GENERAL
1. The specifications are minimum requirements. The pipelines shall be designed and constructed so that California regulations, maintenance, and the public are not interfered with, complicated, or safety compromised.
2. Any replacement or modifications to the existing pipe (carrier or casing) shall be considered as a new installation subject to these specifications.
3. All design shall be signed and sealed by a civil engineer licensed in the state of California.
4. Pipelines shall cross tracks at right angles. If not possible, at maximum 45 degree, the pipelines shall not be placed more than the height of the rail, nor under rail bridges, nor closer than 100 feet in any portion of any rail bridge, culvert, building, or other important structure.
5. Crossing pipelines shall not be located within the limits of a turnout. The limits of a turnout is 25 feet from the switch points.
6. Longitudinal pipelines shall be located as far as practicable from any tracks or other important structures.
7. Longitudinal pipelines shall not be located within earth embankment or within ditches.
8. The depth of the pipelines (carrier and casing pipes) shall be such to withstand rigorous railroad operating conditions and shall allow for future installations (such as conduit, pipe, structures, etc.) by Caltrain.
9. The depth of the pipelines shall be greater than the following measured vertically to the top of the casing (depths in parentheses are for flammable or hazardous substances):
   - A: 6 ft maximum from the bottom of the tie (8 ft minimum)
   - B: 4 ft maximum from the bottom of the track (5 ft minimum)
   - C: 2 ft maximum from the lowest ground level (3 ft minimum)
10. Both carrier and casing pipes shall be installed with sufficient slack so that the pipes are not in tension.
11. Sides to indicate location of pipelines or cuts (banks) shall be installed and maintained by owner of the utilities. The sides shall have durable weatherproofing and be on both sides of the tracks over the centerline of the utilities with the following information:
   A. Name and address of owner
   B. Contact point and pressure in pipe
   C. Soil depth below surface
   D. Emergency phone number in the event of damage (pipe rupture, etc.)
12. Warning tape shall be placed within 2 feet from ground surface for open cut installation.

CARRIERS PIPES
1. Carrier pipe material under and adjacent to tracks must be capable of supporting a minimum of 3,600 pounds per square foot for concrete piers of 50 feet or less. For heights greater than 30 feet, supporting agent shall be increased proportionally.
2. Carrier pipeline shall be sloped one percent (1%).
3. Unboxed carriers pipes shall have the pipe wall thickness in accordance with Table 1A-5-3 (AVCA, Part 1).

CASINGS
1. casing requirements apply to pipelines that carry liquid or gaseous substances as follows:
   A. Oil, gas, petroleum products, or other flammable, highly volatile or hazardous substances under pressure
   B. Unprotected or any non-flammable substance such as water or pressure, may cause damage if escaping on or in the vicinity of the Caltrain corridor.
2. Casing pipe shall be installed to prevent the formation of standing water under the tracks, and shall slope to one end shall to the carrier pipes except for longitudinal pipelines.
3. Casing pipe shall be sized such that there is at least 2 inches clearance to the largest outside diameter of carrier pipe, joints, or couplings.
4. Both ends of the casing shall be suitably sealed against the entrance of foreign material but allowing leakage to pass through the event of carrier break.
5. Casing pipe and joints shall be of leak proof construction, capable of withstanding railroad loading (cement E-43).
6. Casing pipe shall have a minimum yield strength of 20,000 psi when tested per pressure protective coating, and not cathodically protected. The wall thickness shown in Table 1A-5-4 (AVCA, Part 1) shall be increased to the nearest standard size which is a minimum of 1/16" greater than the thickness shown except for diameters less than 12".
7. Casing shall cover the entire width of the Caltrain line.

VENTING
1. Casing pipe shall be properly vented. Vent pipes shall be a minimum 2 inches in diameter and shall be installed near the end of the casing.
2. Vent pipe shall be vertical and shall extend not less than 6 feet above ground surface. Top of vent pipe shall be fitted with stainless steel properly sealed on a relief valve.
3. Draft in locations subject to high water shall be extended above maximum elevation of high water and shall be supported and protected.

MANHOLEs
1. Manholes are not allowed within Caltrain corridor, except for longitudinal pipelines where manholes shall be of prestressed concrete filled with top of ground.

ABANDONED FACILITIES
1. The owner of all crossings of longitudinal pipelines proposed for abandonment shall notify Caltrain in writing, of the intention to abandon.
2. As directed by Caltrain, abandoned pipelines shall be either drained or completely filled with cement grout, compacted sand, or other methods, as approved by Caltrain.
3. Abandoned manholes shall be filled to a minimum depth of 1 foot below finished grade and completely filled with cement grout, compacted sand, or other methods as approved by Caltrain.

NOTES:
1. AVCA: AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
2. Feed optics or electrical installations may use PVC or HDPE pipe schedule 80, as a conduit.

PENINSULA CORRIDOR JOINT POWERS BOARD

STANDARD DRAWINGS

CIVIL ENGINEERING
CROSSING UTILITIES
PIPELINES
GENERAL REQUIREMENTS
CARRIER PIPE

1. CARRIER PIPE SHALL BE USED FOR STORM WATER OR OTHER LIQUIDS THAT COULD CAUSE CORROSION, WHERE THE OPERATING PRESSURE IS UNDER 40 PSI.

2. DUCTILE IRON PIPE IN A CASING IS ACCEPTABLE AS FOLLOWS:
   - CLASS 52 FOR DIAMETERS OF 4" THRU 10"
   - CLASS 53 FOR DIAMETERS OF 12" THRU 14"
   - CLASS 54 FOR DIAMETERS OF 16" THRU 24"
   - CLASS 56 FOR DIAMETERS OF 20" THRU 24"

3. PLASTIC PIPE SHALL BE IN A CASING. THE PLASTIC PIPE SHALL BE PVC OR HIGH DENSITY POLYETHYLENE (HDPE) AND SCHEDULE 80, WHERE THE OPERATING PRESSURE IS UNDER 50 PSI.

CASING PIPE

1. CASING PIPE MAY BE USED FOR NON-PRESSURE (GRAVITY) SEWER AND STORM DRAIN CROSSOVERS UNDER TRUNKS WHERE THE PIPE STRENGTH IS CAPABLE OF WITHSTANDING ROADLOAD LOADS.

2. JOINT BETWEEN CASING AND CASING PIPE SHALL BE FILLED WITH CLEAN SAND OR PRIOR TO INSTALLATION; CASING MAY BE FULLY FILLED WITH SAND AS DESIGNED.

NOTES:

1. ACCEPTABLE EMERGENCY LOAD VALVES MAY BE REQUIRED BY THE FEDERAL, STATE, OR LOCAL AUTHORITIES. IF INSTALLED, THE VALVES SHALL BE LOADED OUTSIDE OF CALTRAIN RIGHT-OF-WAY.

2. SEE SB-800 FOR GENERAL REQUIREMENTS.

3. IS NOT SHOWN FOR CLARITY.
CARRIER PIPES:

The following requirements are in accordance with AWWA, Part 2:

FREEDOM: Carrying oil, liquid petroleum gas, natural or manufactured gas and other flammable liquids shall comply with the requirements of ASME B31.8 and API 1168. Other applicable codes, except that the maximum allowable pressure for design of steel pipe shall not exceed the specified minimum yield strength, which is determined by a percentage of the hoop stress due to internal pressure as listed below:

1. Steel alloy pipe under tracks that is protected with a steel casing. The following percentages apply to hoop stress:
   A. 75% for installation on oil, gas, and other flammable liquids
   B. 70% for pipelines carrying liquids petroleum, gas and other flammable liquids under low flash point
   C. 65% for installations on gas pipelines

2. Steel pipe without a casing under secondary or utility tracks. The following percentages apply to the sum of the hoop stress due to the maximum allowable internal pressure and the flexural ring stress due to external loads:
   A. 70% for installation on oil, gas, and other flammable liquids
   B. 60% for pipelines carrying liquids petroleum, gas and other flammable liquids under low flash point
   C. 55% for installations on gas pipelines

3. Steel pipe laid conditionally on caltrain row without the protection of a casing. The following percentages apply to hoop stress:
   A. 65% for installation on oil, gas, and other flammable liquids
   B. 60% for pipelines carrying liquids petroleum, gas and other flammable liquids under low flash point
   C. 55% for installations on gas pipelines

4. All joints or couplings shall be welded.

5. Gas line shall be allowed carbon steel with a factory-applied corrosion protection coating.