Junction Boxes

NEC Articles
210, 250, 300, 314,

Standard Specifications
- 8-20.3(6)
- 9-29.2 junction boxes
- 9-29.2(3) structure mounted JBs
- 9-29.2(4) cover markings
Type 1 Junction Box
Standard Duty

Standard Plan J-11A
Type 2 Junction Box
Standard Duty
Base Plate and JB Type 8
Standard Duty

Standard Plan J-11C
Type 4 JB
Load Bearing
Type 6 Junction Box
(Load bearing box with integral footing)

Standard Plan J-11B
Traffic Temporarily Placed Over Load Bearing Boxes
JBs and # Inches of Conduit

- Type 1 and Type 4 = 6 in. / Conduit
- Type 2 and Type 5 = 12 in. / Conduit
- Type 3,7,8 and Type 6 = 24 in. / Conduit
8-20.3(6) Adj. JB’s

Both existing and new junction boxes, pull boxes, and cable vaults shall be adjusted to be flush with the finished grade as well as with the grade during the various construction stages proposed in the Contract.
When existing boxes need to be adjusted. Adjustments requiring raising or lowering JBs shall require conduit modification if the resultant clearance from conduit top, to the lid, becomes less than 6-inches or more than 8-inches.

Standard Specifications 8-20.3(6)
New Requirement for Locking Lids
Christie’s Prototypes
H₂ Locking Lid Prototype
Western Conc. Prod. Prototype
Secure the Boxes
JB Secured to Form Face
Close up of Adjustable JB
Junction boxes installed in structures constructed by slip forming shall be stainless steel NEMA 3R and shall be adjustable for depth, with depth adjustment bolts, which are accessible from the front face of the junction box with the lid installed.

Standard Specification 9-29.2(3)
Inside the Box
Ground Lug Inside the Box Drain
Hole Got Missed Box Has Been Hit
Lid After It Takes a Direct Hit
Barrier Box With Extension Added
Deep JB in the rail. The extension ring has been installed with epoxy. A bolt has been installed to bond the extension ring.
Plexiglas spacer and SS lid removed
With Plexiglas Spacer

Standard Specifications requires boxes in the barrier is placed in correct alignment. The face shall not be more than 1/2-inch recessed and uniformly chamfered. NW Region requires within 1/8-inch. 8-20.3(6) Special Provisions
Concrete Made to Fit
Surface JB Hinge Lid
Surface Mount SS JB
Fiber Cable Not Supported
Fiber Cable Supported Correctly
Set Pull Box
Junction Box Inspection Checklist

Copy in your books
Wiring

NEC Articles
200, 250, 240, 300, 312,

Standard Specifications

• 8-20.3(8)
• 9-29.3 conductors, cable
• 9-29.7 luminaire fusing and connections at light standards
• 9-29.12 electrical splice materials
• 9-29.12(1) illumination circuit splices
Wire Sizes

#10-Pole and Bracket Cable Wire Sizes
Mandrels
Pulling Wire

8-20.3(5) Conduit
NW Region Special Provisions

In conduit less than 2-inch pull ropes for wire installation shall be not less than ¼-inch.

In conduits 2-inch diameter or larger, pull ropes shall be not less than ½-inch.

Ideal yellow lube not recommended
Dynamometer on Control Unit

Pulling pressures on copper

8-20.3(8)
Page 8-82
Install Duct Seal

NWR SP 8-20.3(5)
Traffic Elect. Pg. 46
NW Region Requires Mechanical Conduit Plugs in All Cabinets

Duct seal is not acceptable.
Wire Connectors and Grounding Clamps
Burndy Crimp and Crimper
T & B Crimper
Crimping the Ground Wire
Epoxy Splice Kit

9-29.12(1)
Heat Shrink
Heavy-Wall Heat-Shrinkable Tubing

- Made of thermally stabilized cross-linked polyolefin, enabling a recovered wall thickness greater than that of the cable jacket replaced.
- Withstands severe mechanical requirements of U.R.D., submersible, and direct burial installations.
- Tubing, featuring an internally applied sealant, offers protection against moisture, and may be used over lead, steel, aluminum, copper, standard plastic and elastomeric insulating materials.
- Shrink temperature of 120° C.
- High-impact, abrasion, corrosion and chemical resistance.
- Rated for 600V, 90° C continuous use.
- Thermoplastic adhesive liner provides complete environmental protection and insulation.
- Meets: UL® 486D, CSA C22.2 No. 198.2, ANSI C119.1, Western Underground Guide Numbers 2.4, 2.5, ICEA and NEMA insulation thickness requirements.
- Continuous operating temperature: -55° C to 110° C.
Heat Shrink Splice
Heat Shrink Splices
Splice Illumination Conductors
Use Caution Where You Drive
ITS

Intelligent Transportation Systems

8-20 & 9-29
Standard Specifications
ITS 332 Gate Controller Cabinet
ITS 332
CCTV
Controller
Cabinet
(Back)
ITS 332
CCTV Controller
Cabinet (Front)
CCTV Ethernet Switch
CCTV Fuse Block & Transmitter
PTZ (Pan, Tilt, & Zoom) CCTV Camera
Signal Bridge where CCTV Camera is Located
ITS 332
ES
Controller
Cabinet
(Back)
ITS 332
ES
Controller
Cabinet
(Front)
ES Cabinet Loop Legend Board
ES Cabinet Loop Amps
VMS (Variable Message Sign)
VMS Modules
Cabinet Conduit Seals
Cabinet Labeling As Required by NW Region ITS
ITS Manhole, Load Bearing Lid
Fiber Optic Cables and Installation

NEC Articles 770

- Standard Specifications
- 9-29.3(1) Fiber Optic Cable
- 9-29.3(1)a Single mode Fiber Optic Cable
Fiber Optic Tugger
F.O. cable can be pulled at a maximum of 600 LBS. 9-29.3(1)
Setting Up
Cable Is Out and Pulling Around the Puller Wheel
Racking Fiber Optic Cable

Hanger and Cable Buffer per J-15a&b
Some regions require SS hanger
Figure 8 Fiber Optic Rack in C.V.

Stainless Steel Hanger
Missing Cable Buffer per J-15a&b
Stainless Steel Hanger
With Cable Buffer per J-15a&b
F.O. Bend Radius

- Manufacturer should specify the bend radius
  - Bends during installation (when cable is under tension)
  - Long term bends
- The minimum bend radius is also a function of tensile stresses. e.g. while pulling around a sheave
- Common Mfg requirement: Minimum bend radius of not less than 20 times the cable diameter during installation and 10 times the diameter for long term.
Depicts losses in straight fiber

Depicts losses in 60 degree bend

Click the picture below to view a depiction of the signal loss in a 60 degree bend