**Basis of Design**

**Design in accordance with 2017 AASHTO Bridge Design Specifications and AASHTO Bridge Design Manual.**

**Material Properties**
- Design strength, minimum: 60 ksi
- Rebar reinforcement, minimum specified yield stress: 60 ksi
- Concrete, minimum specified compressive strength: 5 ksi or 6 ksi (see table)

**SOA Data**
- Unit weight: 100 lb/ft³
- Live load: 0.25 H = 0.25 × H
- Dynamic load allowance (variable with depth): 0.25 H
- Foundation load, parallel to span: 0.25 H
- Direction parallel to span: 0.25 H
- Direction perpendicular to span: 0.25 H
- If depth of fill, H ≤ 2 ft: 0.7 H
- If depth of fill, H > 2 ft: 0.7 H
- Load factors (stiffness): 1.3
- Earth load (vertical): 1.3 H
- Earth load (horizontal): 1.3 H
- Truck axle load: 32 kips
- Dynamic load allowance (variable with depth): 0.35 H
- Lateral load pressure: 0.35 H
- Equivalent fill height: 0.35 H
- Minimum number of bars: 1

**Shear**
- Shear, minimum: 1.0
- Truck axle load: 32 kips
- Load distribution: 2 at 25 kips each

**Service Limit State**
- Maximum tensile force: 1.25 H
- Maximum shear force: 1.25 H
- Maximum moment: 1.25 H

**Strength Limit State**
- Maximum tensile force: 1.50 H
- Maximum shear force: 1.50 H
- Maximum moment: 1.50 H

**Construction Procedure**
- Tying of bars: 1" min., 2" max.
- Space center to center of longitudinal wires not more than 8".
- Space center to center of transverse wires not less than 2" nor more than 4".

**Reinforcement Spacing**
- Space center to center of transverse wires not less than 2" nor more than 4".

**Concrete Cover Over Reinforcement (all faces):**
- Minimum: 3" min., 4" max.

**Minimum Reinforcement Parallel to Span**
- Minimum: 0.025 b (b = thickness of slab, h = 12 in.)

**Sewer Box Culvert**
- Box culvert sections were designed assuming traffic traveling parallel to the span and up to a skew angle of 45°. Culvert sections are placed in a different arrangement, they may need to be redesigned. Box culvert end sections were designed for shear effects and are located on fig. 5-395.100 through 5-395.100B.

**Aerodynamic Thrust**
- The benefit of aerodynamic thrust was not included in the box culvert design for the strength limit state. However, it was included in the service limit state based on AASHTO 5.12.3.1.1.

**Shear**
- Shear, minimum: 1.0 kip from tip of haunch per AASHTO 5.12.3.1.1.

**Crack Control**
- Crack control per AASHTO 5.12.4 assuming class 2 exposure conditions, the stress in the steel reinforcement calculated per AASHTO 5.12.2.4.

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