



# CITY OF LOMPOC CALIFORNIA

## STANDARD REQUIREMENTS FOR THE DESIGN AND CONSTRUCTION OF SUBDIVISIONS AND SPECIAL DEVELOPMENTS

### SECTION 3 CONSTRUCTION OF SANITARY SEWERS

SECTION 3

CONSTRUCTION OF SANITARY SEWERS

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## Section 3

### Construction of Sanitary Sewers

#### 1. GENERAL REQUIREMENTS

##### A. WORK TO BE DONE WITHIN THE CITY OF LOMPOC

The work covered by these Standard Requirements consists of furnishing all labor, plants, equipment, appliances, and material, and performing all operations in connection with the construction of sanitary sewer mains, including all fittings, manholes and assemblies, and sewer laterals connections to each lot and all other necessary appurtenances, complete and in strict accordance with these Standard Requirements.

##### B. PLANS AND SPECIFICATIONS

Projects shall be constructed as shown on the Plans and shall conform to these Standard Requirements and the Caltrans Standard Specifications. The Caltrans Standard Specifications shall not govern over the Plans or these Standard Requirements. All references herein to Caltrans Standard Specifications are to the Standard Specifications of the State of California, Department of Transportation, current edition.

##### C. ALTERATIONS

- (1) By mutual consent in writing of the parties involved, only then may alterations or deviations, increases or decreases, additions or omissions in the approved Plans, contract or Standard Requirements, be made.
- (2) Each Contractor shall visit the site of the proposed work and fully acquaint himself with conditions relating to construction and labor involved, so that he may fully understand the facilities, difficulties, and restrictions attending the proper execution of the work. Contractors shall thoroughly examine and be familiar with these Standard Requirements.
- (3) It shall be the responsibility of the Contractor to locate any and all utility lines prior to excavation. The Contractor shall be held responsible for any damage to utility lines during the progress of construction, and if damage should occur, he shall repair the same at his own expense.

The Contractor shall notify the City Engineer and the appropriate regional notification center for operations of subsurface installations at least two (2) workings prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structures. Regional notification centers include, but are not limited to, the following:

Underground Service Alert Southern California (USA)  
Telephone: 1 (800) 422-4133

D. SUSPENSION OF WORK

The City Engineer shall have the authority to suspend the work wholly or in part, for such period of time as may be necessary because of the failure of the Contractor to carry out orders from the City Engineer to comply with any of the provisions of these Standard Requirements. Upon receipt of a written notice from the City Engineer, the Contractor shall immediately suspend operation. Only upon written instructions from the City Engineer shall the Contractor resume construction. Upon receipt of such written instructions to resume work, he shall immediately proceed with the work. No claim for damages or additional compensation will be allowed as a result of any such suspension of the work.

E. PROTECTION OF EXISTING FACILITIES

Existing facilities shall be protected by the Contractor at all times. The destruction, obliterating, removing, remodeling, modifying, relaying, or resetting of any facility including, but not limited to, all existing utilities and survey monuments and street signs shall be done by the Contractor at his expense and the work shall conform to Section 15 of the Caltrans Standard Specifications and to the Plans and these Standard Requirements. In the event of unforeseen actual conflict of this construction with existing facilities requiring relocation of existing facilities, such relocation will be done by the Contractor.

The fact that any underground utility or facility is not shown on the Plans shall not relieve the Contractor of his responsibility to ascertain the existence of any underground improvements or facilities which may be subject to damage by reason of his operations.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in protecting, restoring, or repairing property as above specified shall be considered the responsibility of the contractor.

F. TRAFFIC CONTROL

Attention is directed to Section 7-1.09 "Public Safety," 7-1.12 "Responsibility for Damage," and 7-1.08 "Public Convenience" of the Caltrans Standard Specifications. Whenever the Contractor's operations create a condition hazardous to traffic or to the public, he shall furnish, erect and maintain, at his expense and without cost to the City, such fences, barricades, light, signs, and other devices as are necessary to prevent accidents or damage or injury to the public. The Contractor shall also furnish such flagmen and guards as are necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered.

The equipment shall be furnished and kept clean and in good repair by the Contractor at his expense. Signs, lights, flags and other warning and safety devices shall conform to the requirements set forth in the current "Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways," issued by the State of California Department of Transportation. Any such signs shall not obscure the visibility of nor conflict in intent and meaning with City furnished signs and shall be approved by the City Engineer as to size and wording. Generally, at least half of the roadway shall be kept open to traffic unless otherwise directed by the City Engineer.

Under no circumstances shall traffic on any street be held up over ten minutes at any time. In additions, the Contractor shall give personal notice to all affected property owners and to people in the area by way of signs, etc. Indicating when streets will be blocked off, detoured, and for what length of time.

No materials or equipment shall be stored where it will interfere with the free and safe passage of public traffic and at the end of each day's work and at other times when construction operations are suspended for any reason, the Contractor shall remove all equipment and other obstructions from that portion of the roadway open for use by public traffic .

G. PUBLIC ACCESS AND CONVENIENCE

The Contractor shall keep the work area including spoil banks in neat and orderly manner at all times to serve the public convenience.

The Contractor shall notify the City Engineer at least thirty-six (36) hours in advance of any street closure. The Contractor shall furnish, place and maintain detour signs and safety signs and equipment in accordance with Section 7-1.09, "Public Safety" of the Caltrans Standard Specifications. These signs shall be illuminated at night.

Convenient access shall be maintained to driveways where access to the property is solely through the construction area. Driveways may be closed for reconstruction provided that work is completed as soon as possible. All closed streets shall be barricaded at all intersecting streets with Type III barricades as directed by the City Engineer.

H. COOPERATION

The Contractor is hereby advised that other forces and/or agencies may be engaged in locating, protecting, repairing or relocating facilities within the area.

The Contractor shall cooperate with other forces in accordance with these Standard Requirements.

I. GUARANTEE

The Developer shall guarantee all work and materials for a period of one year after the acceptance by the City.

II. MATERIALS

A. GENERAL

All materials shall be new and of the type described in these Standard Requirements or shown on the Plans. The Contractor shall furnish all materials. Whenever the following Standard Requirements specify by name or number any material or article or the maker or distributor thereof, this is done so only for the purpose of more clearly defining the kind and quality desired, and it is to be understood that the written approval of the department head will permit an equivalent which will be equally acceptable.

All materials shall be those as hereinafter specified and approved and shall never be less than those as approved by AWWA, ASA, and ASTM as last revised.

B. PIPE CERTIFICATION AND TESTS

When specified on the Plans or in these Standard Requirements, or when ordered prior to construction by the City Engineer, the Contractor shall, at his own expense, furnish documentary evidence, or when specifically requested, certified test results which indicate that the pipe furnished meets all of the requirements of these Standard Requirements. Documentary evidence will be considered sufficient when the pipe manufacturer furnishes a notarized certificate indicating that the pipe has been sampled, tested and inspected in accordance with the provisions of all AWWA specifications.

The City Engineer shall be the sole judge as to conformance of the pipe to any required ASTM tests. Failure to comply with these requirements shall be prima facie evidence that the water main pipe proposed to be furnished by the Contractor does not conform to these Standard Requirements and shall be rejected in the event of its delivery to the job site.

C. VITRIFIED CLAY SEWER PIPE (VCP)

- (1) Pipe - Vitrified clay sewer pipe and fittings shall be first quality extra strength, bell and spigot, sound and durable vitrified clay sewer pipe, free from objectionable defects. It shall be hard burned, straight and free from cracks, warps, blisters or objectionable defects. The pipe shall not absorb moisture in excess of eight (8) percent of its dry weight. It shall produce a clear metallic ring when placed on end and struck with a light hammer. The body of the pipe shall be smooth and have a uniform thickness. The pipe ends shall be perpendicular to the longitudinal axis and the socket shall be circular and concentric to the bore of the pipe. Sockets shall be of such diameter to receive to their full depth of the spigot end of the next following pipe without any slipping whatsoever and leave a space of not less than 3/8" in width all around for the joint material.

All extra strength vitrified clay pipe shall conform to all the requirements for extra strength clay sewer pipe as set forth in the specifications of the ASTM Serial Designation C200, as amended to date.

- (2) VCP Joints - All vitrified clay pipe and fittings shall be furnished with mechanical compression joints equal to "Wedge-Lock" as manufactured by Pacific Clay Products or "Speed Seal" as manufactured by International Pipe & Ceramics Corporation.

The compression joint on the spigot and bell ends of the pipe shall be factory made of plastisol, polyurethane or other approved resilient elastomer bonded onto the outside of the spigot and the inside of the bell to the pipe and molded and cured to a uniform hardness and compressibility, to form a tight compression coupling when assembled. Materials for compression joints shall conform to ASTM Designation C-425.

D. POLYVINYL CHLORIDE PLASTIC SEWER PIPE (PVC)

- (1) Pipe - Polyvinyl chloride plastic sewer pipe and fittings shall conform to the requirements of ASTM Standard Specifications D 3034, as amended to date, except as modified herein. The pipe shall be furnished in 12.5' or 20' lengths with integral wall belled ends and elastomeric joints. All pipe and fittings



shall be free of imperfection and shall be clearly marked with the name of the manufacturer.

The minimum wall thickness shall be as follows providing a minimum SDR ratio of 35:

|                |       |       |       |       |       |       |
|----------------|-------|-------|-------|-------|-------|-------|
| Diameter       | 4"    | 6"    | 8"    | 10"   | 12"   | 15"   |
| Wall Thickness | .125" | .180" | .240" | .300" | .360" | .440" |

- (2) PVC Pipe Joints - All pipe fittings shall have rubber ring bell and spigot joints providing a water tight seal and allowing for contraction and expansion. The bell shall consist of an integral wall section stiffened with two PVC retainer rings which securely lock the solid cross section rubber ring into position.

Joint tightness shall be measured by assembling two sections of pipe in accordance with the manufacturer's recommendations. Subject the joint to an internal hydrostatic pressure of 25 psi for one hour. Consider any leakage a failure of the test requirements.

- (3) PVC Pipe Stiffness - Minimum "pipe stiffness" (F/y) at five (5) percent deflection shall be 46 psi for all sizes when calculated in accordance with ASTM Designation D 2412.
- (4) PVC Pipe Deflection - All plastic sewer pipe when installed with all backfill in place and compacted shall not exceed five (5) percent of the internal pipe diameter.

#### E. MANHOLES

Shall be precast concrete manhole sections as manufactured by American Pipe and Construction Company. The requirements shall be shown on the drawings and shall meet with the requirements of ASTM Specifications, Serial Designation C75-76 with subsequent amendments. Precast concrete manhole wall sections may be cored at the time of manufacture for the later placement of steps. These sections shall later be properly grouted in place and the wall sections at each manhole step sealed with an approved concrete sealer to exclude infiltration at those locations. Excessive leaks in this area, if not repairable, shall be cause for rejection of this manhole section.

Manhole bases shall be cast in place to the dimension shown on the Plans. The Contractor shall obtain a casting ring to place in the wet manhole base section for the later fitting of precast concrete manhole section. In areas where speed in completion of manhole is essential as determined by the City Engineer, up to one (1) percent calcium chloride additive may be used in the base section.

Inverts shall be formed as shown on the Standard Drawings by laying pipe through and breaking out the top portion after completion of the base and walls of the manholes. The finished invert shall be smooth and true to grade and junction sewer lines shall be curved to merge with mainline flow and to cause as little hydraulic interference as possible. The inner base section in the manhole shall be brought up to the top of the pipes and rounded at sewer channels. Benches shall then be sloped back up to the walls with a slope at least one (1) inch to one (1) foot.

Manhole segments and rings shall be set evenly with the use of Ram-Nec gaskets. The bottom segment shall be set in a pre-formed lip section and shall be grouted inside and outside and all around to make a water tight joint. In areas where shown, especially on ungraded streets, the upper section of the manhole shall have two (2) feet of grade rings placed for future lowering of those streets where final grade has not been estimated or as directed by the City Engineer. The manhole rings shall be jointed into the top of the manholes so that the cover, when placed, will be at the proper elevation of street surface and so that no surface water or ground water may enter the manhole (i.e., 3/8" high).

- (a) Manholes shall be finished inside at all joints with grout to secure a smooth interior finish.
- (b) Contractor shall take special care to see that the manhole cover is slightly above the surrounding grade so that water does not run toward the manhole, but runs away from the manhole to the extent of the surrounding concrete ring. In any event, the area around the manhole ring shall not be subject to any flooding during rainfall.

#### F. MANHOLE FRAME AND COVER

Manhole Frames and covers shall conform to the dimensions shown on the Plans. Iron castings shall conform to ASTM A-159-70T-G300. Castings shall be consistently high quality and shall be free of material and manufacturing defects. Following cleanup and final machining, an asphaltic paint or similar protective coating shall be applied. Horizontal bearing surfaces between cover and frames shall be machined to smooth, plane surfaces providing for full contact between frame and cover and shall prevent any rocking or shifting. Shop drawings and any required load test data shall be submitted for approval before furnishing frames and covers.

All manhole covers not in an established traveled way shall be a bolt-down type. Cover shall fasten to the frame with four 1/2 inch stainless steel bolts with both heads recessed in the cover.

Manholes located in gravelled streets and roads shall have dust pans provided together with the required frame and cover.

Each manhole cover shall have the words "sewer" cast into the top with letters approximately two (2) inches high.

Typically 24 inch manhole frames shall have a minimum weight of 132 pounds and a maximum cover weight of 140 pounds. Typical 30 inch manhole frames shall have a minimum weight of 165 pounds and a maximum cover weight of 215 pounds.

All manhole frames shall have a minimum height of 3-1/2 inches (Alhambra A-1254 B, A-1170) or as approved by the City Engineer.

G. FITTINGS AND ACCESSORIES

All fittings and accessories shall be as manufactured and furnished by the pipe supplier, or approved equal, and have bell and/or spigot configurations identical to that of the pipe. All fittings shall be of the same material as the pipe, unless specified otherwise. Tee/wye fittings shall be installed at all future lateral locations (vacant lots) at the time of installation of the sewer main.

H. LATERALS

For new construction, laterals shall be constructed with same material used for sewer line. Connection shall be made through the use of a wye or tee-wye combination with the appropriate degree bend. Tees are not permitted.

For cut-in to an existing sewer, a PVC saddle or approved equal shall be used. Cut-in to an existing line may be made only under direct supervision of the City Engineer.

I. CASTINGS

Castings for cleanouts, manholes and other purposes shall be built in accordance with the Standard Drawings and accurately conform to the dimensions shown thereon. Frames, grates, covers, and rings shall be machined where they bear on one another to ensure a close fit. After installation, the covers shall not be loose fitting or wobbly or subject to noise or uplift due to traffic. They shall be of good workmanlike finish, free from blows and sand holes or defects of any kind, and shall possess tensile strength of not less than 16,000 psi. Before leaving the foundry, they shall be thoroughly cleaned and coated by dipping in asphalt applied at a temperature of 300° F. in such a manner as to provide a firm, durable and tenacious coating.

J. WELDING

All required field welding shall be performed by welders qualified under the Standard Qualification procedure of the AWS, and welding shall be in accordance with the latest revision of the Standard

Code for Arc and Gas Welding as issued by the AWS. In addition, all field welding shall meet requirements of AWWA C206.

K. MANHOLE STEPS

Manhole steps shall be installed in all manhole sections prior to installation and as shown on the Plans. Approved is the M.A. Industries Inc. Manhole Step Model PS2-PFS.

L. STEEL REINFORCEMENT

Materials for steel reinforcement shall conform in all respects to Caltrans Standard Specifications Section 52-1.02A to C, inclusive.

M. CEMENT MORTAR AND GROUT

Cement mortar and grout, where authorized by the City Engineer, shall be composed of one part Portland Cement to two parts fine aggregate mixed with water in a mechanical batch mixer to produce a plastic workable mixture. Mortar and grout shall be used immediately after mixing and retempered mortar shall not be used. Sand for mortar and grout shall be equal in quality to the requirements of these specifications for fine aggregates for concrete.

N. CONCRETE

Concrete shall conform to the applicable provision of Section 90 of the Caltrans Standard Specifications and as hereinafter modified. Concrete for manholes, pipe junctions and jacketing shall be Class A containing 564 pounds (6 sacks) of Portland Cement per cubic yard. Concrete for pavement replacement shall be Class B containing 470 pounds (5.5 sacks) of Portland Cement per cubic yard. Type II cement shall be used throughout. The cement used for manhole base construction shall have a fifteen (15) percent approved pozzolan replacement.

O. WATER FOR CONCRETE AND MORTAR

Water for concrete and mortar shall be free from injurious amount of oil, acid, alkali, organic impurities, and other deleterious substances.

P. GALVANIZING

Such metal and hardware as specified or shown on the Plans to be galvanized in accordance with the requirements of ASTM A123-47 for Structural Metal and A153-47T for Hardware, with subsequent amendments. Galvanizing shall be performed after fabrication in the largest practical sections.

## Q. ASPHALT CONCRETE REPLACEMENT

- (1) Subgrade Preparation - Subgrade shall be prepared as Class A subgrade, as specified in Section 21-1 and 21-2 of the Caltrans Standard Specifications. After the subgrade has been properly prepared, the City Engineer will be notified and no base material shall be placed until compaction tests have been made and the subgrade is approved.
- (2) Aggregate Base - Aggregate base shall be Class 2 of a thickness equal to the original paving base, but with a minimum thickness of 8" and shall conform to the provisions in Section 26 of the Caltrans Standard Specifications and these Standard Requirements. The percent passing No. 200 sieve shall not exceed 12. The percent compaction of the base shall be 95.
- (3) Penetration Treatment - Penetration treatment of the aggregate base shall conform to the provisions in Section 36 of the Caltrans Standard Specifications and these Standard Requirements.

Liquid asphalt shall be grade SC-70 and shall be applied at the approximate rate of 0.25 gallons per square yard in one application.

A tack coat of SS-1 shall be applied to all existing asphaltic surfaces.

- (4) Asphaltic Concrete - Asphalt Concrete shall be AR 8000 Type B with 1/2" maximum-medium aggregate and shall conform to the provisions in Section 39 of the Caltrans Standard Specifications and these Standard Requirements. The minimum amount of asphalt binder to be mixed with the aggregate for Type B asphalt concrete for paving shall be six (6) percent by weight of dry aggregate.

A fog seal coat shall be applied in accordance with Section 37 of the Caltrans Standard Specifications.

If hot mix asphalt concrete cannot be placed within 24 hours of final backfilling, asphaltic cold mix shall be placed in all existing pavements.

## III. CONSTRUCTION METHODS

### A. PAVING

- (1) Protection of Paving - During the entire construction period, the Contractor shall take care to protect existing pavement of sealed surfaces. Backhoes and trenchers must have 'street pads'. Grousers or metal tipped pads will not be allowed.

Surfaces scarred by cleanup or excavation equipment shall be repaired in a manner satisfactory to the City Engineer. Any and all damage caused by the Contractor's operation shall be replaced by him to at least the original condition and to the satisfaction of the City Engineer.

- (2) Removal of Paving - Only such paving shall be removed as is necessary to excavate the trench to install the pipe or as shown on the Plans. All asphalt concrete shall be saw cut before excavating. Breaking of asphalt concrete with excavating equipment will not be permitted. All edges of the asphalt concrete shall be cut vertically. The Contractor should keep in mind that all broken or crumbled edges shall later be cut back to firm material. Cuts at manholes, rodholes or appurtenant structures shall be no larger than necessary to install the structures.

## B. EARTHWORK

- (1) General - Earthwork shall conform to the provisions of Section 19 of the Caltrans Standard Specifications and to these Standard Requirements.

The Contractor shall do all excavation of whatever substance encountered to the lines and grades shown on the Plans. The Contractor shall do such grading or work as is necessary to prevent surface water from entering the trench.

NOTE: Contractor is hereby specifically informed under his permit, he has sole responsibility for the safety of his work, including his workmen, equipment and that of subcontractors or of the general public as they may come in contact with the work.

- (2) Trenching -- Attention is directed to Section 5, "Trench Excavation Safety Plans," of the Caltrans Standard Specifications. Trenching for all pipes shall be in open cut to provide a minimum cover of 3.0' below finish pavement surface or as established by the Plans.

Where excavation for trenching is in a paved street or alley, or it is necessary to excavate in a paved area, the Contractor will mark out and saw the pavement in a straight line along the trench route to ensure a good clean joint for patching, with the limits of paving cut to be three (3) inches greater in width on each side of the proposed trench than the trench excavation. If the paving is broken to a ragged edge, the Contractor will be required to re-cut the paving before the paving patch is placed. The trench excavation shall then proceed as hereafter specified.

Except where otherwise specifically permitted, banks of trenches shall be vertical and shall be of uniform width from top to bottom. Trenches shall be of a width as shown on Standard Drawing No. 103, except where otherwise specifically permitted. Consideration will be given to the standard widths of buckets available on the excavation equipment. Said widths of trench shall be kept as small as practical while providing sufficient working space for jointing pipe and compacting backfill.

On public rights-of-way, except with specific approval of the City Engineer, no more than two hundred (200) feet of open trench shall be excavated in advance of laying the pipe. Not more than fifty (50) feet of trench excavation shall remain unbackfilled at the end of the day's work. The remainder of the trench shall be backfilled, initially compacted with cold mix asphalt and opened to traffic. All operations shall be carried out in an orderly manner. Backfilling, compacting and cleanup work shall be accomplished as sections of the pipe installation are approved, and traffic through the work shall be impeded or obstructed as little as possible.

The bottom of the trench shall be carried to the lines and grades shown on the Plans allowing a minimum depth as shown on Standard Drawing No. 103, for the thickness of pipe and for the type of bedding specified. Any part of the trench excavated below the proper grade shall be corrected with approved bedding material. The bed shall be hand-raked ahead of the pipe-laying operation to remove any stones or lumps which will interfere with smooth and proper bedding. Bell holes shall be hand-dug at the location of the joints and shall be of sufficient size to allow proper making of the joint and to prevent the collar or bell of the pipe from bearing on the bottom of the trench. After the pipe has been laid and approved for coating, bedding and cover material shall be placed evenly on both sides of the pipe to the full width of the trench.

Where the ground is too soft to make a firm uniform bed for the pipe, the trench shall be over excavated below the bottom of the pipe to a firm bed and backfilled with approved bedding material.

- (3) Disposal of Excess Material - where material is excavated in excess of that required for the site, such excess materials shall be removed and disposed of by the Contractor as directed by the City Engineer. All excess material shall be removed from the right-of-way and disposed of by the Contractor. The location of the disposal site shall be the responsibility of the Contractor and shall be subject to the approval of the City Engineer. Written approval by the Disposal site owner and a grading permit issued by the affected public agency must be provided.

Removal of excess material shall be done immediately following backfilling operations. Any spoils piles, bedding gravel, base material and the like shall be properly lighted and barricaded for traffic safety. In all cases, such piles shall be placed as far out of the traveled way as possible.

Disposal of removed pavement and surplus excavated material shall be in accordance with Section 7-1.13 of the Caltrans Standard Specifications.

All material disposed at the City's Sanitary Landfill is subject to payment of current fees.

- (4) Removal of Water - The Contractor shall remove and dispose of all water entering the excavation. Disposal of water shall be done in such manner to prevent damage or nuisance to adjacent property. Sufficient pumping equipment shall be provided to maintain the trench in a dry condition during the bedding and initial backfilling of the pipe.

The Contractor shall maintain all natural drainage and restore it to its former condition as soon as possible after proceeding through any areas.

- (5) Shoring, Bracing and Sheeting - The Contractor shall furnish, install and maintain such shoring, bracing and sheeting as required to conform to the rules and orders of the California Division of Industrial Safety to support sides of the trench and prevent movement which could cause injury to any person or structures. Any damage resulting from lack of adequate shoring, bracing or sheeting shall be repaired at the Contractor's expense. The Contractor shall be fully responsible and liable for the safety of his operations at all times.
- (6) Backfill - No backfilling shall be done until the installation to be covered has been inspected and approved for covering. Backfilling shall be carried out in an orderly fashion and, in general, shall be done as soon as approval has been given to cover the pipe. **COMPACTION OF BACKFILL SHALL PROCEED SIMULTANEOUSLY WITH BACKFILLING OPERATIONS.**

C. Backfill material shall comply with Standard Drawing No. 103.

#### REMOVAL OR ABANDONMENT OF EXISTING SEWER MAINS

Existing sewer mains which are being replaced shall be removed where necessary, or abandoned as indicated on the Plans and specified herein. The main to be abandoned or replaced shall be removed when any of the following conditions exist:



1. The alignment of the existing main falls within the trench excavation for the new main.
2. The alignment of the existing main is not more than one foot outside of the standard trench width for the new main.
3. When called out on the Plans.

When the existing main is shown on the Plans as located outside of the limits of conditions one and two above, but actually falls within these limits, the Contractor shall remove the main as if it were shown correctly. However, the City Engineer may, but is not obligated to, change the new main alignment so that conditions one or two above does not exist.

Where portions of the old main and/or laterals are abandoned and left in place, either the exposed ends of the abandoned main and lateral shall be tightly plugged with Class B concrete 6 inches thick, or the abandoned main shall be blown full of concrete sand and the exposed ends and abandoned laterals shall be tightly plugged with Class B concrete 6" thick, as indicated on the plans.

All salvaged material from any abandoned sewer main and its appurtenances shall remain the property of the City at the time of its removal from the trench, unless otherwise specified. Such material shall not be allowed to accumulate along the line of work, but shall be removed from the area at the earliest practical time and will be picked up by City forces.

#### D. PVC PIPE INSTALLATION

All PVC pipe and fittings for underground gravity sewers shall be installed in accordance with the requirements of ASTM Standard D-2321, as amended to date. "Recommended Practice for Installation of Flexible Thermoplastic Sewer Pipe."

#### E. PIPE LAYING

Each pipe of the diameter called for by the Plans is to be laid on a firm bed and have a true bearing of its entire length. The pipe shall be laid in perfect conformity to the prescribed lines and grades. All adjustments to line and grade must be made by scraping away or filling in the earth under the body of the pipe, and not by wedging or blocking up the hub. A shallow excavation shall be made underneath the pipe at the joint to accommodate the bell and facilitate the making of the joint.

All pipe shall be laid continuously uphill, and with the bell end upgrade. The faces of the spigot ends and of all shoulder or sockets must be true and brought into fair contact and all lumps and excrescences of said faces shall be cut away before the pipe is lowered into the trench. When the work ceases for any reason, the unfinished end of the pipe shall be securely closed with a plug or cover.

The interior of the pipe shall be free from all dirt and foreign matter as the work progresses and left clean at its completion.

In general the pipe shall be installed in accordance with the manufacturer's recommendations and these Standard Requirements.

F. CROSSING LINES

In cases when crossing other utility lines, a six {6} inch minimum clearance is required. Required separation between water mains and sanitary sewers shall be ten {10} feet horizontal and three (3) feet vertical, or in conformance with guidelines as established by the State of California Department of Health. Any deviation must have the approval of the City Engineer.

G. COMPACTION

- (1) Pipe Bedding - The bedding material shall be placed in six (6) inch layers and thoroughly compacted by the use of an approved tamper. Particular care shall be taken to provide solid backing against the underside of the pipe. The trench shall be backfilled in this manner to a depth of twelve (12) inches above the top of the pipe, to a minimum density of ninety {90} percent.

Where required by unstable sidewalk conditions, special attention shall be given to compacting such material on the sides of the pipe to prevent overstress or excess deflection.

- (2) Pipe Backfill - Except as otherwise specified, backfill material shall be deposited in horizontal layers not exceeding eighteen (18) inches in thickness and compacted to ninety (90) percent compaction with hand-operated power tamper or as an alternate in layers not exceeding thirty-six (36) inches and compacted with hydra-hammer. Backfilling shall continue in this manner to within one {1} foot of the pavement subgrade. The last six (6) inches below pavement subgrade shall be placed and compacted to ninety-five (95) percent compaction by rolling with a vibrating trench roller with a compression of not less than 200 lbs. per linear inch on the compacting wheel, or equivalent mechanical means, including hydra-hammer, or as directed by the City Engineer. Care shall be exercised so that rolling is not continued to the point that 'pumping' develops.

Wherever it is necessary to cross an existing water main, whether the pipe is cut through or replaced or tunneled underneath, the backfill shall be made by use of a pneumatic tamper. The entire area under the pipe, two (2) feet on either side and six (6) inches on top of the crossing pipe shall be so tamped.

In lieu of compaction by tamping, the Contractor, after backfilling the excavation with an imported (river-run) sand may compact by jetting on 18" centers each way to the required ninety (90) percent. Care shall be exercised that no extensive ponding occurs from the excessive use of water.

Excavations, if filled with any uncompacted or unsettled materials, shall be re-excavated and the backfill material reconsolidated.

- (3) Compaction Tests - Compaction tests will be made in accordance with State of California, Department of Transportation California Method number 216 G as noted in the Caltrans Standard Specifications. Relative compaction shall not be less than ninety (90) percent as determined by the specified tests and ninety-five (95) percent in the top six (6) inches.

Compaction tests shall be furnished to the City by the Contractor and paid for by the Contractor. Such tests are to be made by a testing laboratory approved by the City Engineer. The Contractor will furnish one (1) compaction test per each two hundred (200) linear feet of the compacted backfill with samples taken at depths determined by the City Engineer. In the case where trenching and backfilling is performed in a paved street or alley, one compaction test per two hundred (200) linear feet of the compacted subgrade and of the base material will also be furnished to the City by the Contractor, and any additional tests required by the City Engineer to ensure uniform and required compaction over the entire project.

#### H. WATERING

Furnishing and applying water shall conform to the provisions in Section 10 and 17 of the Caltrans Standard Specifications and these Standard Requirements.

Water provided by the City through City approved fire hydrants shall be metered and paid for by the Contractor. Hydrant meters may be obtained through the City Treasurer. Monthly water service charges and water usage charges will commence upon installation.

The Contractor shall provide for the application of water for the purpose of controlling dust caused by his operations or by public traffic.

I. CLEANING

After compaction is approved and prior to final acceptance, all pipe must be flushed and balled (with a Wayne-type Ball) Progressively downstream to clean out any accumulated debris. Contractor shall install a screen or similar device at downstream manhole to prevent contamination of downhill lines. This operation requires witness by the City Inspector. Immediately after the pipe has been cleaned it shall be tested by the air test procedure described below.

J. FINAL INSPECTION AND TESTS

- (1) Deflection Test for All Plastic Sewer Pipe and Composite Sewer Pipe - Following the placement and densification of backfill and prior to the placement of any permanent pavement, all pipe lines shall be cleaned and then mandrelled to measure for obstructions, deflections, joint offsets and lateral pipe intrusions. The mandrel shall be rigid with a circular cross section having a diameter at least ninety-six (96) percent of the specified average inside diameter of the pipe and shall be pulled through the pipe by hand. The minimum length of the cylindrical portion of the mandrel shall be equal to the nominal diameter of the pipe.

Should any section of pipeline fail to pass this mandrel test, the Contractor shall open the pipe trench and repair the pipeline until it satisfactorily passes the mandrel test.

All material, equipment and labor to perform the test shall be provided by the Contractor at no cost to the City.

- (2) Recommended Air Test for VC Sewer Pipe - After the sewer pipe has been laid and backfilled, each section of pipe line between manholes shall be tested by a low pressure air test and inspected by the City Engineer.

The following procedure for air testing as specified by the National Clay Pipe Institute (NCPI) will be acceptable for testing sewer lines.

The Contractor shall furnish all facilities and personnel for conducting the test under the observation of the City Engineer. The equipment and personnel shall be subject to the approval of the City Engineer. The Contractor shall clean the line before proceeding with the air test. All debris shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris or a damaged pipe shall prevent cleaning, the Contractor shall remove the obstruction. The pipe or sections of pipe to be tested should be wetted before the air test is started.

Immediately following the pipe cleaning and wetting, the pipe shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe.

The pipeline shall be considered acceptable when tested at an average pressure of 3.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe when the section under test does not lose air at a rate greater than 0.003 cubic feet per minute per square foot of internal pipe area except that the minimum allowable rate of loss for the section shall not be less than 2 cubic feet per minute.

The requirements of this specification shall be considered satisfied if, during the time as computed according to the "Air Test Table" on the following page entitled "Recommended Procedure for Conducting Acceptance Test," the pressure in the pipeline does not drop more than one p.s.i. below the initial pressure of 3.5 p.s.i. greater than the average back pressure of any ground water head that may submerge the (pipe) line.

Acceptance Test shall be made for each first section of line constructed, for every first reach of line installed where a new sewer crew is used, or wherever the City Engineer may direct. The Contractor shall not proceed with any construction until the prerequisite of meeting the successful installation of each section is made, as mentioned above, to qualify the crew and/or material.

If the pipe installation fails to meet these requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this test, or the alternate water exfiltration or infiltration test before being considered acceptable.

- (3) Safety Provisions - The plugs must be firmly secured and care should be exercised in their removal. (The total force on a 12" plug at 4.0 psi is over 450 pounds.) Care must be exercised in not loading the sewer line with the full pressure of the compressor. Keep men out of manholes until the pressure has been released. If water leaks into the line after the

plugs are installed and floods the air inlet and the needle on the air pressure gauge indicates zero, then possibly the water column has balanced the air pressure in this instance and care is necessary in releasing the pressure. If testing below ground water level, inject the air at the upper plug and/or turn the inlet up as with a water test apparatus.

NCPI AIR TEST TABLES

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3 1/2 TO 2 1/2 PSIG

PIPE DIAMETER

|     | 4"  | 6"  | 8"  | 10" | 12" | 15" | 18" | 21" | 24" | 27" | 30" | 33" | 36"  | 39"  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 25  | 4   | 10  | 18  | 28  | 40  | 62  | 89  | 121 | 158 | 200 | 248 | 299 | 356  | 418  |
| 50  | 9   | 20  | 35  | 55  | 79  | 124 | 178 | 243 | 317 | 401 | 495 | 599 | 713  | 837  |
| 75  | 13  | 30  | 53  | 83  | 119 | 186 | 267 | 364 | 475 | 601 | 743 | 898 | 1020 | 1105 |
| 100 | 18  | 40  | 70  | 110 | 158 | 248 | 357 | 485 | 634 | 765 | 851 | 935 |      |      |
| 125 | 22  | 50  | 88  | 138 | 198 | 309 | 446 | 595 | 680 |     |     |     |      |      |
| 150 | 26  | 59  | 106 | 165 | 238 | 371 | 510 |     |     |     |     |     |      |      |
| 175 | 31  | 69  | 123 | 193 | 277 | 425 |     |     |     |     |     |     |      |      |
| 200 | 35  | 79  | 141 | 220 | 317 |     |     |     |     |     |     |     |      |      |
| 225 | 40  | 89  | 158 | 248 | 340 |     |     |     |     |     |     |     |      |      |
| 250 | 44  | 99  | 176 | 275 |     |     |     |     |     |     |     |     |      |      |
| 275 | 48  | 109 | 194 | 283 |     |     |     |     |     |     |     |     |      |      |
| 300 | 53  | 119 | 211 |     |     |     |     |     |     |     |     |     |      |      |
| 350 | 62  | 139 | 227 |     |     |     |     |     |     |     |     |     |      |      |
| 400 | 70  | 158 |     |     |     |     |     |     |     |     |     |     |      |      |
| 450 | 79  | 170 |     |     |     |     |     |     |     |     |     |     |      |      |
| 500 | 88  |     |     |     |     |     |     |     |     |     |     |     |      |      |
| 550 | 97  |     |     |     |     |     |     |     |     |     |     |     |      |      |
| 600 | 106 |     |     |     |     |     |     |     |     |     |     |     |      |      |
| 650 | 113 | 170 | 227 | 283 | 340 | 425 | 510 | 595 | 680 | 765 | 851 | 935 | 1020 | 1105 |

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY.

- (4) Televising of Sewer Line - Prior to acceptance of the sewer line, the City reserves the right to televise, at no cost to the Contractor, the sewer line. All deficiencies noted during the television will be repaired by the Contractor to the satisfaction of the City. Upon completion of the repairs, the City will re-televise the repaired line. The cost of re-televising the line shall be charged to the Contractor. It is recommended, but not required, that the Contractor request the televising of sewer lines prior to street paving to minimize the cost of possible repairs.

K. CLEAN-UP

The Contractor shall clean-up and dispose of all trash, broken pavement, debris and excess material and remove his equipment from the site of the work as soon as it is completed. Streets shall be swept and washed to remove dust and mud.

MANHOLE RING & COVER  
(ALHAMBRA FOUNDRY NO.  
A1254) OR APPR. EQUAL

STEEL AREA =  
0.08 sq. in./ft.

5" 24" RISER RINGS  
12" MAX.

STEEL AREA =  
0.16 sq. in./ft.

CONCENTRIC REDUCER ①

5" 4' TIE BARS

3" MIN. 3" MIN.

1" MIN.

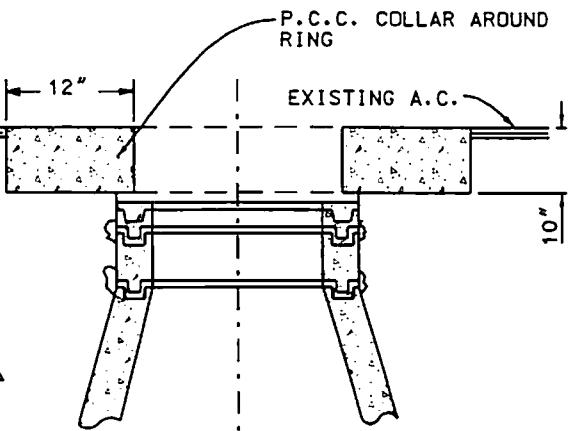
SHAFT PIPE IN  
UNITS OF .16"

MIN. TO  
CLEAR PIPE

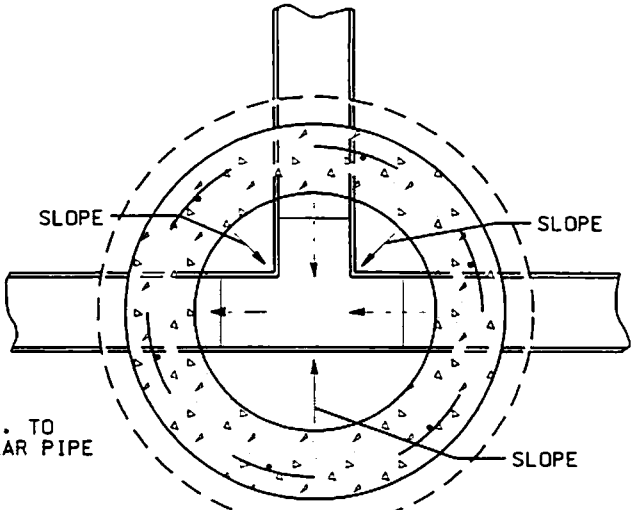
NO. 4 BARS AT  
12" CENTERS - BOTH WAYS

X - SECTION

CLASS A (6 SACK) PORTLAND  
CEMENT CONCRETE BASE



NOTE:  
SET ALL BARREL SECTIONS, TAPER SECTIONS,  
AND GRADE ADJUSTMENT RINGS IN PLASTIC  
GASKET, RAM-NECK OR APPROVED EQUAL.



INVERT PLAN

- NOTES:
1. HEIGHT OF SHAFT PIPE AND RISER RINGS TO BE MADE OF STANDARD UNITS.
  2. ALL UNITS REINFORCED SINGLE CAGE.
  3. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE 4000 P.S.I.
  4. MORTAR SHALL BE 1 PART CEMENT TO 2 PART SAND.
  5. LAY PIPE THROUGH MANHOLE.

APPROVED LAWRENCE McPHERSON 7/13/90  
CITY ENGINEER R.C.E. 21157 DATE

|   |                              |    |       |
|---|------------------------------|----|-------|
| ① | CHANGE TO CONCENTRIC REDUCER | KM | 10/06 |
| ② | REMOVE STEPS                 | KM | 10/06 |

MARK REVISIONS APPR. DATE

CITY OF LOMPOC  
Engineering Division

STANDARD R.C.P. MANHOLES

STANDARD DRAWING NO. 300

Resolution No. 3967(90)

SHEET 1 OF 1



The crown elevation of all pipes shall be the same as the crown elevation of the largest pipe unless otherwise indicated.

2 - 12" pipe joints at inlets and outlet.

Manhole shaft shall be placed on downstream side of manhole.

When unbroken end of pipe is within manhole leave square end and fill fillets of upper section to drain.

When broken end of pipe is within manhole break back flush with inside of manhole wall and plaster broken edges smooth.

REFER TO STANDARD DRAWING NO. 300 FOR DETAILS NOT SHOWN ON THIS DRAWING.

R = 2 X Dia.

Lay larger pipe through manhole

Cone shall be eccentric to the downstream side of the manhole.

TRAFFIC LAMPHOLE COVER AND FRAME (Alhambra Foundry No. A-1240) Or Approved Equal.

Top of pavement or existing grade

Varies

2'

16" typ.

48"

Class "A" concrete

Inside Pipe Plug - Cherne Gripper Mechanical Plug or Approved Equal.

Straight pipe

NOTE

Set all Barrel Sections, Tapers, Sections, and Grade Adjustment Rings in PLASTIC GASKET, RAMNECK or Approved Equal.

Varies

Water tight joints (typical)

Pipe crowns same elevation

Std. drop manhole cross

Straight pipe

Backfill manhole 12" above top of wye with clean sand.

Water stop, when PVC used. (Typ.)

Std. 90° bend


Class "A" concrete

9"


3"

Base poured against undisturbed soil

No. 4 bars @ 12" ctrs.

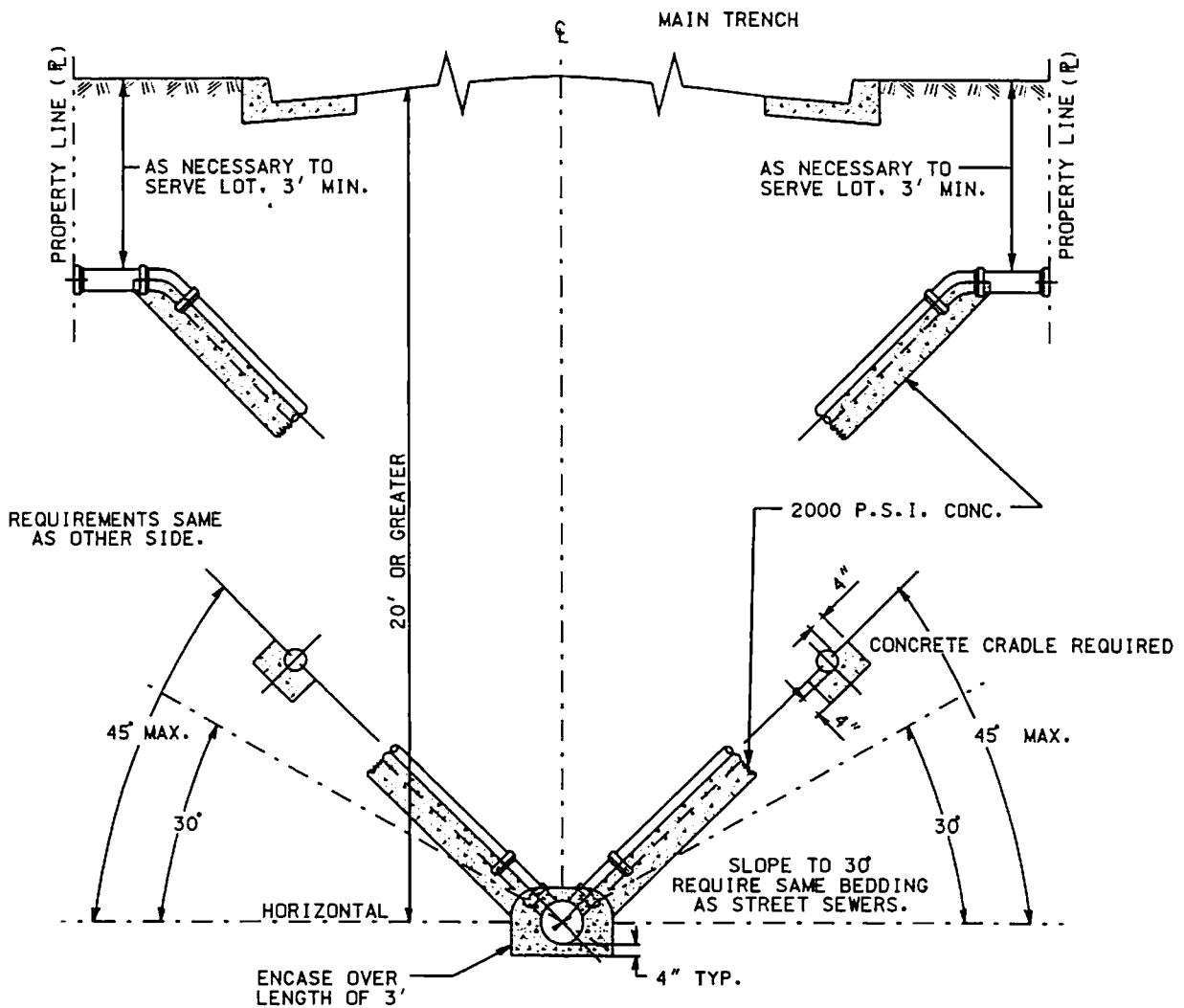
APPROVED:  DATE: 11-2-90  
City Engineer R.C.E.# 21157

**CITY OF LOMPOC  
ENGINEERING DIVISION**

|     |   |     |         |
|-----|---|-----|---------|
| CSH |  Clean-out | CDH | 2-12-92 |
|     | DETAIL DELETED  | KM  | 10/06   |
|     |   |     |         |
|     |   |     |         |

**STANDARD 48" MANHOLE  
AND  
DROP MANHOLE CONNECTION**  
**RESOLUTION NO. 3967(90)**  
**STANDARD DRAWING NO. 301**

| Mark | Revisions | Appr. | Date |
|------|-----------|-------|------|
|------|-----------|-------|------|

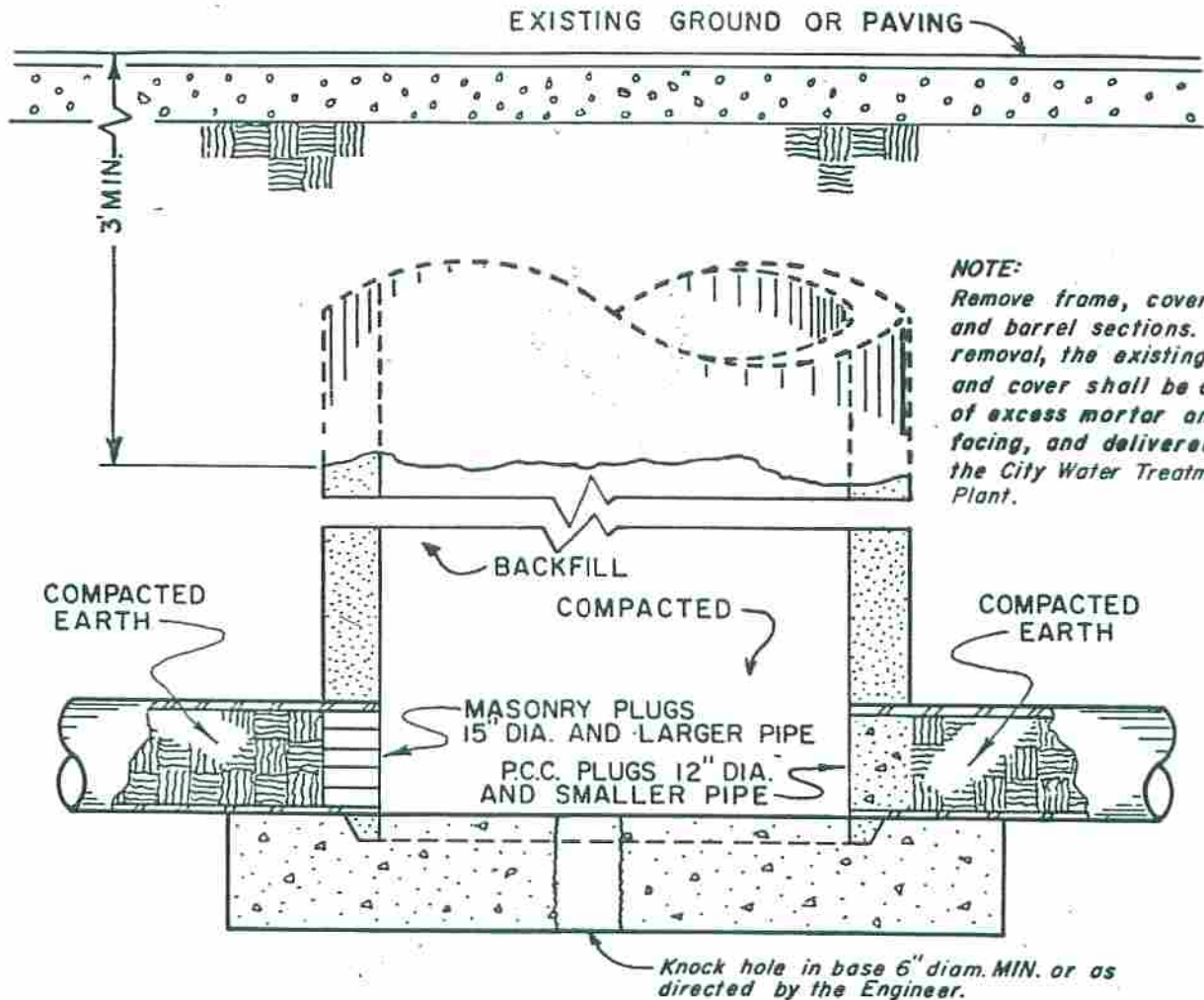


**ELEVATION**


**NOTES:**

1. 4" FOR FAMILY DWELLING.
2. 6" FOR MULTIPLE DWELLINGS.
3. CLEAR WATERMAINS PER STD. DWG. 413.
4. SEE STANDARD DRAWING FOR ALTERNATE DESIGN.
5. ALL WORK TO CONFORM TO STANDARD SPECIFICATIONS.
- △ 6. NO SERVICE TOPS.

|   |                |   |              |
|---|----------------|---|--------------|
| APPROVED <u>JIM DIXON</u><br>CITY ENGINEER R.C.E. 24658 | 7/3/84<br>DATE | <b>CITY OF LOMPOC</b><br>Engineering Division                   |              |
| △ 1 NO SERVICE TOP LATERALS                             | KM 10/06       | <b>STANDARD SEWER DETAILS</b><br><b>LATERAL FOR DEEP SEWERS</b> |              |
| MARK REVISIONS  | APPR. DATE     | <b>STANDARD DRAWING NO. 302</b>                                 |              |
|   |                | Resolution No. 3366(84)   | SHEET 1 OF 1 |



- NOTE:**
1. After plugging all pipes in manhole, the remaining portion of the barrel section and all voids created by the removal of the upper portions of the manhole, shall be backfilled and compacted to 90% relative density.
  2. The street paving section shall be replaced in accordance with STD SPEC'S, or as otherwise authorized by the Engineer.

|          |   |              |
|----------|---|--------------|
| APPROVED |  | DATE 7-3-84  |
|          | CITY ENGINEER   | R.C.E. 24658 |
| MARK     | REVISIONS   | APPR. DATE   |
|          |   |              |
|          |   |              |
|          |   |              |

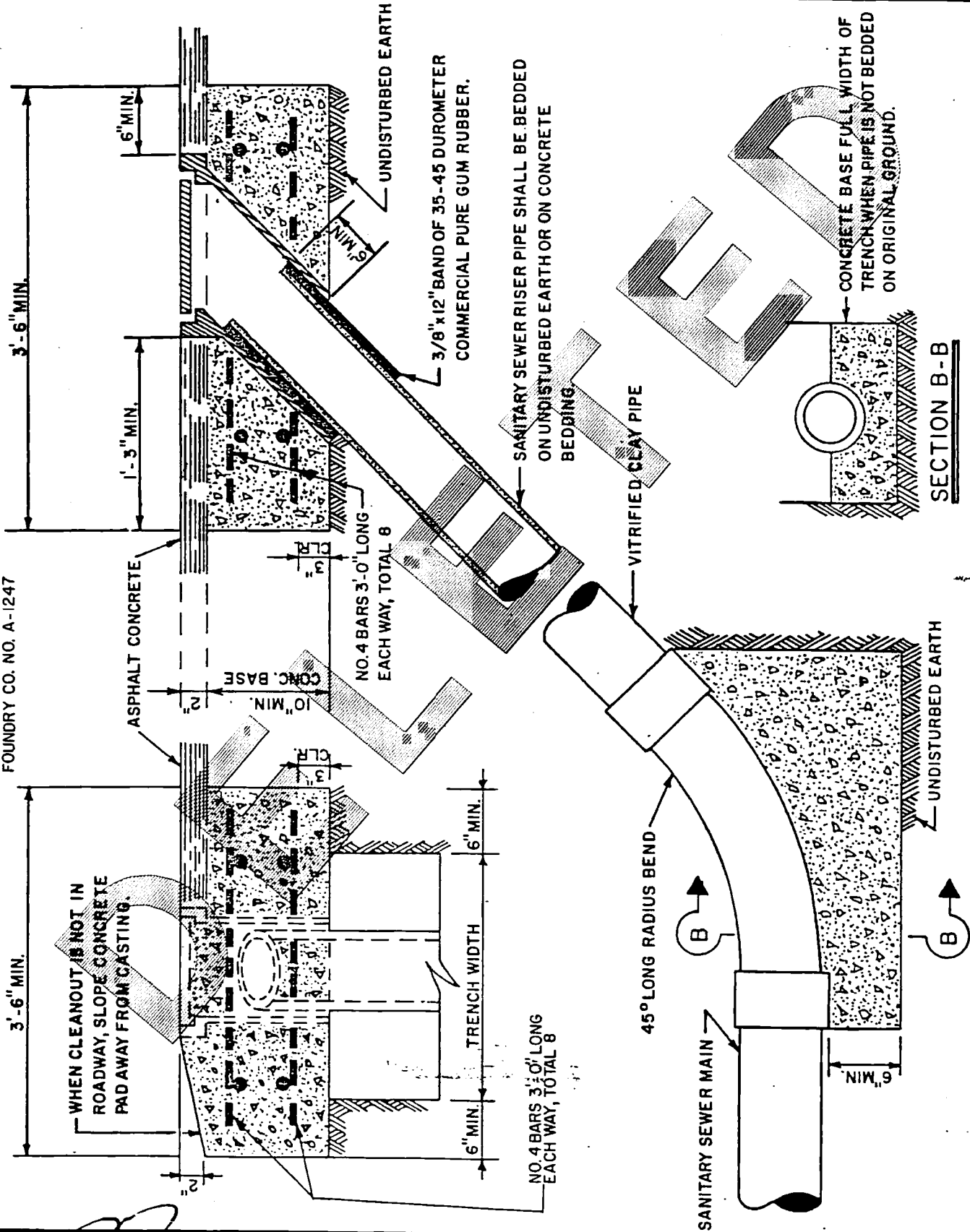
**CITY OF LOMPOC**  
ENGINEERING DIV.

**ABANDONED MANHOLE  
DETAIL**

STANDARD DRAWING NO. 303

RESOLUTION NO. 3366 (84) SHT. 1 OF 1

**APPROVED RIM & COVER**  
 TO BE EQUAL TO ALHAMBRA  
 FOUNDRY CO. NO. A-1247



APPROVED

*[Signature]*  
 CITY ENGINEER

DATE 7-3-84  
 R.C.E. 24658

**CITY OF LOMPOC**  
 ENGINEERING DIV.

BETAIL DELETED

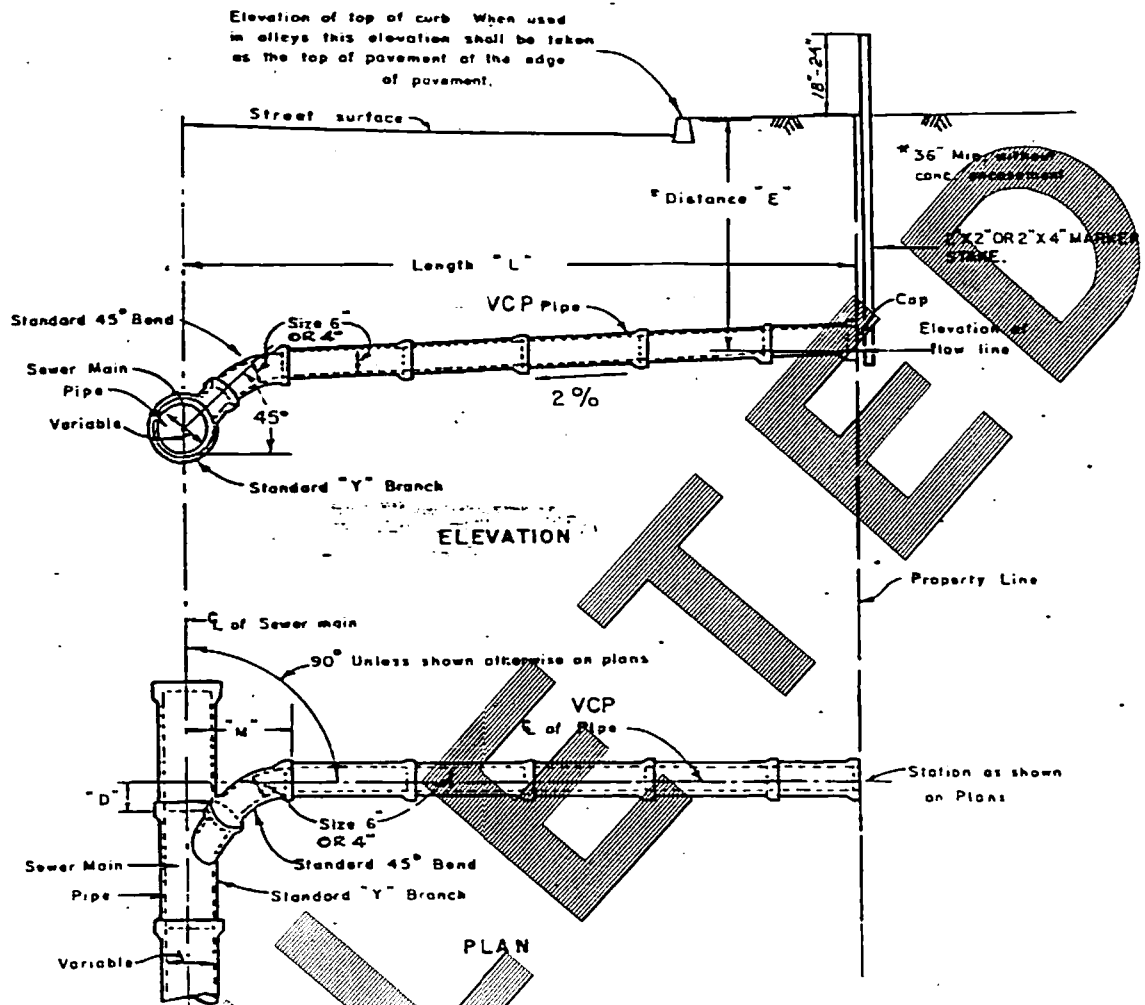
KM 10/06

**MAINLINE CLEANOUT**

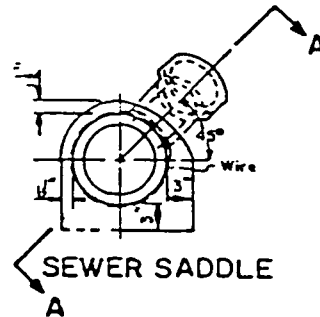
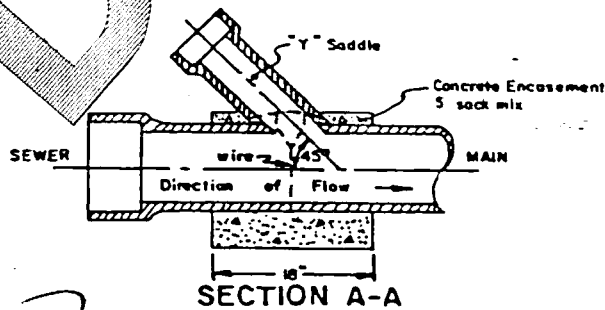
STANDARD DRAWING NO. 304

RESOLUTION NO 3366 (84)

SHT. / OF 1



1. The length "L" is shown on the improvement plans.
2. The station of the point of intersection of the centerline of the sewer connection pipe and the property line is shown on the improvement plans.
3. The inlet end of the sewer connection pipe shall be closed by a cap made for that purpose. The remaining space in the socket shall be filled with wet sand covered with a thin coating of neat cement mortar.
4. The distance "E" is to be 36" unless otherwise specified.
5. An "S" shall be placed on top of curb at lateral crossing for future location.



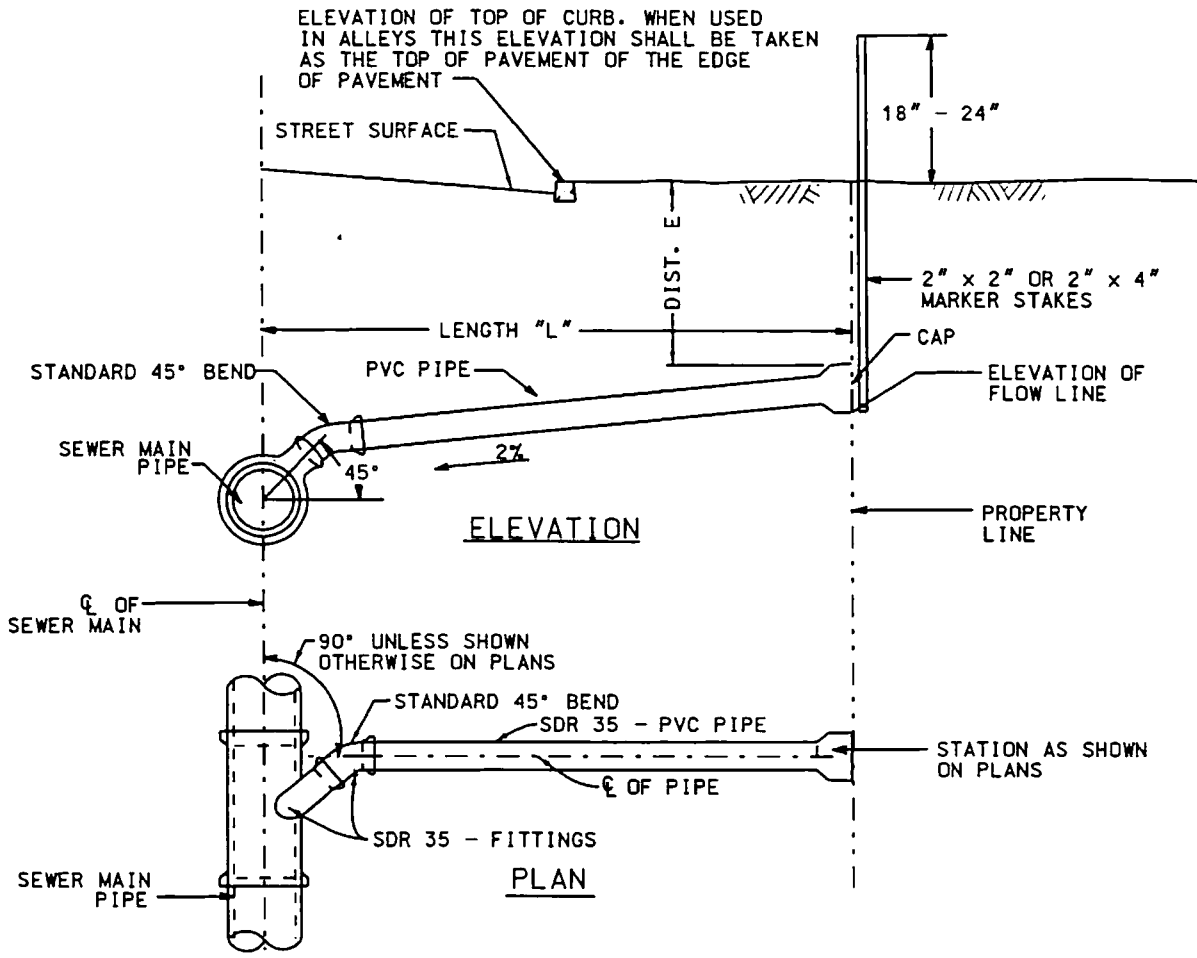
|          |                  |              |
|----------|------------------|--------------|
| APPROVED |                  | DATE 7-3-84  |
|          | CITY ENGINEER    | R.C.E. 24658 |
| D.A.A.   | Distance "E"     | 6-82         |
|          | REVISED PVC PIPE | 7-17-90      |
|          | DETAIL DELETED   | KM 10/06     |
| MARK     | REVISIONS        | APPR. DATE   |

**CITY OF LOMPOC**  
ENGINEERING DIV.

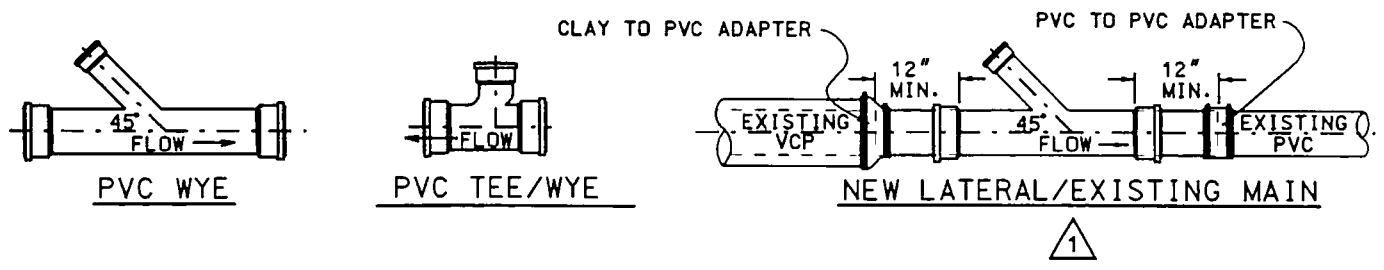
**STANDARD SEWER LATERAL**

STANDARD DRAWING NO. 305

RESOLUTION NO. 3366(84) SHT. 1 OF 2

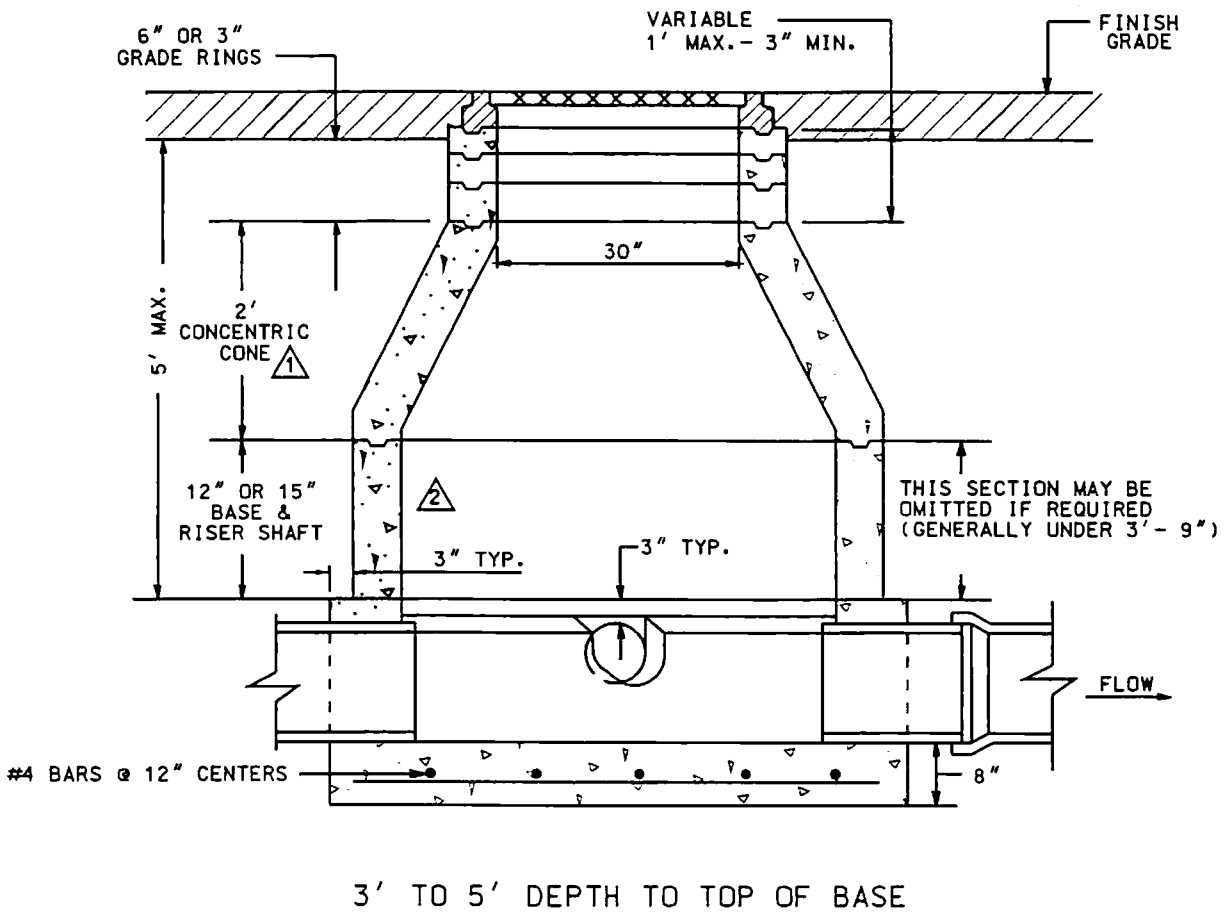
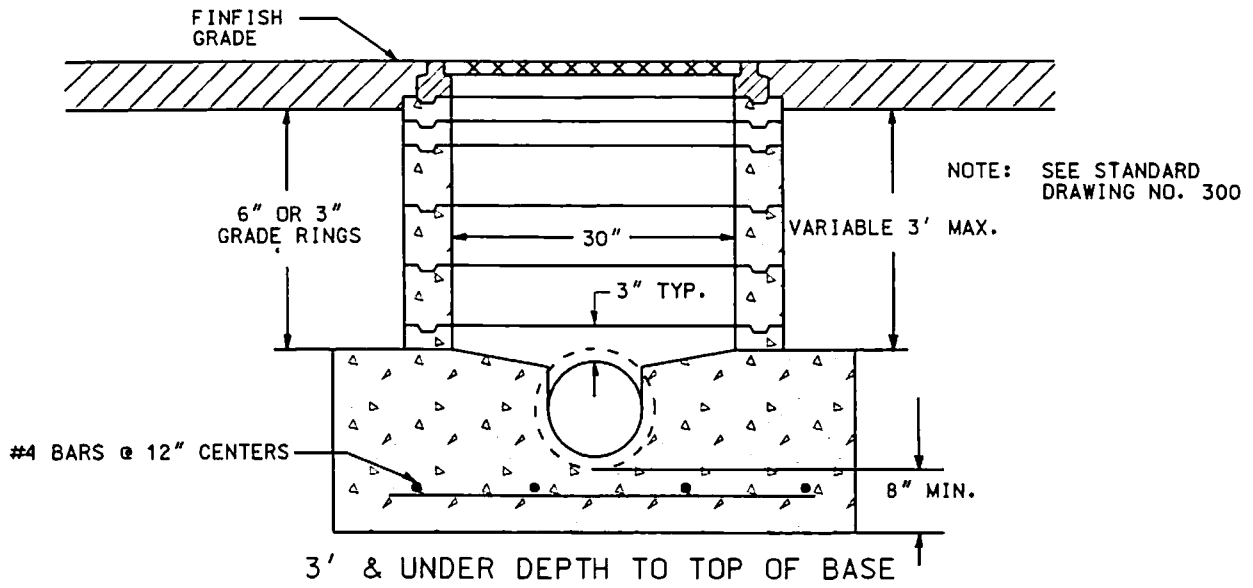


1. THE LENGTH "L" IS SHOWN ON THE IMPROVEMENT PLANS.
2. THE STATION OF THE POINT OF INTERSECTION OF THE CENTERLINE OF THE SEWER CONNECTION PIPE AND THE PROPERTY LINE IS SHOWN ON THE IMPROVEMENT PLANS.
3. THE INLET OF THE SEWER CONNECTION PIPE SHALL BE CLOSED BY A CAP MADE FOR THAT PURPOSE.
4. THE DISTANCE "E" IS TO BE 3' UNLESS OTHERWISE SPECIFIED.
5. AN "S" SHALL BE PLACED ON TOP OF CURB AT LATERAL CROSSING FOR FUTURE LOCATION.



|          |                            |            |
|----------|----------------------------|------------|
| APPROVED | LAWRENCE McPHERSON         | 7/13/90    |
|          | CITY ENGINEER R.C.E. 21157 | DATE       |
| 1        | DELETE SHEET 1 - VCP PIPE  | KM 10/06   |
| 1        | DELETE SADDLE OPTION       | KM 10/06   |
| MARK     | REVISIONS                  | APPR. DATE |

**CITY OF LOMPOC**  
 Engineering Division  
**STANDARD SEWER LATERAL**  
 STANDARD DRAWING NO. 305  
 Reslution No. 3967(90) SHEET 2 OF 2



|          |                              |         |  |
|----------|------------------------------|---------|--|
| APPROVED | LAWRENCE McPHERSON           | 7/13/90 | CITY OF LOMPOC<br>Engineering Division |
|          | CITY ENGINEER R.C.E. 21157   | DATE    |  |
| ①        | CHANGE TO CONCENTRIC REDUCER | KM      | 10/06                                  |
| ②        | REMOVE STEPS                 | KM      | 10/06                                  |
| MARK     | REVISIONS                    | APPR.   | DATE                                   |

**SHALLOW MANHOLES**

STANDARD DRAWING NO. 306

Resolution No. 3967(90) SHEET 1 OF 1