



SEWER
STANDARD SPECIFICATIONS AND DETAILS

NOVEMBER 2006

Prepared By:

KENNEDY/JENKS CONSULTANTS
10850 Gold Center Drive, Suite 350
Rancho Cordova, California 95670
916-858-2700 (Phone)
916-858-2754 (Fax)

JOB NO. 0570015*02

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Section 1: General

These Standard Specifications and Details provide minimum standards to guide the design and construction of sewerage works and related public improvements within the jurisdiction of the Twain Harte Community Services District (District). The sewerage works are to be designed and constructed by the Applicant at no cost to the District and, upon acceptance by the District, dedicated to the public and accepted by the District for maintenance or operation.

Work on public sewerage works shall be constructed by a licensed contractor, subject to inspection by the District, or by District personnel. The Applicant shall follow all applicable District, County, State and Federal laws and regulations relating to construction of improvements. Work on public sewerage works shall be constructed by a licensed contractor.

All work on District facilities shall require a performance and completion bond equivalent to 100 percent of the value of the work, as estimated by a licensed Professional Engineer.

Improvements for acceptance by the District shall be installed in accordance with the approved improvement plans and specifications and these Standard Specifications and Details. In addition, work within the County road right-of-way shall be done to Siskiyou County requirements.

1.1 Related Documents

These criteria and standards are in addition to the requirements of the following District documents:

- Rules and Regulations Relating to Sewers and Sewage Discharge
- Policy and Procedure Manual:
 - Miscellaneous Fee Schedule
 - Development Improvement Standards
 - Project Approval
 - Development Agreements

1.2 Definitions

Terms used in this document are as defined in Rules and Regulations Relating to Sewers and Sewage Discharge.

1.3 Order of Precedence

The following order of precedence shall apply should conflicts arise between these Standard Specifications and Details and other project documents:

- Project-specific conditions of approval by the District shall take precedence over these Standard Specifications and Details.
- These Standard Specifications and Details shall take precedence over all other documents for materials, installation and testing of facilities to be dedicated to the District.
- All other public works shall comply with the standards of the local permitting jurisdiction.

1.4 Periodic Updates and Modifications

The District may from time to time update or otherwise modify these standards. The user is responsible to confirm with the District that they are using the current standards subject to all updates and modifications prior to proceeding with a design submittal or application to the District for plan check and review. Failure to obtain and use the current standards may result in the rejection of a submittal and necessitate resubmittal at additional cost to the applicant.

1.5 Rights-of-Way

The extension or improvement of District sewerage collection facilities shall be located only in public road rights-of-way, on land owned by the District in fee, existing public utility easements, or in an easement granted to the District. Sewer mains shall be located within public road rights-of-way whenever possible; sewer mains outside of the public road right-of-way or an existing utility easement will require District approval.

Public utility easements shall be continuously maintained by the property owners' associations or others where the utilities and easements are not located in a publicly maintained road right-of-way.

The applicant shall convey or grant to the District without cost such land and/or easements the District determines necessary for the facilities. The District may also require an easement for future extensions. Land conveyed to the District shall be free and clear of liens or encumbrances except encumbrances of record that are acceptable to the District.

An easement shall be granted to the District along the entire length of the Applicant's parcel except in cul-de-sacs, dead-end roadways or other situations where the District determines that the pipeline may terminate.

The minimum permanent easement width shall be 20 feet, 10 feet each side of sewer main. Any needed temporary construction easements shall be obtained and paid for by the Applicant.

Section 2: Design Criteria

Design of improvements to these Design Criteria without consideration to the actual project conditions does not guarantee plan approval. These Standards shall be considered minimum design criteria. The actual design parameters shall be established by the designer based on site-specific conditions. Design of any sewerage works not specifically addressed within the design criteria below shall be closely coordinated with and approved by the District.

2.1 Applicable Standards

The most current pertinent requirement of the following agencies and standards shall apply to design of sewerage works:

- Laws, codes and standards of the State of California, Department of Health Services.
- General Order No. 103 of the California Public Utilities Commission.
- Title 17, Chapter V, Sections 7583 – 7622, California Administrative Code regarding cross-connections and backflow prevention.
- Uniform Fire Code.

In case of conflict between the requirements of these standards with the agencies and documents listed above, the District's standards shall govern unless otherwise approved in writing by the District.

2.2 Location of New Facilities

New District facilities shall be located in the public right-of-way whenever possible, to minimize easement acquisition, and are subject to the District's approval of alignment, accessibility and safety of the facilities.

Sewer mains shall abut all parcels served, and shall extend a minimum of 10 feet past the downstream parcel line of the last parcel within the improvement area. When an area outside the improvement area can be logically served by future extension of the sewer, the sewer main shall extend to the improvement boundary or to the end of the paved street in a manner to facilitate further extension, unless otherwise approved by the District.

One public sewer lateral shall be installed for each proposed lot in any subdivision or tract, unless otherwise approved by the District. The District shall have final approval of location of public sewer laterals relative to the property corners. Public sewer laterals shall be installed for proposed and future development and shall extend from the main to the property boundary, edge of permanent easement, or 1 foot beyond the edge of pavement, whichever is furthest.

A horizontal separation between potable water facilities and sewer mains or laterals of at least 10 feet shall be maintained in design and construction of new sewer pipelines. Sewer mains and laterals shall be designed at a depth that provides a vertical clearance of at least 1 foot between pipe surfaces, below any existing or planned water main or service.

2.3 Design Flows

Sewage flow determination shall be based upon the most recent zoning unless growth in the area has experienced trends toward population concentration greater than present zoning allows. If the population trend exceeds present zoning, an estimate shall be made of the probable extent of such concentration and used as the basis for determining the sewage flow rate. Sewer mains that can logically serve an upstream tributary area shall be sized to accommodate anticipated future sewer flow.

2.3.1 Residential

Sewage flow rates for residential units shall be determined from maximum potential buildout of the tributary area, based on 2.5 persons per housing equivalent (HE) and 175 gallons per day (gpd) per person (equal to 437 gpd per HE). A peaking factor of 3.0 shall be used, resulting in a peak flow of 1,311 gpd per HE.

2.3.2 Non-Residential

Design peak flows for non-residential uses shall be determined based upon specific quantities (such as fixture units) for the type of discharge, and are subject to approval by the District.

2.3.3 Infiltration and Inflow

Design infiltration and inflow (I/I) shall be 500 gpd per diameter inch per mile of pipeline.

2.4 Capacity

The capacity of sewerage collection facilities, in all cases, shall be adequate to carry the design flow from the entire tributary area, even if said area is not within the project boundaries. Pipe capacities shall be determined for peak flow rates plus I/I, as specified in Section 2.3, using Manning's formula with an "n" value of 0.013 (for all pipe materials) and a maximum depth of flow of 0.7 times the nominal pipe diameter.

2.5 Sewer Mains

2.5.1 Location

New sewer mains shall be placed on the south side of the street for east to west running streets and east side of the street for streets running north to south where ever possible. The new sewer centerline shall be about 6 or 12 feet off the street centerline, outside vehicle tire wheel path to minimize trench settlement problems. In addition, this location will provide space for a water main in the streets.

2.5.2 Size

The minimum nominal diameter of a sewer main shall be 8 inches, except that sewer mains less than 400 feet in length from the downstream manhole that cannot be extended for future development shall be a minimum nominal diameter of 6 inches, subject to approval by the District.

The District may require that sewer mains be oversized to provide adequate flow capacity for future development.

Downstream pipes shall be of equal or larger diameter than upstream pipes.

2.5.3 Depth

Sewer mains have a minimum cover of 3 feet, and shall be at sufficient depth to allow construction of sewer laterals, as specified in Section 2.7.2.

2.5.4 Minimum Slope

Sewer mains shall be designed to meet a minimum scouring velocity goal of 2 feet per second at peak flow. When this minimum velocity cannot be met, the minimum pipe slopes shown in the table below shall be use.

Pipe Diameter	Minimum Slope
4-inch	0.0200
6-inch	0.0049
8-inch	0.0033
10-inch	0.0024
12-inch	0.0019
15-inch	0.0014
18-inch	0.0013

2.5.5 Trench Dams

Trench dam locations shall be shown on the pipeline profile drawings.

If pipe bedding alternative 2 (see Standard Detail S-1) is used, trench dams shall be installed with maximum 100 foot spacing for sewer mains with a slope greater than four (4) percent.

Trench dams shall be installed in locations of drainage crossings to prevent water flow through the pipe trench after construction.

2.5.6 Pipeline Curves and Bends

Vertical curves are not permitted; any change in pipeline slope shall only occur at a manhole.

Horizontally curved sewer main alignments are allowed; the minimum radius of curvature shall be no less than twice the minimum radius published in the pipe manufacturer's instructions. An abrupt change in direction shall only occur at a manhole.

2.6 Manholes

2.6.1 Location

Manholes shall be spaced at a maximum distance of 400 feet along sewer mains, and shall also be provided at the following locations:

- Connection with another sewer main.
- Change in pipeline slope.
- Change in horizontal alignment (except curves).
- Change in pipe size.
- Connection of 8-inch or larger lateral.
- Upstream terminus of a sewer main. Upon approval of the District, a main line cleanout will be allowed in lieu of a manhole at the terminal end of a 6-inch sewer main if the sewer main between the cleanout and the downstream manhole is no more than 400 feet in length and has no more than four lateral connections.

2.6.2 Pipe Connections

If a sewer main passes through a manhole with no change in size, slope or horizontal direction, the pipe slope shall be maintained through the manhole; otherwise both of the following shall be maintained:

- The invert of each inlet pipe shall be at least one-tenth (0.1) of a foot higher than the invert of the outlet pipe.
- The crown of each inlet pipe shall be at least as high as the crown of the outlet pipe.

Drop manholes shall be installed where the invert drop in the manhole exceeds 2 feet. No more than two drop inlets shall be installed in a single 48-inch manhole.

Pipe connections shall be configured such that flow through a manhole does not exceed a horizontal angle of 90 degrees and vertical slope changes shall not exceed 10 percent.

Sewer main pipe stubs shall be set at proper grade for future extension in manholes located at the upstream terminus of a sewer main, as directed by the District; pipe stubs shall be plugged.

2.6.3 Rim Elevation

Manhole rim elevations shall be shown on the pipeline profile. In paved areas or traveled way the manhole rim elevation shall match the finished grade; otherwise, the manhole rim shall be 12 inches to 18 inches above the finished grade or highwater mark.

2.7 Sewer Laterals

Sewer laterals shall be connected to main with a wye connection only.

2.7.1 Size

Public sewer laterals size shall be 4-inch nominal for residential and 6-inches nominal for commercial laterals unless otherwise approved by the District. Six-inch or larger laterals shall serve developments expected to contribute high sewage flows, and shall be sized in accordance with requirements of the Uniform Plumbing Code.

2.7.2 Depth

Public sewer laterals shall be installed at a minimum depth of 4 feet at the property line or edge of permanent easement. Designer shall verify lateral depths required at property lines or easements to provide a connection to any point on the parcel within the established building setback lines. Sewer lateral shall be designed at a depth that will allow the property owner to install a private lateral with a minimum cover of 12 inches at any location suitable for building. If public lateral is to be installed greater than 4 feet in depth, designer shall specify invert depth of public sewer lateral at the property line or edge of permanent easement on the construction drawings.

2.7.3 Minimum Slope

Minimum slope for sewer service laterals shall be $\frac{1}{4}$ inch per foot.

2.7.4 Cleanouts

Each public sewer lateral will have a minimum of one inline cleanout located within 3 feet of the property line or edge of permanent easement. For straight lateral pipeline runs greater than 100 feet in length, inline cleanouts shall be spaced no more than 100 feet apart. A cleanouts shall be installed for each aggregate change in direction exceeding 135 degrees (three 45 degree bends or one 90 degree bend and one 45 degree bend).

2.7.5 Poppers

The furthest downstream cleanout on a private sewer lateral shall be equipped with a "popper" as shown on the Standard Details.

2.8 Pump Stations and Force Mains

Pump station design, including force mains, shall be closely coordinated with and under the direction of the District. The District shall approve the general layout and control system requirements for an acceptable sewage pump station. The plans shall show the testing required prior to acceptance of the pump stations. Unless otherwise approved by the District, title and ownership of the pump station and force main shall be granted to the District.

Section 3: Materials

3.1 Earthwork

3.1.1 Sand

Caltrans Standard Specifications (July 1992 edition), Paragraph 19-3.025B

3.1.2 Crushed Rock

Angular crushed rock, ¾-inch maximum, per ASTM D 448, size no. 67. The grading requirements are as follows:

Sieve Size	Percent Passing
1"	100%
¾"	90% - 100%
⅜"	20% - 55%
No. 4	0% - 10%
No. 8	0% - 5%

3.1.3 Aggregate Base

Caltrans Standard Specifications for Class 2, ¾-inch maximum aggregate base (Caltrans Paragraph 26-1.02A).

3.1.4 Suitable Native Material

Suitable native material shall be excavated soil processed such that 100% is less than 3 inches in greatest dimension, and free from organic material. Suitable native material shall be capable of meeting a compaction and R-value as shown on the Standard Details. If an adequate quantity of suitable native material cannot be processed that meets the compaction and R-value requirements as specified, import materials shall replace these materials at no cost to the District.

3.1.5 Import Backfill

Import backfill shall be non-expansive soil with liquid limit no greater than 40% and a plasticity index no greater than 15%, free from organic material and from clods or rocks larger than 2 inches in greatest dimension. Import backfill requirement shall be suitable to meet a compaction and R-value as shown on the Standard Details.

3.1.6 Slurry Cement Backfill

Slurry cement backfill shall consist of a fluid, workable mixture of aggregate, Portland cement and water, proportioned either by weight or by volume. Materials shall be machine-mixed in a pug mill, rotary drum or other approved mixer until the cement and water are thoroughly dispersed throughout the material. Slurry cement shall be placed within one hour after mixing. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed. Portland cement shall conform to the provisions of Caltrans Standard Specifications 90-2.01, "Portland Cement", except that testing will not be required. Not less than 188 pounds of cement shall be used for each cubic yard of slurry cement backfill produced. Grading of the aggregate shall be as follows:

U.S. Standard Sieve Size	Percentage Passing
1-1/2 "	100
1"	80-100
3/4"	60-100
3/8"	50-100
No. 4	40-80
No. 100	10-40

3.1.7 Landscape Fill

Landscape fill shall be suitable native backfill free from chemicals, salts, or other materials harmful to plant growth. Material shall be loam type.

3.1.8 Trench Dam Concrete

Concrete for trench dams shall be Caltrans Class A.

3.1.9 Filter Fabric

Geotextile nonwoven polypropylene fabric with 5.0 oz. per square yard and 50 mil thickness. Manufacture Phillips Fibers Corp. Supac NP5 or equal.

3.2 Pipe and Appurtenances

3.2.1 Sewer Mains and Laterals

Pipe and fittings shall be polyvinyl chloride (PVC) sewer pipe; ASTM D3034, SDR 26, with elastomeric gasket joints, ASTM D3212; Diamond Plastics Corp., Certainteed or equal. Gaskets shall be vulcanized styrene butadiene rubber (SBR), ASTM F477.

Elbows shall be long-radius only; PW Pipe, Diamond Plastics equivalent, certified equivalent or equal.

3.2.2 Cleanouts

Cleanouts shall be constructed of PVC SDR 26 pipe and fittings. End of line cleanout shall use SDR 26 ASTM D3034 PVC pipe and fittings. Connections between cleanout fittings and pipes shall be a flexible or transition coupling.

Top of cleanout shall terminate in a traffic rated reinforced concrete valve box (Christy Box, Brooks, or equivalent) with cast iron lid marked "Sewer" and a concrete collar. The riser pipe shall be closed with a watertight removable plastic gripper plug.

3.2.3 Poppers

Poppers shall be manufactured by Plumbest; or equal.

3.2.4 Flexible and Transition Couplings

Flexible and transition couplings shall be elastomeric plastic or synthetic rubber resistant to sewage and grease, chemicals and normal sewer gases; Fernco; Indiana Seal; or equal. Couplings shall be designed to slip over the outside of the pipes being connected with a snug fit. Coupling shall be held in place with a full circle stainless steel shear band clamp at each end. Couplings shall be specifically manufactured for making the transition between various types of pipe with different outside diameters. Couplings shall meet the requirements of the Uniform Plumbing Code. No concentric coupling reducers or donut transition couplings will be allowed.

3.2.5 Locating Wire

Location wire shall be #10 AWG, single-strand, soft drawn copper wire with 1/16-inch PVC insulation.

3.2.6 Warning Tape

Two-inch-wide, detectable, inert, fade-resistant plastic film resistant to acids, alkalis, and other components likely to be encountered in soil. Tape shall be blue, imprinted with "CAUTION SEWER MAIN BELOW"; Griffolyn Terra Tape; or equal.

3.3 Manholes

3.3.1 Precast Sections

Manhole sections shall be precast concrete with ASTM C150, Type V, low alkali cement; Teichert Precast, Cook Concrete Products; or equal. Manhole cone sections shall be concentric taper. Provide lifting eyes for each section.

3.3.2 Frames and Covers

Manhole frames and covers shall be cast iron; ASTM A48, Class 30B, with black bituminous paint and raised letters as shown on the Standard Details.

3.3.3 Appurtenances

Sealant gaskets shall be preformed, continuous rope form plastic material, protected by removable two-piece wrapper, conforming to Federal Specification SS-S-210; RAM-NEK as manufactured by K. T. Snyder Company, Inc., Houston, TX; QUIKSEAL as supplied by Associated Concrete Products, Santa Ana, CA; Kent Seal; or equal.

Sealing compound shall be reinforced hydrocarbon resins blended with plasticizing compounds and reinforced with inert mineral filler, with no solvents, irritating fumes or obnoxious odors. The adhesive and cohesive strength shall not be dependent on oxidizing, evaporating, or chemical action.

Flexible manhole connectors shall be ASTM C923, manufactured by Kor-N-Seal, A-Lok or equal.

Rubber water seal shall be Adeka Ultraseal; Fernco Manhole Waterstop; or equal.

Section 4: Construction Standards

4.1 General

All work shall be performed in strict accordance with applicable law, including local ordinances, applicable OSHA, CALOSHA, California Civil Code, and California Department of Industrial Safety requirements. During construction, work shall be adequately guarded with barricades or lights so as to protect the public from hazards.

Facilities shall be installed in accordance with these Construction Standards and as recommended by the manufacturer. The manufacture's guidelines shall be present at the construction site at all times.

Facilities constructed in asphalt concrete paved streets will require trench patching or overlay as required by the Siskiyou County Public Works Department or property owner.

Proposed facilities shall be field staked, for review by the District, prior to installation.

If available, the District will provide water to the Applicant for construction and cleaning; the Applicant shall rent a hydrant meter and pay for said water in accordance with District Policy 1060. The Applicant will be responsible for providing proper valves and backflow prevention devices at location(s) designated by the District.

4.1.1 Connections to Existing Facilities

Where new sewerage facilities are to be connected to an existing manhole or sewer main that is in active use, existing facilities shall be protected as necessary to prevent construction debris from being washed into or entering existing facilities. Plugged inlets, approved screens, or other suitable protection shall be provided before beginning modification or cleaning of the new facilities.

Prior to testing, and before connecting new sewerage facilities to existing sewer facilities, the inside of each sewer main and public sewer lateral shall be thoroughly cleaned of all dirt, loose scale, sand and other foreign material. Cleaning shall be by flushing with water or bailing as appropriate for the size and type of the pipe, and method of cleaning shall be favorably reviewed by the District.

Applicant shall dispose of cleaning water in accordance with current regulations. Upon approval of the District, Applicant may dispose of cleaning water at the District's wastewater treatment plant; however, debris shall be removed from water prior to disposal. Cleaning water shall not be discharged into existing sewer mains unless approved by the District.

4.1.2 Damage

Materials showing signs of physical damage or excessive ultraviolet exposure will be rejected and shall be immediately removed from the job site.

Any damage to District facilities shall be repaired to the satisfaction of the District, at the cost of the applicant. Streets, sidewalks, parkways and other property disturbed in the course of the work shall be restored to their prior condition.

4.1.3 Inspection

All work performed during the installation of sewerage works and related facilities shall be subject to inspection by the District. The Applicant shall provide the District at least 72 hours notice prior to beginning any portion of work requiring inspection. The Applicant shall provide access to the work for inspection, including but not limited to removal of temporary plating or backfill, and re-excavation. The Applicant shall not proceed with any subsequent phase of work until the previous phase has been inspected and approved by the District. Inspection and approval by the District shall be obtained during and/or at the completion of the following portions of work, as determined by the District:

- Trench excavation and pipe bedding installation.
- Placing pipe, fittings and structures.
- Placing of all restraints.
- Placing and compacting the pipe zone backfill.
- Backfilling balance of trench to grade. Copies of compaction test results shall be given to the District by the Applicant before final acceptance of the work.
- Testing of all mains and laterals.

Improvements installed without proper inspection shall be exposed and inspected as required by the District. Cost associated with such inspections will be the responsibility of the Applicant.

4.2 Pipelines

All sewer mains and public sewer laterals and other public facilities shall be installed by open trench construction unless otherwise approved by the District. Due to local soil conditions, trenchless construction methods are not generally successful. Compaction by jetting methods is not allowed.

Whenever piping leaves a structure, concrete encasement, or concrete bedding, a joint capable of angular deflection shall be provided within 12 inches of the structure, encasement or bedding, except when otherwise approved by the District.

Pipes that are to be abandoned in place shall be cut, and the ends cleaned and plugged, unless otherwise approved by the District. Plugs shall be a minimum of 6 inches in length, constructed of non-shrink grout, and shall be watertight and capable of withstanding all internal and external pressures without leakage.

4.2.1 Storage and Handling

Polyvinyl chloride pipe shall be stored under opaque covers which do not transmit ultraviolet light.

Great care shall be exercised to prevent damage to the pipe during handling, transportation or storage. Pipe shall not be stored on rough ground and rolling of the pipe on the coating will not be permitted. Any damaged pipe sections shall be repaired or replaced at the expense of the Applicant to the satisfaction of the District.

4.2.2 Trench Excavation

Trenches shall be in a reasonably dry condition when pipe is laid. Dewatering, if necessary, shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Applicant shall obtain any required permit for discharge of water to the sewer or storm drain as required by the County of Siskiyou and the Regional Water Quality Control Board.

During inclement weather, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.

Where rocky, unyielding, or unsuitable foundation material is encountered, the subgrade shall be excavated a minimum of 12 inches below the pipe and the trench width shall be increased a minimum of 12 inches. The over-excavation shall be replaced with imported material.

Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated. Three-quarter-inch crushed rock shall be placed in the trench to provide a stable foundation. The rock is in addition to the required pipe bedding used in the pipe zone.

4.2.3 Pipe Installation and Bedding

Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

For sewer mains with horizontal curves, the minimum radius of curvature shall be no less than twice the minimum radius published in the pipe manufacturer's instructions. A locating wire, continuous (no splices) between adjacent manholes, shall be attached to the pipe to as shown in the Standard Details.

Bedding shall provide uniform and continuous support along the barrel of the pipe. Bell holes shall be excavated per manufacturer's recommendations. Adjust line and grade by scraping away, filling in and tamping the earth to provide true grade to fit the barrel of the pipe. No wedging or blocking of the pipe shall be permitted. The minimum depth of bedding material shall be provided under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

The trench and bell holes shall be kept free from water during the laying of the pipe.

Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than one-half of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than the lesser of 6 inches or one-third of the pipe shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe during shovel slicing. Shovel slicing shall be witnessed by the District prior to shading the pipe.

Trench dams shall be installed at no less than 100-foot spacing within trench bedding and backfill zones in areas required in and as shown on the Standard Details.

4.2.4 Trench Backfill

No backfill shall be placed until the work has been inspected and approved by the District.

All trench backfill shall be mechanically compacted suitable native material, mechanically compacted imported fill, mechanically compacted aggregate base, or slurry cement backfill, as required by these Standard Specifications, the Standard Details, and by the County of Siskiyou.

Moisture content shall be controlled to obtain the optimum density for the native soil type encountered. All compaction testing shall conform to ASTM D1557-78 test methods. The quantity and location of compaction tests shall be determined by the District. Trench backfill compaction shall be tested and certified by the Applicant's licensed Geotechnical Engineer. Certification shall be provided to the District prior to the construction of surface improvements.

Compaction equipment shall be of a size and type satisfactory to the District. Impact-type pavement breakers or compactors (hydrahammers) shall not be used within 5 feet from the top of any type pipe. Material for mechanically compacted backfill shall be placed in horizontal lifts which, prior to compaction, shall not exceed eight (8) inches; this depth may be exceeded only upon recommendation of a licensed Geotechnical Engineer. The Applicant shall be responsible for verifying compaction requirements in each lift.

Slurry cement backfill shall be placed in accordance with Caltrans Standard Specifications Section 19-3.062.

Excess material and materials that the District determines are unsuitable for backfill shall be removed from the project site.

4.2.5 Laterals

Laterals shall be laid on a uniform grade between the wye or the top of the riser section and the end of the new public sewer lateral at the point of termination. Minimum slope shall be 1/4 inch per foot unless otherwise permitted by the District. For laterals with horizontal curves, the minimum radius of curvature for a pipeline shall be no less than twice the minimum radius published in the pipe manufacturer's instructions. If a lateral is installed for future upstream connection, the end shall have a watertight removable plug.

Maximum deflection permissible with one fitting shall not exceed 45 degrees except at vertical laterals, and shall be accomplished with long-radius elbows. Short-radius elbows will not be permitted, unless otherwise approved by the District.

Field cuts shall be performed in a neat and workmanlike manner providing a clean, flush, saw-cut end.

Any sewer lateral pipe upstream of the reconnection which is damaged or loosened by the Applicant's operation shall be replaced or repaired at the Applicant's expense.

The Applicant shall maintain as-built drawing information showing location of new public sewer lateral connections at the sewer main (e.g., reference distance from either upstream or downstream manhole), termination of end of new public sewer lateral (e.g., reference distance from building corner, concrete walkway, etc.). Applicant shall submit as-built information to the District.

4.2.6 Leakage Testing

Leakage tests shall be conducted on all new sewer mains and public sewer laterals at a time agreed upon and in the presence of the District. Leakage tests shall be made after pipe is installed and backfilled. Each section of sewer mains and public sewer laterals shall be tested between successive manholes unless otherwise approved by the District.

Pressure gauges and metering devices shall be of a type, accuracy and calibration acceptable to the District. The District may require certification of the gauges and meters by an independent testing firm at the Applicant's expense.

Leakage tests shall be air pressure tests conducted as follows:

1. All openings in the sewer main and the upper ends of all sewer laterals shall be plugged and braced. Prior to the air pressure test, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again. The Applicant has the option of wetting the interior of the pipe prior to the test.
2. Air shall be introduced into the pipeline until 4.0 psi (27kPa) gage pressure has been reached; or if groundwater is present, 4.0 psi (27kPa) above the computed pressure exerted by the average adjacent groundwater. Reduce the flow of air and maintain the air pressure within plus or minus 0.5 psi (3kPa) for at least two minutes to allow the internal air temperature to reach equilibrium. Terminate flow of air into the pipeline. Pressure in the pipeline shall be constantly monitored by a gage and hose arrangement separate from hose used to introduce air into the line. A blowoff valve shall be provided on the test apparatus to prevent over pressurizing the pipeline.
3. After the temperature has stabilized and no air leaks at the plugs have been found, the air pressure shall be permitted to drop until the internal pressure has reached 3.0 psi (21kPa) gage pressure; or when groundwater is present, 3.0 psi (21kPa) above the computed pressure exerted by the average adjacent groundwater. A stopwatch or

sweep-second-hand watch shall be used to determine the time lapse required for the air pressure to decrease an additional 1.0 psi (7kPa).

4. If the time lapse (in seconds) required for the air pressure to decrease the additional 1.0 psi (7kPa) exceeds that shown in the Table “Low Pressure Air Test for Sewers”, in the Standard Specifications for Public Works Construction (“Greenbook”), 1991 Edition, the pipe shall be presumed to be within acceptance limits for leakage.
5. If the time lapse is less than that shown in this table, the Applicant shall make the necessary corrections to reduce the leakage to acceptance limits without additional compensation.

If leakage or infiltration exceeds the allowable, the installation shall be repaired or replaced and leakage test, CCTV inspection, and air test shall be repeated as necessary until conformance test requirements specified herein have been fulfilled at no additional cost to the District. The Applicant shall also cover the cost for additional inspection and engineering time required. All detectable leaks shall be repaired by and at the expense of the Applicant, regardless of the test results.

Keep records of each piping test, including:

- Description and identification of piping tested.
- Description of test procedure.
- Date of test.
- Witnessing by Applicant and District.
- Test evaluation.
- Remarks, to include such items as leaks (type, location) and repairs.

4.2.7 Mandrel Test of Polyvinyl Chloride Pipe

The Applicant shall provide acceptable 9-prong mandrel, or other approved device to check the maximum allowable deflection of pipes 21 inches in diameter and smaller thirty (30) days after installation. Testing must be performed by hand pulling a 9-point mandrel a diameter of 95% of the average inside diameter. Maximum allowable deflection (reduction in vertical inside diameter) of the installed pipe shall not exceed 5%. The allowable limits shall be:

Pipe Diameter	Maximum Allowable Sag
4-inch	1/4-inch
6-inch	3/8-inch
8-inch to 10-inch	1/2-inch
12-inch	3/4-inch
15-inch	1-inch

At any location where the pipe deflection is determined by the District to exceed the allowable limits, the Applicant shall remove, re-bed, restore the surface (e.g., paving or landscaping) and if required, replace the pipe at no additional cost to the District. No rerounding of the pipe shall be allowed. The Applicant shall reduce the pipe deflection to 5% or less, as determined by the District. The pipeline shall then be re-tested after thirty (30) days of installation for deflection, CCTV inspection and air tightness.

4.2.8 CCTV Inspection

After completing sewer mains and public sewer laterals pipeline installation, the Applicant shall complete a Closed-Circuit Television (CCTV) inspection of the new sewer pipelines no sooner than 20 days after installation. The District shall witness the CCTV inspection.

CCTV inspection shall be conducted by an organization that has a minimum of 3 years experience completing CCTV inspection of sewer mains and laterals. Prior to any CCTV inspection, examples of two previous CCTV tapes and inspection reports shall be submitted to the District for its review. The sample videos and inspection reports shall represent the quality of video inspection and text to be provided by the Applicant.

CCTV inspection shall be conducted with a pan and tilt camera system specifically designed and constructed for the sewer environment. The 4-inch laterals shall be inspected by a color push camera. The camera shall include: a solid state color TV camera with a panning and rotational camera head, remote adjustable optical focus and automatic light compensation iris with remote override, camera controller with remote focus, iris and auto centering control and camera lighting system. The camera shall measure and record video inspection length.

The sewer pipelines to be CCTV inspected shall include both the sewer mains and sewer laterals to the end of the sewer pipeline (e.g., cleanout or manhole). The CCTV inspection operator shall stop and pan each sewer lateral connection during the sewer main video inspection. The maximum rate of videotaping shall be 30 feet per minute. Two copies of the video tape(s) shall be made concurrently in the field and witnessed by the District. One copy shall be turned over to the District at the end of each work day that CCTV inspection is completed. A second copy shall be provided to the District within five (5) working days of completing all of the CCTV inspection on the project. If video tape is not viewable after review by the District, the CCTV inspection shall be repeated.

The inspection report shall be indexed and coded for easy location of each line segment, video clips, and captured images. The video and captured images shall be clear and sharp. Voice recordings on the video shall be clear, complete, and distinct. A vocal description shall be recorded at the beginning of each inspection while the "Initial Screen Text" is displayed. A voice recording shall also be performed during each observation and at the conclusion of each inspection.

Inspection reports shall be in electronic format that include, at a minimum, the following:

- Summary list of all pipeline segments inspected (i.e. manhole to manhole).
- Inspection Reports (log sheets) of each segment.

- Video of each segment.

The following items shall be recorded, at a minimum, as screen text on approximately the first 15 seconds of each section:

- Upstream and downstream manhole numbers and direction of camera's travel
- Location and/or project name
- Date
- CCTV company name, operator's name, and evaluator's name

The following items shall be recorded, at a minimum, as audio information for each section:

- Date of inspection
- Verbal confirmation of upstream and downstream manhole numbers
- Verbal descriptions of pipe size and type
- Verbal description and location of defect

During the CCTV inspection, the running screen shall show the following information on the screen away from the central focus of the main:

- Running footage (distance traveled)
- Date
- Time of day
- A gauging tool, e.g. $\frac{3}{4}$ -inch cylinder (size of cylinder shall be indicated on the label), shall proceed the camera for gauging offsets.

If the District review of the CCTV inspection video tape(s) identifies problems, the District will notify the Applicant of the problem(s) in writing. Potential, but not all-inclusive problems may include fishmouth gaskets, reverse grade slopes, deflected joints, sags, protruding taps, etc. The Applicant shall propose methods to correct the problems, for review by the District. The Applicant shall make corrections at no cost to the District.

The Applicant, at no cost to the District, shall conduct a second TV inspection and if already complete, an air test shall be redone after repairs are made to the sewer pipeline. The second TV inspection shall be conducted as described above. All costs for second and subsequent TV inspections shall be borne by the Applicant, including time required for District's inspection and reviewing of TV tapes.

4.3 Manholes

Accurately locate and place the manhole frames to within 1/8-inch vertical elevation in paved or roadway areas. In unpaved areas, manhole frames shall be 12- to 15-inches above existing grade unless otherwise specified or approved by the District.

4.3.1 Installation

Compact subgrade to 93% relative density for 6-inch minimum depth. Provide a 6-inch gravel layer using 3/4-inch crushed rock under the base slab and compact to 93% relative density prior to placement.

For poured in place base and precast manhole sections, set precast manhole sections in a concrete base joint groove, formed in the cast-in-place concrete base slab.

Apply primer to joint surfaces in accordance with manufacturer's instructions. All joints shall be watertight with sealant gaskets.

Manhole covers shall fit quietly in the frames. Machine the cover if necessary to obtain a solid fit, without rattling under load.

Fill all precast base lifting lugs with non-shrink grout.

4.3.2 Backfill

Manholes shall be backfilled with suitable native material or import backfill material. Compact the backfill material to 93% of relative density from the pipe bedding and base slab up to final finish grade or subgrade in paved areas or roadways, over an area defined as being within a distance of 2 feet from the exterior walls of the manhole. For open areas, compact to 90% of relative density. Backfill will be compacted by mechanical compactor and not a sheep's foot wheel roller.

4.3.3 Leakage Testing

Sewer manholes shall be vacuum tested in accordance with ASTM C1244 after installation, but prior to backfilling. Applicant shall also vacuum test manhole after backfilling.

Leakage tests shall be air pressure tests conducted as follows:

1. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole.
2. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendation.
3. A vacuum of 10 inches of mercury (approximately 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 nine inches. The manhole shall pass if the time is greater than the following:
 - 48-inch diameter manhole – 60 seconds.
 - 60-inch diameter manhole – 75 seconds.
 - 72-inch diameter manhole – 90 seconds.

4. 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 and/or replacement shall proceed until satisfactory test is obtained. No grout shall be placed in the horizontal joints before testing.

Section 5: Standard Details

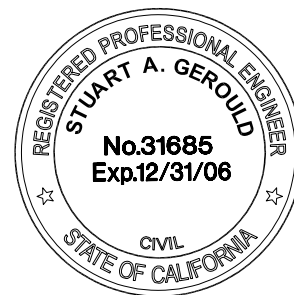
The following is a list of Sewer Standard Details included in this section:

S-1	General Notes
S-2	Pipe Bedding
S-3	Concrete Encasement
S-4	Trench Zone Asphalt Paved Surface
S-5	Trench Zone Open Areas
S-6	Trench Dam
S-7	Carrier & Casing Pipes
S-8	Locating Wire
S-9	Typical Sewer Manhole
S-10	Manhole Details
S-11	Typical Drop Inlet Sewer Manhole
S-12	Public Cleanout
S-13	Public Sewer Lateral
S-14	Private Sewer Lateral
S-15	Private Sewer Lateral Cleanout

SEWER SYSTEM GENERAL NOTES

NOTES:

1. APPLICANT SHALL PROVIDE A MINIMUM OF 48 HOURS ADVANCE NOTICE OF A PLANNED SHUTDOWN.
2. APPLICANT SHALL LOCATE AND STAKE ALL PROPERTY CORNERS WHERE SEWER SERVICES ARE TO BE INSTALLED.
3. APPLICANT SHALL PROVIDE ALL TESTING AND PAY FOR ALL DISTRICT INSPECTION COSTS.
4. EXISTING WATER AND SEWER LINES AND FACILITIES LOCATIONS PROVIDED BY THE DISTRICT ARE APPROXIMATE. APPLICANT IS RESPONSIBLE FOR DETERMINING THE EXACT FIELD LOCATIONS AND MAINTAINING THE FOLLOWING SEPARATIONS BETWEEN UTILITIES.
 - a. MINIMUM VERTICAL CLEARANCE BETWEEN A PRIVATE SEWER SERVICE AND A PRIVATE WATER SERVICE SHALL BE 12 INCHES AND THE WATER SERVICE SHALL BE ABOVE THE SEWER SERVICE.
 - b. MINIMUM VERTICAL CLEARANCE BETWEEN ALL UTILITY CROSSINGS SHALL BE 12 INCHES.
 - c. MINIMUM HORIZONTAL CLEARANCE BETWEEN SEWER PIPELINES AND DISTRICT WATER LINES SHALL BE 10 FEET.
 - d. MINIMUM HORIZONTAL CLEARANCE SHALL BE 24 INCHES BETWEEN ALL NON-SEWER UTILITIES AND WATER.
5. THE APPLICANT IS RESPONSIBLE FOR ALL TRAFFIC CONTROL. TRAFFIC CONTROL AND PAVEMENT CUTTING AND RESTORATION ARE UNDER THE JURISDICTION OF TUOLUMNE COUNTY.
6. THE APPLICANT SHALL NOTIFY UNDERGROUND SERVICES ALERT (USA) A MINIMUM OF 48 HOURS PRIOR TO START OF ANY EXCAVATION.
7. SEE STANDARD SPECIFICATIONS FOR FLUSHING AND TESTING REQUIREMENTS.



STANDARD DETAILS
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GENERAL-NOTES

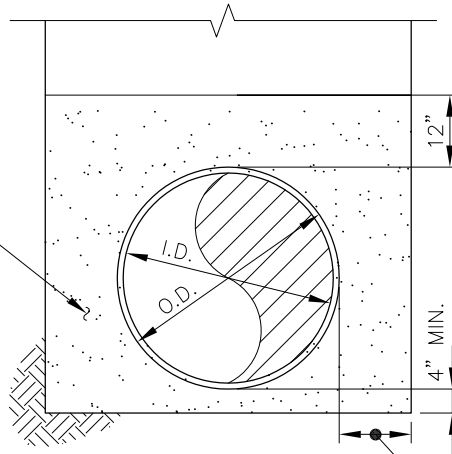
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DATE: NOVEMBER 2006 DRAWN BY: RN

S-1

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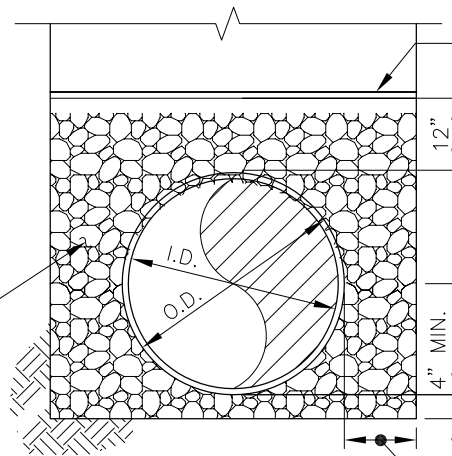
PIPE ZONE
SAND OR AB
COMPACT @ 93%



PIPE O.D. x 0.6
(MIN.) TO 12" MAX.

ALTERNATIVE 1

PIPE ZONE
3/4" CRUSHED ROCK
COMPACT @ 93%



LAYER OF
FILTER FABRIC

PIPE O.D. x 0.6
(MIN.) TO 12" MAX.

ALTERNATIVE 2

NOTES:

1. SEE STANDARD SPECIFICATIONS FOR BEDDING MATERIAL REQUIREMENTS.
2. A VERTICAL TRENCH MAY NOT BE ABLE TO BE MAINTAINED. CONTRACTOR SHALL USE APPROPRIATE TRENCH SHORING AND OTHER EQUIPMENT TO MINIMIZE TRENCH WIDTH.
3. PROVIDE TRENCH DAMS PER DETAIL S-6 AT LOCATIONS SHOWN ON DRAWING PROFILE.



STANDARD DETAILS
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PIPE BEDDING

SCALE: NONE

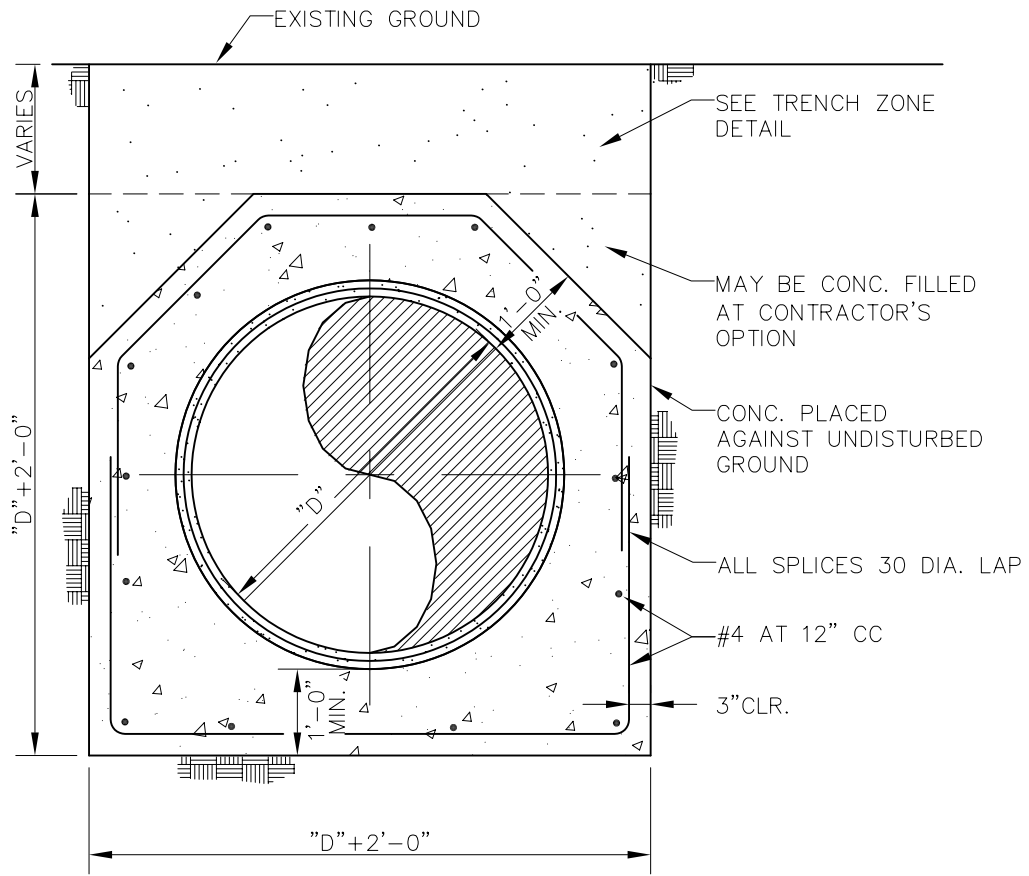
APPROVED BY: SN

DATE: NOVEMBER 2006

DRAWN BY: RN

S-2

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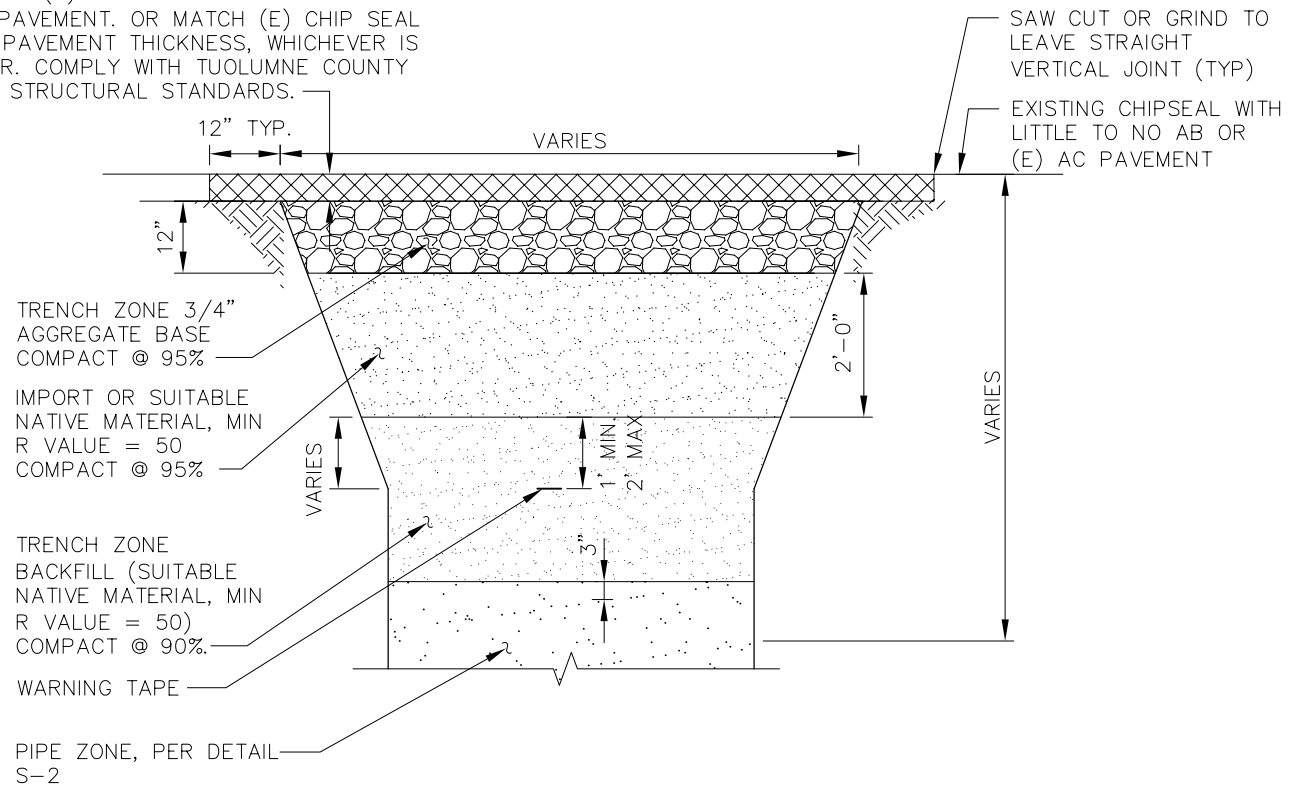


STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District		CONCRETE ENCASEMENT		S-3
22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383		SCALE: NONE	APPROVED BY: SN	
		DATE: NOVEMBER 2006	DRAWN BY: RN	

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FOR (E) GRAVEL ROAD PROVIDE 6" THICK, 3/4" CRUSHED ROCK. FOR (E) CHIP SEAL PAVED OR (E) AC PAVED ROAD PROVIDE MIN. 3" AC PAVEMENT. OR MATCH (E) CHIP SEAL OR AC PAVEMENT THICKNESS, WHICHEVER IS GREATER. COMPLY WITH TUOLUMNE COUNTY STREET STRUCTURAL STANDARDS.



NOTE:

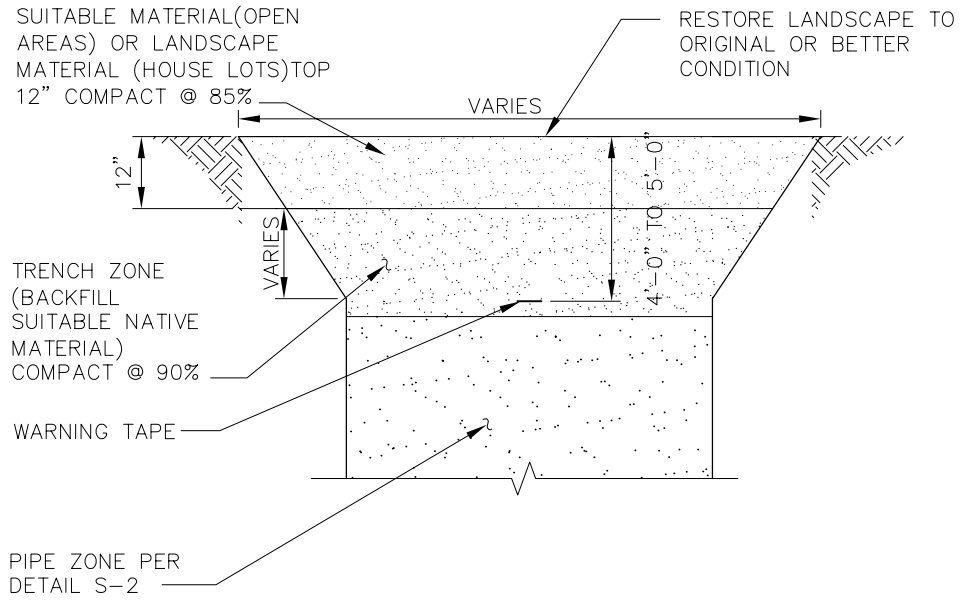
1. SEE STANDARD SPECIFICATIONS FOR BACKFILL MATERIAL REQUIREMENTS.
2. A VERTICAL TRENCH MAY NOT BE ABLE TO BE MAINTAINED. CONTRACTOR SHALL USE APPROPRIATE TRENCH SHORING AND OTHER EQUIPMENT TO MINIMIZE TRENCH WIDTH.
3. WORK IN COUNTY ROADS SHALL COMPLY WITH TUOLUMNE COUNTY STANDARDS, WHICH MAY REQUIRE SLURRY CEMENT BACKFILL.



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District		TRENCH ZONE ASPHALT PAVED SURFACE		S-4
22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383		SCALE: NONE	APPROVED BY: SN	
		DATE: NOVEMBER 2006	DRAWN BY: RN	

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NOTE:

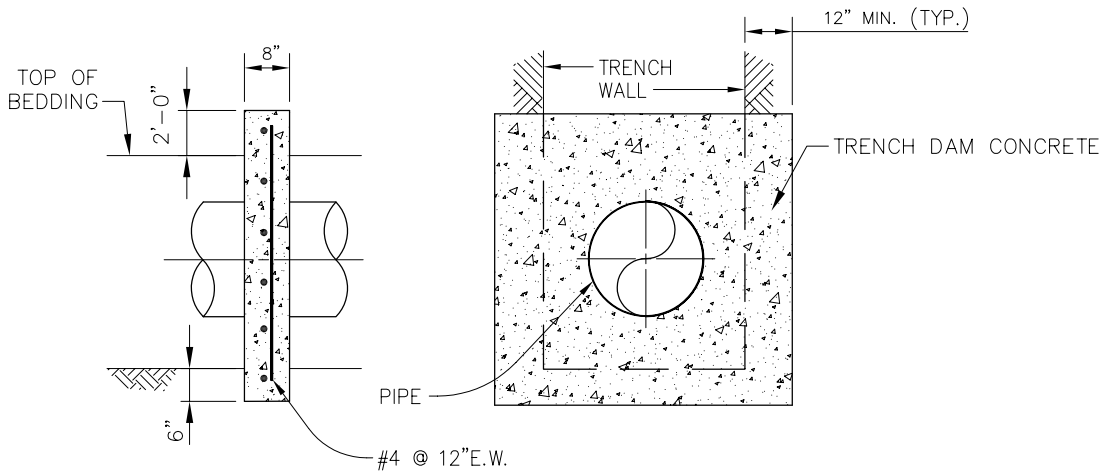
1. SEE STANDARD SPECIFICATION FOR BACKFILL MATERIAL REQUIREMENTS.
2. A VERTICAL TRENCH MAY NOT BE ABLE TO BE MAINTAINED. CONTRACTOR SHALL USE APPROPRIATE TRENCH SHORING AND OTHER EQUIPMENT TO MINIMIZE TRENCH WIDTH.



STANDARD DETAILS
NOT FOR CONSTRUCTION

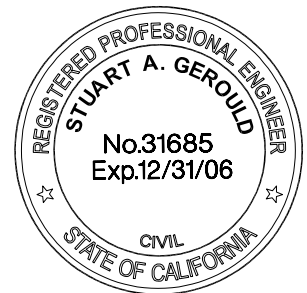
Twain Harte Community Services District		TRENCH ZONE OPEN AREAS		S-5
22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383		SCALE: NONE	APPROVED BY: SN	
		DATE: NOVEMBER 2006	DRAWN BY: RN	

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NOTE:

1. TRENCH DAMS ARE ONLY REQUIRED IF PIPE BEDDING ALTERNATIVE 2 IS USED. PROVIDE TRENCH DAMS AS SHOWN ON DRAWING PROFILES FOR PIPES WITH SLOPES GREATER THAN 4%.
2. TRENCH DAMS SHALL BE KEYED INTO UNDISTURBED SOIL 12" MIN. BEYOND TRENCH WALLS & 6" BELOW TRENCH BOTTOM.



STANDARD DETAILS
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Twain Harte Community Services District

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TRENCH DAM

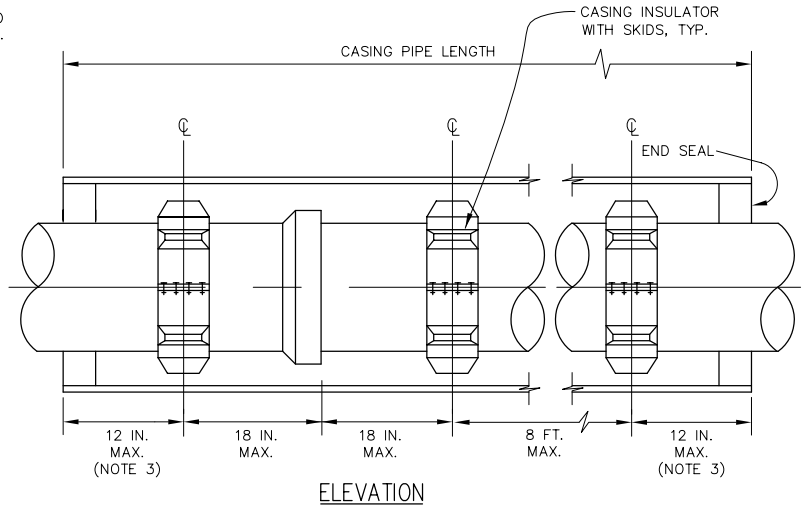
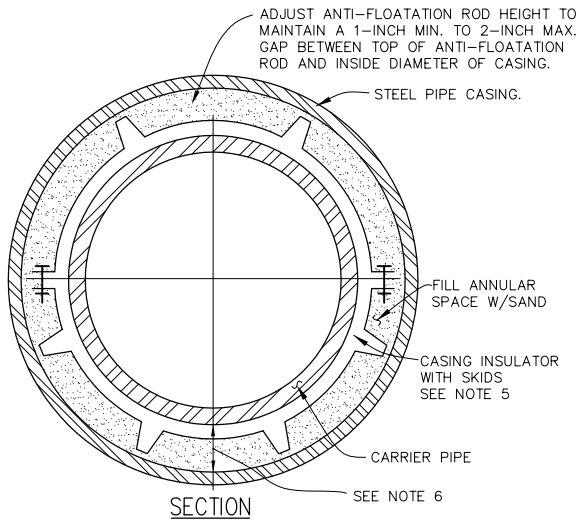
SCALE: NONE

APPROVED BY: SN

DATE: NOVEMBER 2006

DRAWN BY: RN

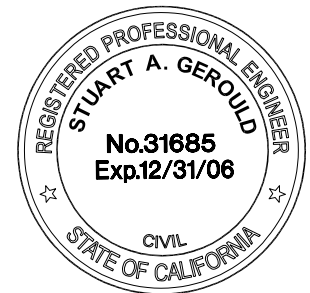
S-6



CASING NOTES:

1. SLOPE OR SHORE EXCAVATION WALL AS REQUIRED FOR SAFETY.
2. CARRIER PIPE SHALL BE TESTED BEFORE INSTALLATION OF END SEAL.
3. CASING INSULATORS WITH SKIDS SHALL BE INSTALLED WITHIN 12 INCHES OF EACH END OF STEEL CASING.
4. CASING INSULATORS SHALL BE SO BOLTED AROUND THE PIPE THAT THE SKIDS ARE LOCATED SYMMETRICALLY ABOUT THE VERTICAL AXIS OF THE PIPE.

5. CASING INSULATOR SHALL BE ANTI FLOTATION TYPE WITH 12 INCH WIDE BAND AS MANUFACTURED BY CALPICO MODEL M, PSI OR EQUAL.
6. CLEARANCE HEIGHT BETWEEN CARRIER PIPE O.D. AND BOTTOM OF CASING INSIDE WALL SHALL BE 3 INCHES.



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District

22933 TWAIN HARTE DRIVE
P.O. BOX 649
TWAIN HARTE, CA 95383

CARRIER & CASING PIPES

SCALE: NONE

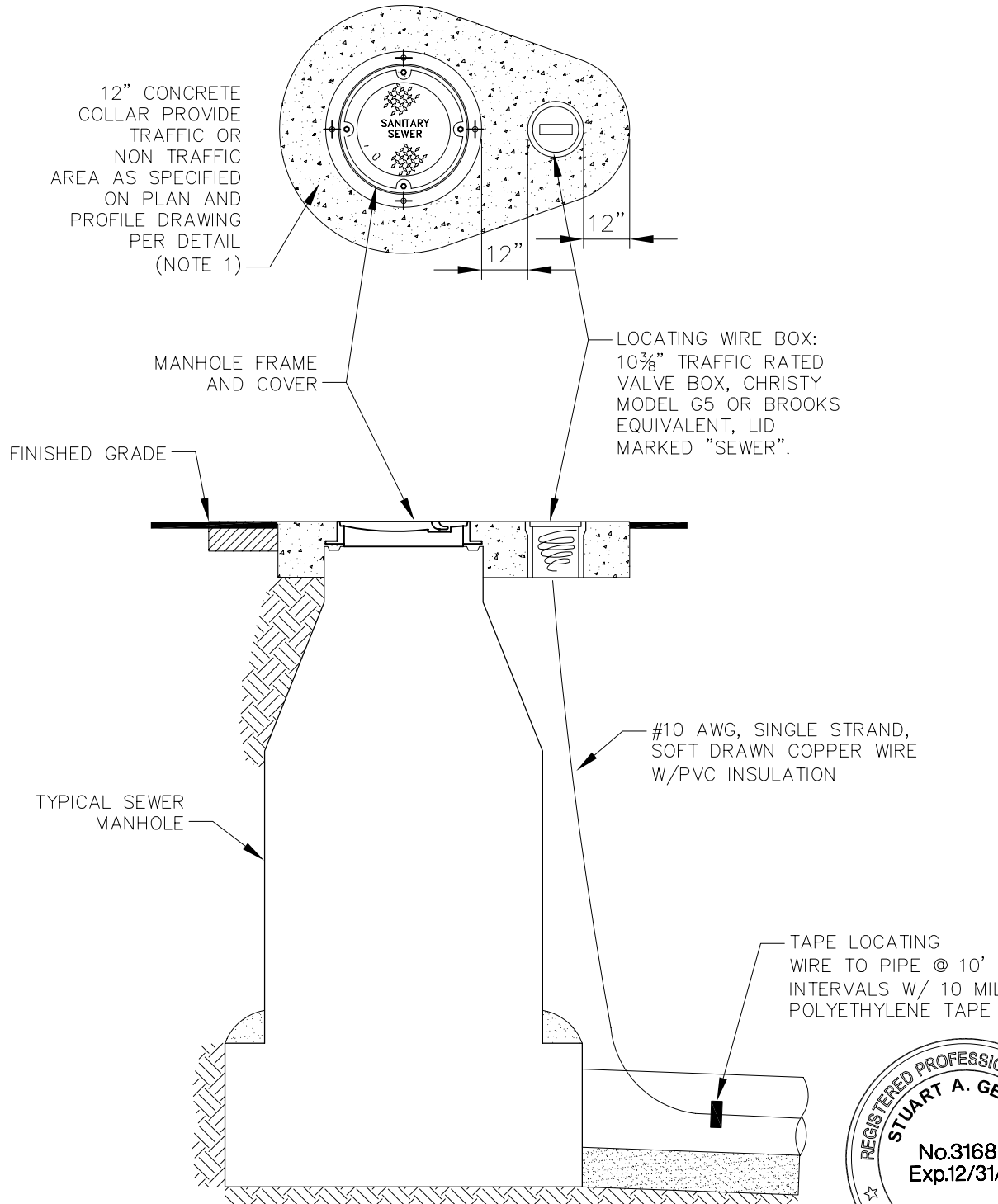
APPROVED BY: SN

DATE: NOVEMBER 2006

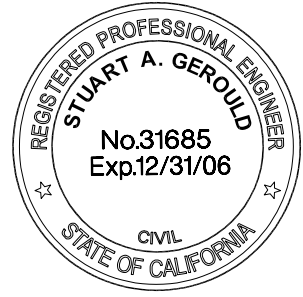
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S-7

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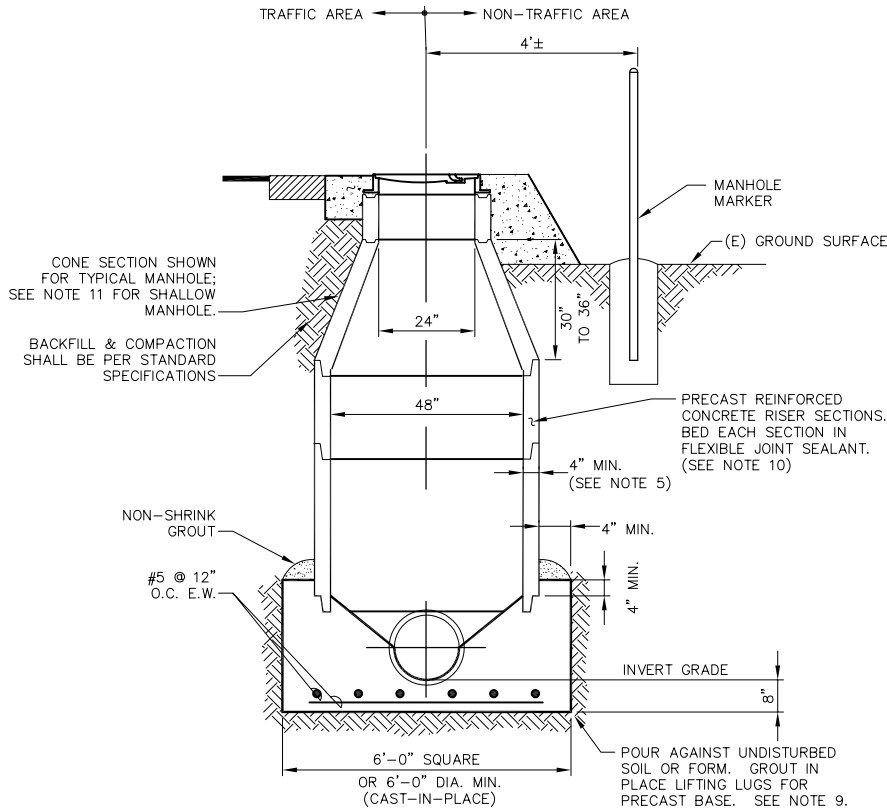
- NOTES:
1. PROVIDE CONCRETE COLLAR UNLESS OTHERWISE SPECIFIED ON PLAN AND PROFILE DRAWINGS.
 2. STRIP 3-INCHES OF PVC INSULATION FROM END LOCATING WIRE WITHIN WIRE BOX.



STANDARD DETAILS
NOT FOR CONSTRUCTION

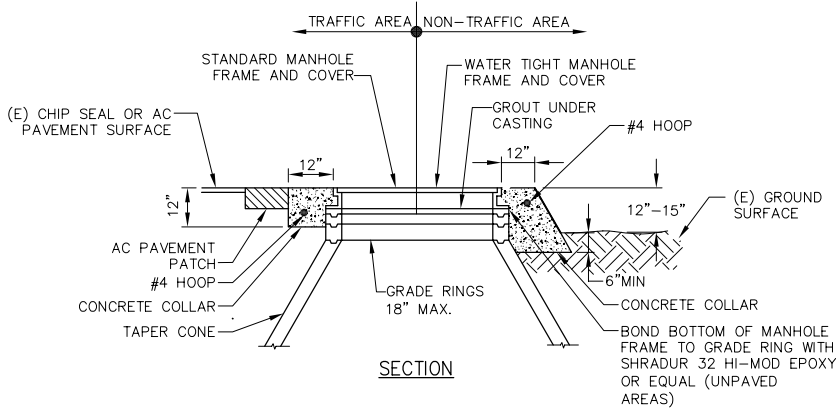
Twain Harte Community Services District		LOCATING WIRE		S-8
22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383		SCALE: NONE	APPROVED BY: SN	
		DATE: NOVEMBER 2006	DRAWN BY: RN	

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TYPICAL SEWER MANHOLE

N.T.S.

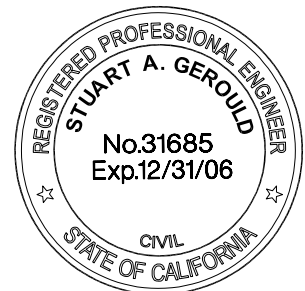


FRAME AND COLLAR DETAIL

N.T.S.

NOTES:

1. WHERE MANHOLES ARE NOT LOCATED IN STREETS OR TRAVELED WAY PLACE TOP OF MANHOLE 12" TO 15" ABOVE EXISTING GROUND UNLESS OTHERWISE SHOWN ON PLANS.
2. ALL CONCRETE USED IN MANHOLE SHALL BE PER STANDARD SPECIFICATIONS.
3. ECCENTRIC TYPE CONCRETE CONE SECTION SHALL BE INSTALLED IN PLACE OF CONCENTRIC CONES WHEN DIRECTED BY THE ENGINEER. WHEN ECCENTRIC CONE SECTION IS INSTALLED, THE VERTICAL WALL SHALL BE INSTALLED DOWNSTREAM.
4. PIPE MAY BE LAID THROUGH AN INLINE MANHOLE EXCEPT WHEN A GRADE OR LINE CHANGE OCCURS AS SHOWN ON THE DRAWINGS. MINIMUM DROP THROUGH ALL OTHER MANHOLES SHALL BE THE DIFFERENCE IN DIAMETERS OF THE UPSTREAM AND THE DOWNSTREAM PIPES OR 0.10 FEET WHICH EVER IS GREATER.
5. PRECAST REINFORCED CONCRETE MANHOLE SECTIONS SHALL CONFORM TO ASTM DESIGNATION: C478-70 4" MINIMUM THICKNESS.
6. PRECAST REINFORCED CONCRETE MANHOLE RISER SECTIONS SHALL BE FORMED WITH MALE AND FEMALE ENDS.
7. WHEN EXISTING CLAY PIPE IS INSTALLED, FIRST PIPE JOINT SHALL NOT EXTEND MORE THAN 12" FROM SIDE OF MANHOLE.
8. WHEN PVC PIPE IS USED, THE BARREL OF THE PIPE SHALL BE PRE-PRIMED WITH SOLVENT AND SPRINKLED WITH SAND IN ORDER TO PROVIDE A WATERTIGHT SEAL BETWEEN THE PIPE AND CONCRETE. THIS REQUIREMENT IS IN ADDITION TO THE USE OF THE WATERSTOP.
9. PRECAST CONCRETE BASES MANUFACTURED BY COOK CONCRETE PRODUCTS OR TEICHERT AGGREGATE MAY USED IN LIEU OF POURED-IN-PLACE BASES. PRECAST BASES AND POURED-IN-PLACE BASES SHALL BE SUPPORTED PER STANDARD SPECIFICATIONS.
10. ALL SEGMENTS SHALL BE BEDDED IN FLEXIBLE JOINT SEALANT: (KENT-SEAL NO. 2, RAM NEK EQUIVALENT OR EQUAL). A DOUBLE BEAD SHALL BE USED IF SEALANT IS 3/4-INCH OR 1-INCH DIAMETER. A SINGLE BEAD SHALL BE USED IF THE SEALANT IS 1 1/4-INCH OR GREATER DIAMETER.
11. WHERE INVERT IS LESS THAN 5 FEET BELOW GRADE, PROVIDE SPECIAL PRE-CAST REINFORCEMENT CONCRETE SLAB DESIGNED FOR H-20 AASHTO LOAD INSTEAD OF CONE.
12. SEE S-10 FOR ADDITIONAL DETAILS.
13. SEE S-11 FOR DROP INLET MANHOLE.



STANDARD DETAILS
NOT FOR CONSTRUCTION

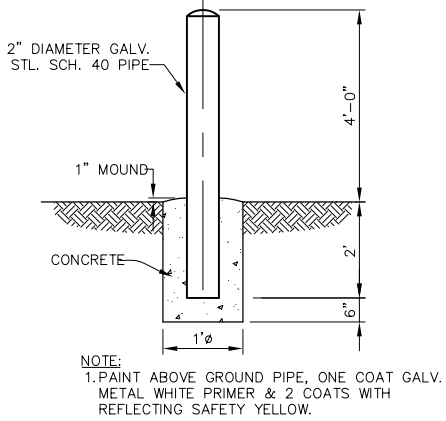
Twain Harte Community Services District

22933 TWAIN HARTE DRIVE
P.O. BOX 649
TWAIN HARTE, CA 95383

TYPICAL SEWER MANHOLE

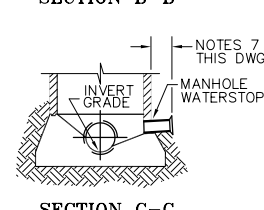
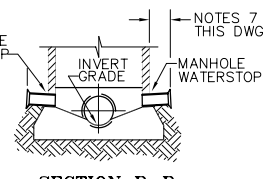
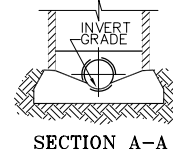
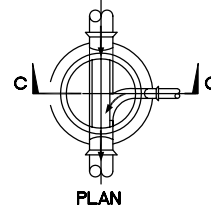
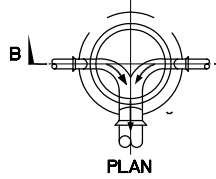
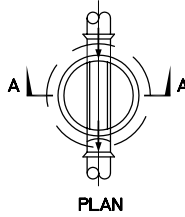
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DATE: NOVEMBER 2006 DRAWN BY: RN

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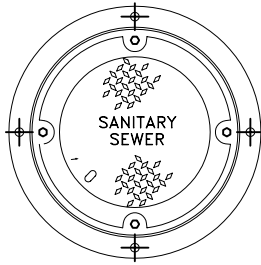
MANHOLE MARKER DETAIL

N.T.S.



MANHOLE BASE DETAIL

N.T.S.



ACCEPTABLE MANUFACTURERS

DOMESTIC MFR. ONLY

SOUTH BAY FOUNDRY

SBF 1900 BS

FRAME 150 lbs.

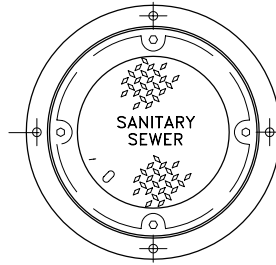
COVER 130 lbs.

D AND L SUPPLY

D&L A-1024

FRAME 150 lbs.

COVER 130 lbs.



ACCEPTABLE MANUFACTURERS

DOMESTIC MFR. ONLY

SOUTH BAY FOUNDRY

SBF 1900 BS

COVER 130 lbs.

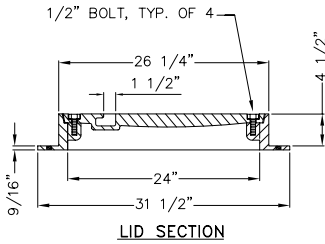
FRAME 140 lbs.

D AND L SUPPLY

D&L A-1024

COVER 130 lbs.

FRAME 150 lbs.

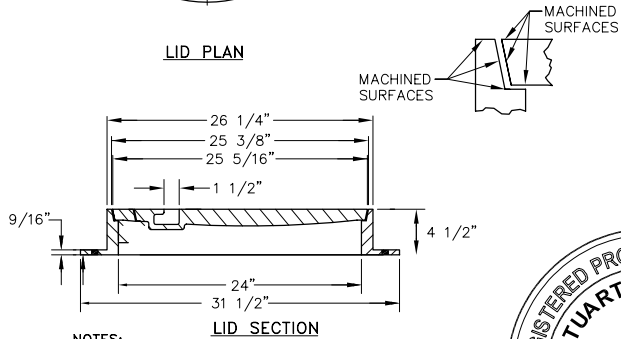


NOTES:

- COVER MARKINGS: "SANITARY SEWER".
- CASTING SHALL BE FURNISHED WITH BLIND PICK HOLE.
- CASTING SHALL BE DIPPED IN ASPHALT PAINT.
- WATER TIGHT COVER PROVIDE RUBBER GASKET (R/G DESIGNATION)

WATERTIGHT MANHOLE FRAME & COVER

N.T.S.



NOTES:

- FRAME AND COVER FULLY MACHINED ON SURFACES AS SHOWN FOR PERFECT NO-ROCK, NO-STICK FIT.
- COVER MARKINGS "SANITARY SEWER".
- CASTING SHALL BE FURNISHED WITH BLIND PICKHOLE.
- CASTINGS SHALL BE DIPPED IN ASPHALT PAINT.
- ALL PARTS OF ACCEPTABLE ASSEMBLIES ARE INTERCHANGEABLE.

MANHOLE FRAME & COVER

N.T.S.



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District

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MANHOLE DETAILS

SCALE: NONE

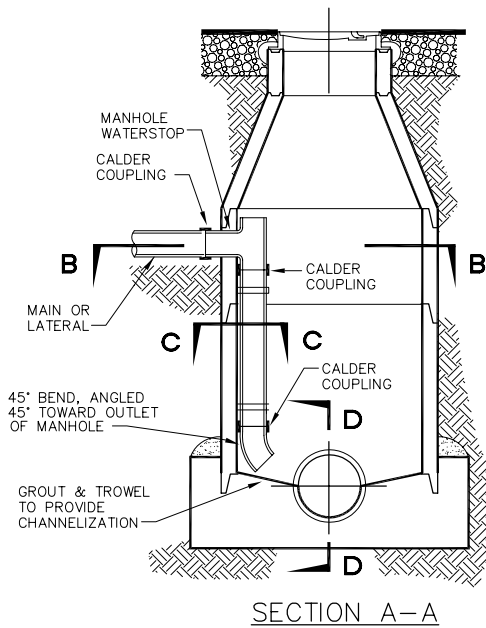
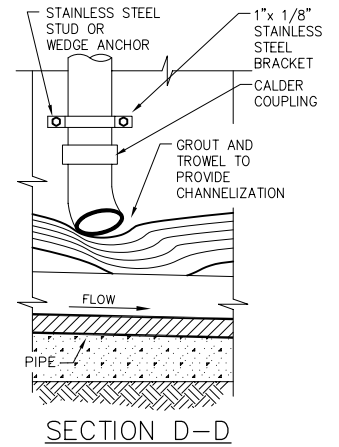
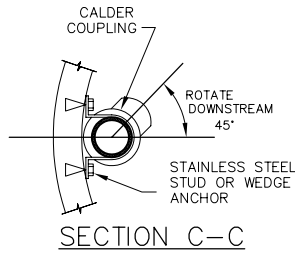
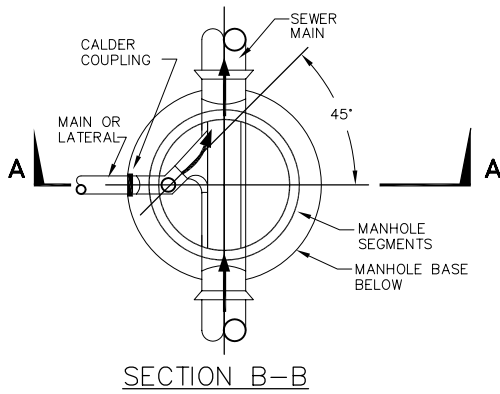
APPROVED BY: SN

DATE: NOVEMBER 2006

DRAWN BY: RN

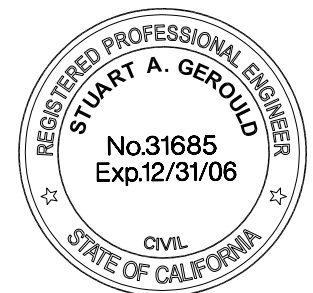
S-10

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NOTES:

1. INSIDE DROP MANHOLE IS REQUIRED WHEN SEWER INLET INVERT & SEWER OUTLET INVERT DIFFERENCE IS 2FT. OR GREATER AND WHEN APPROVED BY ENGINEER.
2. THIS TYPE DROP MANHOLE CONSTRUCTION MAY BE UTILIZED ONLY WHEN 8 INCH OR SMALLER PIPE IS USED.
3. VERTICAL PIPE SHALL MATCH PIPE DIAMETER FOR 6 INCH AND 8 INCH INCOMING LINES. 4 INCH VERTICAL PIPE MAY BE USED FOR INCOMING PIPES 4-INCH OR SMALLER.
4. PVC SCH 40 DWV OR PVC PIPE SHALL BE USED IN THE DROP SECTION OF THE MANHOLE.
5. A CALDER COUPLING OR EQUAL SHALL BE USED ON THE JOINT IMMEDIATELY OUTSIDE THE MANHOLE.
6. A MINIMUM OF ONE STAINLESS STEEL BRACKET PER JOINT OF PIPE SHALL BE USED. A MINIMUM OF TWO BRACKETS SHALL BE USED PER MANHOLE INSTALLATION. BRACKET TO BE 1"x 1/8" STAINLESS STEEL WITH (2)STAINLESS STEEL ANCHORS PER BRACKET.
7. SEE S-9 AND S-10 FOR ADDITIONAL DETAILS.



STANDARD DETAILS
NOT FOR CONSTRUCTION

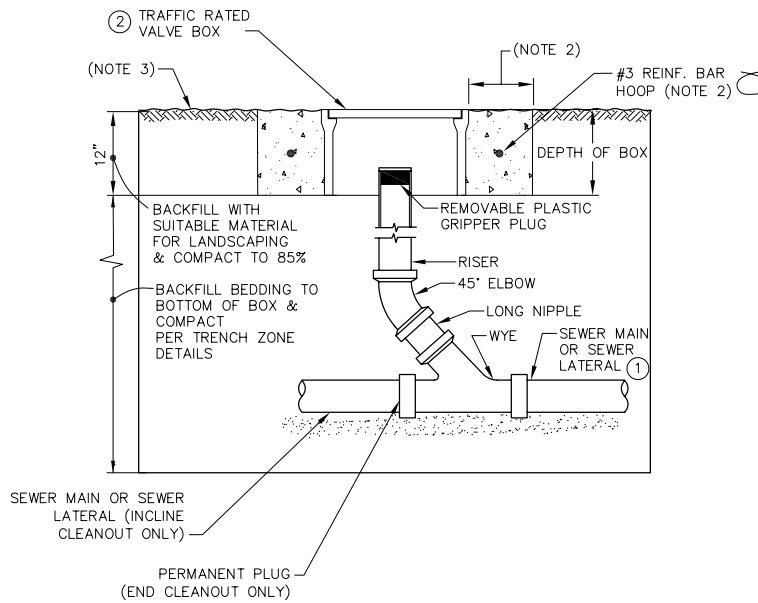
Twain Harte Community Services District

22933 TWAIN HARTE DRIVE
P.O. BOX 649
TWAIN HARTE, CA 95383

TYPICAL DROP INLET SEWER MANHOLE

SCALE: NONE	APPROVED BY: SN
DATE: NOVEMBER 2006	DRAWN BY: RN

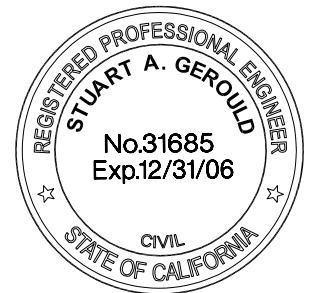
S-11



NOTES

1. TOP OF CLEANOUT SHALL BE LOCATED IN A PRECAST CONCRETE VALVE BOX WITH CAST IRON LID.
2. UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PROVIDE 8" WIDE CIRCULAR REINFORCED CONCRETE COLLAR AS SHOWN.
3. IN LANDSCAPED AREAS, BACKFILL & RESTORE LANDSCAPING TO AS GOOD OR BETTER CONDITION.
4. CLEANOUT SIZE SHALL MATCH SEWER LATERAL PIPE SIZE.
5. MAXIMUM 100 FEET BETWEEN LATERAL CLEANOUTS.
6. DO NOT LOCATE CLEANOUT IN DITCH FLOWLINE.

① CO PIPE DIAMETER, (IN.)	② BOX SIZE/CHRISTY MODEL OR BROOKS EQUIV.
4	10 3/8"/G5
6	10 3/8"/G5
8	13"/G8



STANDARD DETAILS
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Twain Harte Community Services District

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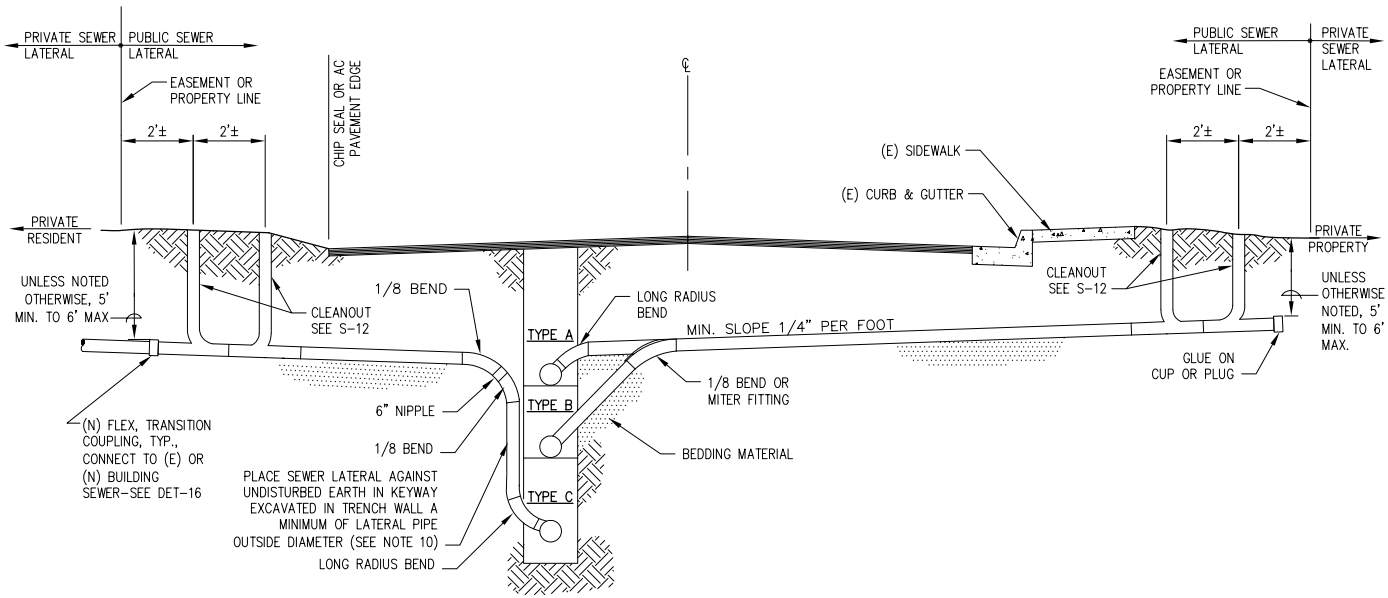
PUBLIC CLEANOUT

SCALE: NONE APPROVED BY: SN

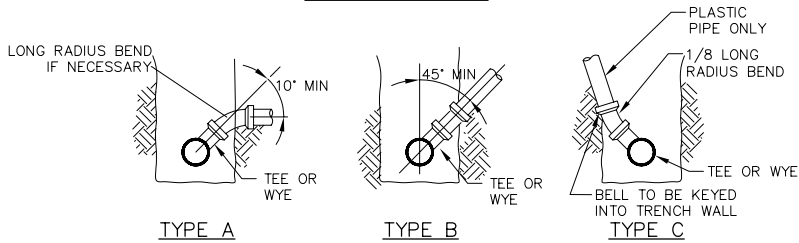
DATE: NOVEMBER 2006 DRAWN BY: RN

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ELEVATION



CONNECTION DETAILS

SEWER LATERAL DETAIL

N.T.S.

- SEWER LATERALS SHALL BE 4" IN DIAMETER UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- FOR BACKFILL MATERIAL FROM 3" MIN BELOW TO 12" MIN ABOVE THE PIPE BELL. SEE STANDARD SPECIFICATIONS FOR BACKFILL MATERIAL REQUIREMENTS.
- CONTRACTOR SHALL USE THE MOST APPROPRIATE TYPE CONNECTION (A, B, OR C) FOR THE PARTICULAR SITUATION.
- PUBLIC SEWER LATERALS SHALL HAVE MINIMUM 5' TO 6' MAXIMUM COVER AT PROPERTY LINE OR EDGE OF EASEMENT WHENEVER LATERAL DEPTH AND SEWER LATERAL SLOPE OF 1/4" PER FOOT (MINIMUM) PERMIT, OR UNLESS OTHERWISE SHOWN ON DRAWINGS.
- WHEN THE SEWER MAIN DEPTH IS SUCH THAT MINIMUM COVER AT PROPERTY LINE OR EDGE OF EASEMENT CANNOT BE MET, THE MINIMUM SLOPE OF 1/4" PER FOOT SHALL GOVERN THE COVER.
- PLACE CONCRETE 12" WIDE OR WELL COMPACTED BEDDING MATERIAL 18" WIDE UNDER THE TEE OR WYE, THE FITTINGS, AND UNSUPPORTED PIPE. WHEN BEDDING MATERIAL IS USED, PLACE ADDITIONAL BEDDING TO TOP OF BEND THE FULL WIDTH OF THE TRENCH.
- MINIMUM SPECIFIED COVER AT THE PROPERTY LINE SHALL BE MEASURED FROM EXISTING GROUND SURFACE OR EDGE OF ADJACENT ROADWAY, WHICHEVER IS LOWER.
- A SPECIFIC ELEVATION AT THE PROPERTY LINE, WHEN SHOWN ON THE PLANS OR DESIGNATED BY THE ENGINEER, SHALL GOVERN.
- MITER FITTINGS SHALL BE MAX. 45 DEGREES.
- IN LIEU OF KEYWAY CONSTRUCTION, CONTRACTOR SHALL USE 3/4" CRUSHED ROCK BEDDING TO AT LEAST 6 INCHES IN DIAMETER AROUND THE PIPE O.D. RISER. THIS SHALL REQUIRE A SHORED TRENCH WIDTH WIDE ENOUGH TO COMPLETE THIS ALTERNATE INSTALLATION METHOD.
- CONTRACTOR SHALL USE WYES AND 45° LONG RADIUS ELBOWS FOR ALL PUBLIC SEWER LATERAL BENDS. IF 45° LONG RADIUS ELBOWS ARE NOT AVAILABLE, CONTRACTOR SHALL USE TWO 22-1/2° ELBOWS WITH A SHORT PIECE (± 1') OF STRAIGHT PIPE IN BETWEEN.



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District

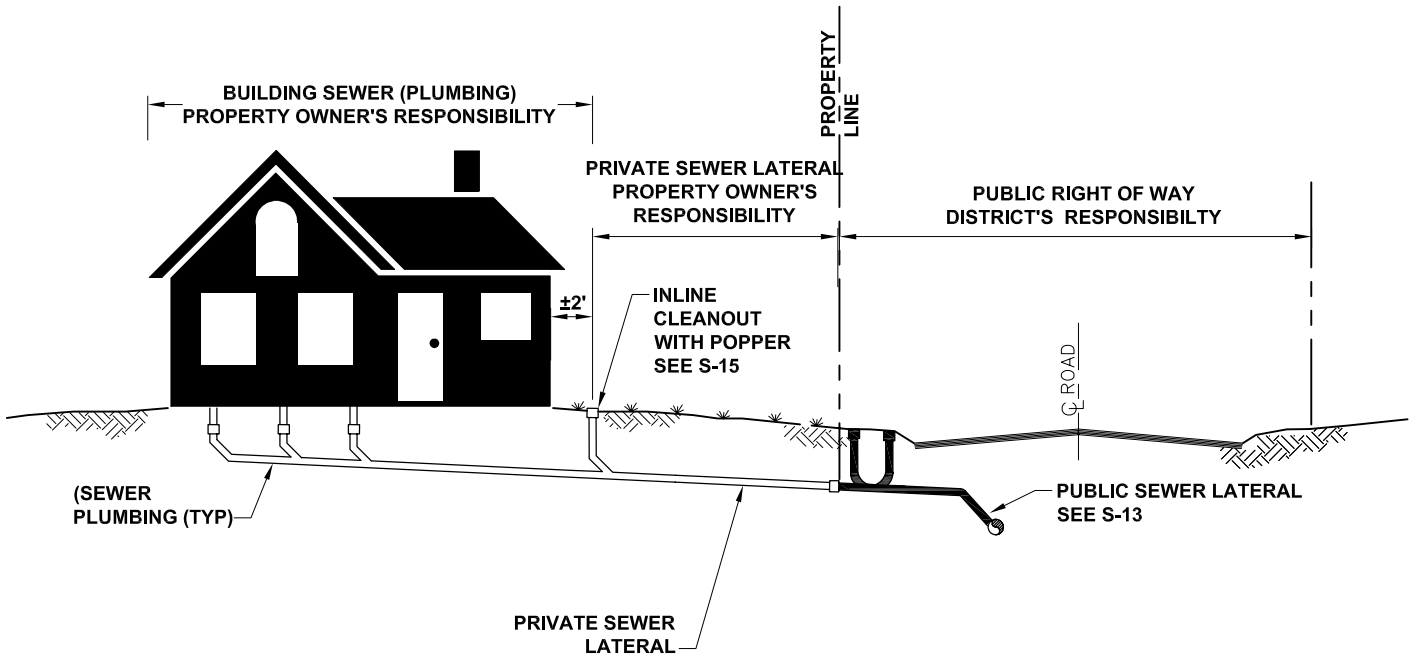
22933 TWAIN HARTE DRIVE
P.O. BOX 649
TWAIN HARTE, CA 95383

PUBLIC SEWER LATERAL

SCALE: NONE APPROVED BY: SN
DATE: NOVEMBER 2006 DRAWN BY: RN

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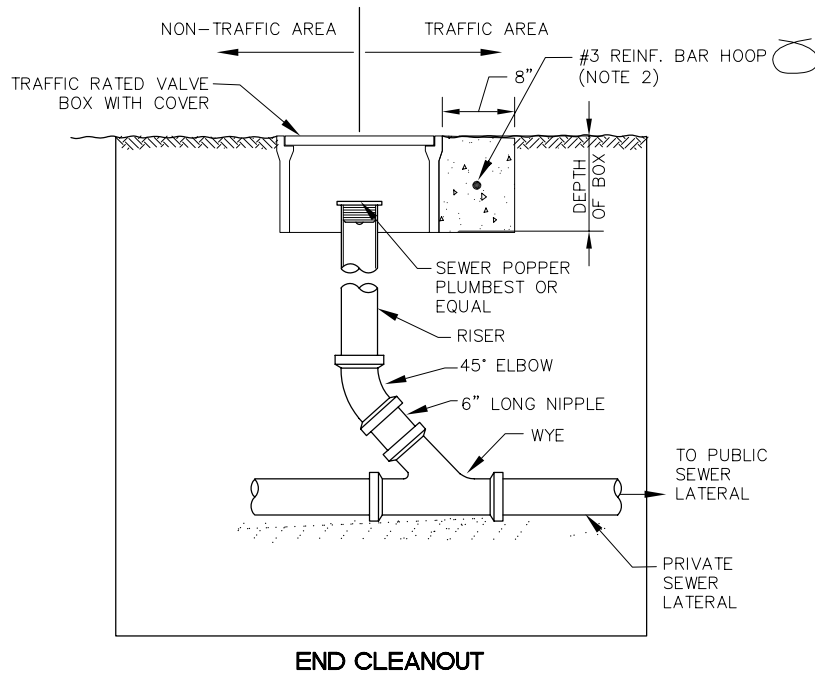
**PRIVATE SEWER LATERAL CONNECTION DETAIL
ELEVATION VIEW**



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District 22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383	<h2>PRIVATE SEWER LATERAL</h2>		<h1>S-14</h1>
	SCALE: NONE	APPROVED BY: SN	
	DATE: NOVEMBER 2006	DRAWN BY: RN	

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NOTES

1. TOP OF CLEANOUT SHALL BE LOCATED IN A VALVE BOX PER SPECIFICATIONS.
2. CLEANOUT IN TRAFFIC AREAS SHALL BE CONSTRUCTED WITH 8" WIDE CIRCULAR REINF. CONC. COLLAR AS SHOWN.
3. CLEANOUT SIZE TO MATCH SEWER LATERAL PIPE SIZE.



STANDARD DETAILS
NOT FOR CONSTRUCTION

Twain Harte Community Services District		PRIVATE LATERAL CLEANOUT		S-15
22933 TWAIN HARTE DRIVE P.O. BOX 649 TWAIN HARTE, CA 95383		SCALE: NONE	APPROVED BY: SN	
		DATE: NOVEMBER 2006	DRAWN BY: RN	