

MTS Jack and Bore General Notes

1. See MTS Standard Construction Notes for addition requirements.
2. The Contractor shall layout the proposed jack and bore pits prior to the commencement of work. Only after the MTS inspector has approved the layout will the Contractor be allowed to begin work.
3. Jacking and receiving pits shall be constructed outside of the railroad right-of-way unless otherwise shown on the MTS approved plans.
4. All jack and bore operations within the railroad right-of-way shall be performed continuously on a 24-hour basis until work is completed. An MTS inspector shall be present at all times unless otherwise approved by MTS. Should work begin without the proper approvals, the work will be halted and any casing installed will be abandoned in place, pressure grouted full, and capped to the satisfaction of the MTS.
5. Pits shall be fenced on sides.
6. The Contractor shall submit shoring drawings and calculations to MTS for review. All drawings and calculations shall be signed and stamped by a Civil or Structural Engineer licensed in the State of California.
7. Prior to commencement of work, the Contractor shall submit to MTS for review, load calculations for the proposed casing with applied load as defined by Cooper E-80 with a 50% added impact load. The calculations shall be signed and stamped by a California licensed Civil or Structural Engineer.
8. All backfilling shall be at 90% relative dry compaction. For areas within or that affect the railroad right-of-way, the contractor shall submit a compaction report prepared by a California licensed Geotechnical Engineer.
9. Five (5) days prior to the commencement of work, the Contractor shall submit to MTS for review, an updated description of the work process including scheduled activities.
10. The Contractor shall remove all temporary facilities constructed on the railroad right-of-way, debris, and other items not originally at the site prior to construction and shall notify MTS that all construction has been completed.
11. The Contractor or contracting party, shall obtain all permits necessary for the proposed project including but not limited to encroachment, SWPPP, and environmental permits, and third-party utility permits.

MTS Jack and Bore Pipeline Notes

1. Unless otherwise shown on the plan view or plan and profile, the Contractor shall adhere to the following requirements.
2. For pipelines carrying flammable or hazardous materials, the Contractor shall adhere to special conditions stated in the Right-of-Entry (ROE) permit.
3. All underground utilities under railroad tracks shall be encased in a larger pipe or conduit called the "casing pipe."
4. Casing pipe shall be installed across the entire width of the railroad right-of-way and shall extend beyond the right-of-way a minimum of 10 feet.

5. Should ground water or other loose and unstable soils conditions be encountered during construction, the Contractor shall immediately stop work, notify the railroad inspector and flagman, provide necessary support to track and other railroad structures, and notify MTS. It shall be the responsibility of the contractor to make necessary corrections to construction process to allow for said conditions.
6. Prior to commencement of construction, the Contractor shall submit to MTS a plan showing the proposed method of casing installation, construction access, stockpile locations, SWPPP control measures, fencing type and location, and a milestone schedule.
7. All abandoned pipes shall be removed from their casing pipes. The empty casing pipe shall be pressure grouted full the entire length. If no casing pipe exists, the pipe shall be pressure grouted full the entire length. An MTS inspector must be present during the grouting process.
8. The Contractor shall install permanent signs identifying the location of the pipe at the edge of the railroad right-of-way unless within a public grade crossing.
9. All ends of the casing pipe shall be sealed unless otherwise authorized by MTS.
10. The top of casing shall have a minimum depth of 5.5 feet below the top of tie and a minimum depth 3 feet below ground surface including bottom of ditches and other low points within the railroad right-of-way.
11. Casing and carrier pipes shall be constructed to prevent leakage of any substance. When casing pipes are sealed at each end, vent pipes shall be installed.
12. All casing pipes shall be installed with a minimum slope of 1%.
13. Installation of casing pipes by open trench is prohibited unless approved by MTS.
14. Casing jacking shall adhere to the following requirements:
 - a. This method shall be in accordance with the American Railway Engineering and Maintenance of Way Association recommended practices, Volume 1, Chapter 1, Part 4, "Earth Boring and Jacking Culvert Pipe Through Fills." This operation shall be conducted without handmining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.
 - b. Bracing and backstops shall be designed and jacks with sufficient rating used so that the jacking can progress without stoppage (except for adding lengths of pipe) until the leading edge of the pipe reaches the receiving pit.
 - c. During jacking, an earth plug 1.5 times the diameter of the casing shall be maintained at all times. Jacking operations shall be continuous on a 24-hour per day basis until the jacking operation is completed.
15. Casing boring shall adhere to the following requirements:
 - a. This method consists of pushing the pipe into the fill with a boring auger rotating within the pipe to remove the spoil. When augers or similar devices are used for casing placement, the front of the pipe

shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the casing so that there will be no unsupported excavation ahead of the casing. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than one-half inch. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or poor material.

- b. The use of water or other liquids to facilitate casing placement and/or spoil removal is prohibited.
 - c. Plans and descriptions of the auger stop arrangement to be used shall be submitted to MTS for approval prior to commencement of work.
 - d. Any method which employs simultaneous boring and jacking or drilling and jacking for pipes over 8 inches in diameter that does not adhere to the above requirements will not be permitted. For casings 8 inches and smaller in diameter, augering or boring without the same requirements may be considered if approved by MTS.
16. If an obstruction is encountered during installation of the casing pipe that will stop the forward action of the pipe, and it becomes evident that it is impossible to advance the pipe, operations will cease and the pipe shall be abandoned in-place and pressure grouted full before continuing with work. Location, length, and depth of abandoned casing pipes and carrier pipes shall be shown on the as-built drawings.
17. Bored or jacked installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing plus the thickness of the protective coating. If voids should develop or if the bored-hole diameter is greater than the outside diameter of the casing pipe, plus coating, by more than approximately 1 inch, grouting or other methods as approved by MTS shall be employed to fill such voids.
18. Pressure grouting of the soils before or during jacking or boring may be required to stabilize the soil, control water, prevent loss of material, and prevent settlement or displacement of the ground and/or tracks. Grout shall be cement, chemical, or other special injection material selected to accomplish the necessary stabilization. The grouting contractor shall be a specialist in the field with a minimum of 5 years continuous experience of successfully grouting soil. Materials to be used and the method of injection shall be prepared by a California licensed Geotechnical Engineer, or by an experienced and qualified company specializing in this work and submitted for approval by MTS prior to the commencement of work. Proof of experience and competency shall accompany the submission.
19. When water is known or expected to be encountered, pumps of sufficient capacity to handle the flow shall be maintained at the site and be constantly attended operationally on a 24-hour per day basis until the MTS inspector determines their operation can be safely halted. When dewatering, close observation shall be maintained to detect any settlement or displacement of track, ground, or facilities.

20. The dewatering system shall lower and maintain the ground water level a minimum of 2 feet below the invert at all times during construction by utilizing well points, vacuum well points, or deep wells to prevent the inflow of water or water and soil into the heading. Ground water observation wells may be required to demonstrate that the dewatering requirements are being complied with.
21. The proposed methods of dewatering shall be submitted to MTS prior to the commencement of work. The discharge from the dewatering operations in the vicinity of the railroad shall be carefully monitored. Should excessive fine soils particles at any time during the dewatering process be observed, the dewatering shall be halted immediately and cannot resume until the unsatisfactory condition is remedied to the satisfaction of the MTS inspector.