
1.0 SR 99 Bored Tunnel Cross Section Study Outline

- I. Executive Summary
- II. Background
 - A. Project Description
 - B. Assumptions

State Route 99 is assumed to consist of two northbound and two southbound lanes.

- C. Constraints
 - 1. Horizontal Roadway Clearances
 - a) Lanes

Travel lanes are typically 12 feet in accordance with the WSDOT Design Manual. When existing conditions require, lanes have been reduced to 9.5 feet. Safety is reduced with the decrease of lane width. Design speed is also reduced as lane widths decrease.

- b) Shoulders

An inside shoulder is typically 4 feet wide for a two-lane roadway. An outside shoulder for this same roadway is typically 8 feet. Shoulders enhance roadway safety by extending sight distance, providing emergency vehicle access, and allowing stalled vehicles to stop outside of the travel way. Reduction of shoulder width naturally reduces the ability to provide these safety features.

- 2. Vertical Roadway Clearance
 - a) Vehicular

Vertical clearance for vehicular traffic is to be 16.5 feet in accordance with the WSDOT Design Manual. This clearance accounts for a 16 foot roadway clearance with a 0.5 foot allowance for future roadway resurfacing. Reducing the initial clearance to below 16 feet will result in a deviation.

- b) Sign

Highway clearances and sizes for signs are typically not applicable to tunnel construction as the clearance within tunnels is limited. Sign clearances commonly used in tunnels vary from 2 to 3 feet.

- c) Overlay

- 3. Egress
 - a) Clearances
 - (1) NFPA 502 / NFPA 101
 - (2) 3'-8" Walkway
 - (3) 200 meter spacing (656')

- b) Landings
 - c) Refuge
 - 4. Maintenance Access
 - 5. Ventilation
 - a) Fully Transverse
 - b) Semi-Transverse
 - c) Jet Fans
 - d) Single Point Extraction
 - e) Intermittent Ventilation Shafts
 - f) Area
 - (1) Large
 - (2) Reduced
 - 6. Tunnel Diameter
 - a) Largest Existing Tunnel
 - b) Outer Shell Thickness
 - D. Configurations
 - 1. Table of Configurations
 - 2. Maximum Configuration
 - 3. Minimum Configuration
 - 4. Progression of Configurations
 - 5. Optimal Configuration
 - 6. Table of configurations

III. Conclusion and Recommendations

IV. Supporting Materials

- A. Drawings and Supporting Documents
- B. Reviews, Comments, and Resolutions