

Section 02401

COMMON TUNNEL SHAFTS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Common shafts are bid as part of Work defined in Section 02400 - Tunnel Shafts, except as modified in this Section.
2. Construction of 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 temporary plug in pipe. Payment is made in accordance with Section 02400 - Tunnel Shafts and as specified in Section 01292 - Schedule of Values.
3. Work within 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, pavement base and subbase, curbs, curb and gutter, driveways, topsoil, sodding, and hydro-mulch. Payment is made in accordance with Section 02400 - Tunnel Shafts and as specified in Section 01292 - Schedule of Values.
4. Traffic control and regulation, including flagmen are paid under Section 01555 - Traffic Control and Regulation.
5. Agreement which may be reached between two contractors involving common tunnel shaft which results in departure from or omits element of common shaft concept specified in this Section will not result in an adjustment in Contract Price by City for either contractor.

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

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

1.04 SYSTEM DESCRIPTION

- A. Design Requirements. Common shaft design to be site specific with minimum clear dimensions, depth and at location shown on Drawings. Differing dimensions may only be used with written consent of Second Contractor, and approval of City Engineer.
 - 1. Design shaft to withstand full piezometric pressure with adequate factor of safety, and without dependence on ground water control system.
 - 2. Design seal slab to have sump for purposes of pumping out seepage and surface water inflow.
 - 3. Design shaft liner for uniformly distributed loading of 200 pounds per square foot at surface, or HS-20 vehicle loading, as applicable.
 - 4. Second Contractor designs shaft structural modifications required to suit his construction needs.
 - 5. Design common shaft using materials, which minimize ground water intake and prevent migration of fines into shaft.
 - 6. Design shaft with liner or ground support system such that it may be readily removed to depth of 8 feet below existing pavement or ground elevation.

1.05 SUBMITTALS

A. First Contractor.

1. Conform to requirements of Section 02400 - Tunnel Shafts and Section 01330 - Submittal Procedures.
2. Submit to City Engineer, two copies of record photographs showing shaft condition immediately prior to handover.
3. Prepare record drawings for shaft and submit to City Engineer prior to Second Contractor taking over shaft and work site.

B. Second Contractor.

1. Conform shaft modification submittals to requirements of Section 02400 - Tunnel Shafts and Section 01330 - Submittal Procedures.
2. Submit monitoring results in accordance with Section 02400 - Tunnel Shafts and Section 01330 - Submittal Procedures.

1.06 TRANSFER OF SHAFT RESPONSIBILITY

A. First Contractor. First Contractor relinquishes site of common shaft and transfers responsibility to Second Contractor on date specified in Section 01110 - Summary of Work. Date is based on specified number of days from Date of Commencement. First Contractor may transfer responsibility of shaft prior to date specified when approved by Second Contractor and City Engineer. Failure to transfer that responsibility by date specified will cause assessment of liquidated damages against First Contractor in accordance with Article 9.13 of Document 00800 - General Conditions.

B. Second Contractor. Second Contractor takes responsibility for common shaft site on date First Contractor relinquishes site. Date shall occur within period specified in Section 01110 - Summary of Work. Second Contractor is not required to take responsibility for shaft prior to first date of period specified, but shall be prepared to take over responsibility on date thereafter. Second Contractor shall have no claim for delay provided First Contractor turns over shaft prior to last day of period specified.

C. Mutual Agreements on Transfer of Responsibility. Changes to date specified for occupation of site requires written approval of both Contractors, with approvals forwarded to City Engineer.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

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

PART 3 EXECUTION

3.01 SITE EXAMINATION

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

3.02 CONSTRUCTION

- A. First Contractor.
 - 1. Construct common shaft, including utility relocations, dewatering, shaft excavation and ground support, seal slab, traffic control, and safety and security barriers in accordance with Section 02400 - Tunnel Shafts.
 - 2. Do not construct back-tunnel in common shaft.
 - 3. Repair damage to shaft liner and grout voids outside shaft ground support to restore integrity of shaft to its original design capabilities, prior to transfer.
 - 4. Install plug immediately upstream of shaft.
 - 5. Clean out shaft, including removal of construction equipment and debris prior to transfer.
 - 6. Monitor for settlement in conformance with Section 02400 - Tunnel Shafts.
 - 7. Remove dewatering system, when used, including backfilling wells and removing header pipes.
 - 8. Repair damage to pavement outside immediate limits of shaft, such as settlement damage to pavement resulting from shaft or tunneling operations.

9. Remove equipment from shaft including thrust blocks when used, except access ladder, prior to handover.
 10. Remove traffic control system. Coordinate with Second Contractor to maintain continuous traffic control.
 11. Repair 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 temporary plug at downstream end of sewer pipe installed by First Contractor.
 14. Provide and deliver to Second Contractor, two new and undamaged joints of pipe identical to pipe installed by First Contractor immediately upstream of 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 shaft. Provide ground water control at shaft as required to control inflow.
 3. Design, fabricate, and install 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 02400 - Tunnel Shafts.
 6. Complete upstream sewer construction within shaft.
 7. Complete downstream sewer construction in accordance with Drawings.
 8. Complete other permanent construction work within shaft as shown on Drawings and in accordance with Specifications. Place backfill in accordance with Section 02400 - Tunnel Shafts.
 9. Restore permanent pavement in accordance with Drawings, including repairs needed to existing pavement outside immediate limits of 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