SEWER

STANDARD SPECIFICATIONS AND DETAILS

AUGUST 2024

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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 and/or improvements. Work on public sewerage works shall be constructed by a licensed contractor.

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 Tuolumne County requirements.

1.1 Related Documents

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

- District Wastewater Code
- Policy and Procedure Manual:
  - Miscellaneous Fee Schedule
  - Encroachment Permits
  - Construction Code Enforcement
  - Use of Common Sewer Lateral
  - Other related District Policies

1.2 Definitions

Terms used in this document are as defined in District's Wastewater Code.

1.3 Order of Precedence

Project-specific conditions of approval, plans and specifications shall take 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. Under extraordinary circumstances the District's General Manager, in his/her sole discretion, may allow a smaller easement width. In no case shall it be less than 12 feet.

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, California State Water Resources Control Board.
- General Order No. 103 of the California Public Utilities Commission.
- California Code of Regulations, Title 22, Section 64572.

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 and upstream 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 outer pipe diameter surfaces, below any existing or planned water main or service. Vertical crossings with clearance less than 1 feet, shall require a casing with minimum length of 5-feet, centered at point of crossing.

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 64 gallons per day (gpd) per person (equal to 160 gpd per HE). A peaking factor of 3.5 shall be used for new construction, resulting in a peak flow of 560 gpd per HE. A peaking factor of 6 shall be used for al replacements or repairs to existing infrastructure.

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 the lesser of 500 gpd per diameter inch per mile of pipeline or 800 gallons per acre per day rainfall. Derived inflow and infiltration shall be added to the design peak dry weather flow (PDWF) in order to determine the design peak wet weather flow (PWWF).

The District may consider reduced design infiltration and inflow rates if the average daily flows meet the criteria for non-excessive flows by the Environmental Protection Agency (EPA).

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 wherever 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 shall 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.

Mains installed with less than 36” cover shall use ductile iron pipe or other engineered alternatives and shall require the approval of the District. Each location not meeting the minimum cover and clearance requirements will require special pipe, bedding and/or backfill and shall be approved by the District.

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 used.

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 dams shall be installed in locations of drainage crossings to prevent water flow through the pipe trench after construction. Additionally, trench dams shall be installed for sewer mains with a slope greater than ten (10) percent. The District may also require trench dams for sewer mains with slopes between four (4) and nine (9) percent based on existing groundwater, hydrogeologic and geotechnical conditions.

Trench dam locations shall be shown on the pipeline profile drawings. Sewer mains as identified above shall have, at a minimum, one (1) Trench Dam on pipe runs between manholes or structures, installed with maximum 200 foot spacing.

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 300 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 300 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-inch nominal for commercial laterals unless otherwise approved by the District. Sewer laterals 6-inch or larger shall be installed for developments that are 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 ¼ inch per foot.

2.7.4 Cleanouts

Each public sewer lateral will be required to have a bilateral cleanout per S11 located within 3 feet of the property line or edge of permanent easement. Any other cleanouts may be single cleanouts. THCSD will not maintain the sewer lateral in the street if a 2-way (bilateral) cleanout is not installed at the property line.

For straight lateral pipeline runs greater than 100 feet in length, inline cleanouts shall be spaced no more than 100 feet apart. A cleanout 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 upstream cleanout on a private sewer lateral located near the house, shall be equipped with a backflow prevention “popper” in accordance with the THCSD Wastewater Ordinance and as shown on S14.

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 (2023 edition), Paragraph 19-3.02F(2)

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%
3/4"	90% - 100%
3/8”	20% - 55%
No. 4	0% - 10%
No. 8	0% - 5%

3.1.3 Aggregate Base

Caltrans Standard Specifications for Class 2, 3/4-inch maximum aggregate base (Caltrans Paragraph 26-1.02B).

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 90-1.02B, (2), 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
1-½ ”	100
1”	80-100
¾”	60-100
3/8”	50-100
No. 4	40-80
No. 100	10-40

3.1.7 Pipe Bedding

Bedding material shall be sand, aggregate base, controlled density fill, or native material. When the Contractor requests to use native material, the District requires testing of the native material by an independent, state-certified testing laboratory and review and recommendation by a registered Geotechnical Engineer to confirm the material is suitable for bedding material for the proposed sewer pipe. Materials testing and Geotechnical Engineering is paid for by the Developer/Contractor. The bedding shall be free of rocks and clods greater than 3 inches in diameter and shall be free of organic material and other the unsuitable material.

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.

High Density Polyethylene (HDPE) pipe for wastewater utility systems may also be installed when approved by the District Engineer. HDPE sewer pipe and fittings; ASTM F585, ASTM F2206

3.2.2 THCSD Cleanouts/Lampholes

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 Backflow Prevention Poppers

Backflow prevention 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 manufacturer'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 Tuolumne 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 Tuolumne Utility 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 will only be considered with geotechnical investigation and a geotechnical report that includes written recommendation by a licensed Geotechnical Engineer with the State of California. All costs associated with such geotechnical inspections and reports will be the responsibility of the Applicant.

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 , Tuolumne County 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 shall be bedded at the proper slope. Trench bedding shall be ¾-inch crushed rock at a depth of 12-inches.

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 Tuolumne County.

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 19-3.03F.

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) gauge 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 gauge 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) gauge 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. The 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 re-rounding 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 of 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. ¾-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	**Water Main Constructed Near Existing Sewer Main**
S-3	**Sewer Main Constructed Near Existing Water Main**
S-4	**Standard Trench For Water And Sewer**
S-5	**Creek Crossing For Water And Sewer Mains And Bore & Jack Casing**
S-6	**Trench Dam**
S-7	**Locating Wire**
S-8	**Typical Sewer Manhole**
S-9	**Manhole Details**
S-10	**Typical Drop Inlet Sewer Manhole**
S-11	**Public Cleanout**
S-12	**Public Sewer Lateral**
S-13	**Private Sewer Lateral**
S-14	**Private Sewer Lateral Cleanout**
S-15	**Sewer Connection to Existing Manhole**
S-16	**Private Pump System to Gravity Sewer Main**

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.

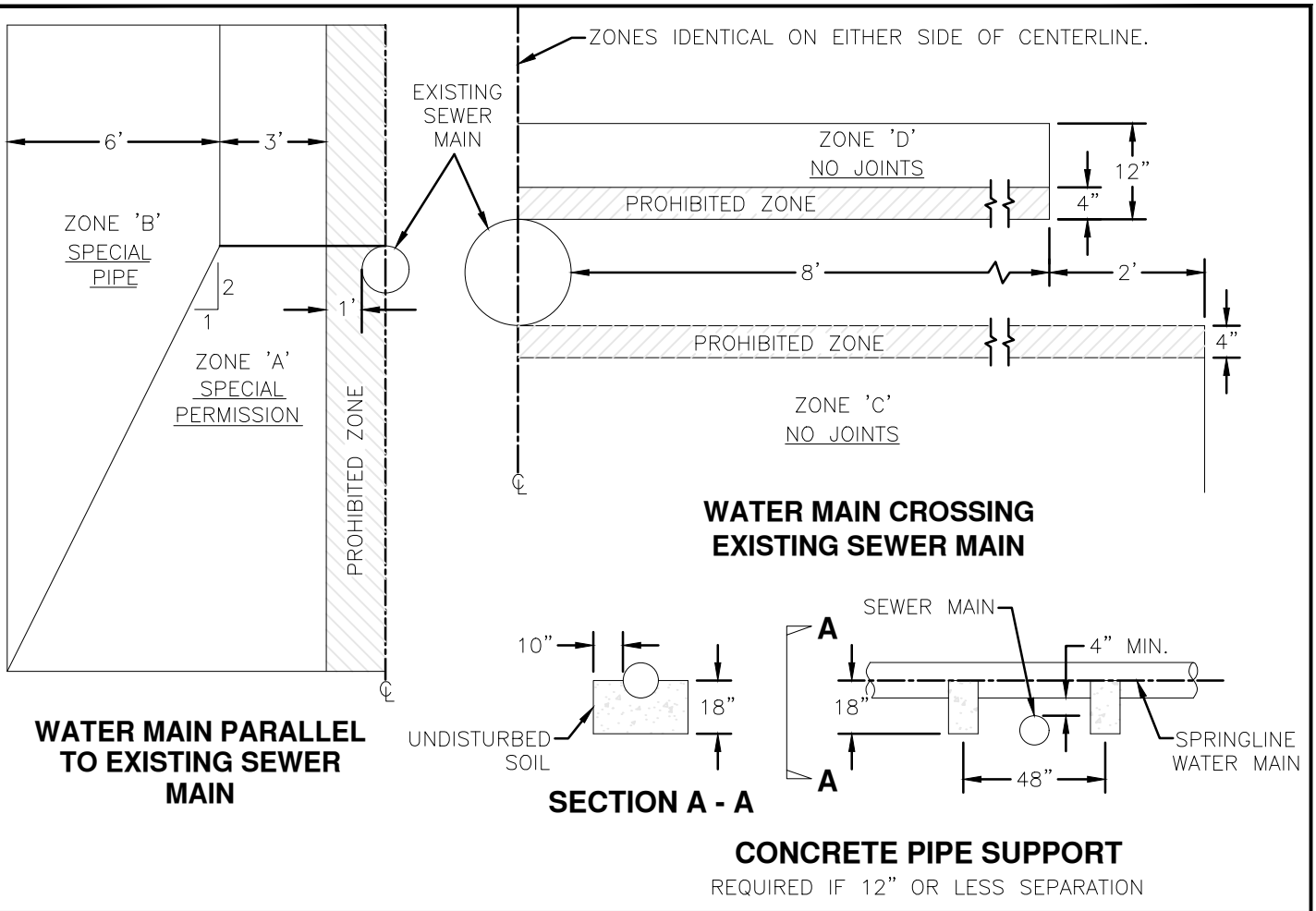
7. SEE STANDARD SPECIFICATIONS FOR FLUSHING AND TESTING REQUIREMENTS.

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

GENERAL-NOTES

SCALE: NONE		APPROVED BY: SN	**S-1**
DATE: AUG 2024		DRAWN BY: RN	



SPECIAL CONSTRUCTION REQUIRED FOR WATER MAIN

ZONE A: WATER MAIN PARALLEL TO SEWER MAIN SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE CALIFORNIA STATE DEPARTMENT OF HEALTH SERVICES AND THCSD

ZONE B: WATER MAIN PARALLEL TO SEWER MAIN SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE WITH INTERIOR CEMENT COATING OR C900 PIPE (DR14).

ZONE C: WATER MAIN CROSSING UNDER SEWER MAIN SHALL HAVE NO JOINTS WITHIN 10 FEET AND SHALL BE CONSTRUCTED WITH ONE OF THE TWO MATERIALS LISTED UNDER ZONE B.

ZONE D: WATER MAIN CROSSING OVER SEWER MAIN SHALL HAVE NO JOINTS WITHIN 8 FEET OF SEWER MAIN AND SHALL BE CONSTRUCTED OF ZONE 'B' MATERIALS.

NOTES

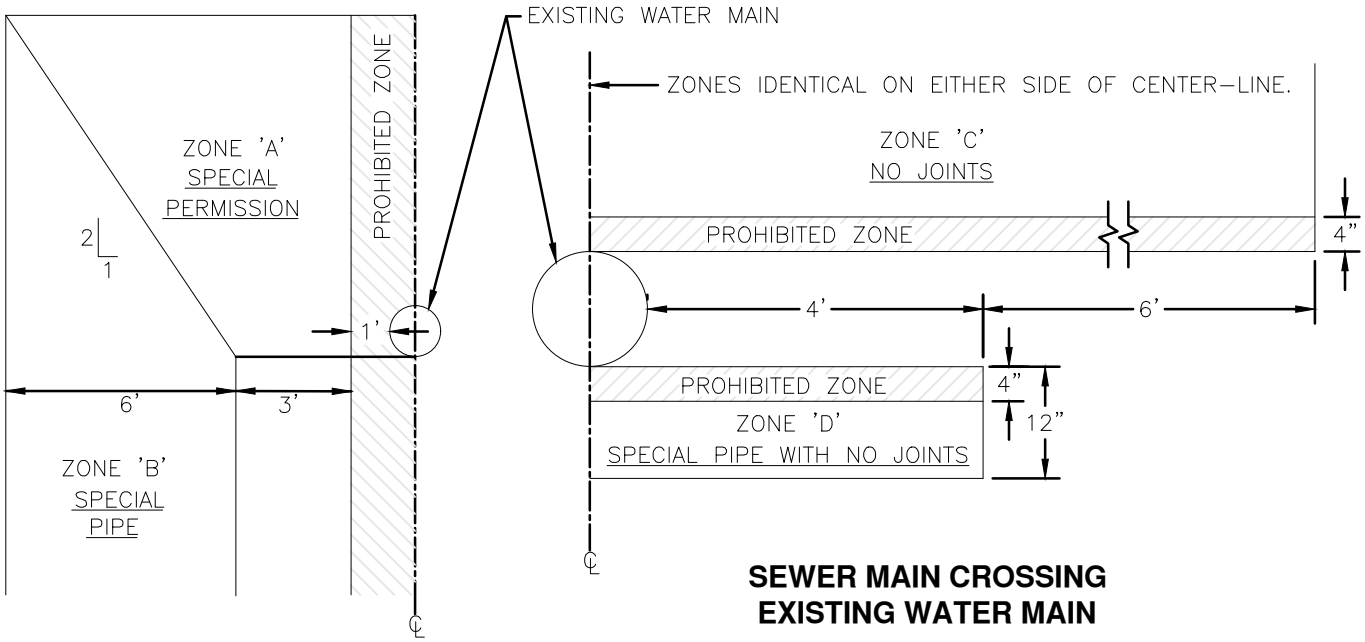
A. WATER MAIN PARALLEL TO SEWER FORCE-MAIN SHALL HAVE A HORIZONTAL SEPARATION OF 10 FT. MIN.

B. WATER MAIN CROSSING OVER SEWER FORCE-MAIN SHALL BE AS CLOSE TO PERPENDICULAR AS PRACTICAL AND AT LEAST ONE FOOT ABOVE FORCE-MAIN. WATER MAIN SHALL HAVE NO JOINTS WITHIN 10 FEET EITHER SIDE OF FORCE-MAIN AND BE CONSTRUCTED OF ZONE 'B' MATERIAL.

C. WATER MAIN PARALLEL TO STORM DRAIN SHALL SHALL HAVE A HORIZONTAL SEPARATION OF 4 FEET AND A VERTICAL SEPARATION OF ONE FOOT. VERTICAL SEPARATION IS REQUIRED ONLY WHEN HORIZONTAL SEPARATION IS 10 FEET OR LESS.

D. ALL DRY UTILITIES SHALL MAINTAIN 5 FEET HORIZONTAL SEPARATION WHEN PARALLEL, 1 FOOT VERTICAL SEPARATION WHEN CROSSING, AND SHALL BE LOCATED UNDER EXISTING WATER AND SEWER. DRY UTILITIES MAY ONLY BE LOCATED OVER EXISTING WATER AND SEWER WITH PRIOR DISTRICT APPROVAL AND SHALL MAINTAIN 6 INCHES OF VERTICAL SEPARATION. A PROTECTIVE CONCRETE OR 3 SACK SLURRY CAP (6" MIN. THICK) SHALL BE PLACED OVER ALL CONDUITS.

Twain Harte Community Service District	WATER MAIN CONSTRUCTED NEAR EXISTING SEWER MAIN		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	S2
	DATE: AUG 2024	DRAWN BY:	



SEWER MAIN PARALLEL TO EXISTING WATER MAIN

SEWER MAIN CROSSING EXISTING WATER MAIN

SPECIAL CONSTRUCTION REQUIRED FOR SEWER

ZONE A: SEWER MAIN PARALLEL TO WATER MAIN SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE CALIFORNIA STATE DEPARTMENT OF HEALTH SERVICES, SANITARY ENGINEERING BRANCH, AND TUOLUMNE UTILITIES DISTRICT.

ZONE B: SEWER MAIN PARALLEL TO WATER MAIN SHALL BE CONSTRUCTED OF:
(1) PVC SEWER PIPE WITH RUBBER RING JOINTS (ASTM D3034, SDR 35 OR EQUAL) OR
(2) CAST IRON OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS. PIPE TYPE SHALL BE CONTINUOUS FROM MANHOLE TO MANHOLE.

ZONE C: SEWER MAIN CROSSING OVER WATER MAIN SHALL BE CONSTRUCTED OF:
(1) DUCTILE IRON PIPE WITH HOT DIP BITUMASTIC COATING AND MECHANICAL JOINTS, OR
(2) A CONTINUOUS SECTION OF C900, CLASS 200 PVC PIPE (DR14) CENTERED OVER PIPE BEING CROSSED, OR
(3) SDR35 PIPE IN A CONTINUOUS C900, CLASS 150 OR DUCTILE IRON SLEEVE EXTENDING 10 FT. EACH SIDE OF THE WATER PIPE.

PIPE TYPE SHALL BE CONTINUOUS FROM MANHOLE TO MANHOLE.

ZONE D: SEWER MAIN CROSSING UNDER WATER MAIN SHALL BE CONSTRUCTED OF ZONE 'C' MATERIALS.

SEWER FORCE-MAIN INSTALLATION NOTES

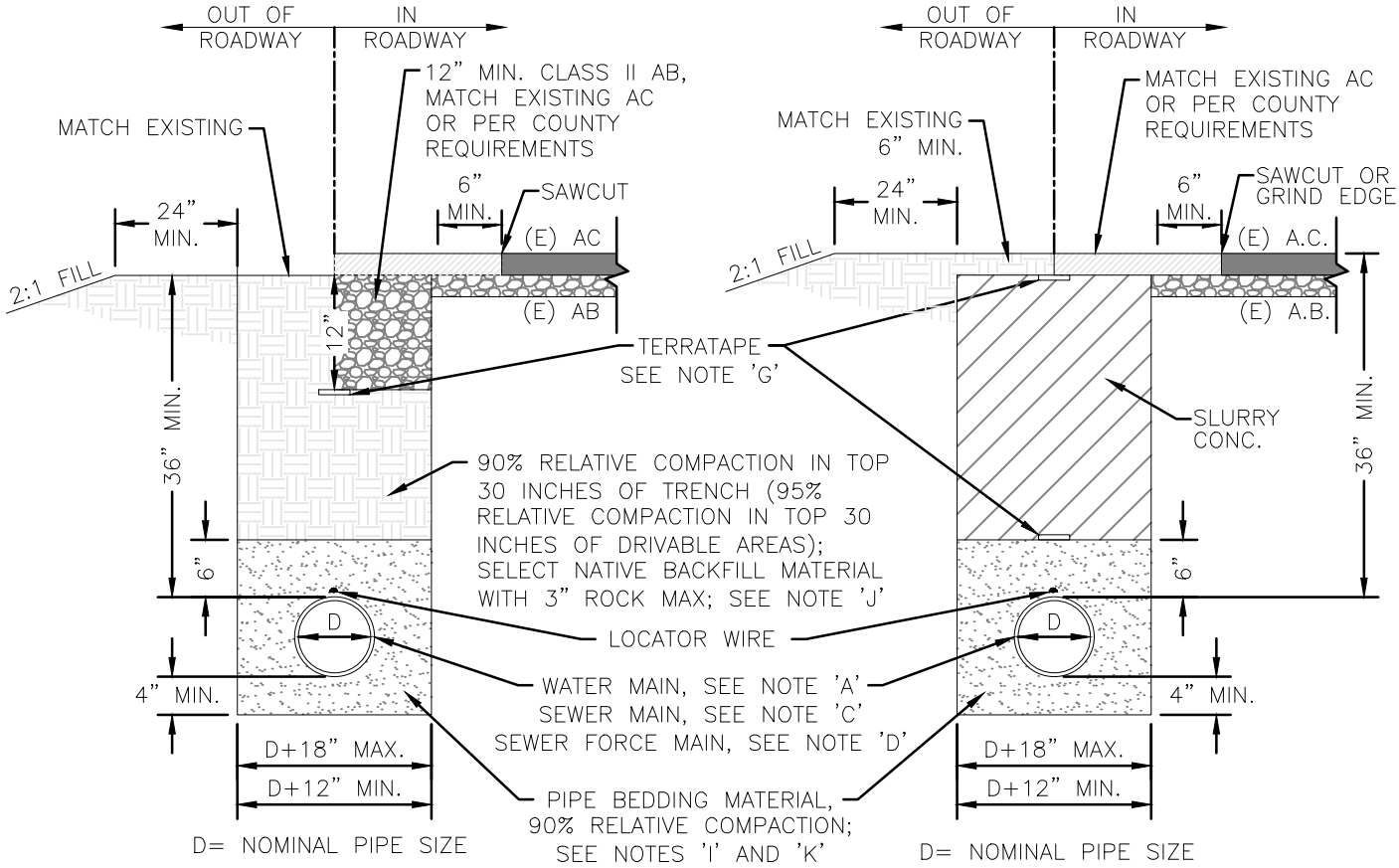
A. PARALLEL INSTALLATION: SEWER FORCE MAIN SHALL NOT BE INSTALLED WITHIN 10 FT. HORIZONTALLY OF WATER MAIN.

B. CROSSING UNDER WATER MAIN: SEWER FORCE MAIN MUST BE AS CLOSE TO PERPENDICULAR AS PRACTICAL AND AT LEAST ONE FOOT BELOW WATER MAIN.

C. CROSSING UNDER WATER MAIN IN ZONE 'D': SEWER FORCE MAIN WITHIN 8 FT. HORIZONTALLY OF WATER MAIN SHALL BE ENCLOSED IN A CONTINUOUS C900, CLASS 150 OR DUCTILE IRON SLEEVE.

D. ALL DRY UTILITIES SHALL MAINTAIN 5 FEET HORIZONTAL SEPARATION WHEN PARALLEL, 1 FOOT VERTICAL SEPARATION WHEN CROSSING, AND SHALL BE LOCATED UNDER EXISTING WATER AND SEWER. DRY UTILITIES MAY ONLY BE LOCATED OVER EXISTING WATER AND SEWER WITH PRIOR DISTRICT APPROVAL AND SHALL MAINTAIN 6 INCHES OF VERTICAL SEPARATION. A PROTECTIVE CONCRETE OR 3 SACK SLURRY CAP (6" MIN. THICK) SHALL BE PLACED OVER ALL CONDUITS.

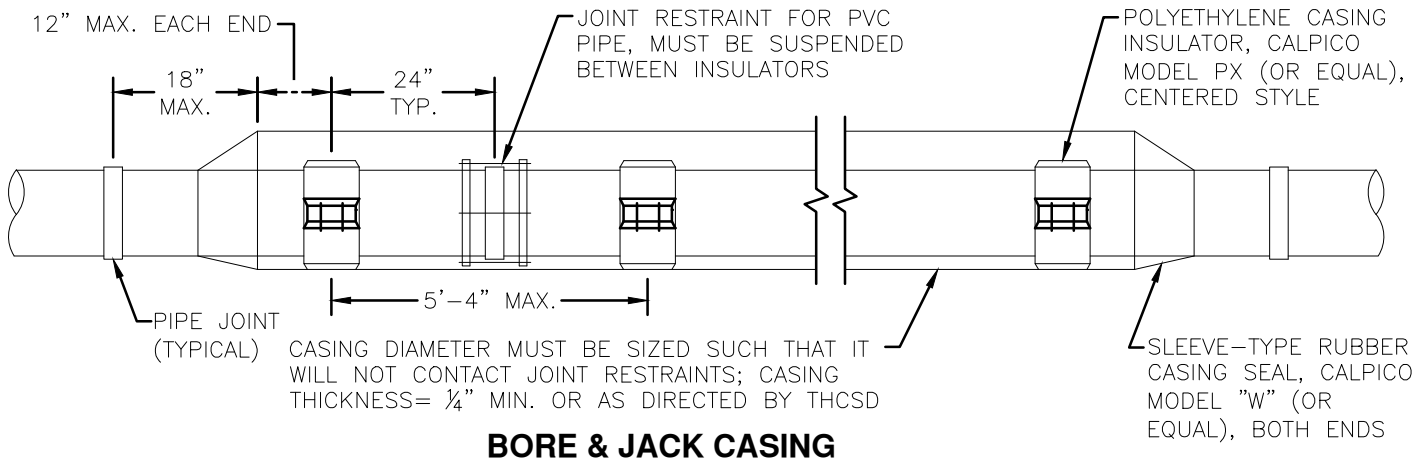
Twain Harte Community Service District	SEWER MAIN CONSTRUCTED NEAR EXISTING WATER MAIN		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	S3
	DATE: AUG 2024	DRAWN BY:	



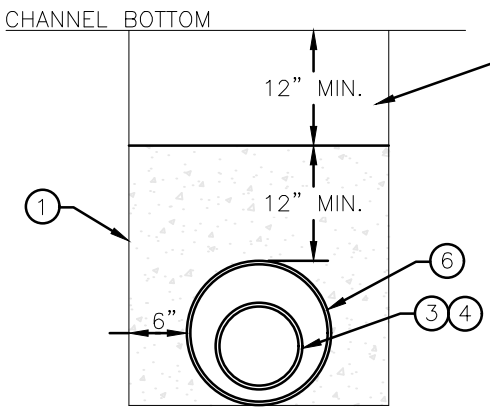
STANDARD TRENCH **SLURRY TRENCH**

A. FOR WATER MAINS 4" DIA. OR GREATER, PIPE SHALL BE AWWA C900 AND C909 PVC PIPE; CLASS RATING SHALL BE APPROVED BY THCSD PRIOR TO INSTALLATION.
B. WATER MAINS SHALL BE PRESSURE TESTED. PRESSURE TEST SHALL NOT BE LESS THAN 150 PSI AT THE HIGHEST ELEVATION OF THE TEST SECTION AND SHALL BE 200 PSI AT THE LOWEST ELEVATION OF THE TEST SECTION.
C. FOR GRAVITY SEWER MAINS 4"–15" DIA., PIPE SHALL BE PVC SDR35 AND SHALL MEET ASTM D3034 STANDARDS. MAINS 18"–24" DIA., PIPE SHALL MEET ASTM F679 STANDARDS. RUBBER SEALANT RINGS SHALL MEET ASTM D3212 REQUIREMENTS. CAMERA INSPECTION BY THCSD STAFF (OR EQUAL) SHALL BE REQUIRED FOR ALL SEWER LINES.
D. FOR SEWER FORCE MAINS 4" DIA. OR GREATER, PIPE SHALL BE AWWA C900 DR18 PVC PIPE; HIGHER CLASS RATING MAY BE REQUIRED BY THCSD. MAINS LESS THAN 4" DIA. ARE NOT PERMITTED.
E. PRIOR TO INSTALLING GRAVITY SEWER PIPE, BOTTOM OF TRENCH SHALL BE COMPACTED AND INSPECTED.
F. GRAVITY SEWER ELBOWS SHALL BE SDR35 PVC "SLOW–BANANA" BEND. OTHER ELBOWS MAY BE USED WITH PRIOR DISTRICT APPROVAL AND SHALL NOT EXCEED 22 ½° IN ANY CASE. ALL OTHER SEWER FITTINGS SHALL BE CAST IRON.
G. TERRATAPE (2" WIDE LOCATING TAPE) TO BE LABELED "BURIED WATERLINE [SEWER LINE] BELOW".
H. ALL TRENCHES OVER 5 FT. DEEP SHALL BE SLOPED, SHORED, BRACED, OR OTHERWISE SUPPORTED IN ACCORDANCE WITH CAL–OSHA REQUIREMENTS. THCSD ASSUMES NO RESPONSIBILITY FOR THE DESIGN OF SUCH SUPPORT SYSTEMS. IN PAVED AREAS TRENCHES SHALL NOT BE SIDE–SLOPED.
I. RELATIVE COMPACTION TO BE 90% OR GREATER IN THE HAUNCH AREA OF THE PIPE FROM THE SPRINGLINE TO THE BOTTOM OF THE PIPE.
J. ALL NATIVE MATERIAL REQUIRES DISTRICT APPROVAL PRIOR TO USE. CONTRACTOR SHALL USE OTHER APPROVED MATERIAL IF NEEDED TO MEET COMPACTION REQUIREMENTS.
K. REFER TO THCSD SPECIFICATIONS FOR BEDDING MATERIAL.
L. ALL IMPORTED MATERIAL FOR AREAS UNDER THCSD JURISDICTION SHALL BE ASBESTOS FREE. ALL IMPORTED MATERIAL FOR AREAS UNDER COUNTY JURISDICTION SHALL COMPLY WITH COUNTY AIR POLLUTION CONTROL REQUIREMENTS REGARDING ASBESTOS.

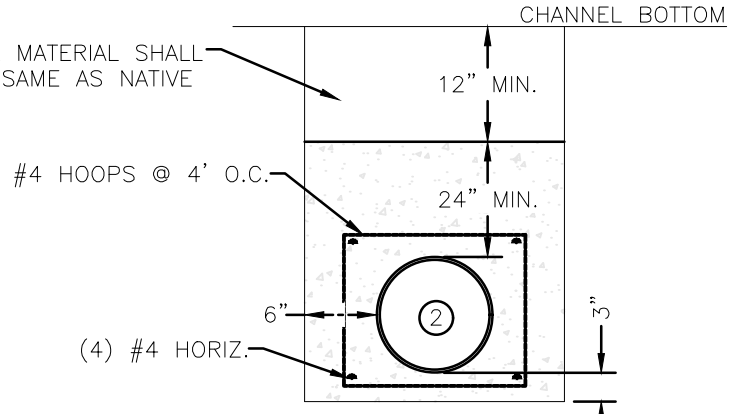
Twain Harte Community Service District	**STANDARD TRENCH FOR WATER AND SEWER**		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	**S4**
	DATE: AUG 2024	DRAWN BY:	



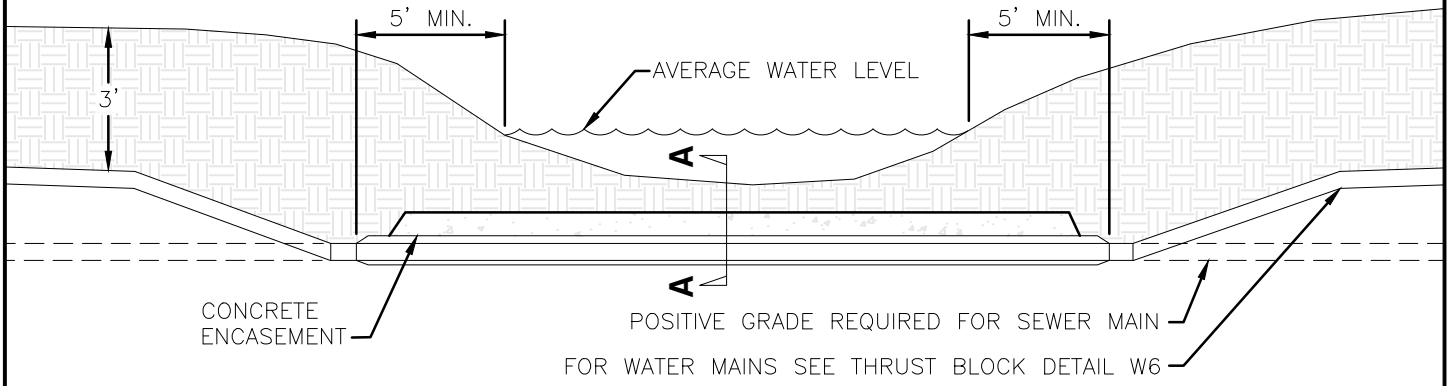
BORE & JACK CASING



SECTION A-A, SEE BORE & JACK CASING DETAIL



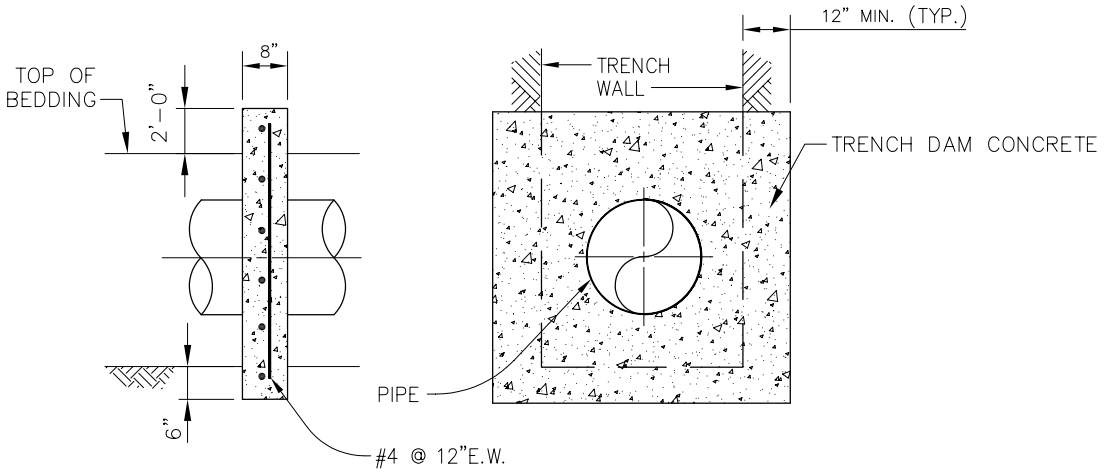
SECTION A-A ALTERNATE VERSION (REQUIRES THCSD APPROVAL)



CREEK CROSSING FOR WATER AND SEWER MAINS

ITEM	QTY	DESCRIPTION	REMARKS
1		3-SACK SLURRY MIX	NO LOADS TO BE PLACED ON CONCRETE FOR 7 DAYS
2		DUCTILE IRON PIPE	CEMENT OR PVC LINED; USE CAST IRON FITTINGS AS NEEDED
3		PVC C900-DR18 FOR WATER	USE CAST IRON FITTINGS AS NEEDED
4		SDR35 FOR SEWER	USE CAST IRON FITTINGS AS NEEDED
5		6-SACK STRUCTURAL CONCRETE	USE CAST IRON FITTINGS AS NEEDED
6		CASING	

Twain Harte Community Service District	**CREEK CROSSING FOR WATER AND SEWER MAINS AND BORE & JACK CASING**		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	**S5**
	DATE: AUG 2024	DRAWN BY:	



NOTES:

1. TRENCH DAMS PER SECTION 2.5.5.

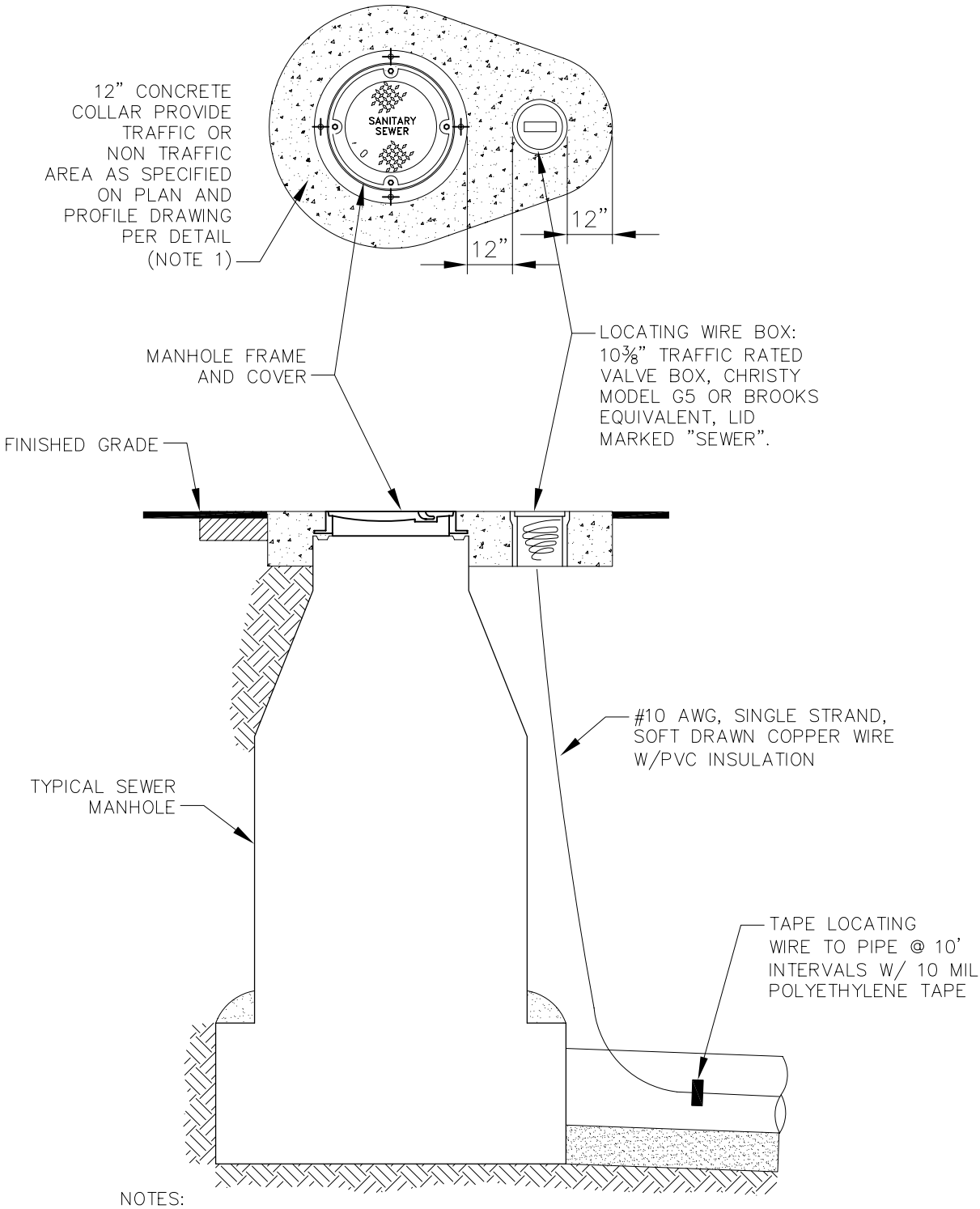
2. TRENCH DAMS SHALL BE KEYED INTO UNDISTURBED SOIL 12" MINIMUM BEYOND TRENCH WALLS AND 6" BELOW TRENCH BOTTOM.

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

TRENCH DAM

SCALE: NONE		APPROVED BY: SN	**S-6**
DATE: AUG 2024		DRAWN BY: RN	



NOTES:

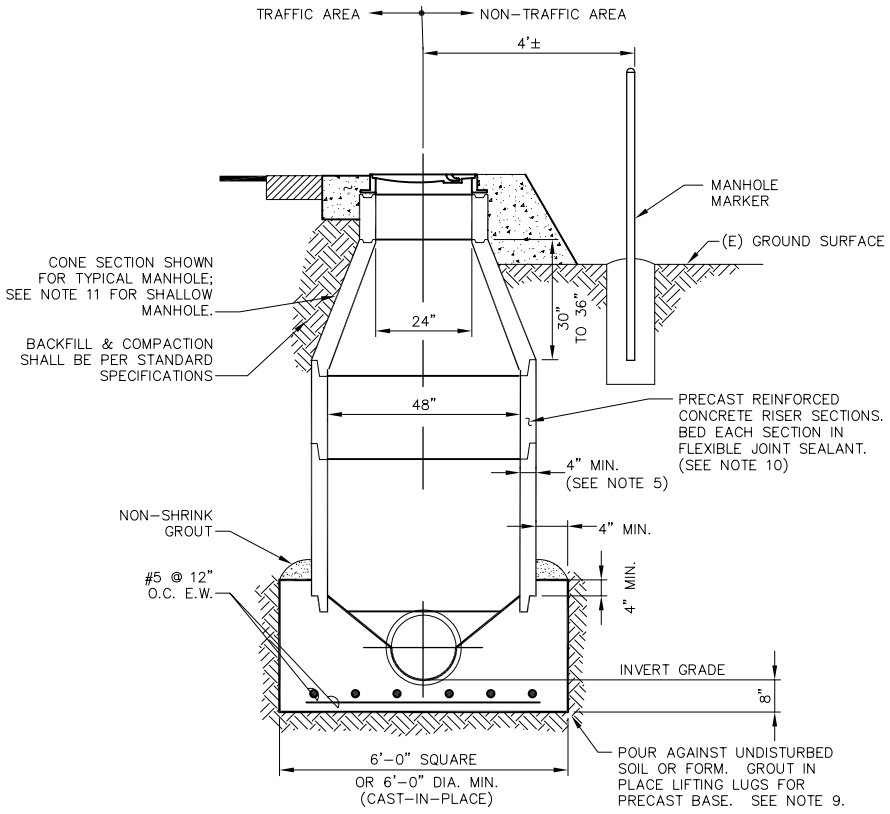
1. PROVIDE CONCRETE COLLAR UNLESS OTHERWISE SPECIFIED ON PLAN AND PROFILE DRAWINGS.
2. STRIP 3–INCHES OF PVC INSULATION FROM END LOCATING WIRE WITHIN WIRE BOX.

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

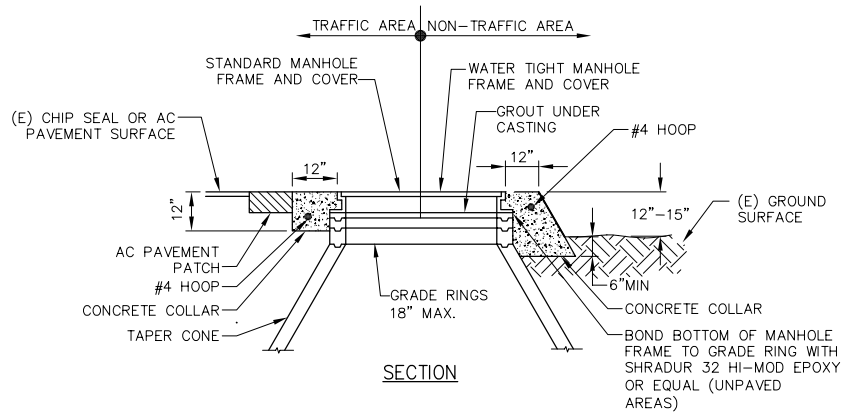
LOCATING WIRE

SCALE: NONE	APPROVED BY: SN	**S7**
DATE: AUG 2024	DRAWN BY: RN	



TYPICAL SEWER MANHOLE

N.T.S.



FRAME AND COLLAR DETAIL

N.T.S.

NOTES:

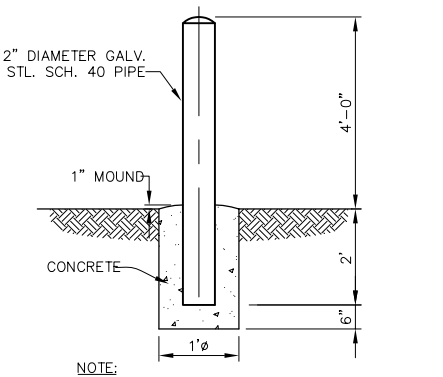
1. WHERE MANHOLES ARE NOT LOCATED IN STREETS OR TRAVELED WAY PLACE TOP OF MANHOLE 12" TO 15" ABOVE EXISTING GROUND UNLESS OTHERWISE SHOWN ON PLANS.
2. ALL CONCRETE USED IN MANHOLE SHALL BE PER STANDARD SPECIFICATIONS.
3. ECCENTRIC TYPE CONCRETE CONE SECTION SHALL BE INSTALLED IN PLACE OF CONCENTRIC CONES 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-9** FOR ADDITIONAL DETAILS.
13. SEE S-10 FOR DROP INLET MANHOLE.

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

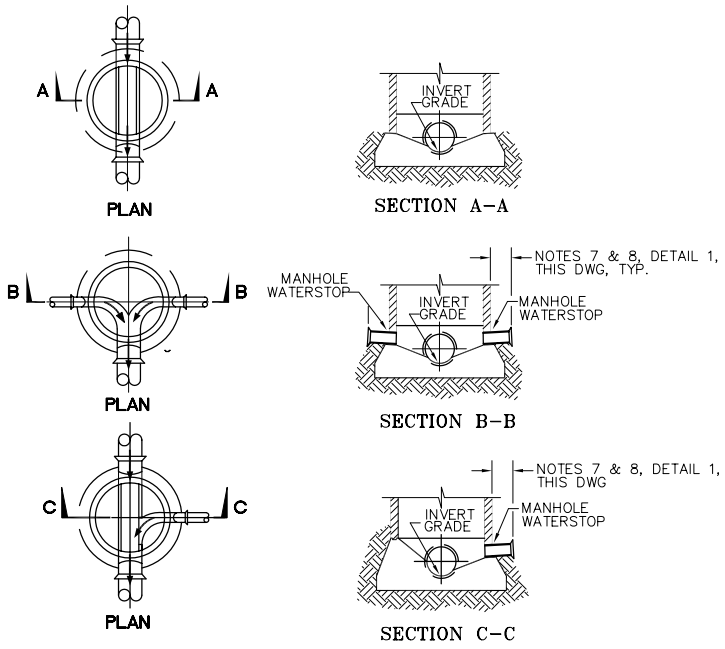
TYPICAL SEWER MANHOLE

SCALE: NONE	APPROVED BY: SN	**S8**
DATE: AUG 2024	DRAWN BY: RN	

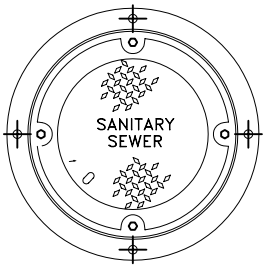


NOTE:
1. PAINT ABOVE GROUND PIPE, ONE COAT GALV. METAL WHITE PRIMER & 2 COATS WITH REFLECTING SAFETY YELLOW.

MANHOLE MARKER DETAIL
N.T.S.



MANHOLE BASE DETAIL
N.T.S.

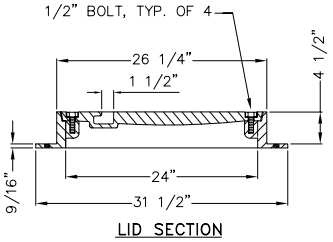


ACCEPTABLE MANUFACTURERS
DOMESTIC MFR. ONLY

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.

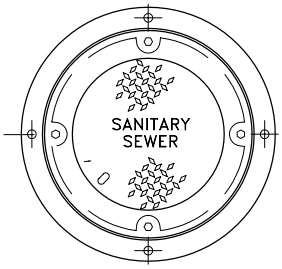
LID PLAN



LID SECTION

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

WATERTIGHT MANHOLE FRAME & COVER
N.T.S.

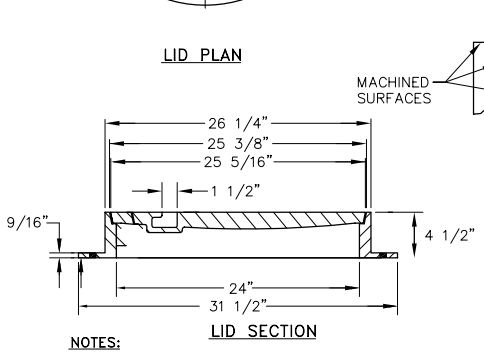


ACCEPTABLE MANUFACTURERS
DOMESTIC MFR. ONLY

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.

LID PLAN



LID SECTION

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

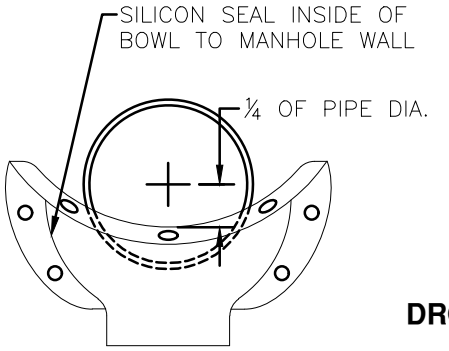
MANHOLE FRAME & COVER
N.T.S.

Twain Harte Community Services District

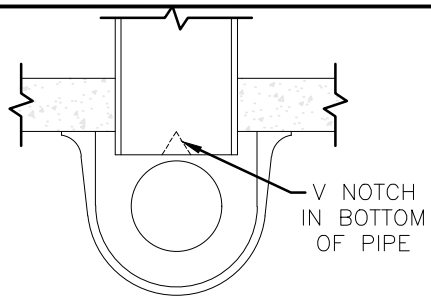
22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

MANHOLE DETAILS

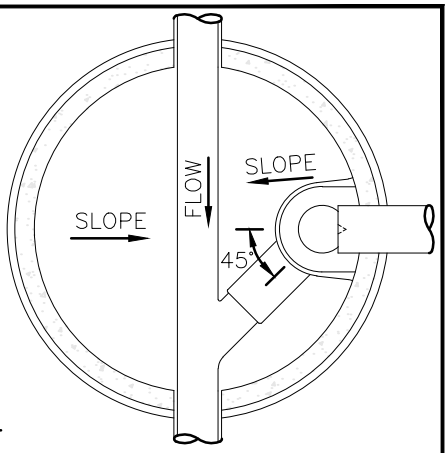
SCALE: NONE		APPROVED BY: SN	**S9**
DATE: AUG 2024		DRAWN BY: RN	



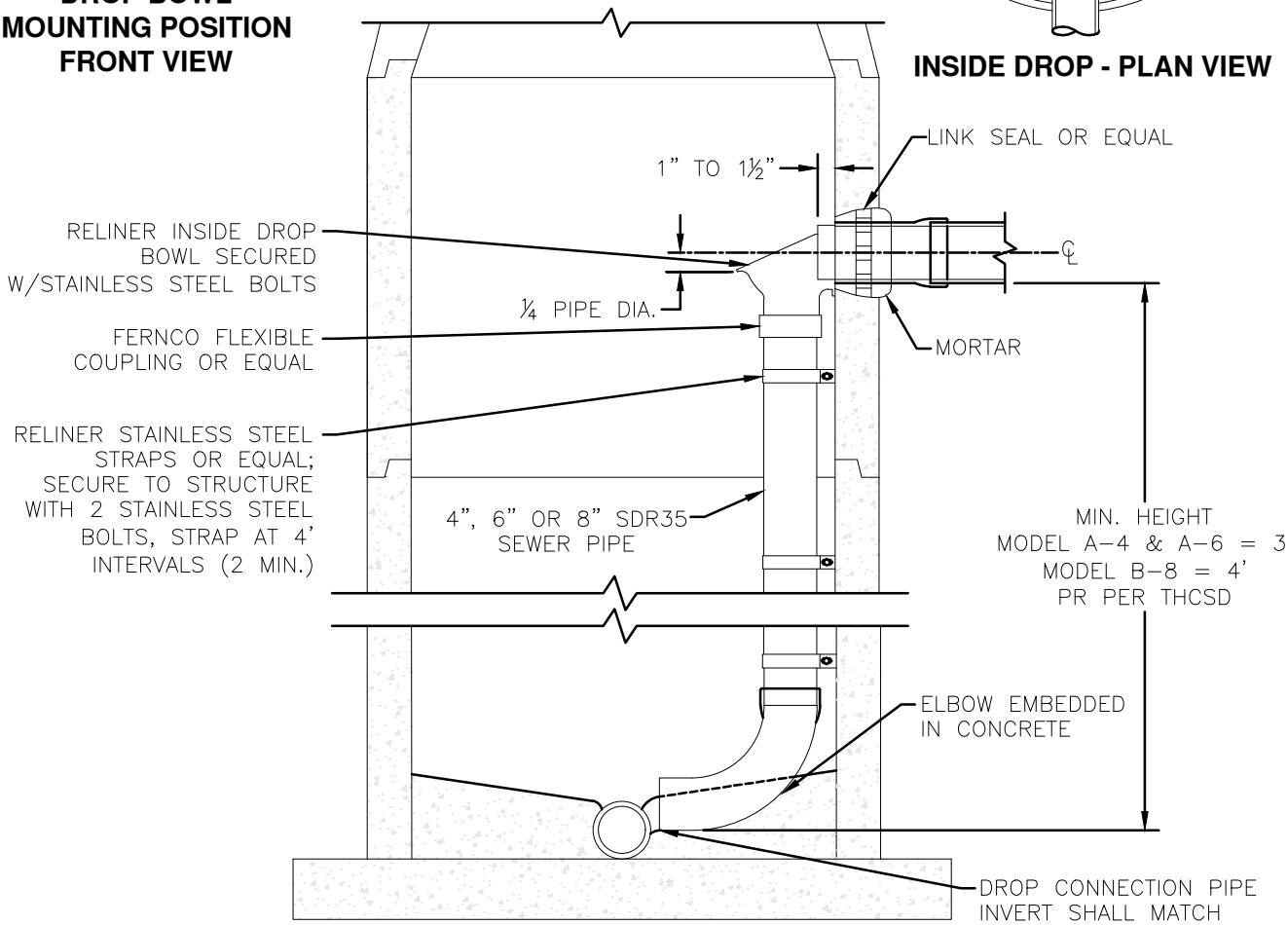
DROP BOWL MOUNTING POSITION FRONT VIEW



DROP BOWL MOUNTING POSITION TOP VIEW



INSIDE DROP - PLAN VIEW



INSIDE DROP CONNECTION

NOTES

A. ALL INSIDE DROP CONNECTIONS FOR SERVICES AND COLLECTOR SEWERS SHALL USE THE DROP BOWL AS PRODUCED BY RELINER-DURAN, 53 MT. ARCHER RD., LYME, CT 06371, 860-434-0277, 860-434-3195 (FAX), WWW.RELINER.COM

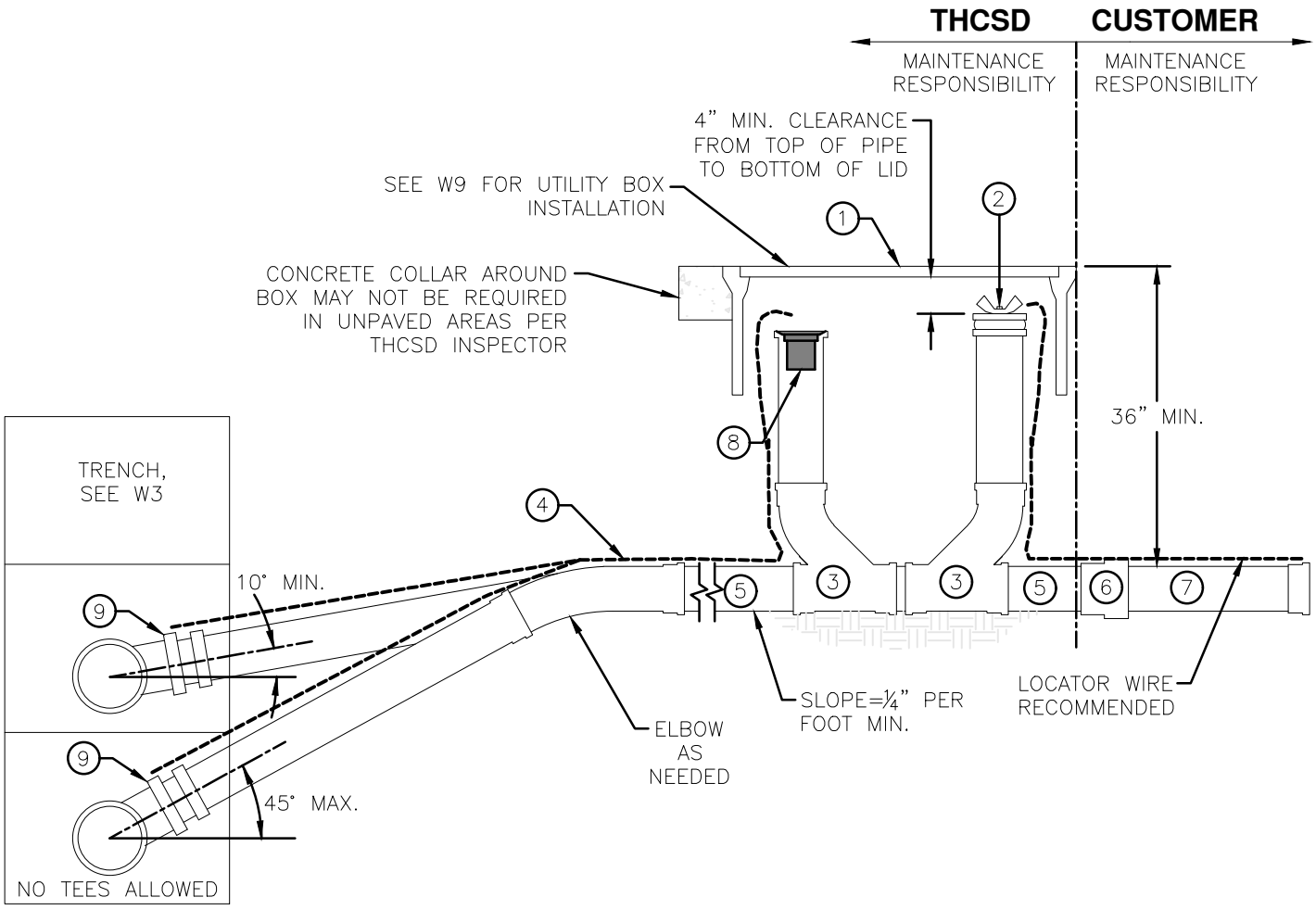
B. DROP BOWL MODEL A-4 SHALL BE USED FOR ALL LINES UP THROUGH FULL 6" INLETS. DROP BOWL MODEL A-6 SHALL BE USED FOR ALL 8" INLETS. DROP BOWL MODEL B-8 SHALL BE USED FOR ALL 10" INLETS. LINES LARGER THAN 10" SHALL BE AS DIRECTED BY THCSD

C. THE FORCE LINE HOOD SHALL BE ATTACHED ON MODELS A-4 AND A-6 WHEN THE INCOMING LINE IS FROM A FORCE MAIN OR WHEN INCOMING FLOWS CANNOT BE FULLY CONTAINED.

D. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS #4SS35 (SEE WEBSITE) OR APPROVED EQUAL.

E. ATTACH THE DROP BOWL AND EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH ⅜"x 3¾" RAMSET/RED-HEAD BOLTS. PRE-ROTO DRILL AND SET BOLTS IN PLACE WITH EPOXY PASTE. EPOXY PASTE SHALL BE SIKADUR 31 HI-MOD GEL BY SIKA CORP. (PHONE: 592-941-0231), OR APPROVED EQUAL, IN ACCORDANCE WITH ASTM D695, ASTM D638 AND ASTM C882.

Twain Harte Community Service District	MANHOLE DROP CONNECTION		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	S10
	DATE: AUG 2024	DRAWN BY:	



NOTES

A. LOCATE CLEANOUTS OUTSIDE TRAFFIC AREAS IF POSSIBLE.

B. BACKFLOW PREVENTION IS REQUIRED FOR CLEANOUT AT PROPERTY, RIGHT-OF-WAY OR EASEMENT LINE.

C. PLACE 1 CU.FT. MIN. OF CONCRETE OR 2 CU.FT. OF WELL-COMPACTED BEDDING MATERIAL UNDER THE ENTIRE LENGTH OF THE WYE BRANCH, FITTING OR ANY UNSUPPORTED PIPE. WHEN BEDDING MATERIAL IS USED, PLACE ADDITIONAL MATERIAL TO TOP OF BEND FOR THE FULL WIDTH OF THE TRENCH.

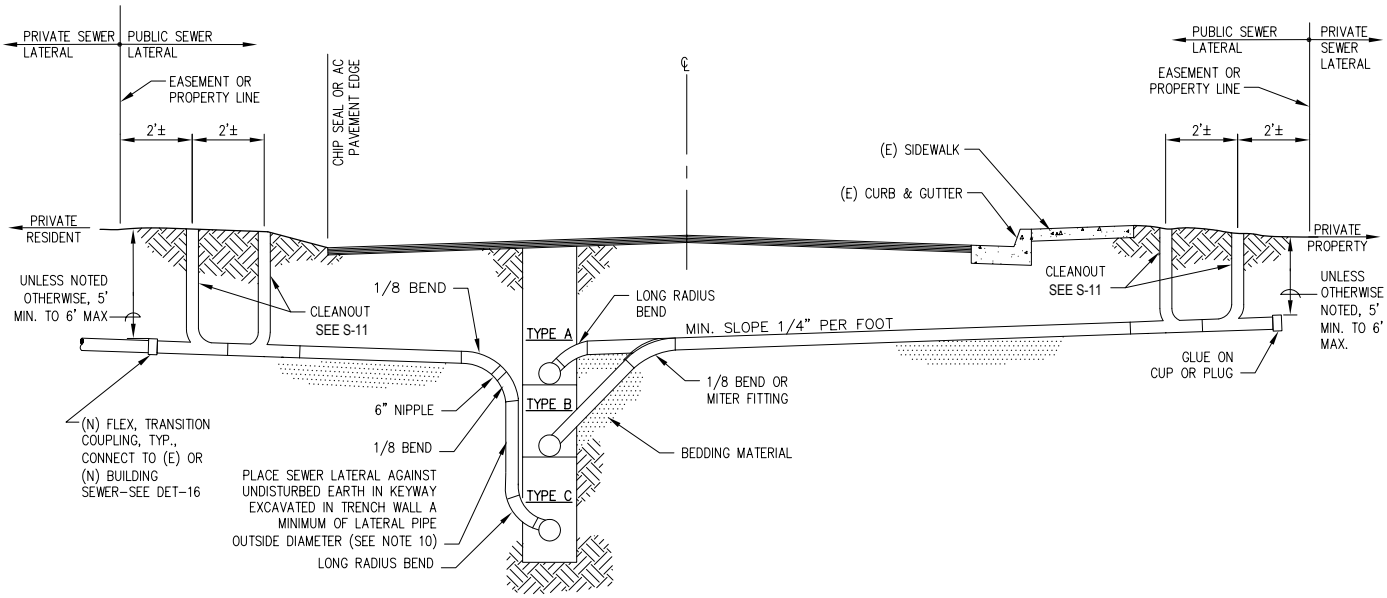
D. A "CARSON" PLASTIC BOX CAN BE USED IN PLANTER AREAS WITH PRIOR THCSD APPROVAL.

E. A 4-INCH LATERAL IS ACCEPTABLE FOR A DOUBLE SERVICE.

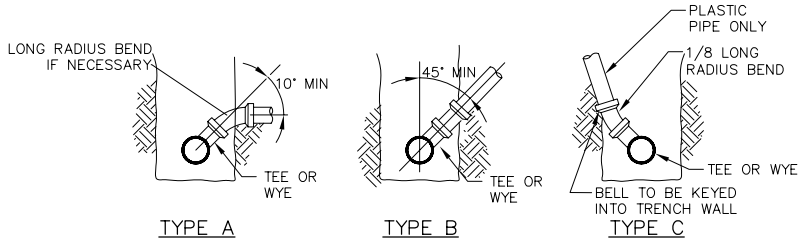
F. FLUSHING BRANCH SHALL BE END-OF-LINE CLEANOUT, SAME SIZE AS MAIN, WITH STREET 90° OR (2) 45° ELBOWS.

ITEM	QTY	DESCRIPTION	REMARKS
1	1	UTILITY BOX WITH LID MARKED "SEWER"	CHRISTY B30 OR (2) G5, SEE NOTE 'D'
2	1	EXPANSION PLUG	PASCO HAND-TIGHT OR APPROVED EQUAL, SEE NOTE 'C'
3	2	COMBINATION WYE AND 45° SWEEP	SDR35 PVC PIPE
4		#12 AWG INSULATED LOCATOR WIRE	SINGLE STRAND COPPER, SEE W3
5		SINGLE SERVICE: 4" MIN., DOUBLE SERVICE: 4" MIN., MAIN-LINE CLEANOUT: SAME SIZE AS MAIN	SDR35 PVC PIPE
6	1	4"x4" SWRxDWV REDUCER	PTI #P657, USE ABS TO SDR GLUE
7	1	2 FT. STUB WITH GLUED CAP	ABS-DWV OR OTHER BUILDING CODE APPROVED MATERIAL
8	1	SEWER RELIEF POPPER (SEE NOTE 'B')	PLUMBEST (POPPER), UHS (HOMESAVER FLIP TOP) OR APPROVED EQUAL
9	1	PVC OR SADDLE WYE, DFW/HPI, FLEXIBLE RUBBER, REQUIRED IF EXISTING WYE NOT FOUND	

Twain Harte Community Service District	**SEWER SERVICE, BI-DIRECTIONAL CLEANOUT & FLUSHING BRANCH**		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	**S11**
	DATE: AUG 2024	DRAWN BY:	



ELEVATION



CONNECTION DETAILS

SEWER LATERAL DETAIL

N.T.S.

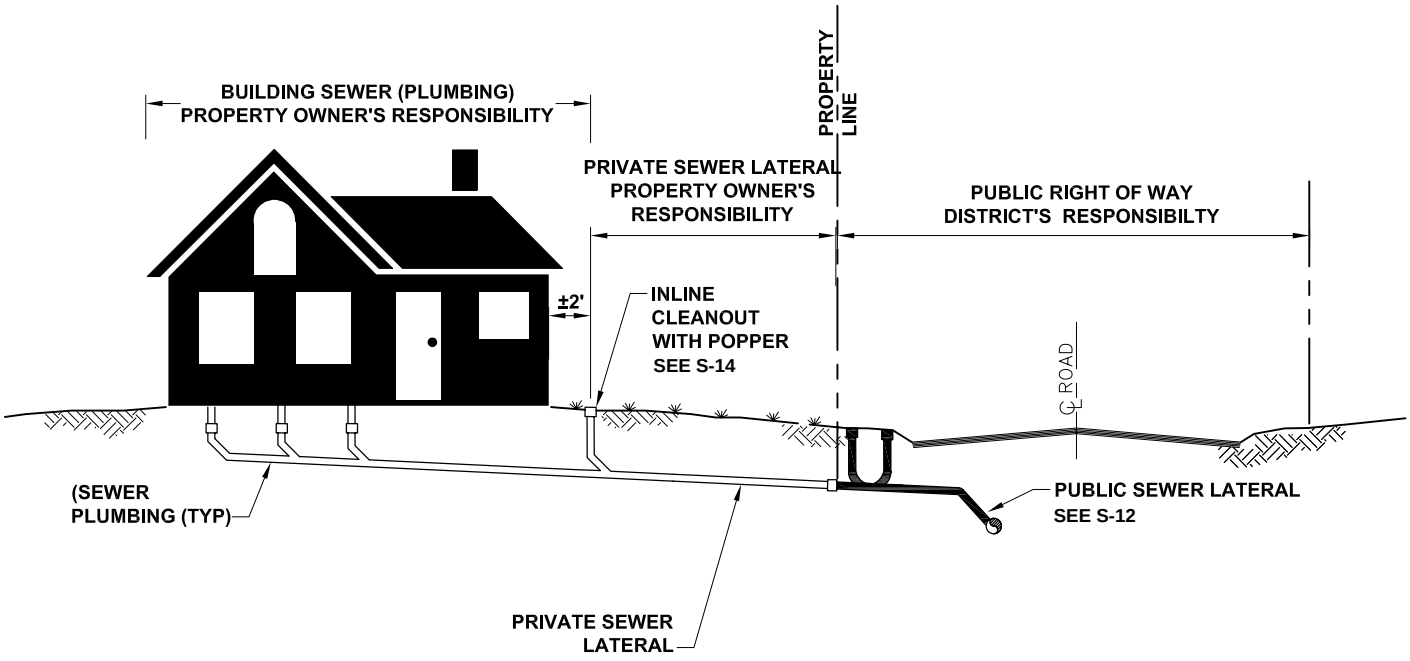
1. SEWER LATERALS SHALL BE 4" IN DIAMETER UNLESS OTHERWISE NOTED ON THE DRAWINGS.
2. FOR BACKFILL MATERIAL FROM 3" MIN BELOW TO 12" MIN ABOVE THE PIPE BELL. SEE STANDARD SPECIFICATIONS FOR BACKFILL MATERIAL REQUIREMENTS.
3. CONTRACTOR SHALL USE THE MOST APPROPRIATE TYPE CONNECTION (A, B, OR C) FOR THE PARTICULAR SITUATION.
4. 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.
5. 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.
6. 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.
7. MINIMUM SPECIFIED COVER AT THE PROPERTY LINE SHALL BE MEASURED FROM EXISTING GROUND SURFACE OR EDGE OF ADJACENT ROADWAY, WHICHEVER IS LOWER.
8. A SPECIFIC ELEVATION AT THE PROPERTY LINE, WHEN SHOWN ON THE PLANS OR DESIGNATED BY THE ENGINEER, SHALL GOVERN.
9. MITER FITTINGS SHALL BE MAX. 45 DEGREES.
10. 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.
11. 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.

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

PUBLIC SEWER LATERAL

SCALE: NONE		APPROVED BY: SN	**S12**
DATE: AUG 2024		DRAWN BY: RN	



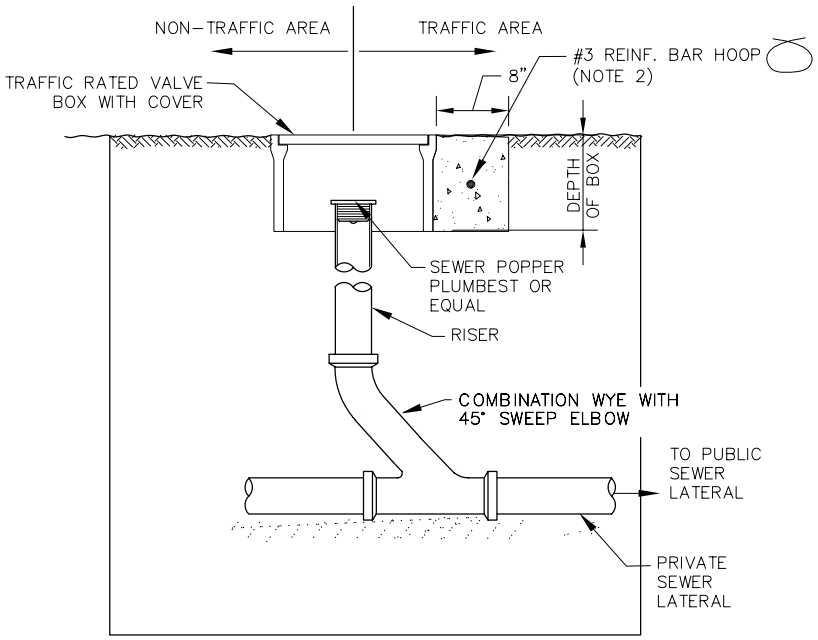
PRIVATE SEWER LATERAL CONNECTION DETAIL
ELEVATION VIEW

Twain Harte Community Services District

22912 VANTAGE POINTE DRIVE
PO BOX 649
TWAIN HARTE, CA 95383

PRIVATE SEWER LATERAL

SCALE: NONE		APPROVED BY: SN	**S13**
DATE: AUG 2024		DRAWN BY: RN	



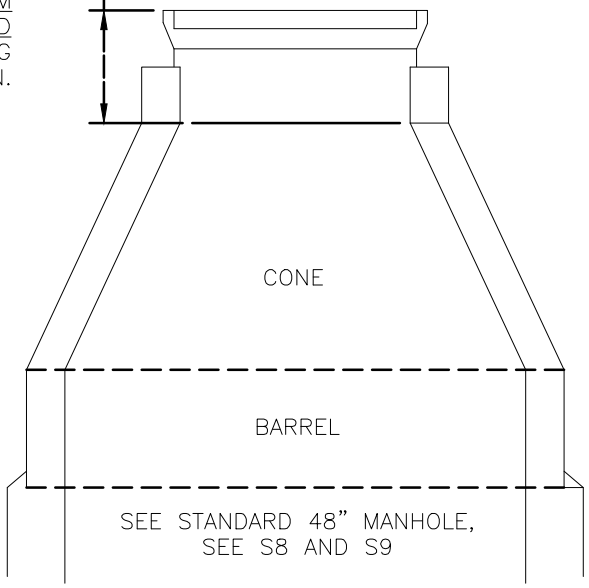
END CLEANOUT

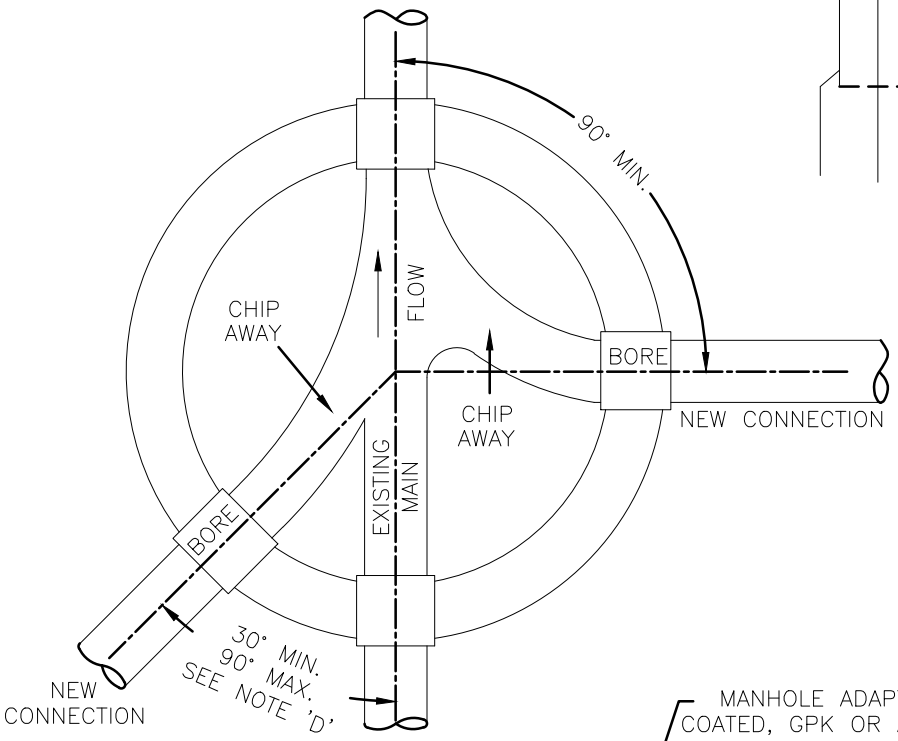
NOTES

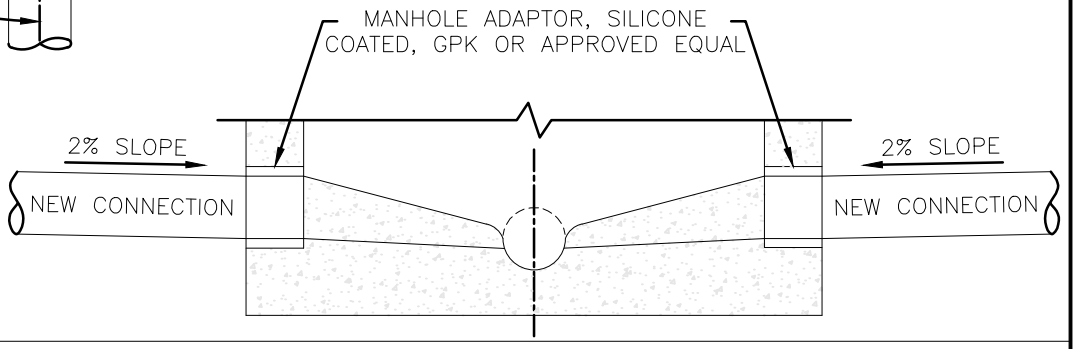
1. TOP OF CLEANOUT SHALL BE LOCATED IN A VALVE BOX PER SPECIFICATIONS.
2. CLEANOUT IN TRAFFIC AREAS SHALL BE CONSTRUCTED WITH 8" WIDE CIRCULAR REINF. CONC. COLLAR AS SHOWN.
3. CLEANOUT SIZE TO MATCH SEWER LATERAL PIPE SIZE.

Twain Harte Community Services District 22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	**PRIVATE LATERAL CLEANOUT**		
	SCALE: NONE	APPROVED BY: SN	**S14**
	DATE: AUG 2024	DRAWN BY: RN	

WHEN RAISING EXISTING MANHOLE TO MATCH FINISHED GRADE, THE DISTANCE BETWEEN THE RIM AND TOP OF CONE SECTION SHALL NOT EXCEED 12". RAISING THE RIM MUST BE DONE BY ADDING BARRELS OR USING A TALLER CONE SECTION.



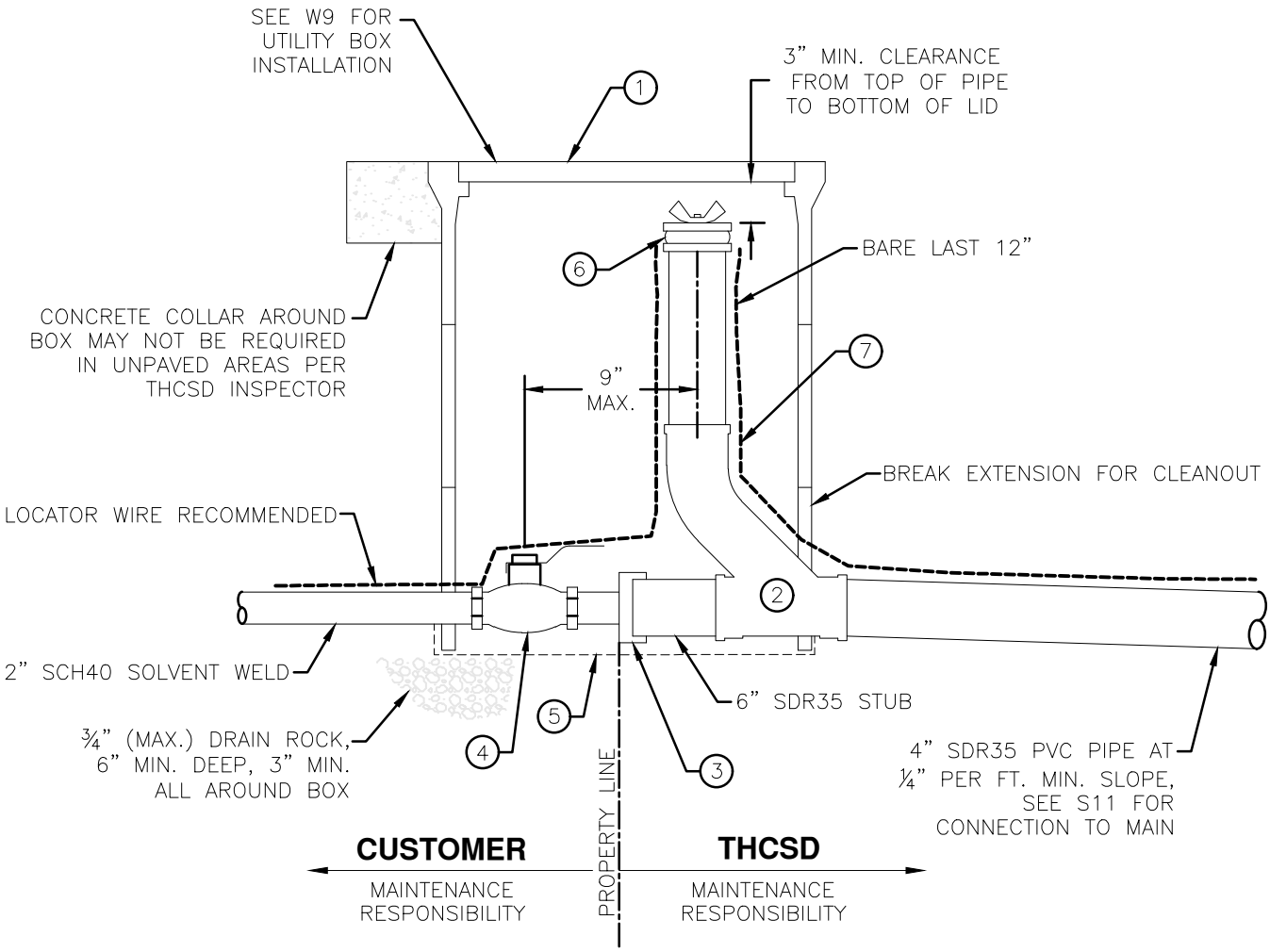




NOTES

A. NEW CONNECTIONS TO BE BORED 2" LARGER THAN THE PIPE DIAMETER.
B. NEW CONNECTIONS WILL HAVE A MINIMUM SLOPE OF 2%.
C. FLOW CHANNEL FROM THE NEW CONNECTION TO THE EXISTING MAIN SHALL BE CHIPPED AWAY AND MORTARED TO A SMOOTH FINISH.
D. IF TIGHTER ENTRANCE ANGLES ARE REQUIRED DUE TO SITE CONSTRAINTS, USE LONG RADIUS BEND OUTSIDE OF MANHOLE.
E. CONTRACTOR IS RESPONSIBLE FOR DEBRIS REMOVAL AND PREVENTION OF FLOW BLOCKAGE WHILE UNDER CONSTRUCTION.
F. CONTRACTOR SHALL COMPLY WITH ALL CONFINED-SPACE REQUIREMENTS PER CAL-OSHA.

Twain Harte Community Service District	SEWER CONNECTION TO EXISTING MANHOLE		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	S15
	DATE: AUG 2024	DRAWN BY:	



NOTES

A. THCSD IS RESPONSIBLE FOR MAINTAINING THE SEWER LATERAL TO THE CLEANOUT.
B. PRIVATE LIFT STATIONS, PUMPS, SUMPS, TANKS, ETC. WILL BE THCSD APPROVED AND INSPECTED.
C. SEE DETAIL #203 FOR PIPE BEDDING MATERIAL.
D. LOCATE CLEANOUTS OUTSIDE TRAFFIC AREAS.
E. ALL FITTINGS SHALL BE SDR35 PVC PIPE, RING–TITE OR APPROVED EQUAL.
F. PVC JOINT ADHESIVE IS "WELD–ON" JM7–21 BLUE WITH JMP PRIMER OR THCSD APPROVED EQUAL.
G. ALL FITTINGS TO HAVE RATING OF 150 PSI WORKING PRESSURE AT 73°F.

ITEM	QTY	DESCRIPTION	REMARKS
1	1	UTILITY BOX AND LID, USE EXTENSION(S)	CHRISTY B30 BOX W/61D LID
2	1	COMBINATION WYE WITH 45° SWEEP ELBOW	SDR35, RING–TITE OR APPROVED EQUAL
3	1	2" X 4" ADAPTER	PVC
4	1	2" BALL VALVE	BRONZE, 150 LB
5	1	½" GALV. STEEL WIRE MESH	WIRE DIA.=0.105", COVER ACCESS HOLES
6	1	EXPANSION PLUG WITH LIP	PASCO HAND–TIGHT OR APPROVED EQUAL
7	1	#12 AWG INSULATED LOCATOR WIRE	SINGLE STRAND COPPER, SEE W3

Twain Harte Community Service District	**PRIVATE PUMP SYSTEM TO GRAVITY SEWER MAIN**		
22912 VANTAGE POINTE DRIVE PO BOX 649 TWAIN HARTE, CA 95383	SCALE: NTS	APPROVED BY:	**S16**
	DATE: AUG 2024	DRAWN BY:	