

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

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## **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 2010.**

A62A, Excavation and Backfill – Miscellaneous Details  
A62D, Excavation and Backfill - Concrete Pipe Culverts  
A62DA, Excavation and Backfill – Concrete Pipe Culverts Indirect Design Method  
A62E, Excavation and Backfill – Cast-In-Place Reinforced Concrete Box and Arch Culverts  
A62F, Excavation and Backfill - Metal and Plastic Culverts  
A62G, Excavation and Backfill Precast Reinforced Concrete Box Culvert  
D79, Precast Reinforced Concrete Pipe –Direct Design Method  
D79A, Precast Reinforced Concrete Pipe –Direct Design Method  
D80, Cast-In-Place Single Box Culvert  
D81, Cast-In-Place Double Box Culvert  
D82, Cast-In-Place Reinforced Concrete Box Culvert Miscellaneous Details  
D83A & D83B, Precast Reinforced Concrete Box Culvert  
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  
D89, Pipe Culvert Headwalls – Straight and "L"  
D90, Pipe Culvert Headwalls **Endwalls and Wingwalls**  
**D91A & D91B, Cast-in-place Reinforced Concrete Junction Structure**  
B14-1, Structural Steel Plate Vehicular Undercrossing

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

17-030, CIP Bottomless Culvert Foundation: Piles/Footings on Rock  
17-040, CIP Bottomless Culvert Foundation: Piles/Footings on Soil  
17-050-1, CIP Bottomless Culvert: General Configuration  
17-050-2, CIP Bottomless Culvert: Wall, Slab & Foundation Details  
17-050-3, CIP Bottomless Culvert: Foundation Details  
17-060-1, Corrugated Metal Culvert: General Procedures for Invert Repair  
17-060-2, Corrugated Metal Culvert: Details for Invert Repair

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

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

Section 19 Earthwork  
Section 25 Aggregate Subbases  
Section 26 Aggregate Bases  
Section 51, Concrete Structures  
Section 52 Reinforcement  
Section 61 Culvert And Drain Pipe Joints  
Section 62 Alternative Culverts  
Section 64 Plastic Pipe  
Section 65 Concrete Pipe  
Section 66 Corrugated Metal Pipe  
Section 67 Structural Plate Culverts  
Section 90 Concrete

### **4. Manuals.**

- **AASHTO LRFD Bridge Design Specifications with California Amendments,**  
Section 3 Load and Load Factors  
Section 4 Structure Analysis and Evaluation  
Section 5 Concrete Structures  
Section 10 Foundation  
Section 11 Abutments Piers and Walls  
Section 12 Buried Structures and Tunnel Liners
  
- **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 Slabs  
Section 4 Foundations  
Section 6 Culverts.  
Section 8 Reinforced Concrete.  
Item 8.16.6.7, Special Provisions for Box Culverts  
Section 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.**  
Chapters 800-890, Highway Drainage Design  
Topic 829, Special Considerations  
Item 829.2, Bedding and Backfill

**ENCROACHMENT PERMIT PROCEDURES**  
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Topic 852 Pipe Materials

Item 852.1, Reinforced Concrete Pipe (RCP)

Item 852.2, Concrete Boxes and Arches

Item 852.3, Corrugated Steel Pipe, Steel Spiral Rib Pipe and Pipe Arches

Item 852.4, Corrugated Alum Pipe, Alum Spiral Rib Pipe and Pipe Arches

Item 852.5, Structural Metal Plate

Item 852.6, Plastic Pipe

Item 852.7, Special Purpose Types

• Encroachment Permits Manual (**EPM**), 2013 Edition.

Chapter 500, Specific Encroachment Permits.

Section 508.9, **Engineering Services**

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/construction\\_standards.html](http://www.dot.ca.gov/hq/esc/oe/construction_standards.html)
- **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/construction\\_standards.html](http://www.dot.ca.gov/hq/esc/oe/construction_standards.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>