

## CONDUIT SYSTEMS

### 5-393.600

#### 5-393.601 CONDUIT SYSTEMS

Conduits provide a secure pathway for wires and cables of an electrical system that traverses a bridge. Metal and non-metallic conduits are used for raceways for bridge deck lighting, sign lighting, signals, and surveillance cameras.

Materials furnished for and methods of constructing conduit systems are to be in accordance with the requirements of the Specifications, the Special Provisions, the Plans, the National Electric Code (NEC) and the Mn/DOT Utilities Manual. Before permitting the work to start, the inspector should ascertain that the materials to be used have been approved.

The three major conduit types are rigid steel conduit (RSC), intermediate metal conduit (IMC), and non-metallic conduit (NMC). The Specifications allow for IMC as an alternate whenever RSC is specified. However, this substitution is not allowed for conduit runs under roadbeds with vehicular traffic. Most conduit systems on bridge structures require the use of RSC, the contract documents will specify if any alternate material types are allowed.

The inspector should be aware that all fixtures and fittings should be the type intended for the type of conduit used. For example, fixtures for metal conduit shall be galvanized, cast or malleable iron. Fixtures for NMC shall be non-metallic intended for use with the type of NMC used.

Inspection should be made during the placing to determine that the conduit is in satisfactory condition and properly installed. Typical items for the inspector to look for include:

1. Field bends in the conduit should be made with the proper tools; the bends should be smooth and uniform and should not reduce the diameter of the conduit. Damaged conduit having sharp kinks or reduced cross section is to be rejected.
2. Conduit embedded in concrete should normally have a minimum cover of 75 mm (3 in.) and should be pitched to drain, preferably to a junction or pull box. Space is often tight near areas of conduit installations, and there can be problems with conduit fit and required clearances. These problems are typically solved by the Contractor with approval of the field inspector.
3. When conduit is installed for a future systems' use, it is important that an appropriate pull wire or rope be installed and that the ends are tightly plugged or capped.
4. The ends of each conduit system shall be identified as to the type of system, i.e. lighting, signals, telephone, etc., by the use of embossed metal tags or other durable means approved by the inspector.

5. Conduit installation should be made at the appropriate time to preserve the conduit from damage and to provide for its proper incorporation into the bridge. Conduit that will be encased in concrete shall be rigidly held in position during the placement of the concrete.

Where the conduit crosses an expansion joint in the structure, an expansion/deflection fitting is required in the conduit. Single fittings generally provide for a maximum total movement of 100 mm (4 in.). The fittings are required to be provided with a bonding jumper unless NMC. Some expansion fittings are designed with an internal bonding jumper as an integral part of the fitting; while other types require an external bonding jumper. The inspector should determine which type of fitting is furnished and make sure that it is installed properly. Those fittings with an internal bonding jumper should not be twisted during installation.

Pull boxes and junction boxes are used with conduit to provide access to and facilitate placing wires in long conduit runs. On structures, junction boxes are generally galvanized cast iron boxes with accessible covers and are of the size and type specified. They are installed at the location and in the manner shown on the Plans. When pedestrian traffic goes over the boxes, the covers shall be made with a raised pattern surface for safety. The junction boxes should have waterproof covers and equipped with a drain.

Utility installations on highway structures are allowed by utility permit or may be provided for by agreement when installed in conjunction with highway construction. The utility is responsible for obtaining a permit or agreement and for the design of its facility, which are both subject to Mn/DOT approval.

The State limits parallel pipe line installations on highway structures to water, steam, sewer, cable TV, telephone, fiber optic lines, electrical power lines, and natural gas distribution pipelines. All will be installed in accordance with the latest applicable codes.