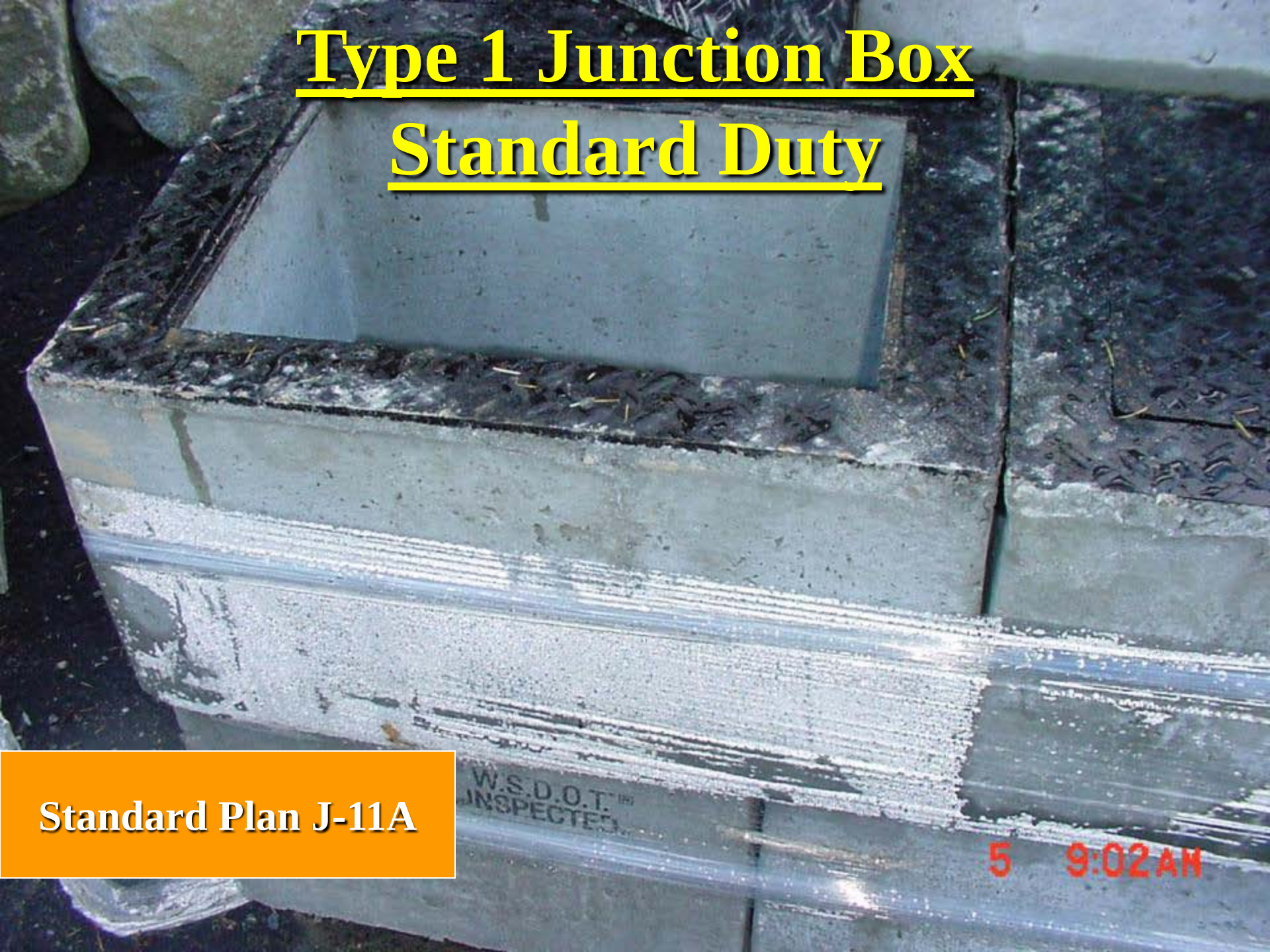
Junction Boxes

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

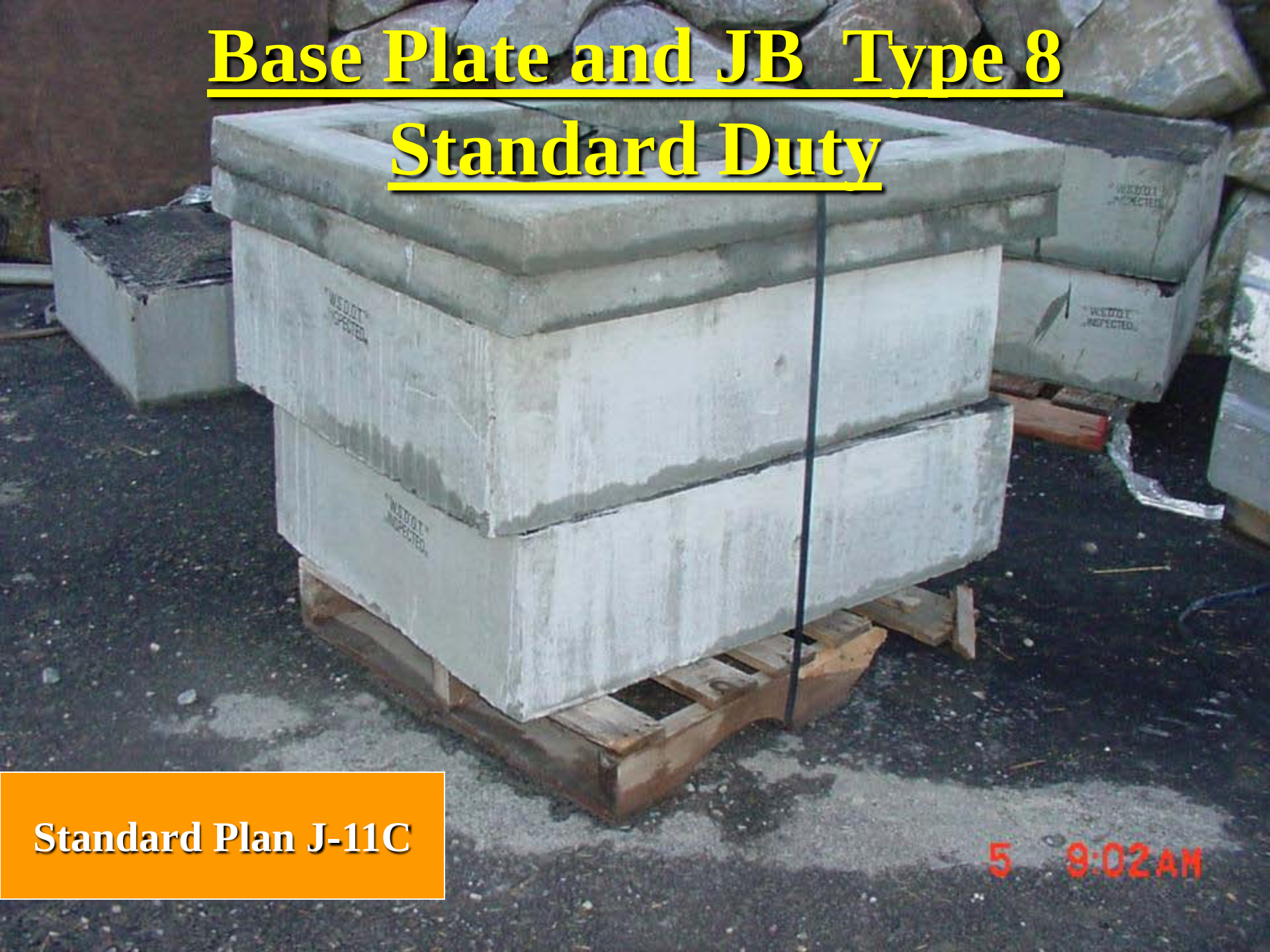
Type 1 Junction Box
Standard Duty



Standard Plan J-11A

Type 2 Junction Box Standard Duty

Base Plate and JB Type 8 Standard Duty



Standard Plan J-11C

Type 8 Junction Box

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

Pull Box With Section Out

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.

JB Too High and Poor Placement

Standard Plans J-10

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

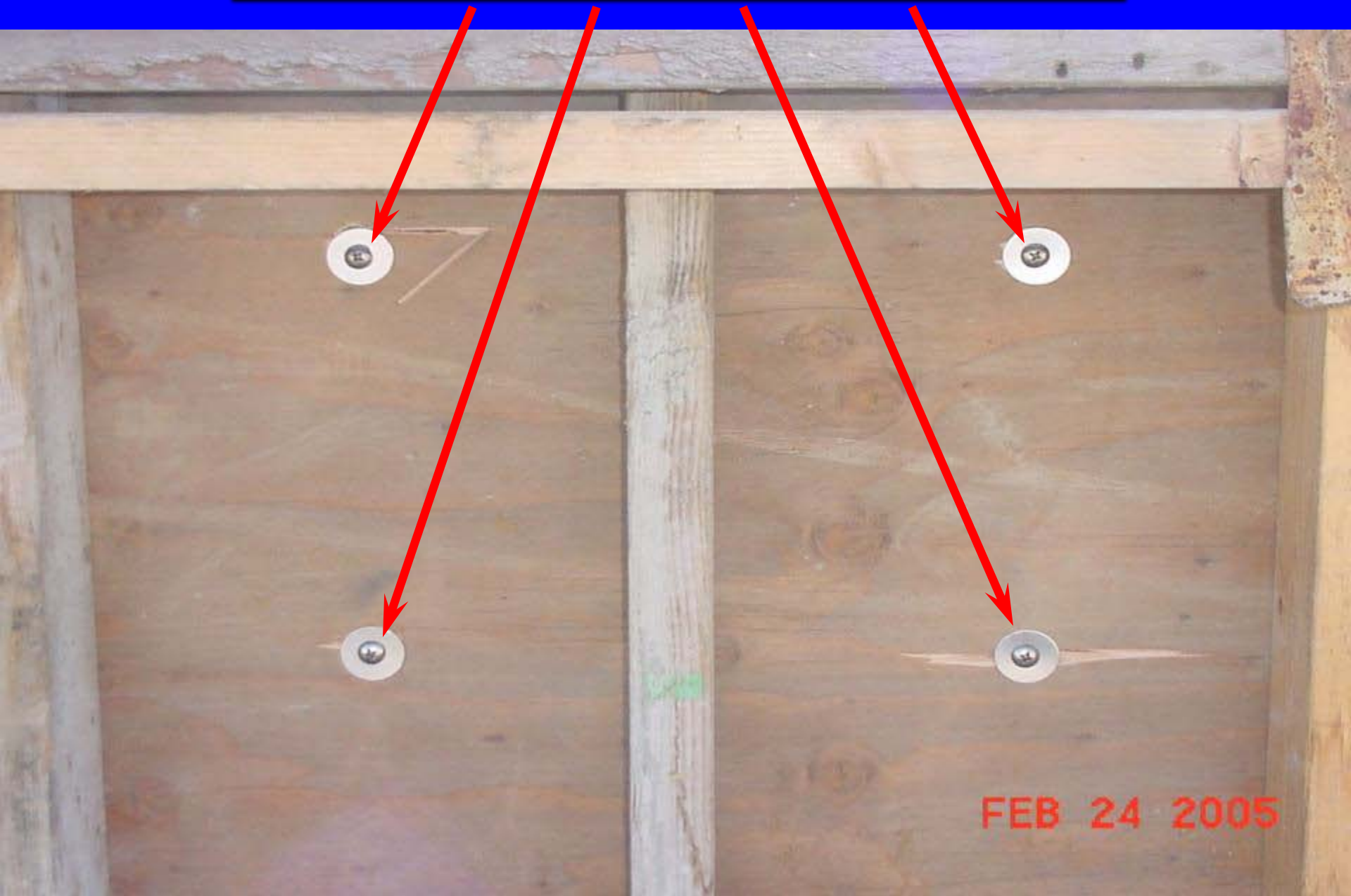
H_2 Locking Lid Prototype

Western Conc. Prod. Prototype

Secure the Boxes

JB with Rail - Form Face in Place

JB Secured to Form Face



Close up of Adjustable JB

Adjustable JB With About 1.5-Inch of Adjustment

Adjustable JB Video Clip

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)

After the Pour

Inside the Box

Ground Lug Inside the Box Drain Hole Got Missed Box Has Been Hit

Lid After It Takes a Direct Hit

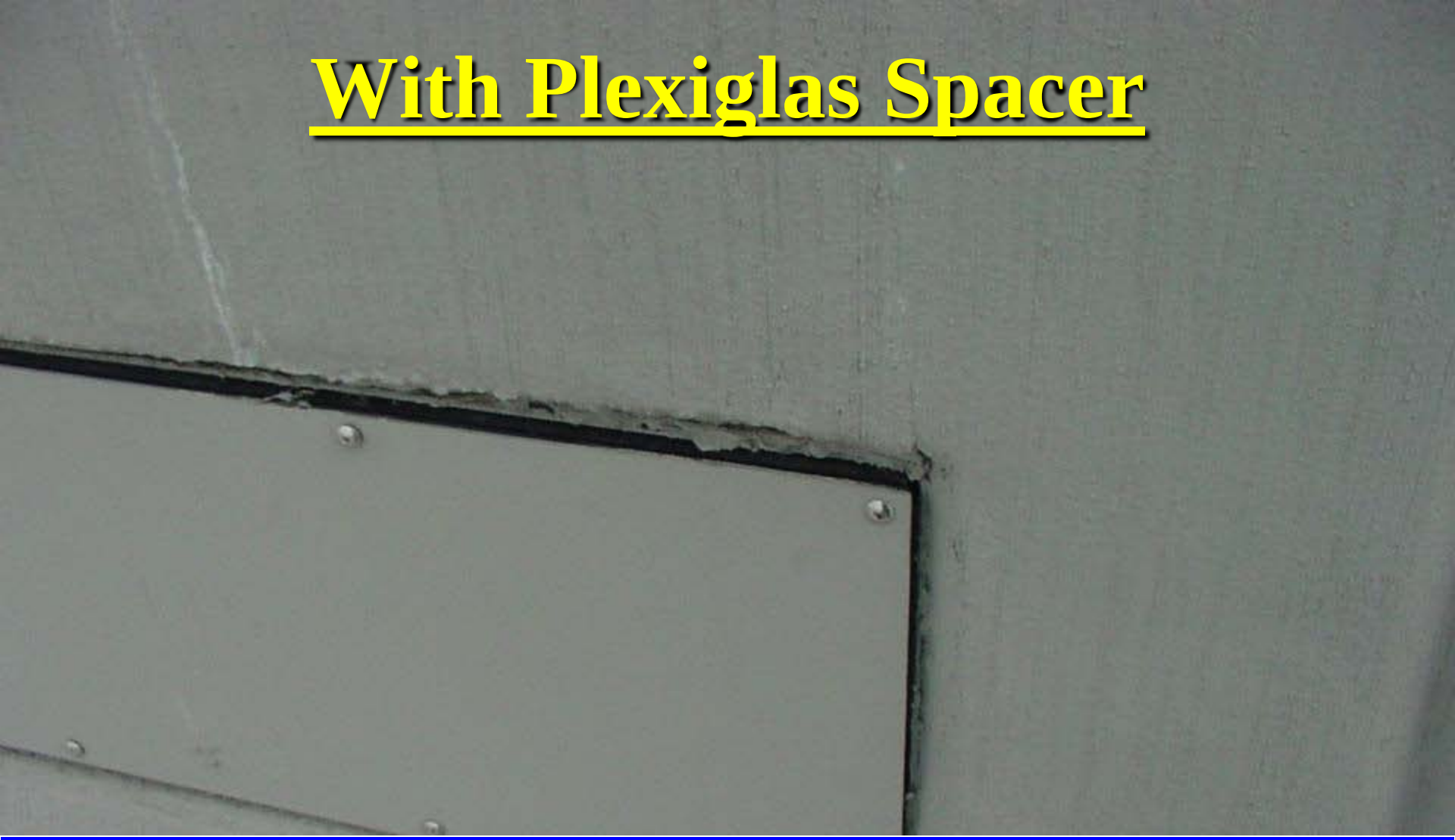
Barrier Box With Extension Added

Deep JB in the rail. The extention ring has been installed with epoxy. A bolt has been installed to bond the extention ring

Extension Installed With Epoxy

Plexiglas spacer and SS lid
removed
2 12:19PM

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

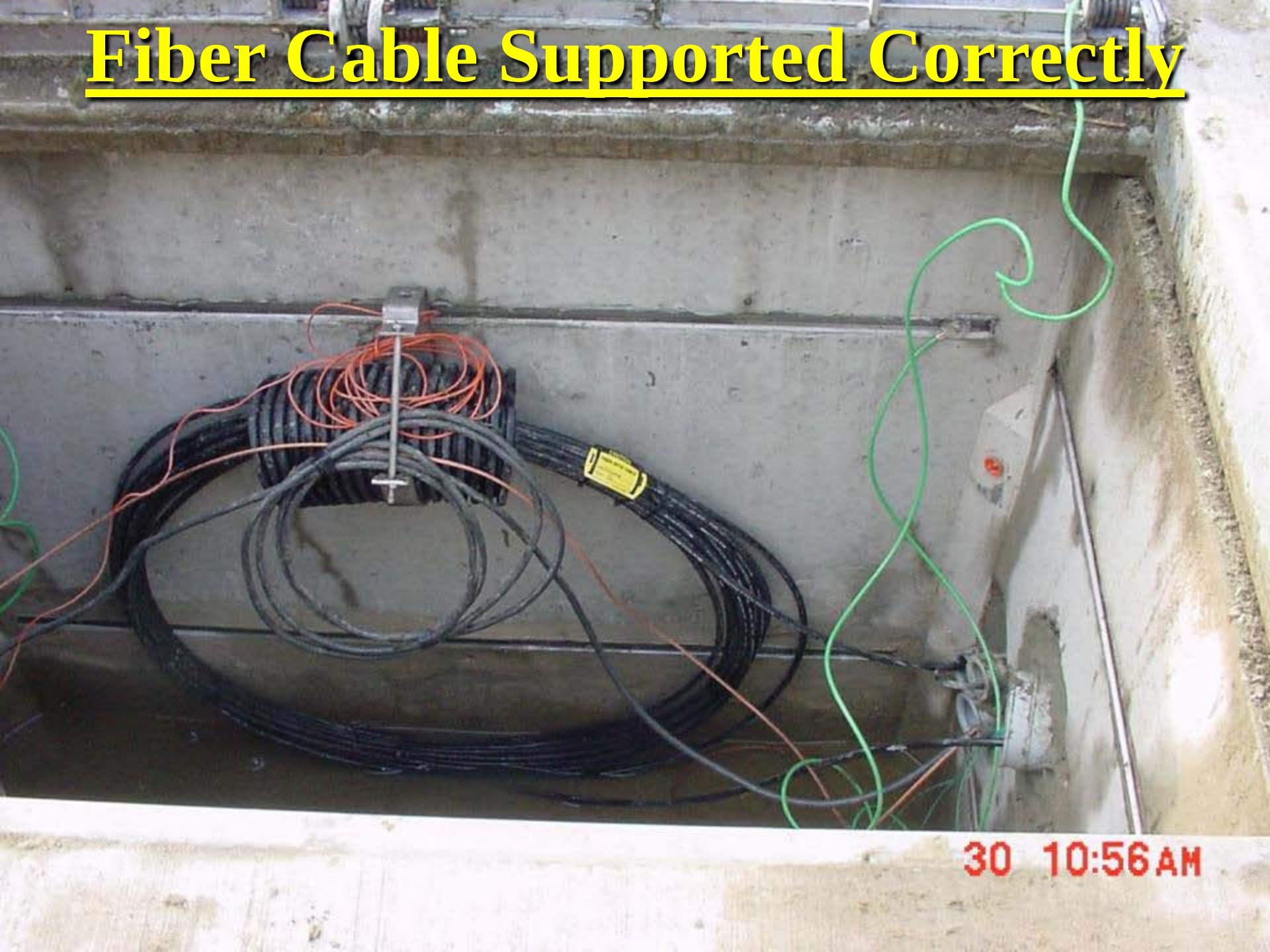
Concrete Made to Fit

Surface JB Hinge Lid

Surface Mount SS JB

Fiber Cable Not Supported

Fiber Cable Supported Correctly



CV With Load Bearing Lid

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

Mandrels

Pulling Wire

Ideal yellow lube not recommended

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.

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

17 1:36PM

9-29.12(1)

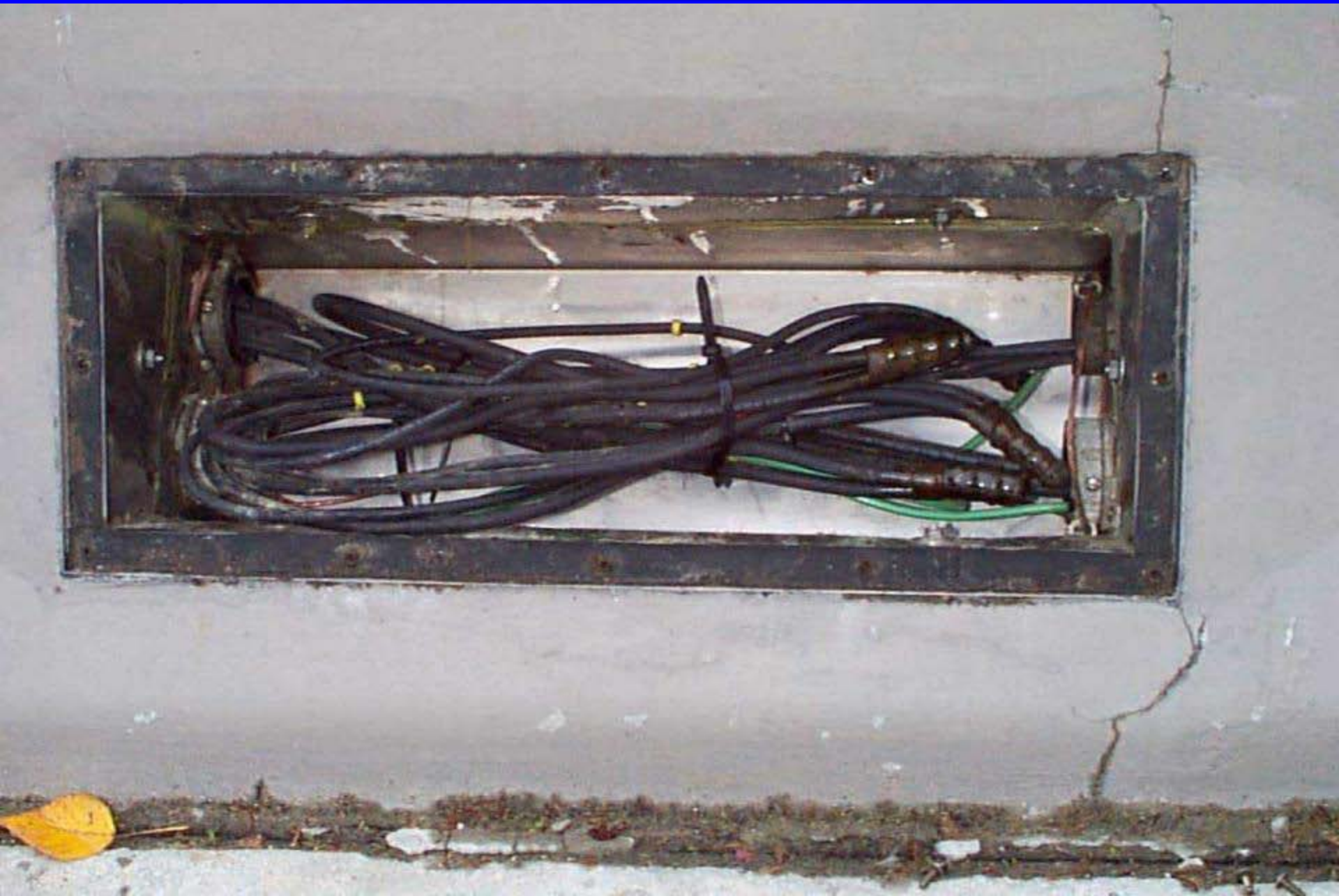
Heat Shrink

9-29.12(1)

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

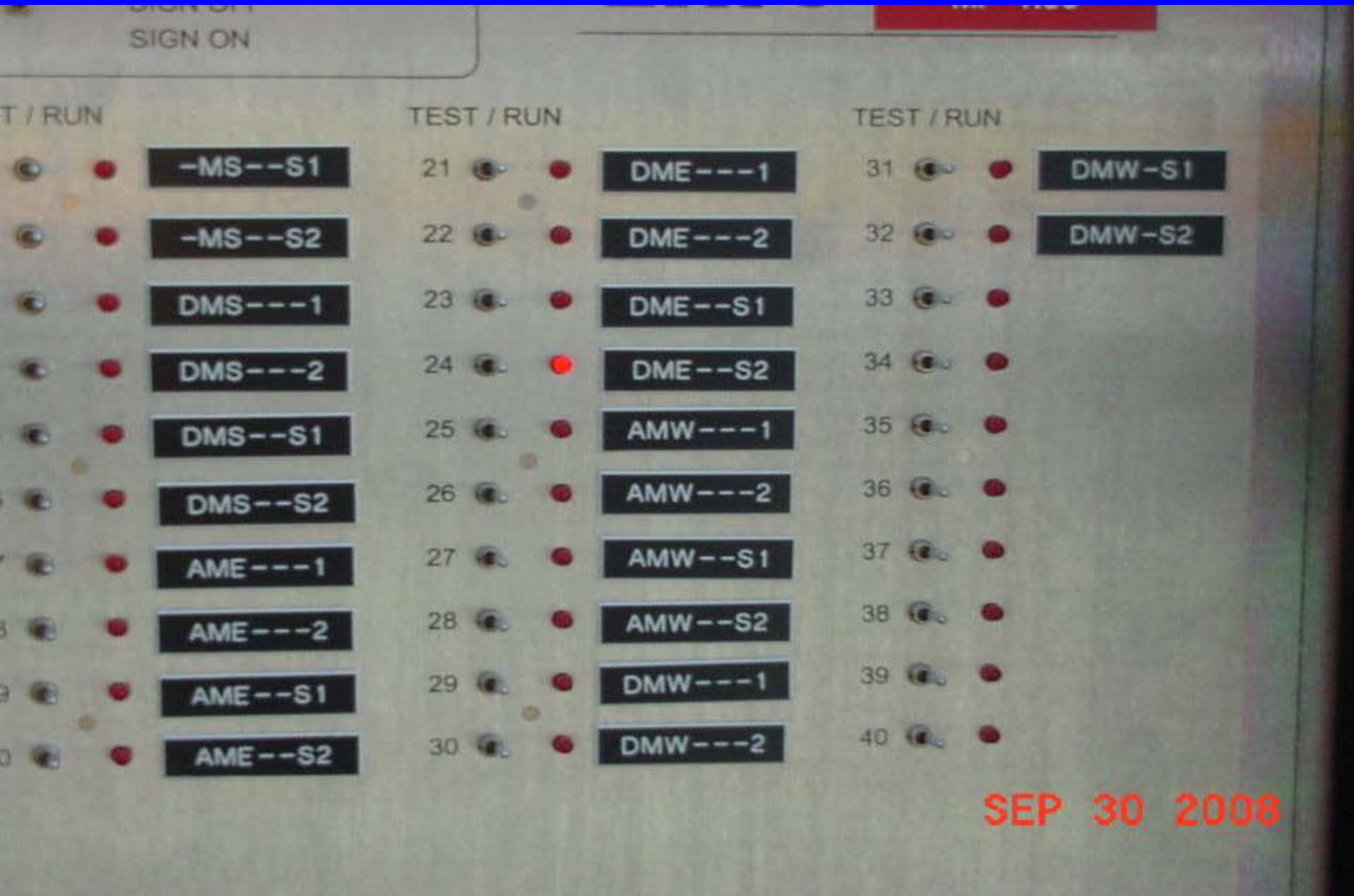
PTZ (Pan, Tilt, & Zoom) CCTV Camera

Signal Bridge where CCTV Camera is Located

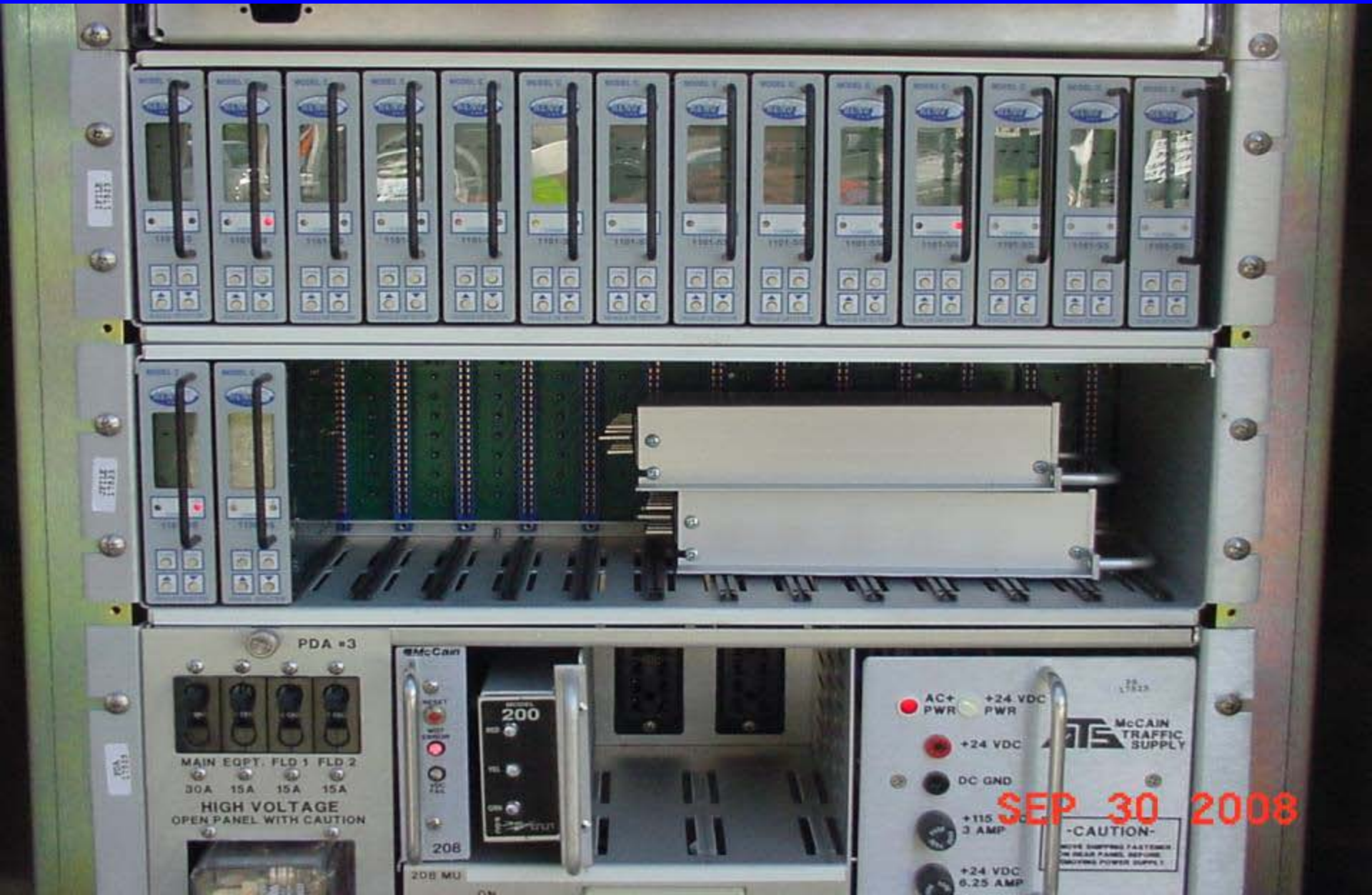
ITS 332 ES Controller Cabinet (Back)

ITS 332 ES Controller Cabinet (Front)

ES Cabinet Loop Legend Board



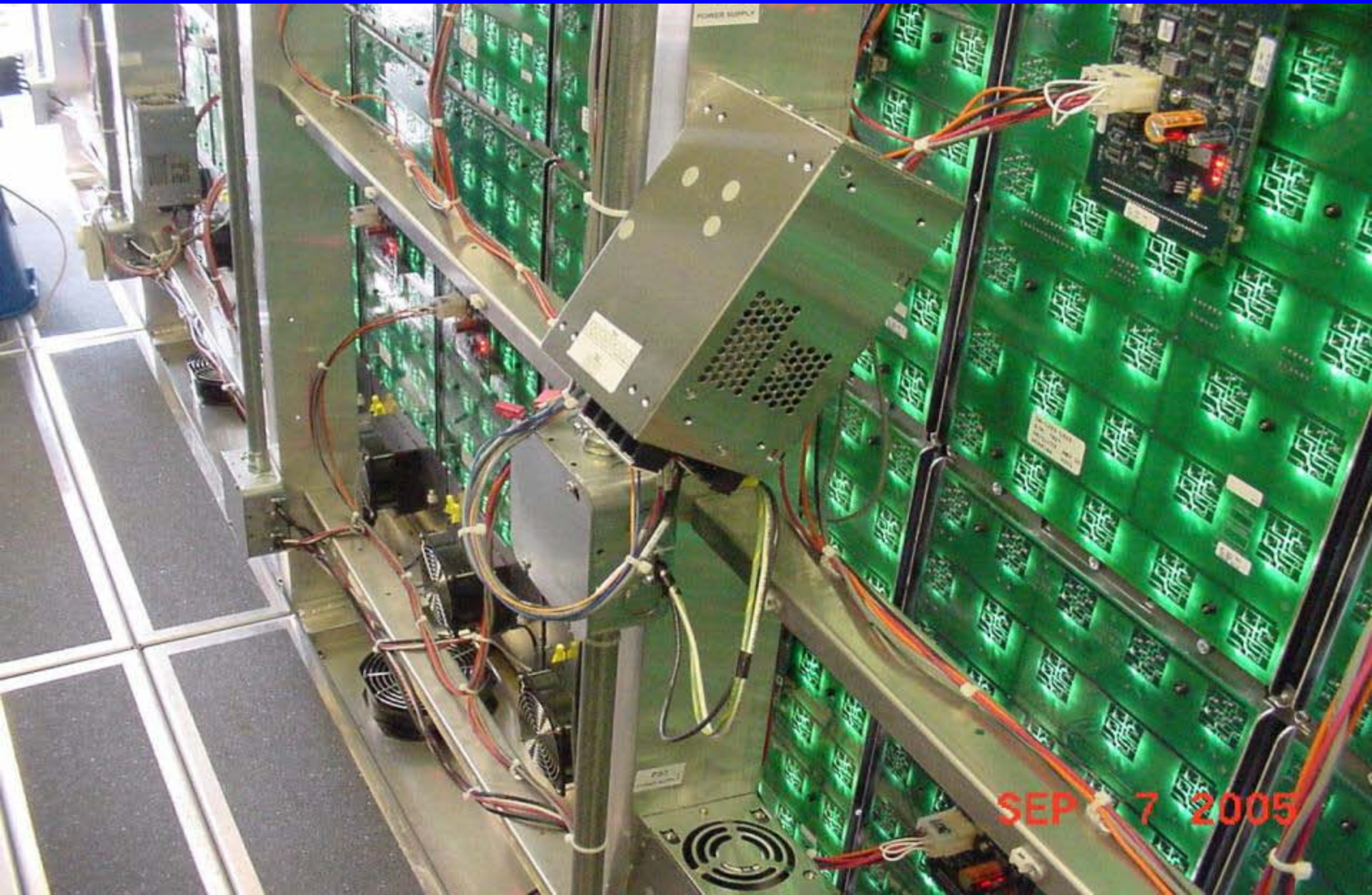
ES Cabinet Loop Amps



VMS (Variable Message Sign)

Inside VMS

VMS Modules



VMS Outside (Back)

Service, ES, CCTV, & Signal Cabinets

Cabinet Conduit Seals

Cabinet Labeling As Required by NW Region ITS

NWR SP ITS
Page 8

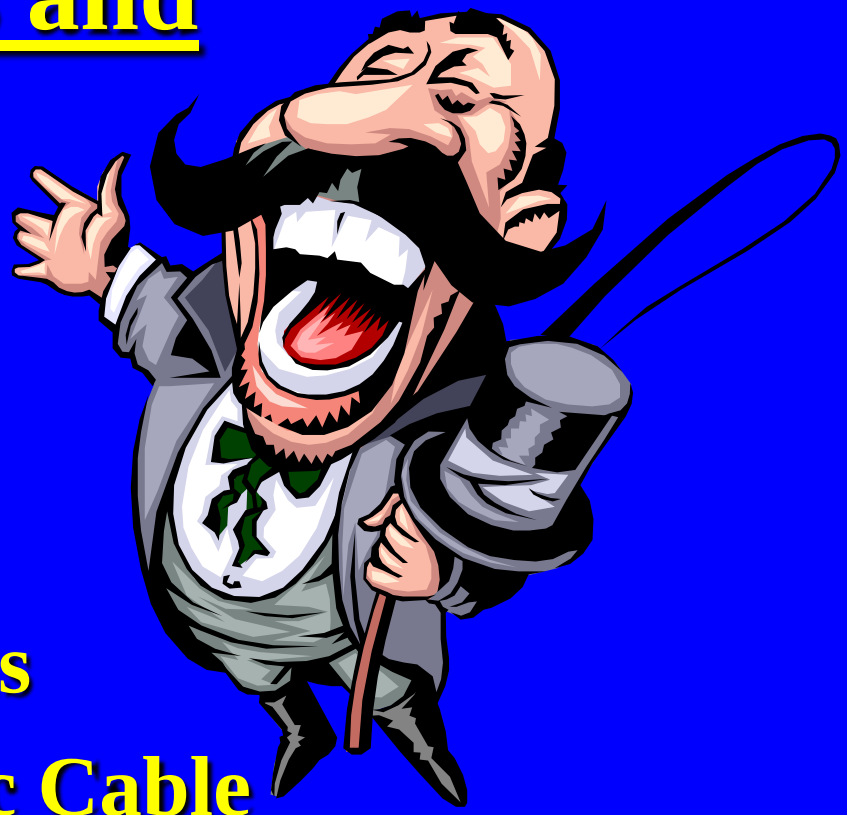
Camera Cable Termination

Properly done

Corrosion Results

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

Dynamometer on Control Unit

F.O. cable can be pulled at a maximum of 600 LBS.
9-29.3(1)

Dynamometer Close up

Setting Up

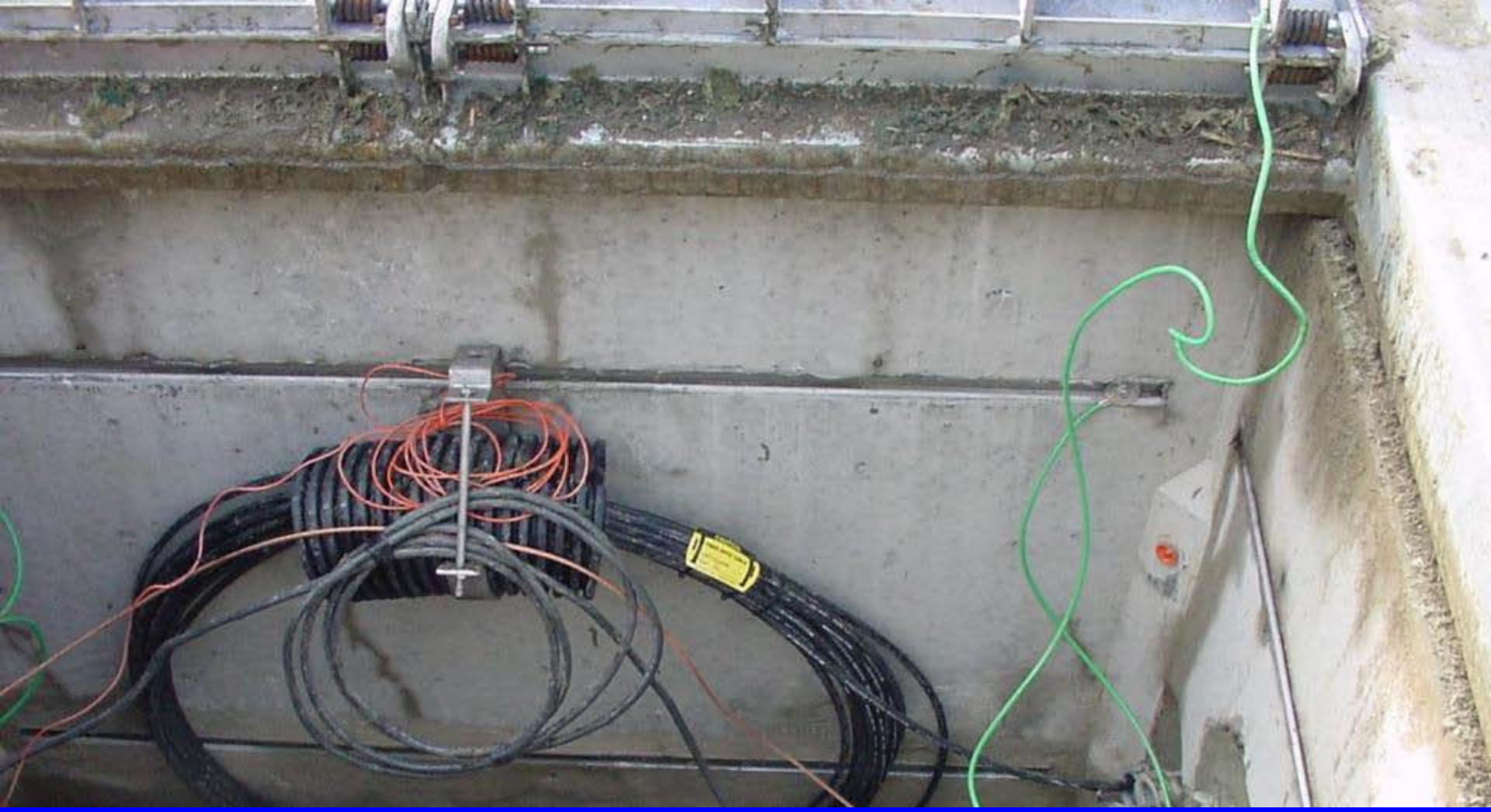
Cable Is Out and Pulling Around the Puller Wheel

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.

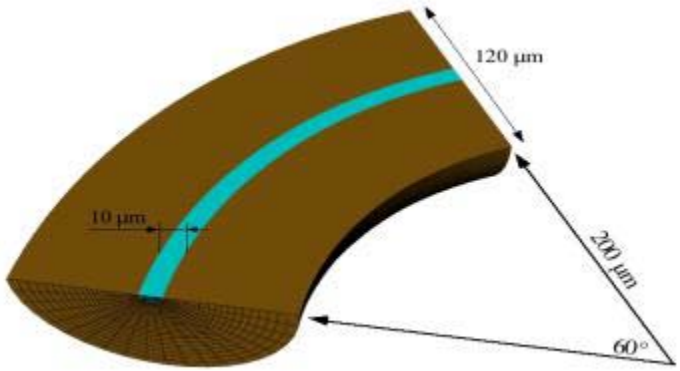
Stainless Steel Hanger
Missing Cable Buffer per J-15a&b



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.

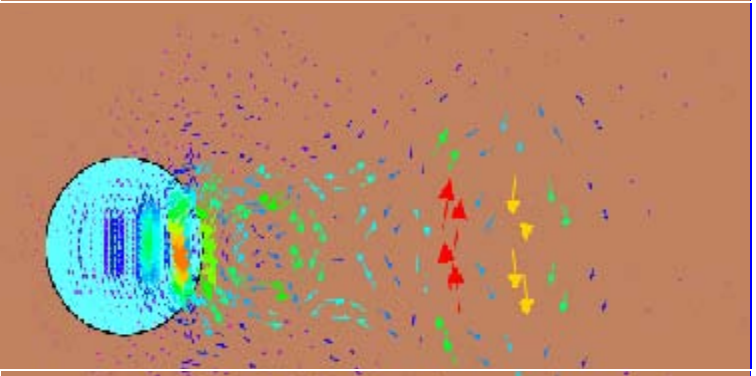
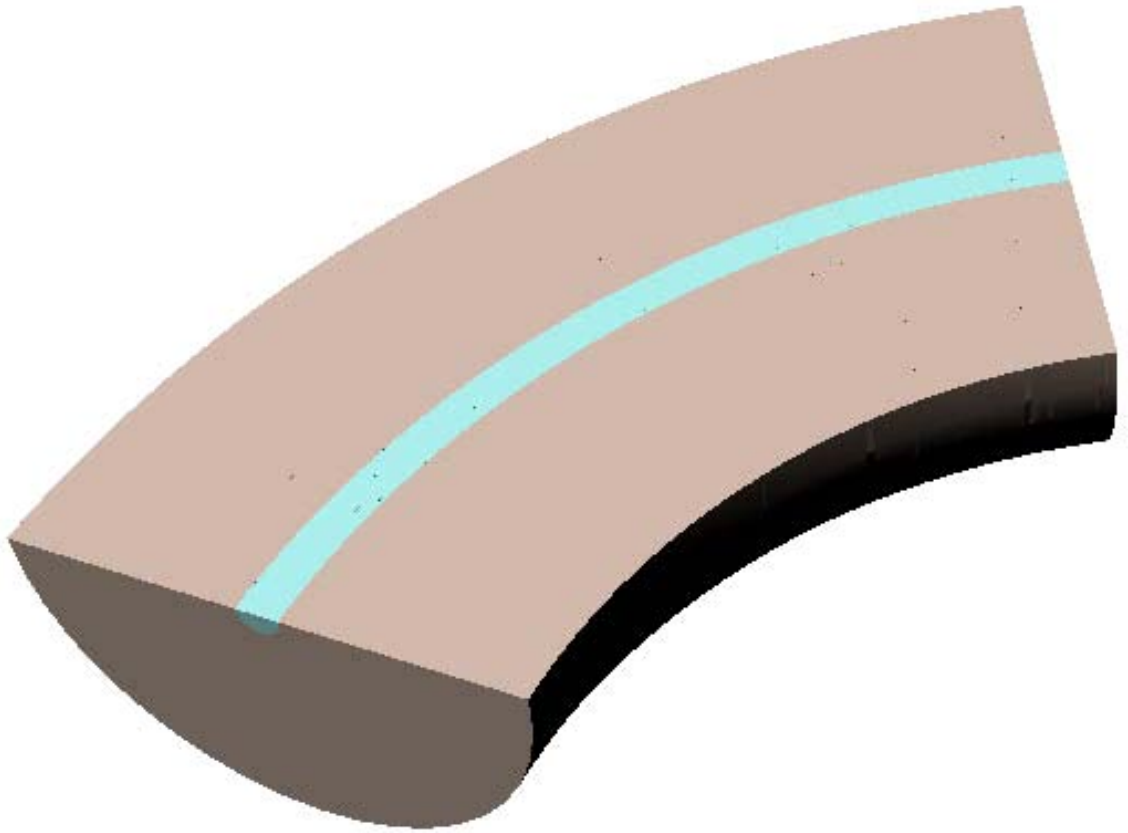


FO Bends

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

60 degree bend

Depicts losses in straight fiber



Depicts losses in 60 degree bend