

**Problem: WHAT SPECIFICATIONS AND CODES APPLY TO DESIGN AND INSTALLATION OF UNDERGROUND PRECAST CONCRETE PRODUCTS?**

The best way to learn about designing and building underground chambers is to take advantage of information experienced by others. Codes and specifications are written by people with experience in this field. They are publications that can be obtained through the society that originates them. In the case of underground precast products, three societies publish the most popular codes and specifications. They are ACI (American Concrete Institute), ASTM (American Society for Testing and Materials) and AASHTO (American Society of State Highway Transportation Officials). Reference will be made to them in further discussions. They are:

#### ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE

This reference is a good source for covering strength of concrete, mixing, placing, etc. Reinforcing steel details and requirements are also covered here. While all chapters do not apply to underground structures, the formulas and restrictions for concrete design are beneficial.

#### ACI 350 CONCRETE SANITARY ENGINEERING STRUCTURES

This reference was written for poured in place concrete work in sewer plants. It is different than ACI 318 because of its effort to control cracking. The authors of the manual recognize the value of ASTM standards covering precast environmental structures by stating that structures made per ASTM standards are not covered in ACI 350 code. Engineers writing specifications should refer to ASTM Standards for a specific product not ACI 350.

#### AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO uses the new Load and Resistance Factor Design (LRFD) method in this manual. It contains formulas for design of reinforced precast concrete. One section addresses precast box culvert design requirements. The Federal Highway Administration (FHA) has strongly recommended that State Highway Departments use this manual in design of their projects.

#### ASTM C789 SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX SECTIONS FOR CULVERTS, STORM DRAINS AND SEWERS

This is an old specification superseded by ASTM C1433.

#### ASTM C850 SPECIFICATION FOR PRECAST REINFORCED CONCRETE BOX SECTIONS FOR CULVERTS, STORM DRAINS, AND SEWERS WITH LESS THAN 2FT OF COVER SUBJECTED TO HIGHWAY LOADINGS

This is an old specification superseded by ASTM C1433.