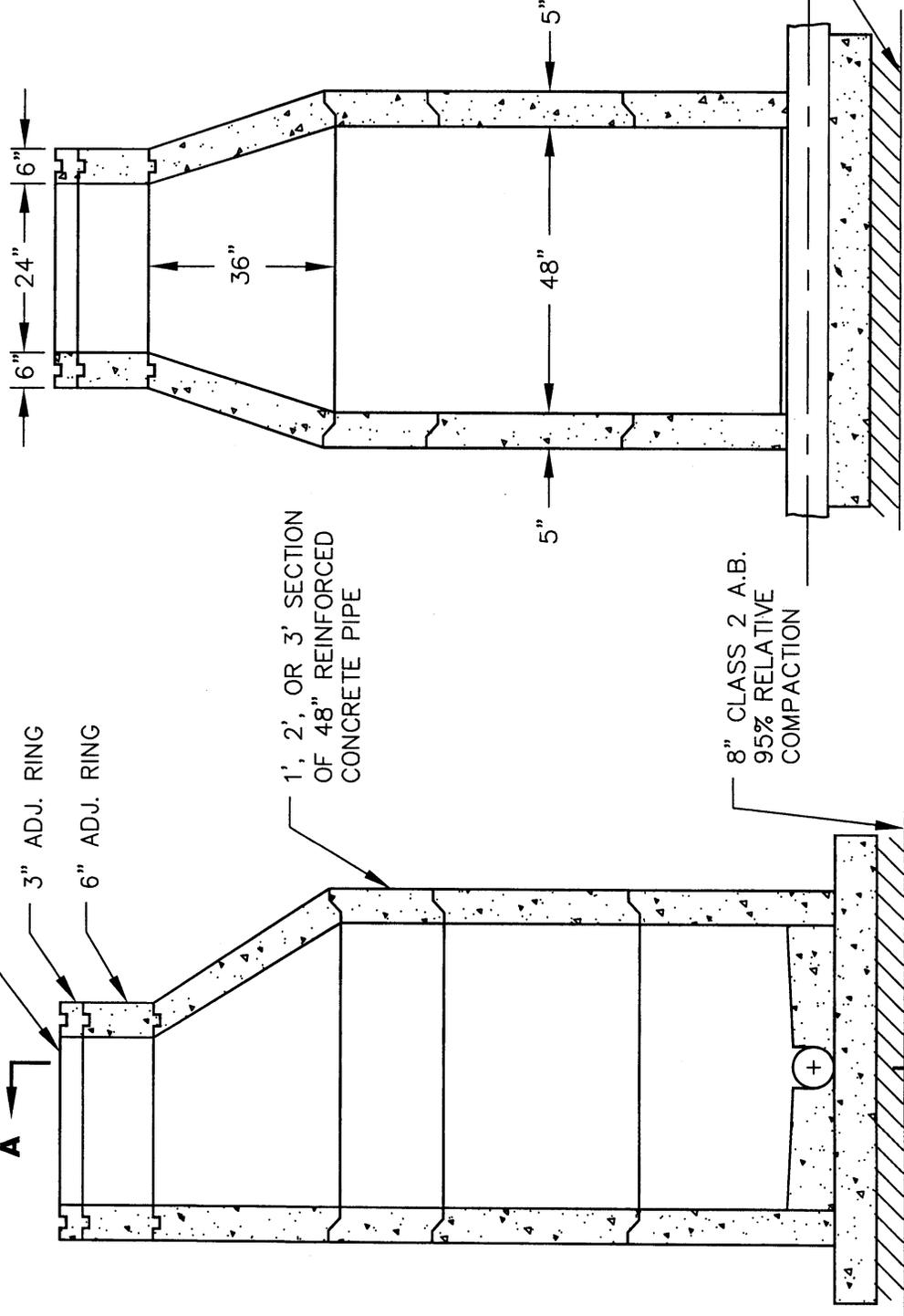
3" ADJ. RING

6" ADJ. RING

1', 2', OR 3' SECTION
OF 48" REINFORCED
CONCRETE PIPE

8" CLASS 2 A.B.
95% RELATIVE
COMPACTION

8" CLASS 2 A.B.
95% RELATIVE
COMPACTION



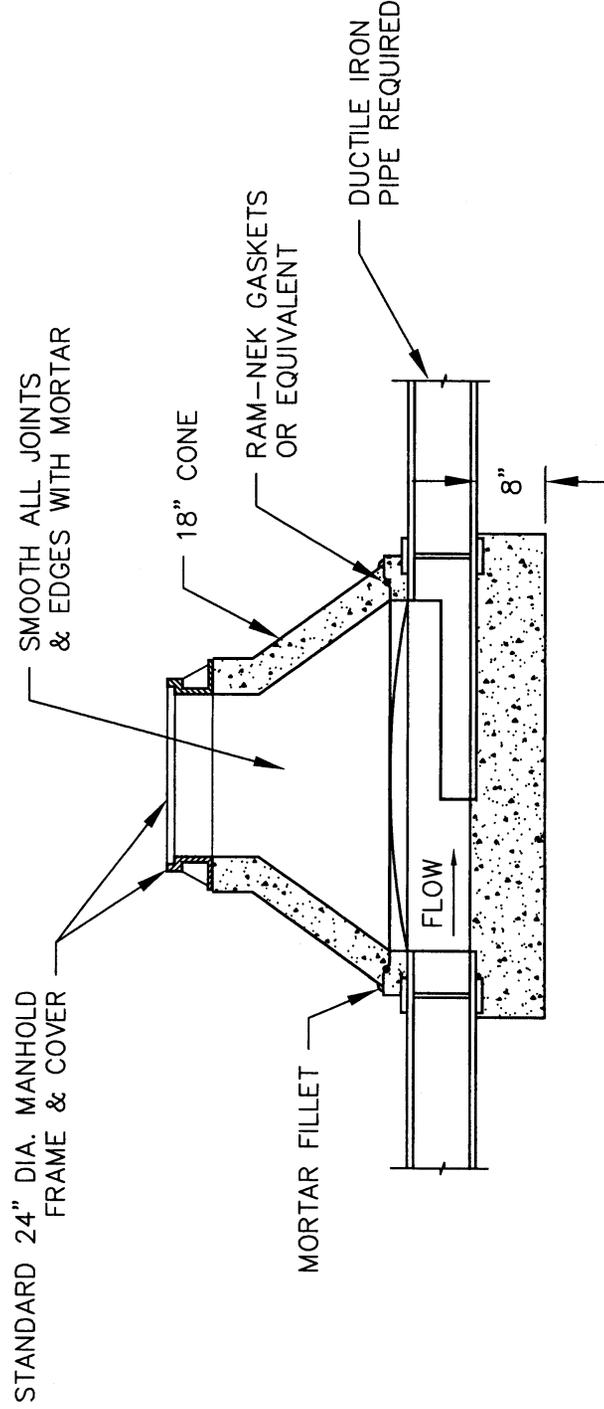
SECTION A-A

COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS

SPECIAL SANITARY SEWER MANHOLE

DATE: JULY, 2005 NTS PLATE U-11 (88)

APPROVED: *Joan Hackworth*
DIRECTOR OF PUBLIC WORKS



**THIS MANHOLE IS USED WHERE TOP OF PIPE IS
LESS THAN 30 INCHES BELOW SURFACE.**

NOTES:

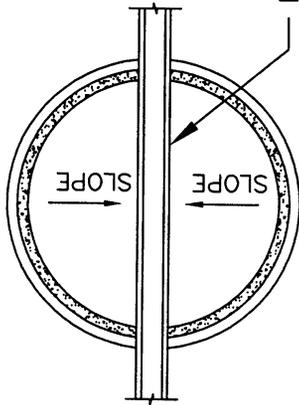
1. FOR MANHOLE FRAME & COVER DETAILS, SEE PLATE U-13.
2. FOR CAST-IN-PLACE BASE DETAIL SEE PLATE U-10.1.
3. FOR PIPES WITH LESS THAN 22 IN. COVER, NOTCH HOLE IN SIDE OF CONE.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

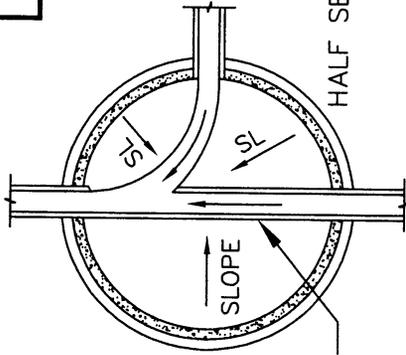
**STANDARD SANITARY SEWER MANHOLE
CHANNELIZATION DETAIL**

DATE: JULY, 2005 NTS PLATE **U-12** (87)

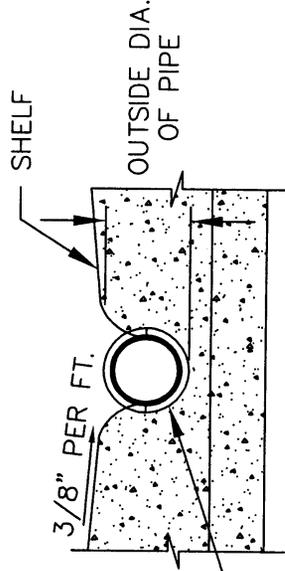
APPROVED: *Ami Hochkorth*
DIRECTOR OF PUBLIC WORKS



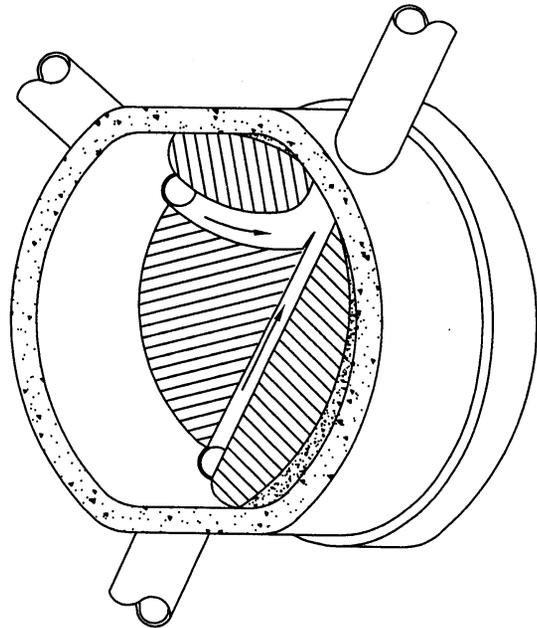
SECTION A-A



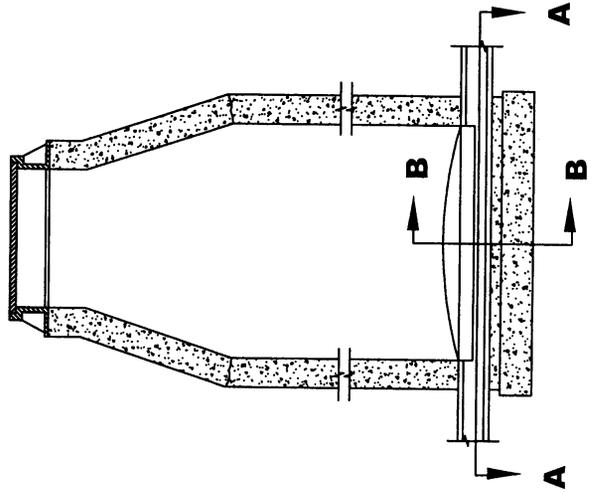
**SECTION A-A
MANHOLE WITH
INTERSECTING SEWERS**



SECTION B-B



**ISOMETRIC DRAWING
SHOWING CHANNELIZATION**



NOTES:

1. PIPE MAY STOP AT INSIDE FACE OF MANHOLE, OR BE CONTINUOUS THROUGH MANHOLE IF PIPE LAID CONTINUOUS, TOP HALF SHALL BE CUT AWAY AFTER BASE IS POURED.
2. MIN 0.1' DROP BETWEEN INLET AND OUTLET PIPES.
3. SEWER SERVICES SHALL BE INSTALLED WITH THE INVERT ELEVATION MATCHING THE CROWN ELEVATION OF THE OUTLET PIPE.
4. FOR SEWER CAMERA ACCESSIBILITY, PROVIDE A STRAIGHT THROUGH CHANNEL SECTION OF 30" OR MORE.
5. SEE SECTION 71-1.07 OF THE GENERAL SPECIFICATIONS.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

**STANDARD 24" SANITARY SEWER MANHOLE
FRAME AND COVER**

DATE: JULY, 2005 NTS PLATE **U-13** (89)

APPROVED: *Ami Hochkorn*
DIRECTOR OF PUBLIC WORKS

NOTES:

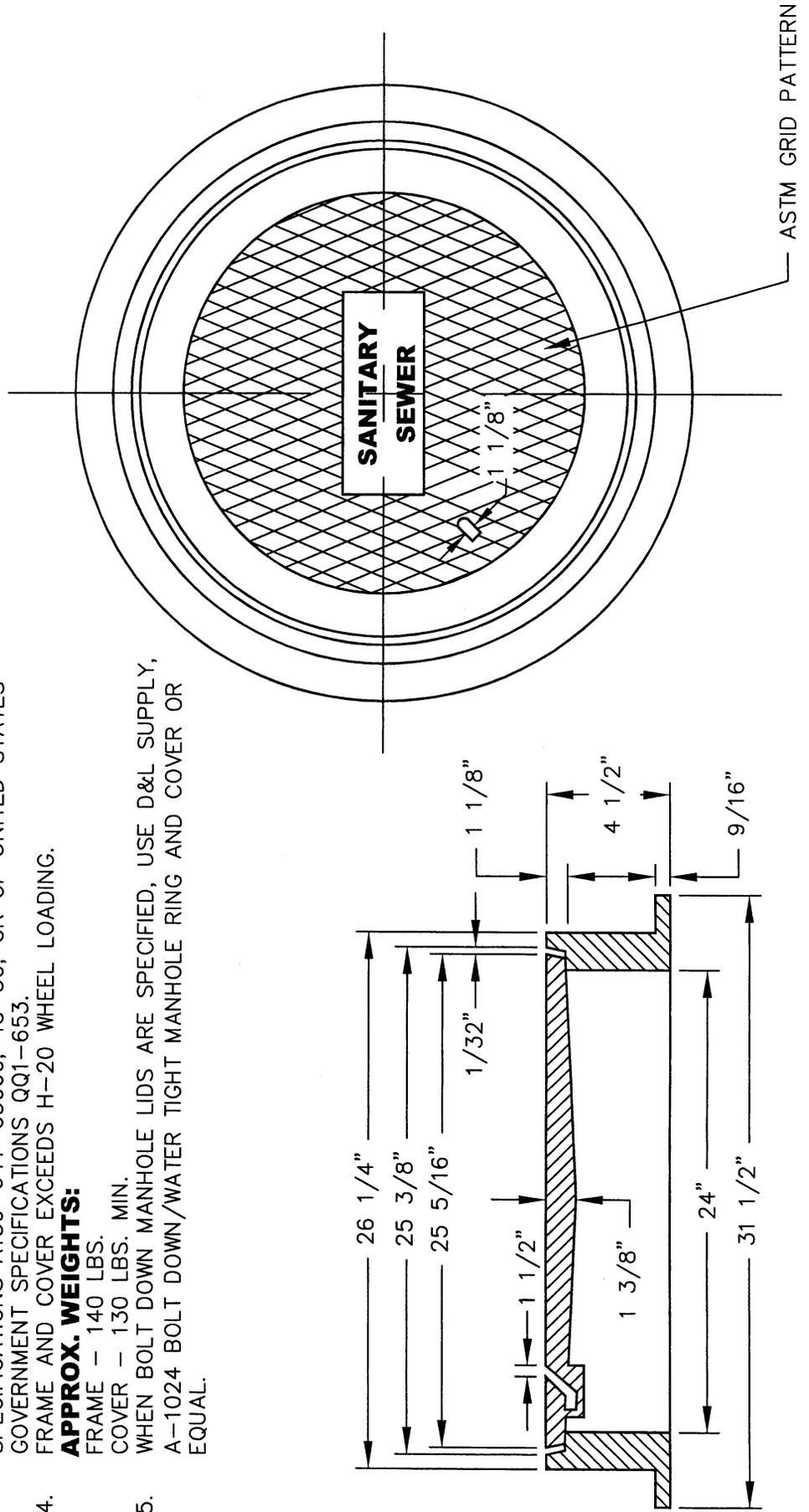
1. FRAME AND COVER BEARING SURFACES MACHINED TO ASSURE INTERCHANGEABILITY AND CLOSE, QUIET FIT.
2. CASTINGS DIPPED IN BLACK BITUMINOUS PAINT.
3. ALL MATERIAL USED IN MANUFACTURING SHALL CONFORM TO ASTM SPECIFICATIONS A159-64T-G3000, 48-30, OR OF UNITED STATES GOVERNMENT SPECIFICATIONS QQ1-653.
4. FRAME AND COVER EXCEEDS H-20 WHEEL LOADING.

APPROX. WEIGHTS:

FRAME - 140 LBS.

COVER - 130 LBS. MIN.

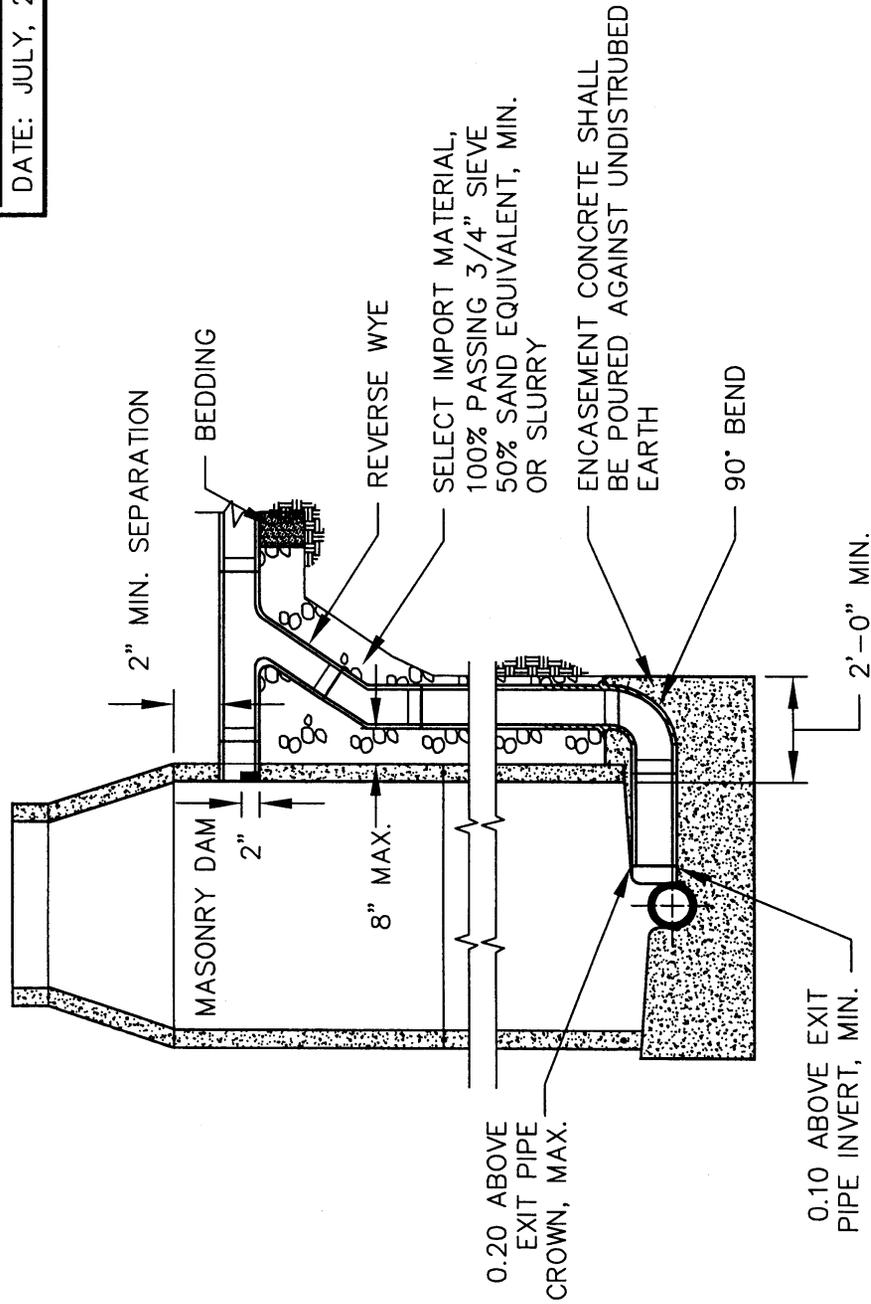
5. WHEN BOLT DOWN MANHOLE LIDS ARE SPECIFIED, USE D&L SUPPLY, A-1024 BOLT DOWN/WATER TIGHT MANHOLE RING AND COVER OR EQUAL.



**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS
OUTSIDE DROP CONNECTION
6" & 8" SANITARY SEWER ONLY**

DATE: JULY, 2005 NTS PLATE U-15 (91-1)

APPROVED: *Levi Hocherwitz*
DIRECTOR OF PUBLIC WORKS



NOTES:

1. DROP CONNECTION PIPE AND FITTINGS TO BE SAME SIZE AS LATERAL. FOR CONNECTIONS TO MANHOLES WITH EXIT PIPES 10 IN. DIAMETER OR LARGER, MATCH THE FLOWLINE OF THE DROP PIPE TO THE CROWN OF THE EXIT PIPE.
2. 6 IN. & 8 IN. SEWER, MIN. DROP 24 IN. NOT ALLOWED FOR 10 IN. OR LARGER PIPE.
3. USE OUTSIDE DROP CONNECTIONS ONLY WITH APPROVAL OF THE ENGINEER.
4. PIPE TYPE TO BE SAME AS INLET PIPE.
5. PENETRATE MANHOLE BARREL WITH SMOOTH BORE CUT.

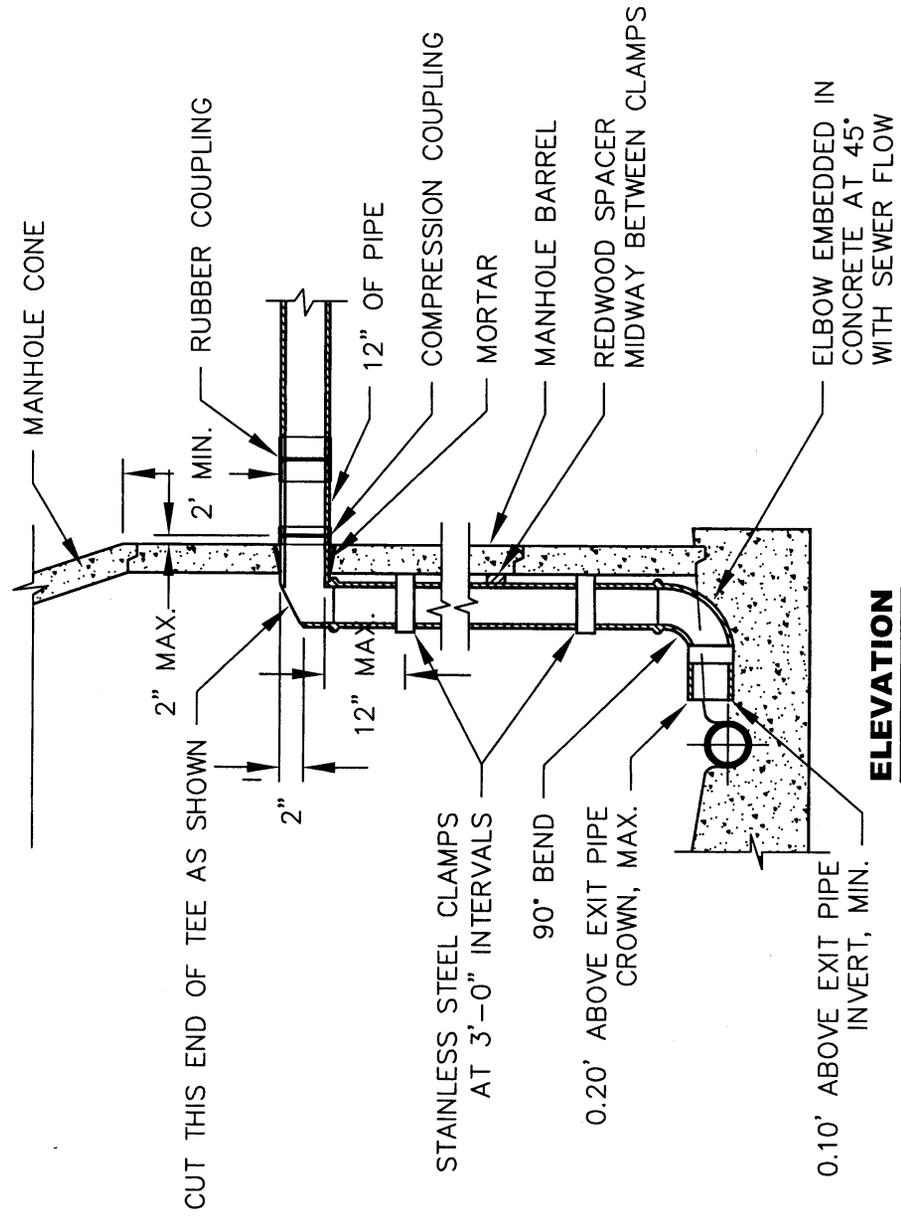
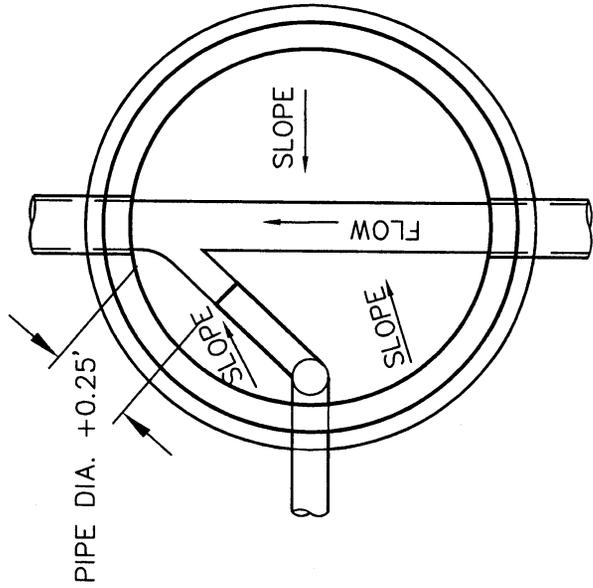
NOTES:

1. ALL INSIDE DROP PIPING SHALL BE P.V.C. PIPE, SCHEDULE 40. PRIME AND CEMENT ALL JOINTS AS RECOMMENDED BY THE MANUFACTURER.
2. DROP CONNECTION PIPE AND FITTINGS TO BE SAME SIZE AS ENTERING PIPE.
3. CLAMPS SHALL BE 1 1/2 IN. BY 12 GAUGE STAINLESS STEEL, ANCHORED TO MANHOLE WALL WITH 2 1/2 IN. CADMIUM PLATED BOLTS.
4. FOR CONNECTIONS TO MANHOLES WITH EXIT PIPES 10 IN. DIAMETER OR LARGER, MATCH THE FLOWLINE OF THE DROP PIPE TO THE CROWN OF THE EXIT PIPE.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS
INSIDE DROP CONNECTION
SANITARY SEWER 4", 6" & 8" ONLY**

DATE: JULY, 2005 NTS PLATE **U-16** (91-2)

APPROVED: *Levi Hochkorth*
DIRECTOR OF PUBLIC WORKS



APPROVED: *Levi Hochstadt*
 DIRECTOR OF PUBLIC WORKS

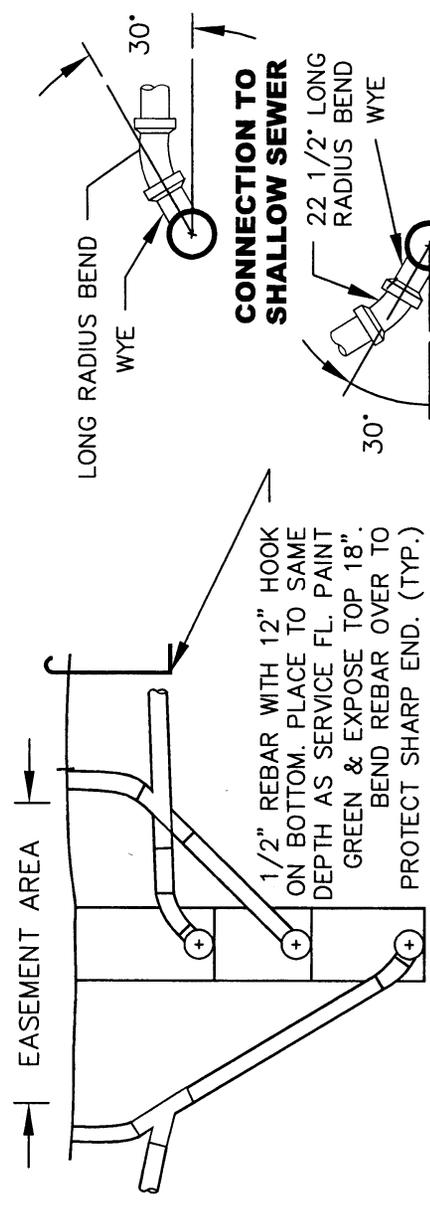
**COUNTY OF PLACER
 DEPARTMENT OF PUBLIC WORKS**

**STANDARD SEWER
 SERVICE CONNECTIONS**

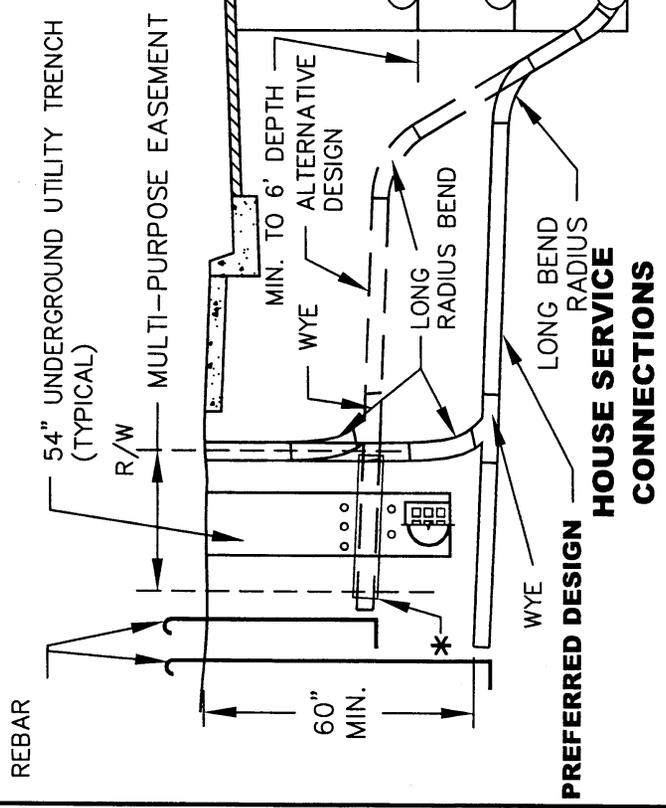
DATE: JULY, 2005 NTS PLATE U-17 (92)

NOTES:

1. IN ROCK CONDITION EXCAVATE TRENCH 3 FT. BEYOND END OF PIPE. BACKFILL WITH NATIVE MATERIAL WITH ALL ROCKS OVER 3 IN. REMOVED (SEE SHADED AREA).
2. EXTEND SEWER SERVICE PAST ALL MULTI-PURPOSE UTILITY EASEMENTS.
3. STATE DEPARTMENT OF HEALTH SERVICES CRITERIA FOR SEPARATION OF WATER MAINS AND SANITARY SEWERS SHALL APPLY.
4. ALL SERVICES AND CLEANOUTS SHALL BE INSTALLED WITH A THREADED CAP AND A G5 TYPE TRAFFIC BOX. CAP TO BE WITHIN 6" TO 12" OF THE BOX LID.
5. ONLY LONG RADIUS BENDS SHALL BE USED ON SERVICE CONNECTIONS.
6. ALL SEWER SERVICE WYES SHALL ONLY BE INSTALLED AT 30° ABOVE HORIZONTAL [2 (TWO) OR 10 (TEN) O'CLOCK.]



EASEMENT CONNECTIONS



**PREFERRED DESIGN
 HOUSE SERVICE
 CONNECTIONS**

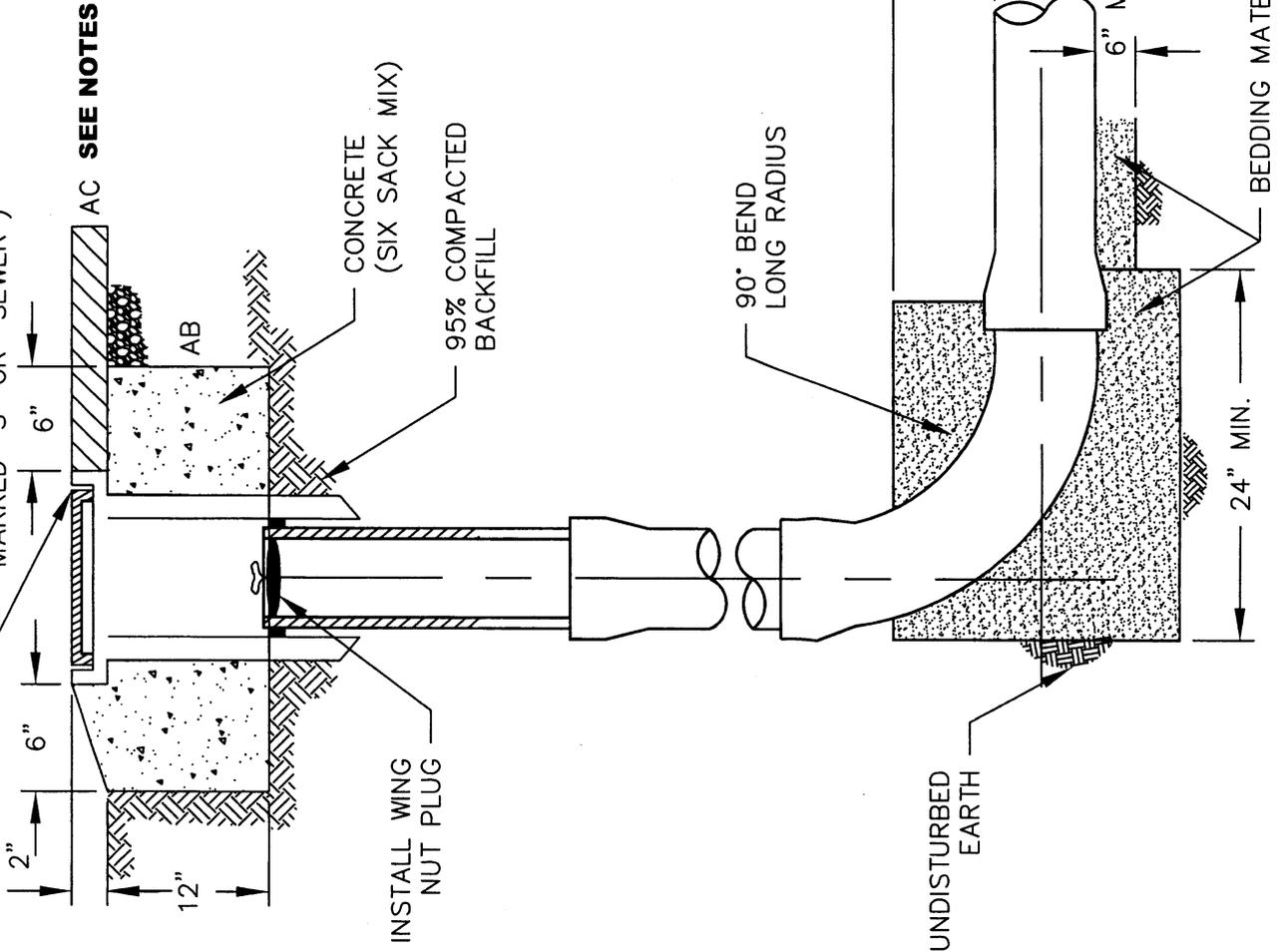
**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

**STANARD 90°
SEWER FLUSHING BRANCH**

DATE: JULY, 2005 NTS PLATE U-19

APPROVED: *Ami Stackowitz*
DIRECTOR OF PUBLIC WORKS

TRAFFIC FRAME & COVER "D&L SUPPLY"
#H-8024 SERIES OR EQUAL (W/LID
MARKED "S" OR "SEWER")



NOTES:

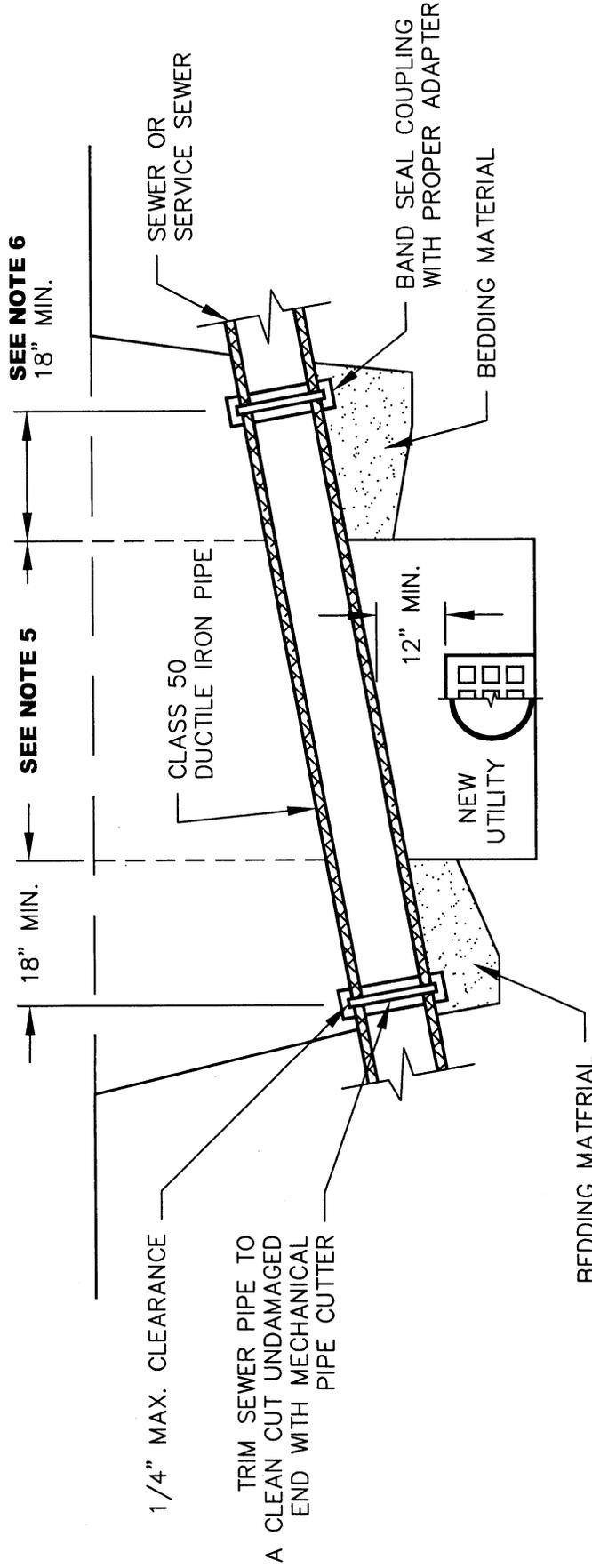
1. WHEN IN ROADWAY LEAVE CONCRETE 2 IN. DOWN. IN OTHER AREAS SLOPE CONCRETE AS SHOWN.
2. RAISE BOX TO FINAL GRADE AFTER PAVING.

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

SEWER UTILITY CROSSING

DATE: JULY, 2005 NTS PLATE **U-20** (94)

APPROVED: *Ami Hackworth*
DIRECTOR OF PUBLIC WORKS



NOTES:

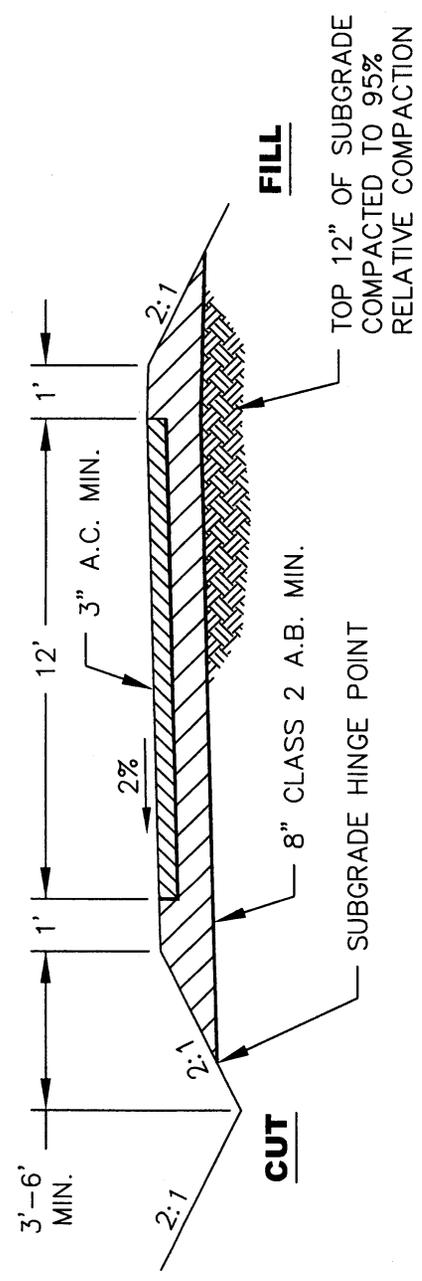
1. INSIDE DIAMETER OF DUCTILE IRON PIPE TO BE SAME AS THE PIPE TO WHICH IT CONNECTS.
2. REPLACE WITH DUCTILE IRON PIPE, AS PER THIS DETAIL, WHENEVER A NEW UTILITY IS CONSTRUCTED BENEATH THE SEWER PIPE.
3. USE DUCTILE IRON PIPE, AS PER THIS DETAIL WHENEVER A NEW SEWER PIPE IS CONSTRUCTED ABOVE AN EXISTING UTILITY OR WHENEVER CLEARANCE IS LESS THAN 12".
4. ALTERATION OF SEWER GRADES WILL BE PERMITTED ONLY AFTER WRITTEN PERMISSION HAS BEEN RECEIVED FROM THE PLACER COUNTY DEPARTMENT OF FACILITY SERVICES.
5. WHENEVER THE SPAN, WHETHER CAUSED BY TRENCH WIDTH OR CROSSING ANGLE, OF THE DUCTILE IRON PIPE EXCEEDS 3 FT.-0 IN. PLACE BEDDING MATERIAL TO 6 IN. ABOVE THE DUCTILE IRON PIPE.
6. FOR CROSSINGS OF DOMESTIC WATER LINES, A MINIMUM OF 18 LF OF DIP SHALL BE USED AND CENTERED OVER CROSSING.
7. THIS DETAIL TO BE USED WHENEVER A SEWER LATERAL OR SEWER SERVICE CROSSES OVER ANY EXISTING OR PROPOSED UTILITY OR CULVERT AND WHEN A NEW UTILITY IS INSTALLED UNDER AN EXISTING SEWER.

APPROVED: *Juni Hackworth*
 DIRECTOR OF PUBLIC WORKS

**COUNTY OF PLACER
 DEPARTMENT OF PUBLIC WORKS**

UTILITY ACCESS ROAD

DATE: JULY, 2005 NTS PLATE **U-21**



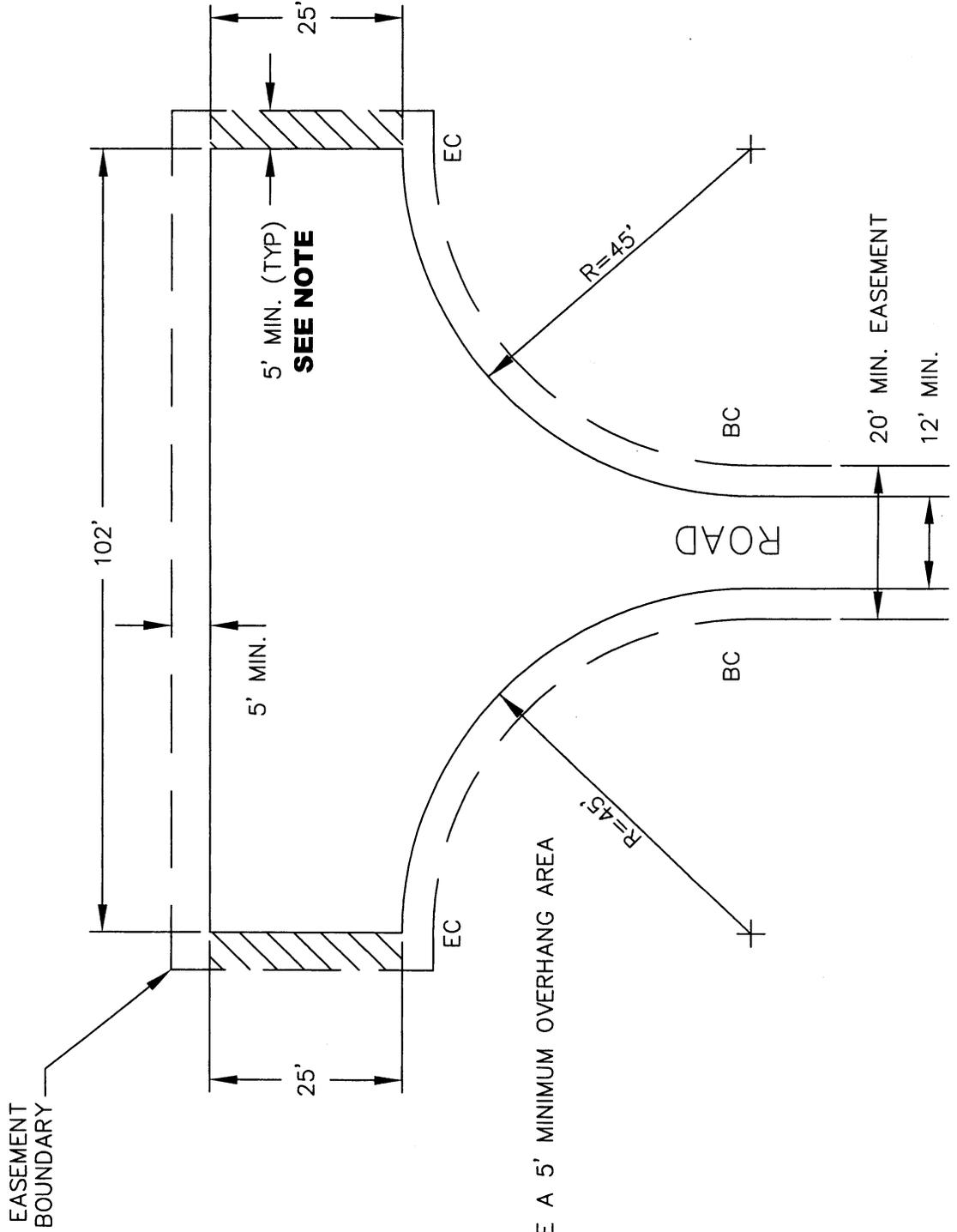
NOTES:

1. MAXIMUM VERTICAL GRADE IS 12%.
2. DITCH FLOWLINE MUST BE A MINIMUM OF ONE FOOT BELOW SUBGRADE HINGE POINT. THE DITCH MAY BE REQUIRED TO BE LARGER DEPENDING ON THE DRAINAGE TO BE CONVEYED.
3. A.C. MIX SHALL BE AR8000, 3/4 IN. AGGREGATE.

COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS
ACCESS ROAD HAMMERHEAD
FOR UTILITY TRUCKS (OPTION 1)

DATE: JULY, 2005 NTS PLATE **U-22.1** (4)

APPROVED: *Jimi Hochkorth*
 DIRECTOR OF PUBLIC WORKS



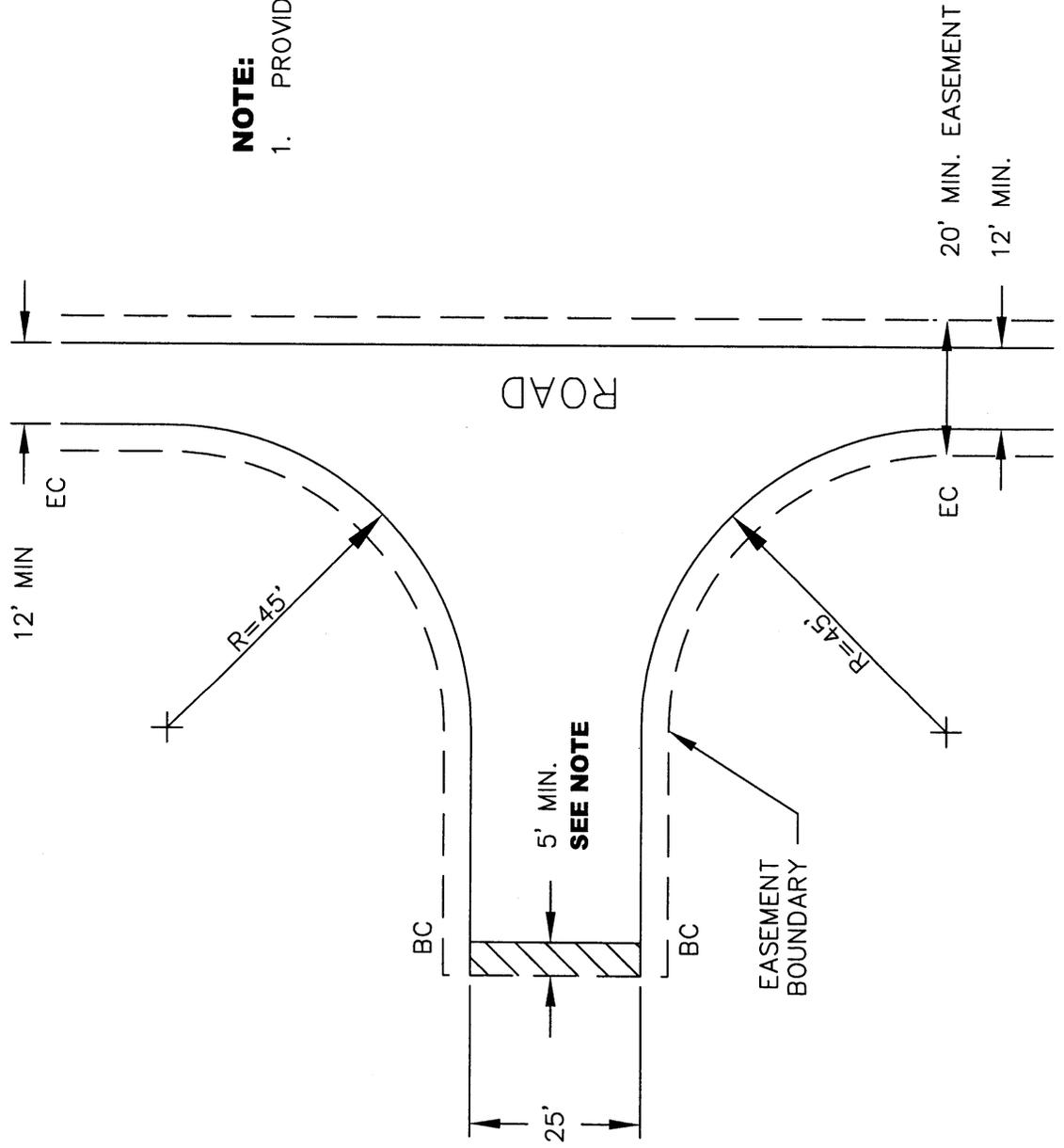
NOTE:
 1. PROVIDE A 5' MINIMUM OVERHANG AREA

**COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS**

**ACCESS ROAD HAMMERHEAD
FOR UTILITY TRUCKS (OPTION 2)**

DATE: JULY, 2005 NTS PLATE **U-22.2** (5)

APPROVED: *Ami Heckworth*
DIRECTOR OF PUBLIC WORKS



NOTE:

1. PROVIDE A 5' MINIMUM OVERHANG AREA.