

## **ENCROACHMENT PERMIT PROCEDURES** **CULVERTS AND UNDERGROUND STRUCTURES SYSTEMS (UGS)**

### **Definitions.**

1. Culverts are defined as structures which span less than 6096 mm (20').  
Reference: HDM Item 806.2, Drainage Terms.
  
2. Culverts are buried systems and include both rigid and flexible drainage and highway separation structures. They are usually buried within the roadway embankment, but may also be "At-Grade". Underground structures include circular pipe, pipe-arch, box shapes, and others.

### **Submittals.**

Summarized below are references applicable to Encroachment Permit submittals. Structural submittals should conform as much as possible to the Caltrans Standard Plans, Bridge Design Specifications, Standard Specifications and the Highway Design Manual. Procedural requirements pertaining to tunneling and trenchless technologies are included in the Encroachment Permits Manual. Special designs will be evaluated on a case-by-case basis.

### **References.**

#### **1. Standard Plans.**

A62A, Excavation and Backfill – Miscellaneous Details  
A62D & A62DA, Excavation and Backfill - Concrete Pipe Culverts  
A62E, Excavation and Backfill - Reinforced Concrete Box and Arch Culverts  
A62F, Excavation and Backfill - Metal and Plastic Culverts  
D79, Precast Reinforced Concrete Pipe  
D80, Cast-In-Place Single Box Culvert  
D81, Cast-In-Place Double Box Culvert  
D82, Cast-In-Place Reinforced Concrete Box Culvert Miscellaneous Details  
D84, D85 & D86A, Box Culvert Wingwalls  
D86B, Pipe Culvert Headwalls, Endwalls and Warped Wingwalls  
D86C, Arch Culvert Headwalls, Endwalls and Warped Wingwalls  
D88, Construction Loads on Culverts  
D88A, Strut Details for Structural Steel Pipes, Arches and Vehicular Undercrossing  
D90, Pipe Culvert Headwalls  
B14-1, Structural Steel Plate Vehicular Undercrossing

#### **2. XS-Sheets.**

17-010, Junction Structure  
17-020, Culvert - Precast RCB, Reinforcement and Design Tables  
17-030, Culvert - Precast RCB, Miscellaneous Details  
17-040, Culvert - Precast RCB, Excavation and Backfill Details

#### **3. Standard Specifications.**

Section 19, Earthwork  
Section 61, Culvert And Drain Pipe Joints  
Section 62, Alternative Culverts  
Section 63, Cast-In-Place Concrete Pipe  
Section 64, Plastic Pipe  
Section 65, Reinforced Concrete Pipe  
Section 66, Corrugated Metal Pipe  
Section 67, Structural Metal Plate Pipe

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**4. Manuals.**

- Bridge Design Specifications (**BDS**), LFD Version, April 2000.  
Section 3, Loads.
  - Item 3.22, Combinations of Loads
  - Item 3.24, Distribution of Loads and Design of Concrete SlabsSection 6, Culverts.  
Section 8, Reinforced Concrete.
  - Item 8.16.6.7, Special Provisions for Box CulvertsSection 12, Soil-Corrugated Metal Structure Interaction Systems.  
Section 16, Steel Tunnel Liner Plates.  
Section 17, Soil Reinforced Concrete Structure Interaction Systems.  
Section 18, Soil-Thermoplastic Pipe Interaction Systems.
  
- Bridge Design Practice (**BDP**).  
Section 6, Underground Structures.
  - Part 1, Underground Structures
  - Part 2A, Reinforced Concrete Box Culvert, Cast-In-Place
  
- Bridge Memo To Designers (**MTD**), Volume 1.  
Chapter 14, Railings and Barriers.
  - Topic 14-6, Bridge Railing Replacement.
  - Page 5, Bridge Barrier and Culvert Railings Retro-Fit Details.
  
- Bridge Design Aids (**BDA**).  
Section 5, Concrete Design, Pages 5-81 to 5-90, Anchorage to Concrete.  
Section 11, Estimating, Appendix A-4, Single Bar Splices.
  
- Highway Design Manual (**HDM**), Change #6.  
Chapter 800, Highway Drainage Design.
  - Topic 829, Special Considerations.
    - Item 829.2, Bedding and Backfill
  - Topic 854, Kinds of Pipe Culverts.
    - Item 854.1, Reinforced Concrete Pipe
    - Item 854.2, CIP Non-Reinforced Concrete Pipe
    - Item 854.3, Corrugated Steel Pipe, Steel Spiral Rib Pipe and Pipe Arches
    - Item 854.4, Corrugated Alum Pipe, Alum Spiral Rib Pipe and Pipe Arches
    - Item 854.5, Special Purpose Types
    - Item 854.6, Structural Metal Plate
    - Item 854.7, Concrete Box and Arch Culverts
    - Item 854.8, Plastic Pipe
    - Item 854.9, Minimum Height of Cover
  
- Encroachment Permits Manual (**EPM**), 7th Edition.  
Chapter 500, Specific Encroachment Permits.
  - Section 508.9, Structures
  - Section 518, Tunnel Under Road  
Chapter 600, Utilities Permits.
  - Section 623, Trenchless Technologies
    - i. Section 623.6, Tunneling - Rib & Lagging
    - ii. Section 623.7, Procedural Requirements For Structural & Sub-Structural Design & Calculations  
Appendix D, Form TR-0133, Certification of Structural/Sub-Structural Experience

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### **5. Web Sites.**

The following web sites are available for download of the References listed above:

- **Standard Plans.**  
[http://www.dot.ca.gov/hq/esc/oe/project\\_plans/](http://www.dot.ca.gov/hq/esc/oe/project_plans/)
- **XS-Sheets.**  
<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-standard-detail-sheets/index.html>
- **Standard Specifications and Standard Special Provisions (SSP).**  
<http://www.dot.ca.gov/hq/esc/oe/index.html>
- **Manuals.**
  - BDS.**  
<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-design-specifications/bds.html>
  - BDP.**  
<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-design-practice/bdp.html>
  - MTD.**  
<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-memo-to-designer/bmd.html>
  - BDA.**  
<http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/bridge-design-aids/bda.html>
  - HDM.**  
<http://www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm>
  - EPM.**  
[http://www.dot.ca.gov/hq/traffops/developserv/permits/encroachment\\_permits\\_manual/index.html](http://www.dot.ca.gov/hq/traffops/developserv/permits/encroachment_permits_manual/index.html)
- **Tunnel Safety Orders.**  
<http://www.dir.ca.gov/Title8/sub20.html>
- **Construction Safety Orders.**  
<http://www.dir.ca.gov/Title8/sub4.html>