

SECTION 02309

COMMON TUNNEL SHAFTS

NOTE TO SPECIFIER: THIS SPECIFICATION IS INCLUDED FOR REFERENCE BUT SHALL BE THOROUGHLY REVIEWED FOR APPLICABILITY AND REVISED AS NECESSARY FOR PROJECT SPECIFIC REQUIREMENTS.

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for the design and construction of a common tunnel shaft used for tunnel construction by a contractor (First Contractor) followed by transfer of the shaft and work site to a separate contractor (Second Contractor) for use in completing interconnecting tunneling operations and permanent work within the shaft.

1.02 UNIT PRICES

- A. Common shafts are bid as part of the Work defined in Section 02308 - Tunnel Shafts, except as modified in this Section.
- B. Construction of a common shaft includes installation of site security, removal of affected site improvements, shaft excavation, disposal of excess material, sheeting, shoring or bracing, seal slab, ground water control, and installation of a temporary plug in the pipe. Payment is made in accordance with Section 02308 - Tunnel Shafts and as specified in Section 01300 - 1.03 - Schedule of Values.
- C. Work within a common shaft, previously constructed by First Contractor, and transferred to Second Contractor includes maintaining site, security, groundwater control, permanent backfilling, replacement of permanent site improvements, such as sidewalks, asphaltic and concrete pavement, base and subbase, curbs, curb and gutter, driveways, topsoil, sodding, and hydromulch. Payment is made in accordance with Section 02308 - Tunnel Shafts and as specified in Section 01300- 1.03 - Schedule of Values.
- D. Traffic control and regulation, including flagmen, are paid under Section 01570 - Traffic Control and Regulation.
- E. Any agreement which may be reached between two contractors involving a common tunnel shaft which results in a departure from or omits any element of the common shaft concept specified in this Section will not result in an adjustment in Contract Price by the City for either contractor.

1.03 DEFINITIONS

- A. Common Shaft. A shaft that the First Contractor constructs under one contract and then is transferred as a responsibility of the Second Contractor, under a separate contract, who completes interconnected tunneling operations, permanent work, backfill and restoration of site improvements.
- B. First Contractor. Contractor responsible for design and construction of a common shaft. First Contractor uses the shaft for tunneling and installing permanent sewer line, and then relinquishes responsibility at the time of transfer to Second Contractor.
- C. Second Contractor. Contractor who takes responsibility for the shaft constructed by First Contractor, and uses it to complete interconnected tunneling and to complete the permanent work at that location.
- D. Starter Shaft. Generally the downstream shaft of First Contractor; the shaft from which First Contractor begins tunnel work. This shaft, if common, becomes the receiving shaft for Second Contractor.
- E. Receiving Shaft. Generally the shaft at the upstream end of the tunnel work where the tunneling operation ends. If common, it will have been constructed by First Contractor as a starter shaft.
- F. Back Tunnel. A short length of tunnel constructed at a starter shaft in the opposite direction to the main tunnel to facilitate construction operations.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements. Common shaft design to be site specific with the minimum clear dimensions, depth and at the location shown on the Drawings. Differing dimensions may only be used with the written consent of the Second Contractor, and approval of the Owner's Representative.
 - 1. Shaft shall be designed to withstand full piezometric pressure with adequate factor of safety, and without dependence on a ground water control system.
 - 2. Design seal slab to have a sump for purposes of pumping out seepage and surface water inflow.
 - 3. Design the shaft liner for a uniformly distributed loading of 200 pounds per square foot at the surface or H-20 vehicle loading, as applicable.
 - 4. Second Contractor designs shaft structural modifications required to suit his construction needs.

5. Design the common shaft using materials which minimize ground water intake and prevent migration of fines into the shaft.
6. Design shaft with liner or ground support system such that it may be readily removed to a depth of eight feet below any existing pavement or ground elevation.

1.05 SUBMITTALS

A. First Contractor.

1. Make submittals in conformance with all sections and provisions of these specifications.
2. Submit to Owner's Representative two copies of record photographs showing shaft condition immediately prior to handover.
3. Prepare record drawings for shaft and submit to Owner's Representative prior to Second Contractor taking over the shaft and work site.

B. Second Contractor.

1. Make shaft modification submittals in conformance with Section 02308 - Tunnel Shafts and Section 01300 - Submittals.
2. Submit monitoring results in accordance with Section 02308 - Tunnel Shafts and Section 01300 - Submittals.

1.06 TRANSFER OF SHAFT RESPONSIBILITY

A. First Contractor.

1. First Contractor relinquishes the site of a common shaft and transfers responsibility to Second Contractor on the date specified in Section 01010 - Summary of Work, which shall be based on a specified number of days from the Date of Commencement. The First Contractor may transfer responsibility of the shaft prior to the date specified if approved by the Second Contractor and the Owner's Representative. Failure to transfer that responsibility by the date specified will cause assessment of liquidated damages against the First Contractor in accordance with the General Conditions of the Agreement.

B. Second Contractor.

1. Second Contractor takes responsibility for the common shaft site on the date the First Contractor relinquishes the site, the date of which shall occur within a period specified in Section 01010 - Summary of Work. The Second Contractor is not required to take responsibility for the shaft prior to the first date of the period specified, but shall be prepared to take over responsibility on any date thereafter. The Second Contractor shall have no claim for delay provided the First Contractor turns over the shaft prior to the last day of the period specified.
- C. Any changes to the date specified for occupation of the site requires written approval of both Contractors, and this shall be forwarded to the Owner's Representative.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Equipment and materials used for construction shall be in good condition.
- B. Construct permanent work as specified and as shown on the Drawings.
- C. Any material or equipment left in the shaft or at the site by First Contractor, either as defined by this Section, or otherwise, becomes the property of Second Contractor.

PART 3 EXECUTION

3.01 SITE EXAMINATION

- A. First Contractor: Repair any damage to existing structures or facilities which has been caused by construction activity. Leave the site in a clean condition.
- B. Second Contractor: Inspect the site and report damage observed to the Owner's Representative immediately prior to transfer. The site includes the surrounding area insofar as it may have been impacted by First Contractor's construction activity.

3.02 CONSTRUCTION

- A. First Contractor.
 1. Construct the common shaft, including utility relocations, dewatering, shaft excavation and ground support, seal slab, traffic control and safety and security barriers in accordance with Section 02308 - Tunnel Shafts.
 2. Do not construct a back-tunnel in the common shaft.

3. Repair any damage to shaft liner and grout any voids outside shaft ground support to restore integrity of shaft to its original design capabilities, prior to transfer.
 4. Install plug immediately upstream of the shaft.
 5. Clean out shaft, including removal of construction equipment and debris prior to transfer.
 6. Monitor for settlement in conformance with Section 02308 - Tunnel Shafts.
 7. Remove the dewatering system, if used, including backfilling wells and removing header pipes.
 8. Repair any damage to pavement outside the immediate limits of the shaft, such as settlement damage to pavement resulting from shaft or tunneling operations.
 9. Remove all equipment from shaft including any thrust blocks if used, except access ladder, prior to handover.
 10. Remove traffic control system. Coordinate with Second Contractor to maintain continuous traffic control.
 11. Repair any damage to site security fencing, shaft fencing or cover, and portable concrete traffic barriers.
 12. Transfer security fencing, covers, and portable concrete traffic barriers to Second Contractor.
 13. Provide, install, and handover a temporary plug at the downstream end of the sewer pipe installed by First Contractor.
 14. Provide and deliver to Second Contractor, two new and undamaged joints of pipe identical to the pipe installed by First Contractor immediately upstream of the common shaft.
- B. Second Contractor.
1. Install traffic control system. Coordinate with First Contractor to maintain continuous traffic control.
 2. Provide necessary pumps and power source at the shaft. Provide ground water control at the shaft as required to control inflow.

3. Design, fabricate, and install any modification of existing shaft to suit Second Contractor's needs.
4. Install necessary hoisting equipment, communication system, and other safety provisions, including ventilation and lighting.
5. Monitor for earth settlement in conformance with Section 02308 - Tunnel Shafts.
6. Complete upstream sewer construction within the shaft.
7. Complete downstream sewer construction in accordance with Drawings.
8. Complete other permanent construction work within the shaft as shown on Drawings and in accordance with Specifications. Place backfill in accordance with Section 02308 - Tunnel Shafts.
9. Restore permanent pavement in accordance with Drawings, including repairs needed to existing pavement outside the immediate limits of the shaft, such as settlement damage to pavement resulting from shaft or tunnel operations.
10. Clean site and restore site and surrounding area to original condition as shown in Drawings and in accordance with Specifications.
11. Remove and dispose of temporary plug in upstream sewer pipe.

END OF SECTION