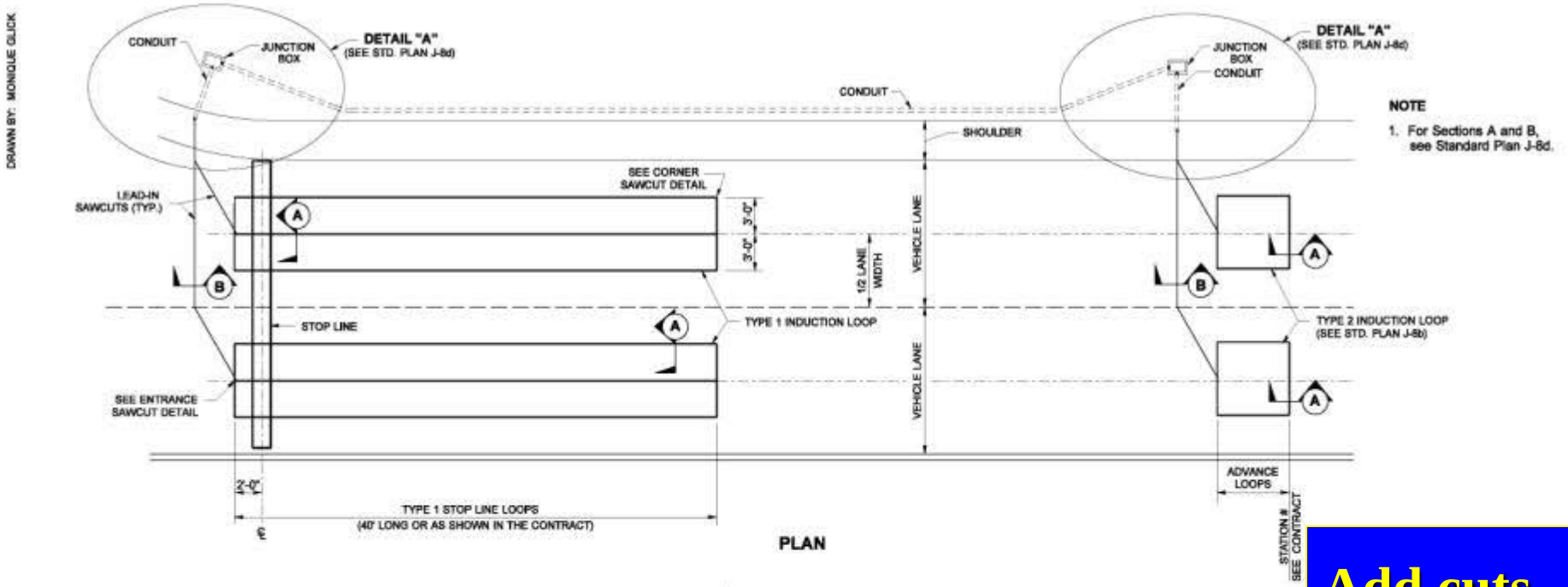
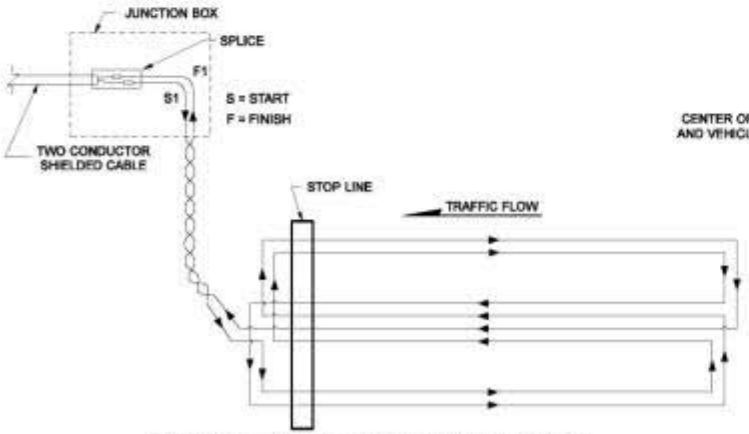
Signal Detection

Standard Specifications

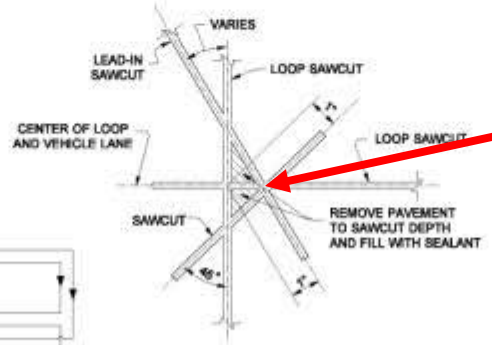
- **8-20.3(14)c**
- **Induction loop Vehicle Detectors**
- **Video detection**
- **Pre-form loops**
- **Magnetometers**
- **9-29.18 Vehicle Detectors**

Standard Plan J-8a

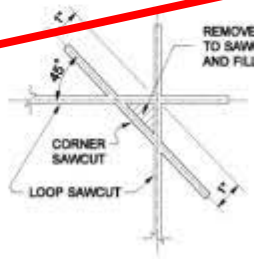




TYPE 1 STOP LINE LOOP WIRING DIAGRAM



ENTRANCE SAWCUT DETAIL



CORNER SAWCUT DETAIL

Add cuts or chisel. 45 degree max. corner

TYPE 1 INDUCTION LOOP

STANDARD PLAN J-8a

SHEET 1 OF 1 SHEET

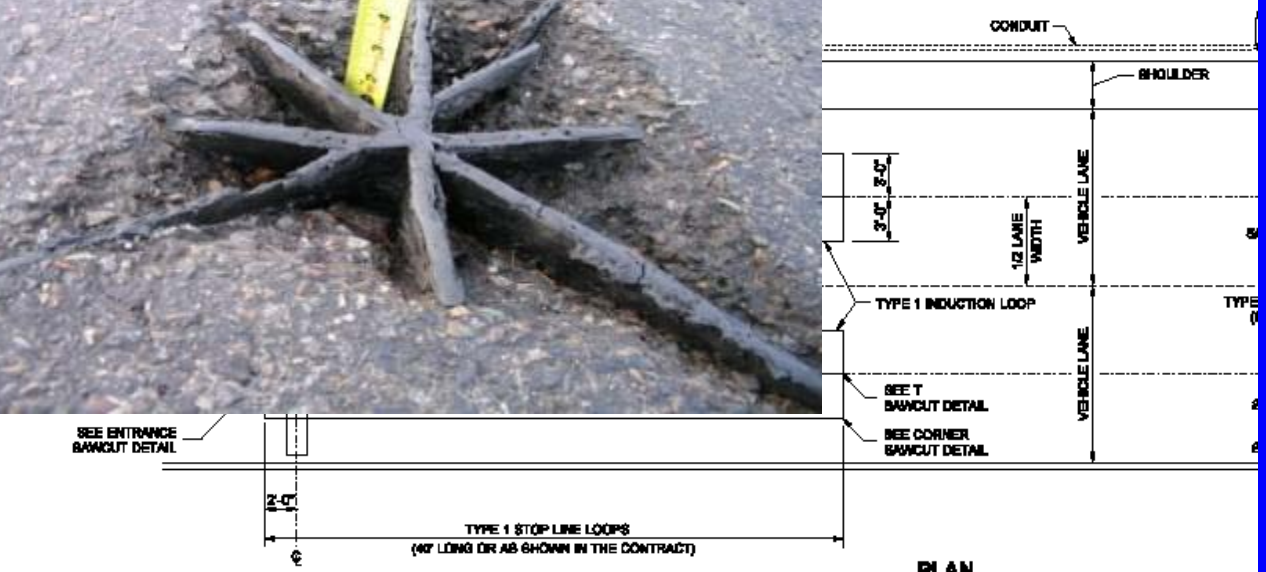
APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-20-04

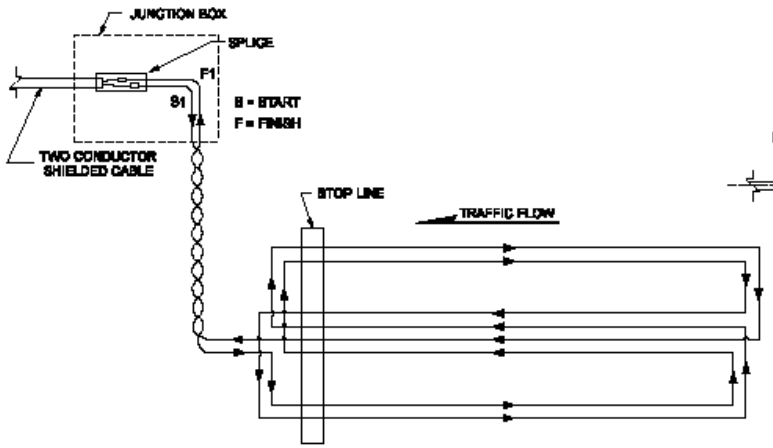
STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

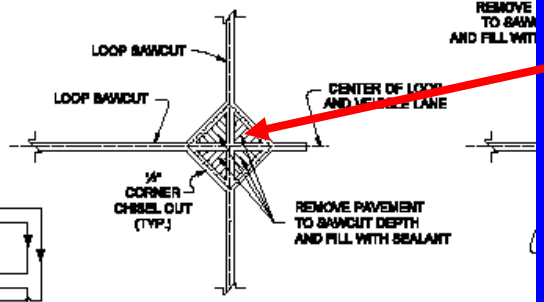
Standard Plan J-8a (Revised)



PLAN



TYPE 1 STOP LINE LOOP WIRING DIAGRAM

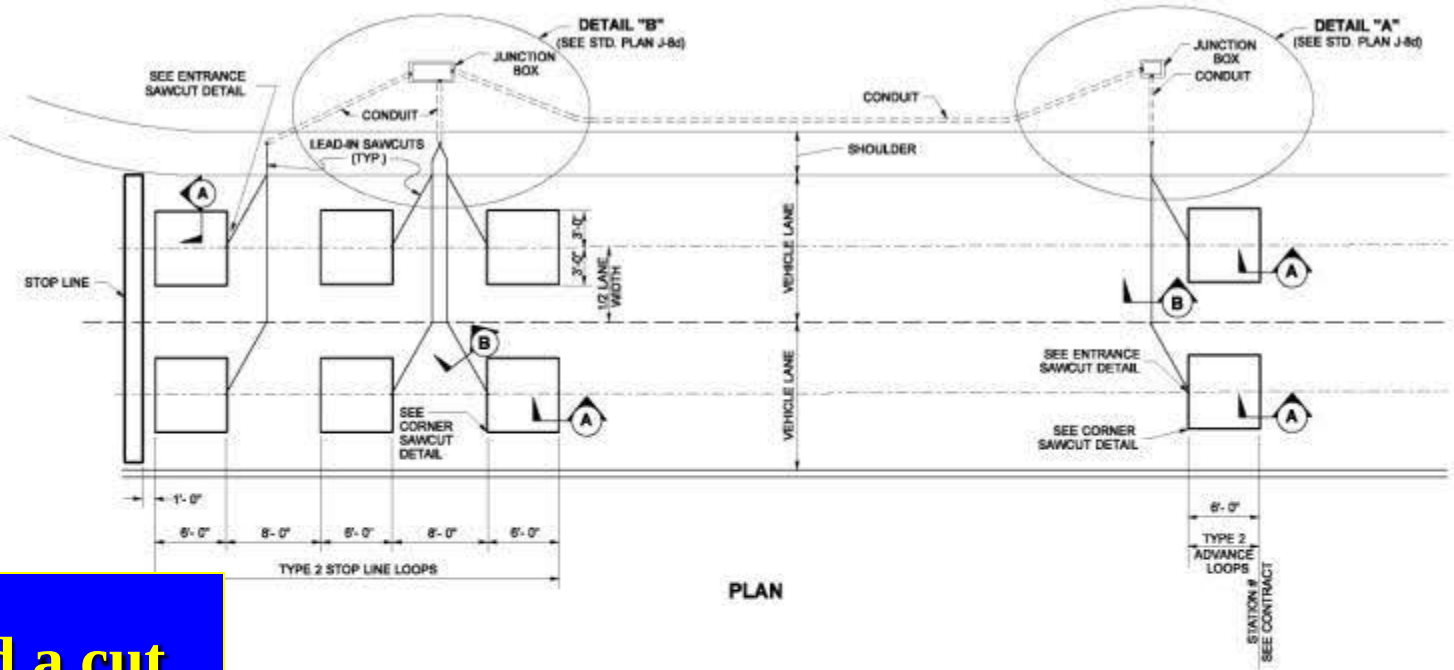


ENTRANCE SAWCUT DETAIL
(TYPE 1 STOP LINE LOOPS)

Change showing chiseled out area. 45 degree max. corner

Standard Plan J-8b 1 of 2

DRAWN BY: MONIQUE GLICK

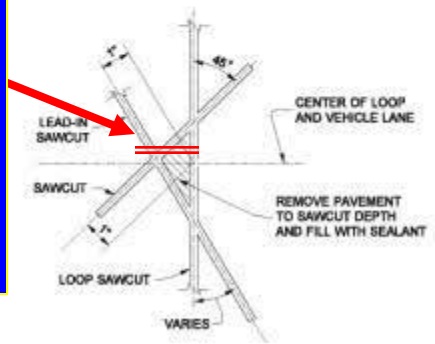


PLAN

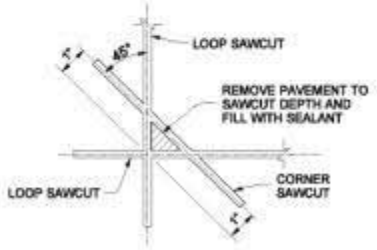
NOTE

1. For Sections A and B, see Standard Plan J-8d.

Add a cut. 45degree max. corner



ENTRANCE SAWCUT DETAIL



CORNER SAWCUT DETAIL

R. SCOTT ZELLER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: MAY 5, 2005

TYPE 2 INDUCTION LOOP

STANDARD PLAN J-8b

SHEET 1 OF 2 SHEETS

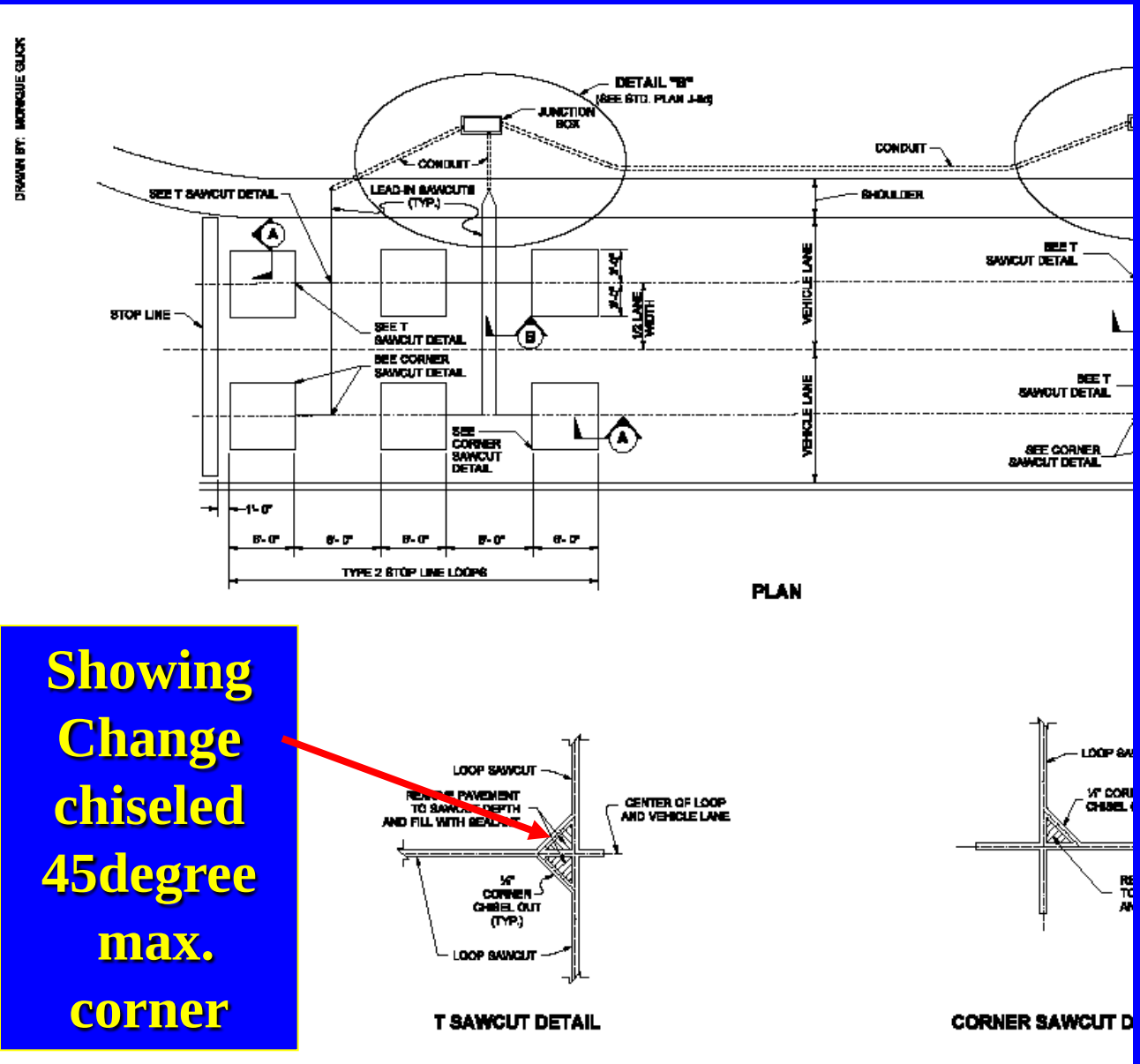
APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

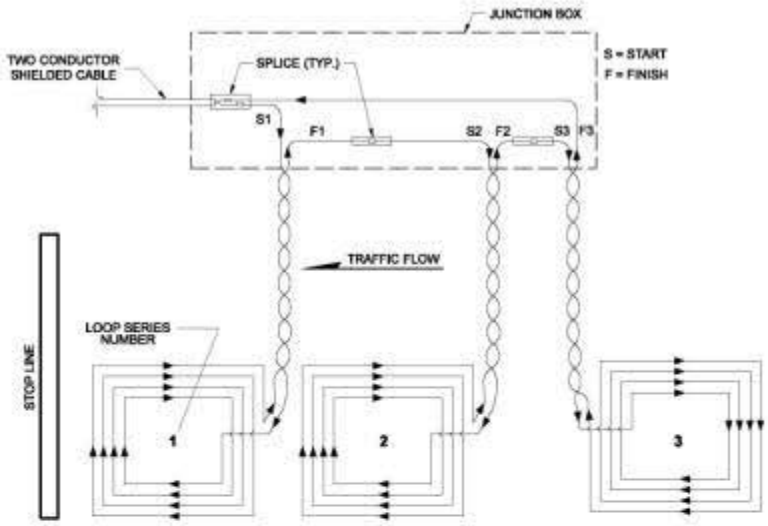
Standard Plan J-8b 1 of 2 (Revised)



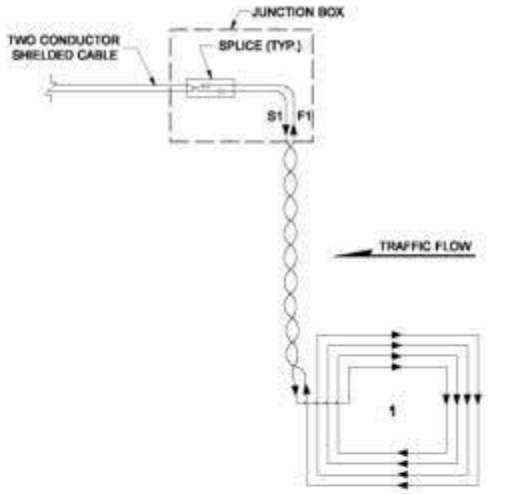
Showing Change chiseled 45degree max. corner

Standard Plan J-8b 2 of 2

DRAWN BY: MONIQUE GLICK



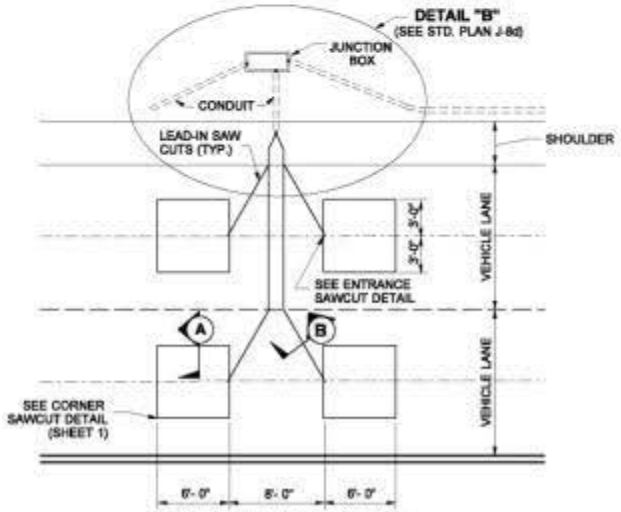
TYPE 2 STOP LINE LOOP WIRING DIAGRAM
(SERIES SPLICE SHOWN)



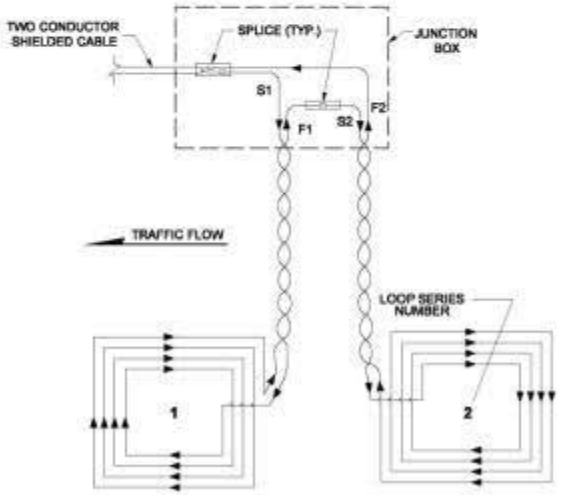
TYPE 2 ADVANCE LOOP WIRING DIAGRAM

NOTES

1. All of the loop lead-in wires shall return to the Junction Box.
2. For Splice Detail, see Standard Plan J-8d.



TYPE 2 SAMPLING LOOPS



TYPE 2 SAMPLING LOOP WIRING DIAGRAM
(SERIES SPLICE SHOWN)

R. SCOTT ZELLER
STATE OF WASHINGTON
22800
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

TYPE 2 INDUCTION LOOP

STANDARD PLAN J-8b

SHEET 2 OF 2 SHEETS

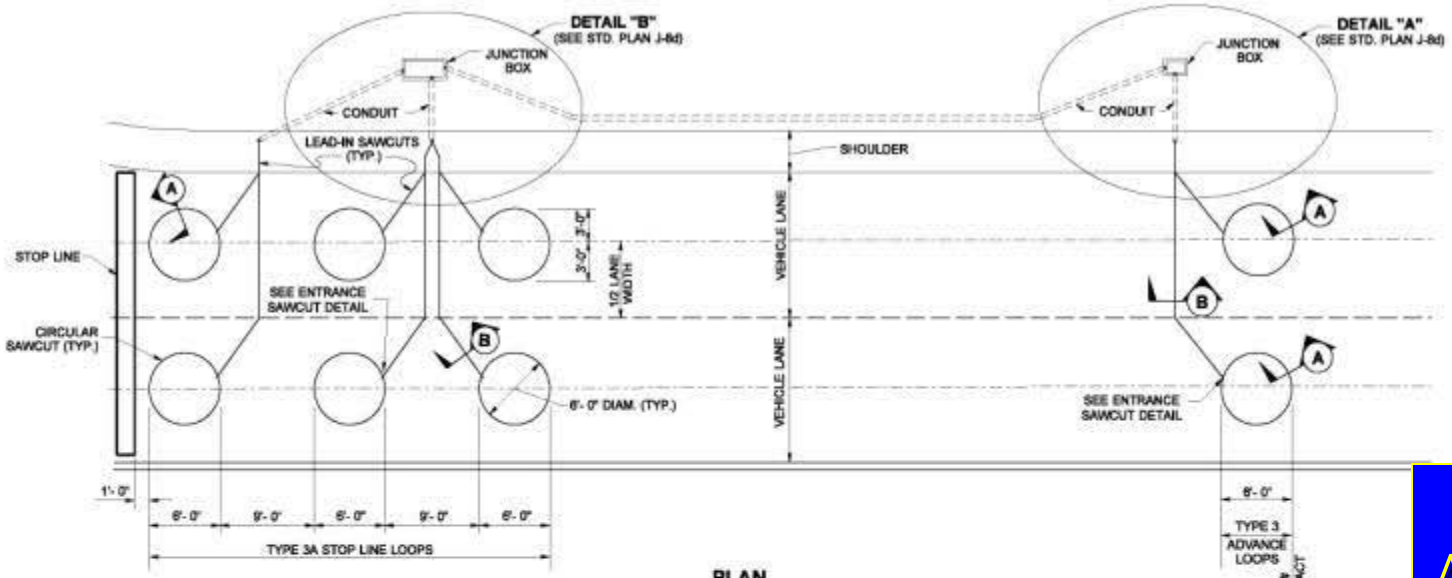
APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

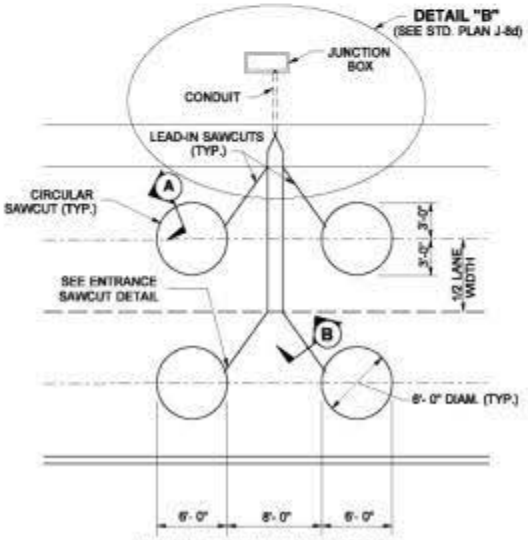
Standard Plan J-8c 1 of 3



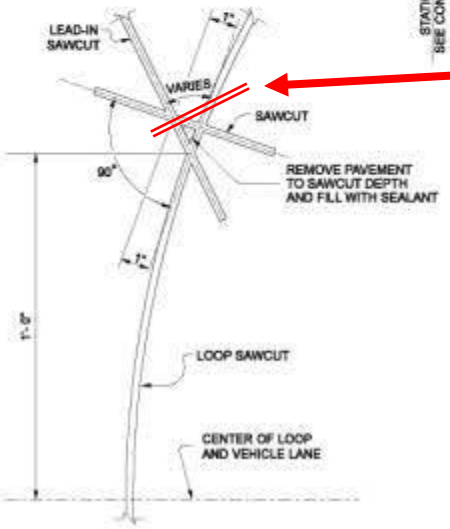
PLAN

NOTE

1. For Sections A and B, see Standard Plan J-8d.



TYPE 3 SAMPLING LOOPS



ENTRANCE SAWCUT DETAIL

Add a cut. 45 degree max. corner

EXPIRES: MAY 5, 2005

TYPE 3 INDUCTION LOOP

STANDARD PLAN J-8c

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

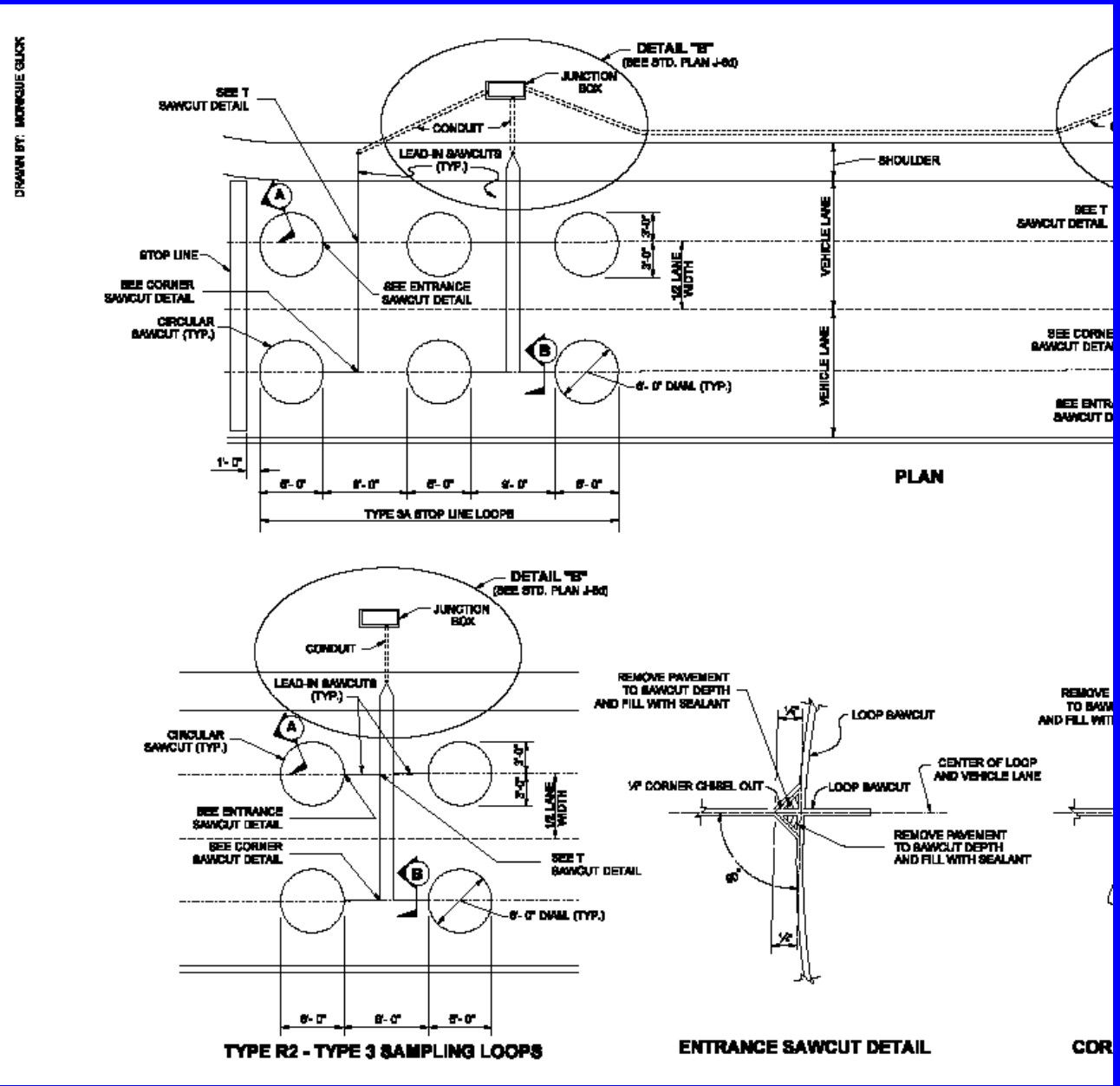
Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

DRAWN BY: MONIQUE GLICK

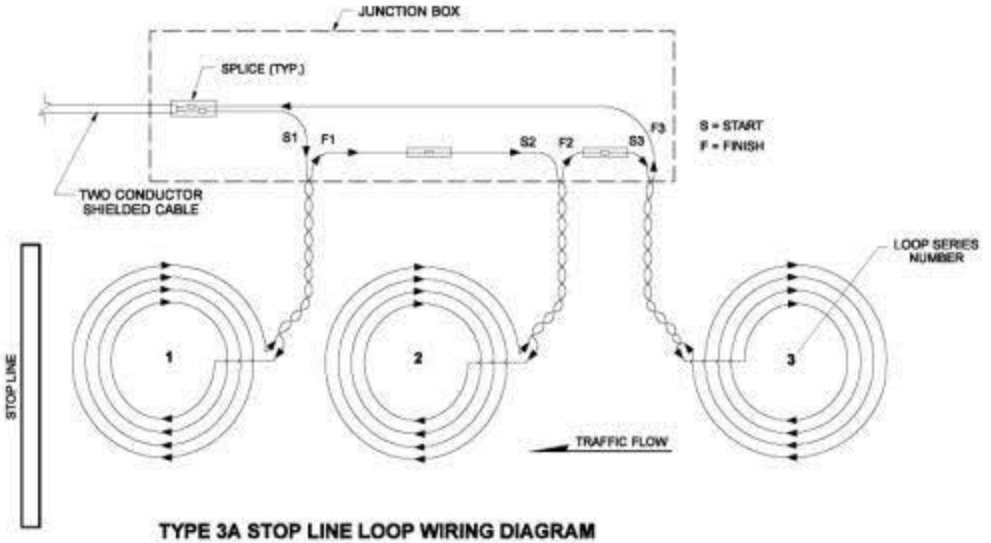
Standard Plan J-8c 1 of 3 (Revised)



Showing Chiseled 45 degree max. corner

Standard Plan J-8c 2 of 3

DRAWN BY: MONIQUE GLICK

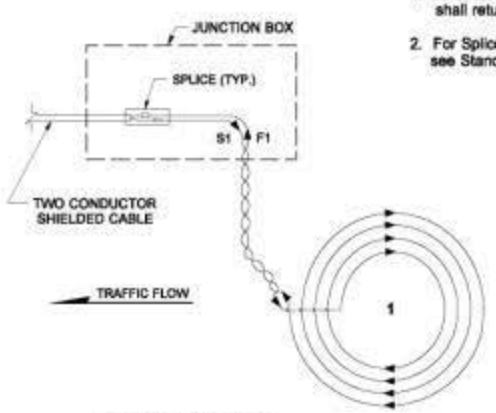


TYPE 3A STOP LINE LOOP WIRING DIAGRAM

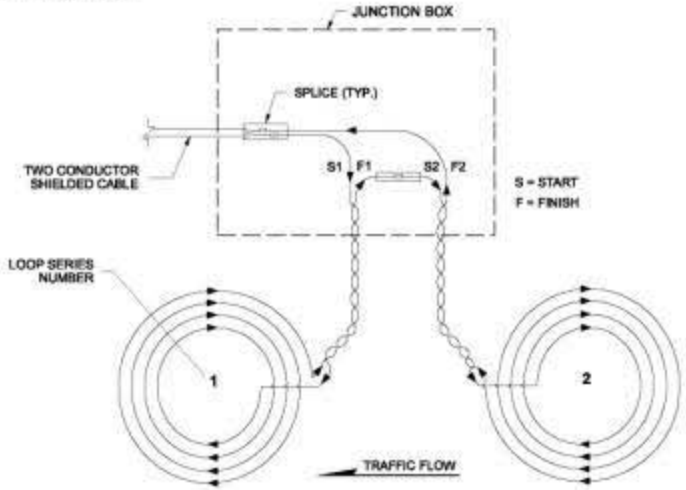
(SERIES SPLICE SHOWN)

NOTES

1. All of the loop lead-in wires shall return to the Junction Box.
2. For Splice Detail, see Standard Plan J-8d.



TYPE 3 ADVANCE LOOP WIRING DIAGRAM



TYPE 3 SAMPLING LOOP WIRING DIAGRAM

(SERIES SPLICE SHOWN)

R. SCOTT ZELLER
STATE OF WASHINGTON
21440
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

TYPE 3 INDUCTION LOOP

STANDARD PLAN J-8c

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

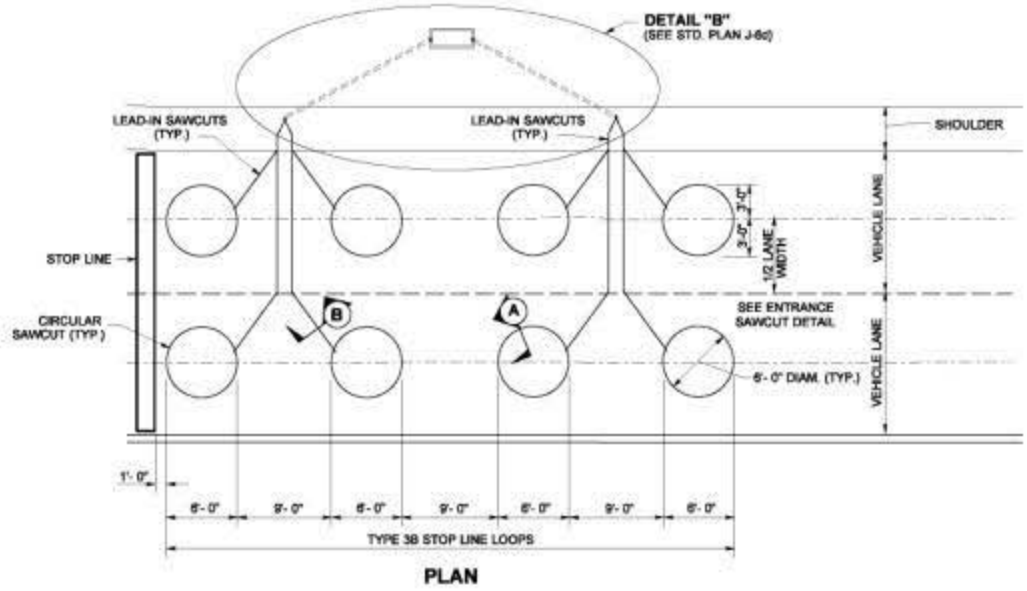
Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER DATE

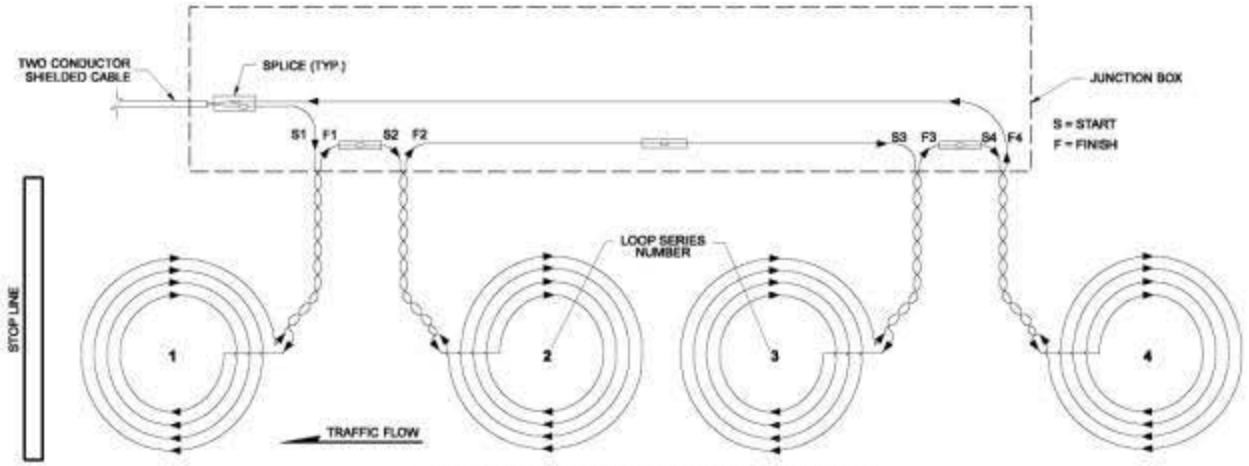
Washington State Department of Transportation

Standard Plan J-8c 3 of 3

DRAWN BY: MONIQUE GLICK



PLAN



TYPE 3B STOP LINE LOOP WIRING DIAGRAM

(SERIES SPLICE SHOWN)

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: MAY 5, 2005

TYPE 3 INDUCTION LOOP

STANDARD PLAN J-8c

SHEET 3 OF 3 SHEETS

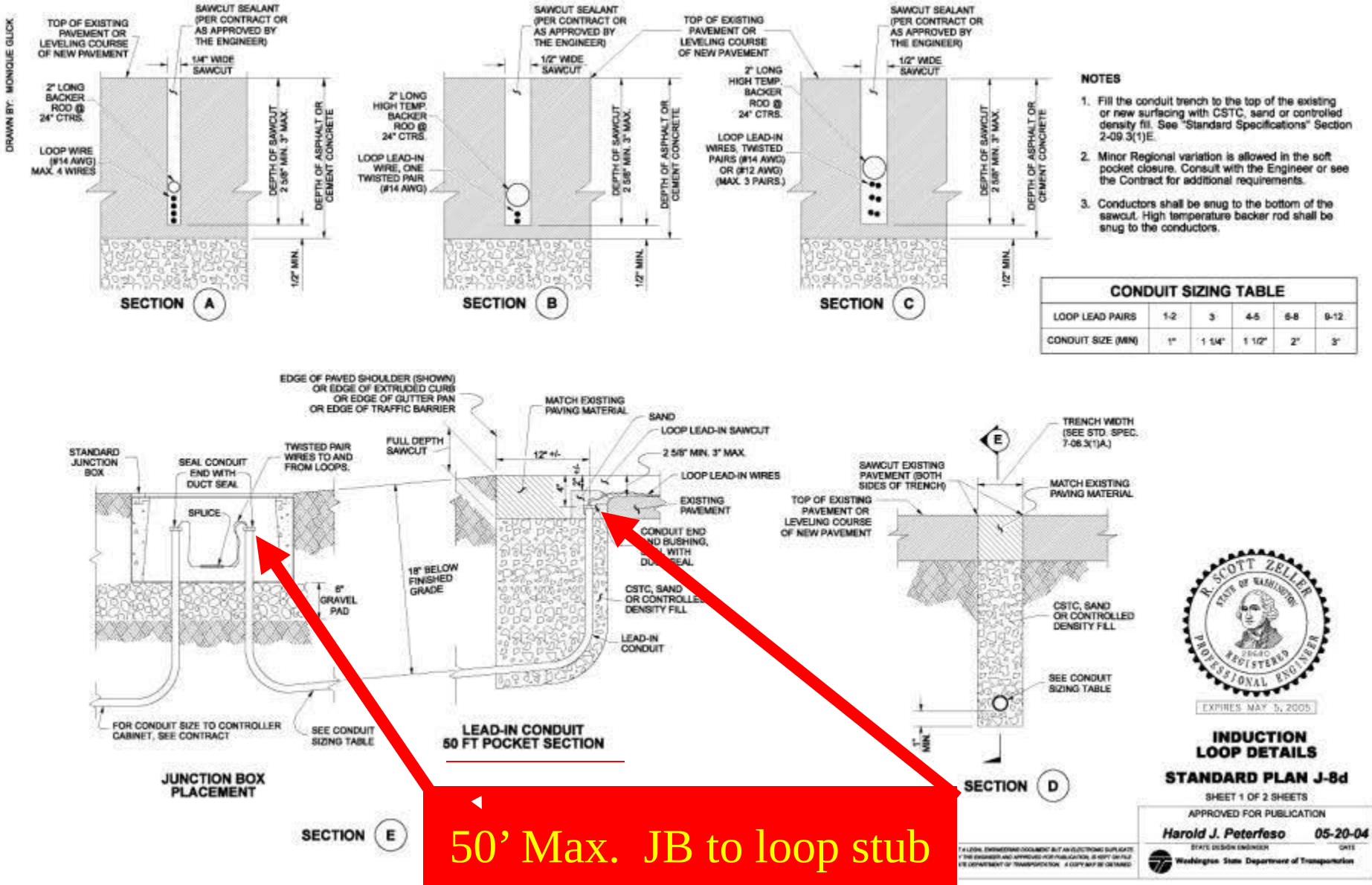
APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER — DATE

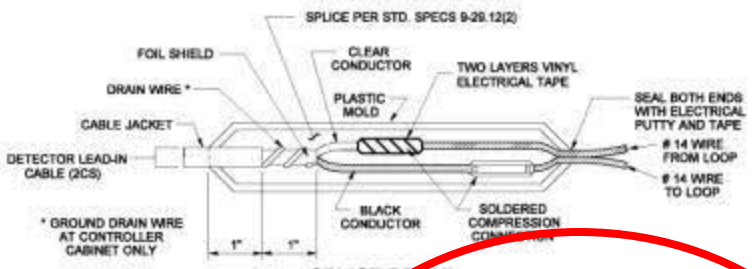
Washington State Department of Transportation

Standard Plan J-8d 1 of 2

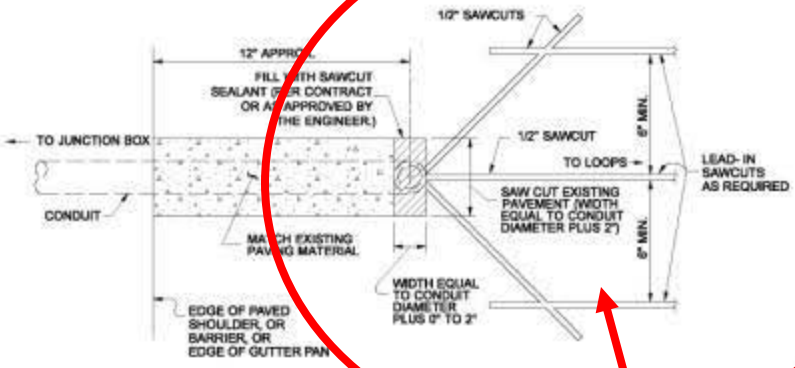


Standard Plan J-8d 2 of 2

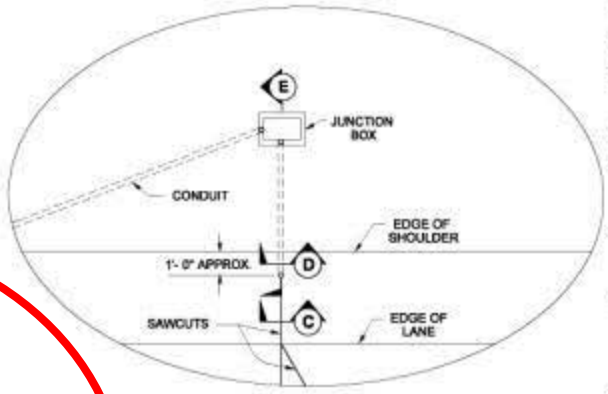
DRAWN BY: MONIQUE GLICK



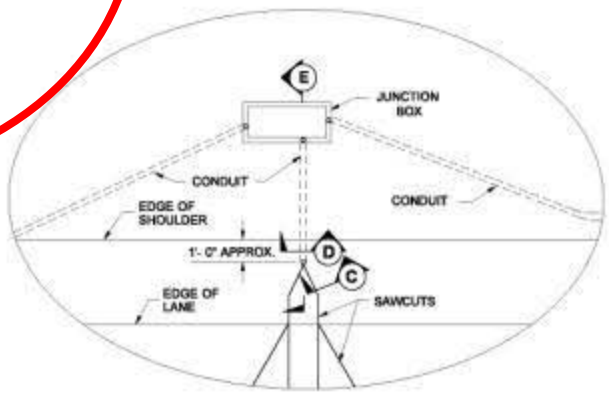
SPLICE DETAIL



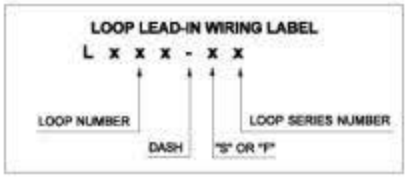
SAWCUT AND CONDUIT CONNECTION PLAN



DETAIL "A"



DETAIL "B"



Watch cuts at stub out!

LOOP INSTALLATION NOTES

1. Install the Junction Box and the lead-in conduit.
2. Sawcut the loop slots and the lead-in slots.
3. Lay out the loop wire starting at the Junction Box, allowing 5' minimum slack.
4. Install the wire in the loop slot as shown.
5. Finish laying out the wire at the Junction Box and identify the leads with the loop number, the "S" for start and the "F" for the finish, and the loop series number.
6. Twist each pair of the lead wires two times per foot from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed.
7. Construct a supplemental splice containing any series loop connections required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead and the shielded cable splice.
8. Splice the loop leads of supplemental splice leads to the shielded cable as noted in the Contract.
9. Complete installation and test loop circuits or combination loop circuits. See Standard Specifications 8-20.3(14)D.
10. Conduit for the loop stubout shall be as required in the Contract.

R. SCOTT ZELLER — STATE OF WASHINGTON — 29680 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES: MAY 5, 2005

INDUCTION LOOP DETAILS

STANDARD PLAN J-8d

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-20-04

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

Poor Stub Out Cuts

8-20.3(14)C
Page 8-87

Circle Saw

Circle Saw Blade

Vacuum

SS 1-07.5(3)
Page 1-48
Lines 1-4

Vacuum Slurry

Sand Bags Help Control Slurry

Home Runs Cut With Flat Saw

Home Run Cuts at 45 Degree Angles

Pressure Washer

8-20.3(14)c
Page 8-88 #7

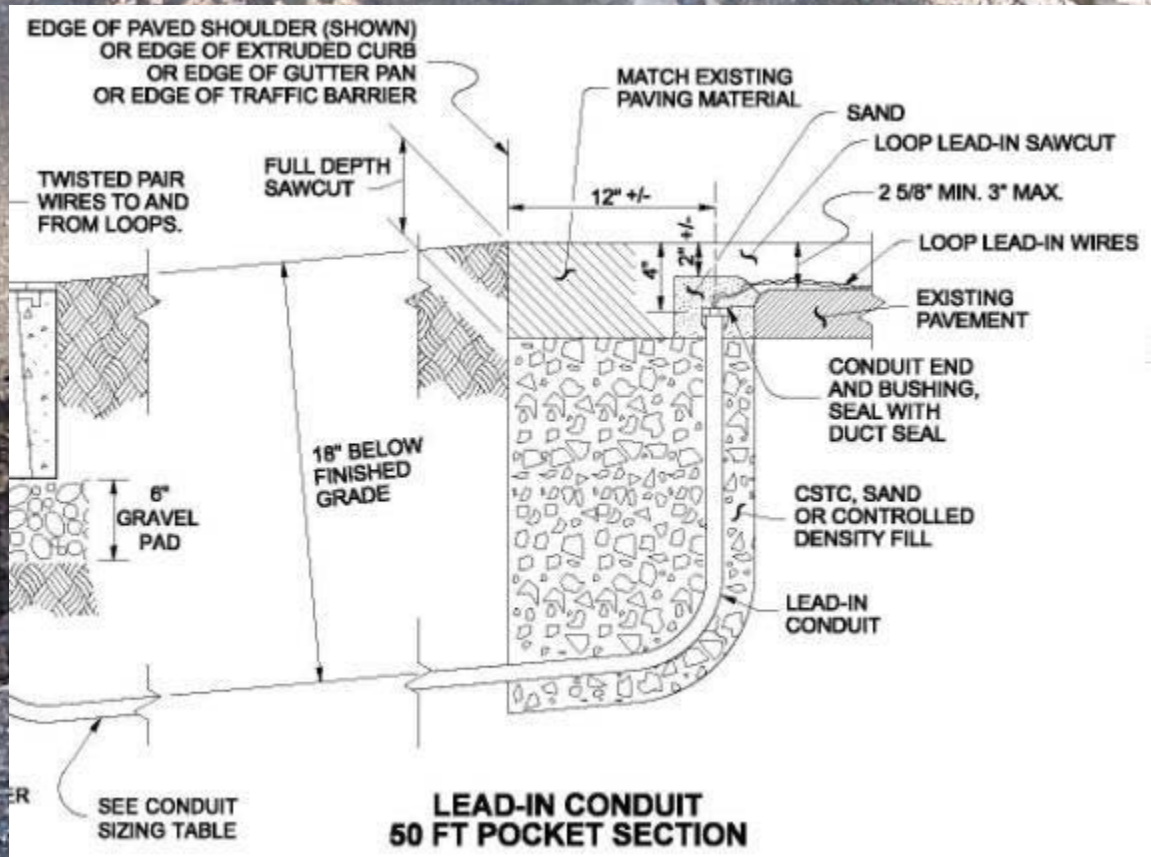
NW region requires 1000 PSI (6.9 M)

Wash Them and Dry Them

8-20.3(14)c
Page 8-88 #7

Loop Stub

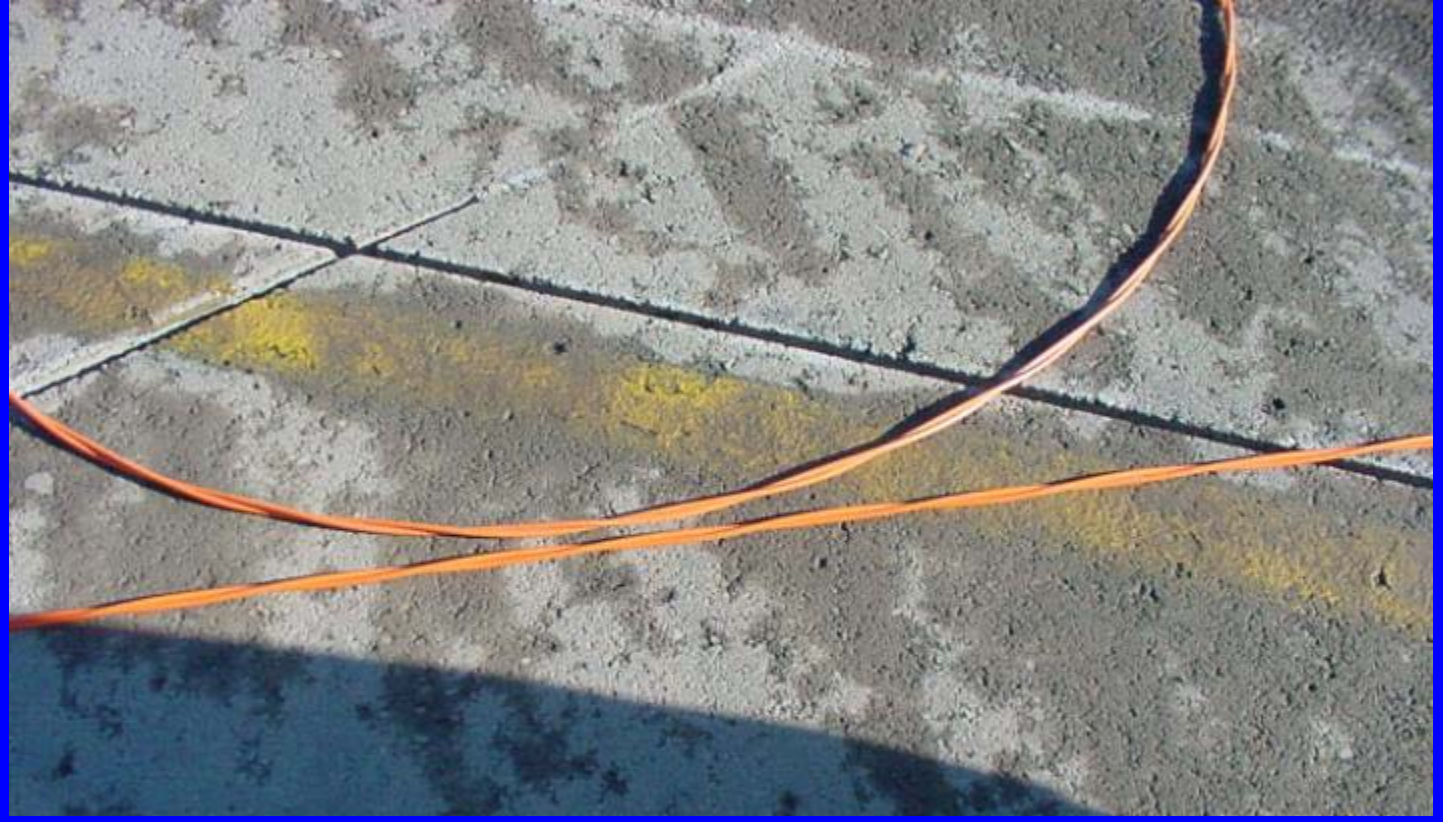
J-8d



Install Wire

Wiring shall be installed with a blunt-nosed wooden wedge.

8-20.3(14)c
Page 8-88 #8



Twist each pair of loop lead wires 2 times per foot. Reverse direction of twist for each successive pair installed.

J-8d sheet 2 Loop installation Note 6

J-8d

IMSA 51-3/51-7 Wire

9-29.3 #8 Detector loop wire may be 12 or 14 AWG stranded copper wire, IMSA 51-3.

NWR Specials - IMSA Specification 51-7, with cross-linked polyethylene\(XLPE) insulation encased in a polyethylene outer jacket (PE tube).

NW Region Special Provision GMRLOOP.DT1
(Traffic Design GSP (doc.) Page 3 & 4)

ISMA 51-7 Wire Specified by Some Regions

Loop Wire In Transition Cut From Loop To Home Run.

Test Loop Before Sealing.
(Not Required But Recommended.)
15 8:07AM

Loop Sealant and Backer Rod

- 8-20.3(14)C

8-20.3(14)c
Page 8-88

9) Remove slack before installing High Temperature Backer Rod.

10) Install High Temp. Backer Rod on 2 foot centers and at all sharp corners (more than 45 degrees)

11) Install Sealant as per contract or as approved by Engineer

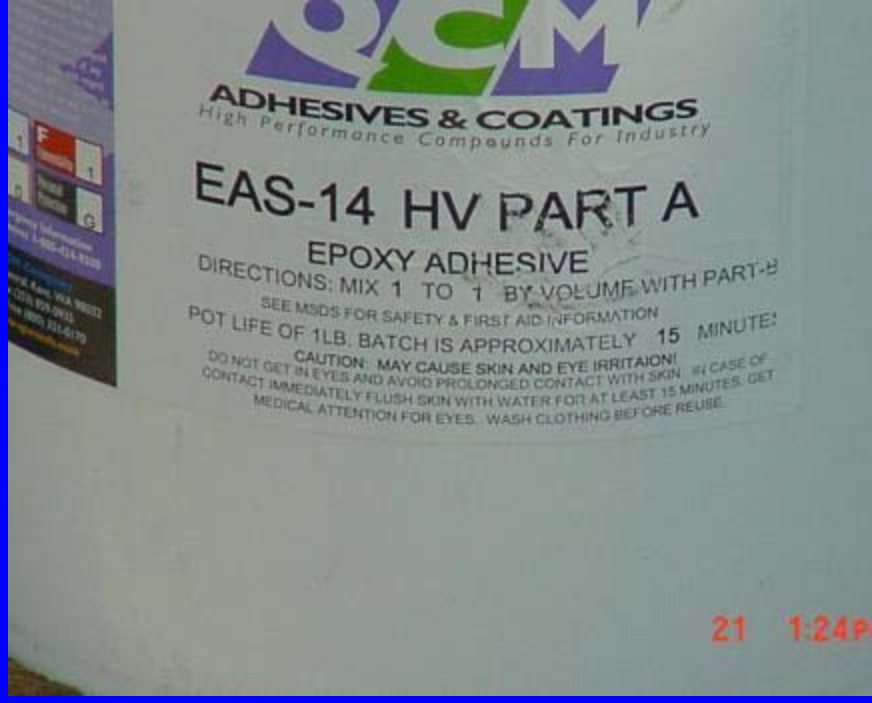
12) Install Sealant so no air is trapped in the cut.

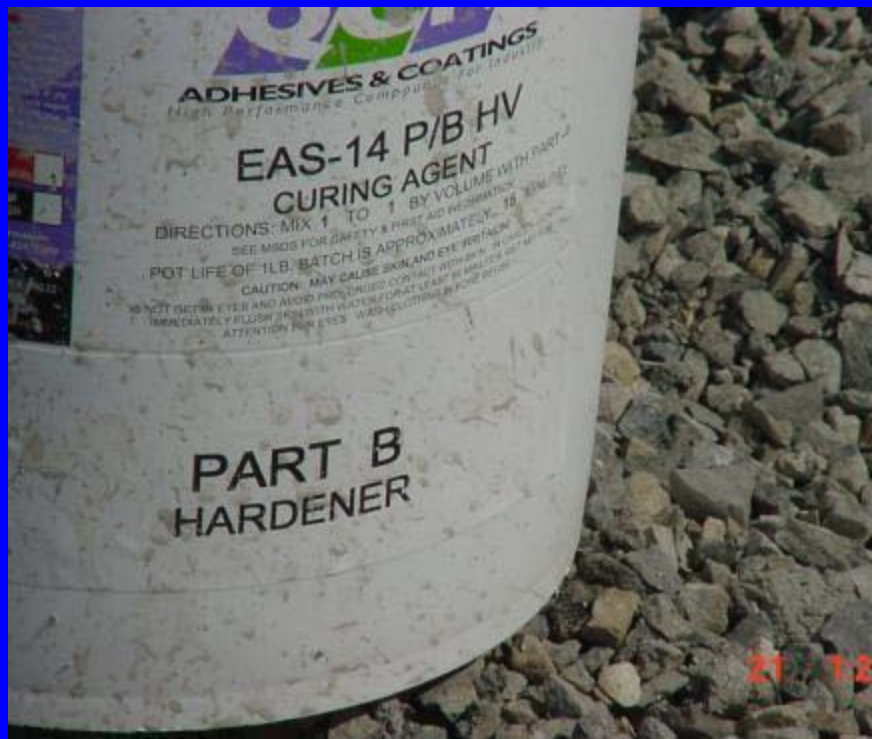
Click Picture
for Video

Sealing Loops With 3M 5000

Injection Pump in 5 Gallon Bucket

Manufacturer (3M) recommends 5 days cure time before an overlay is allowed.





QCM 2 Part Epoxy Loop Sealant

Mixing QCM Epoxy

Install QCM Loop Sealant

QCM Can Be Messy

Rai Pro-Seal 6006 EX

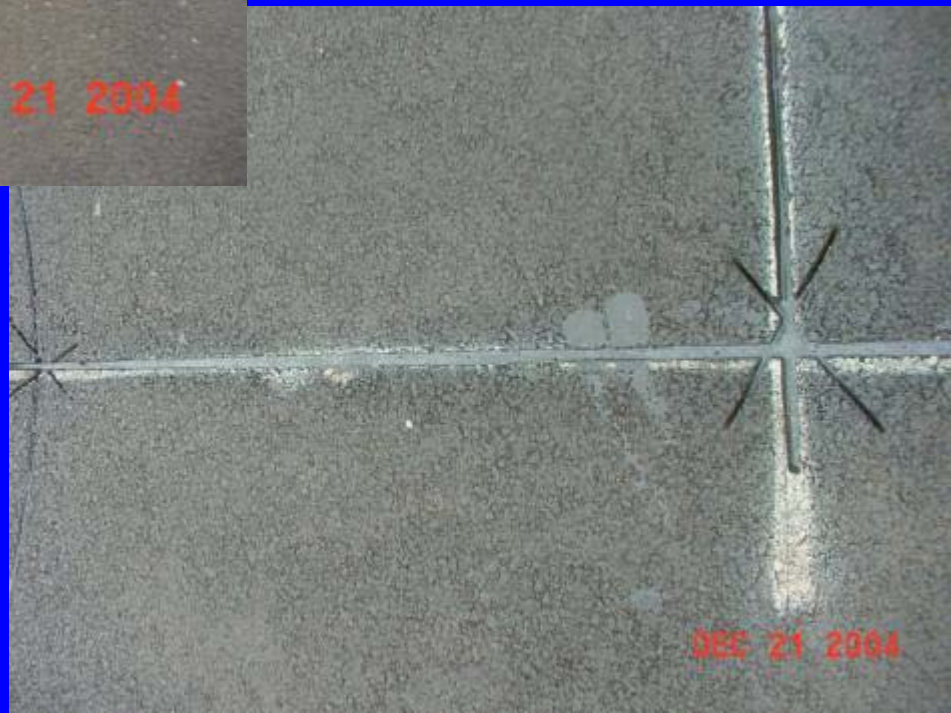
Rai Pro-Seal 6006 EX
JUL 17 2007

Cold Application Loop Sealants

- NW Region Sealants for ACP
  - RAI Pro-Seal 6006EX
  - QCM EAS-14
  - 3m Black 5000
- NW Region Sealants for PCC
  - QCM EAS-14
  - 3m Black 5000
  - Gold Label Flex 1P

Don’t Over Fill Cuts

These Look Good



3M 5000 Issues
Roadway Dissolving

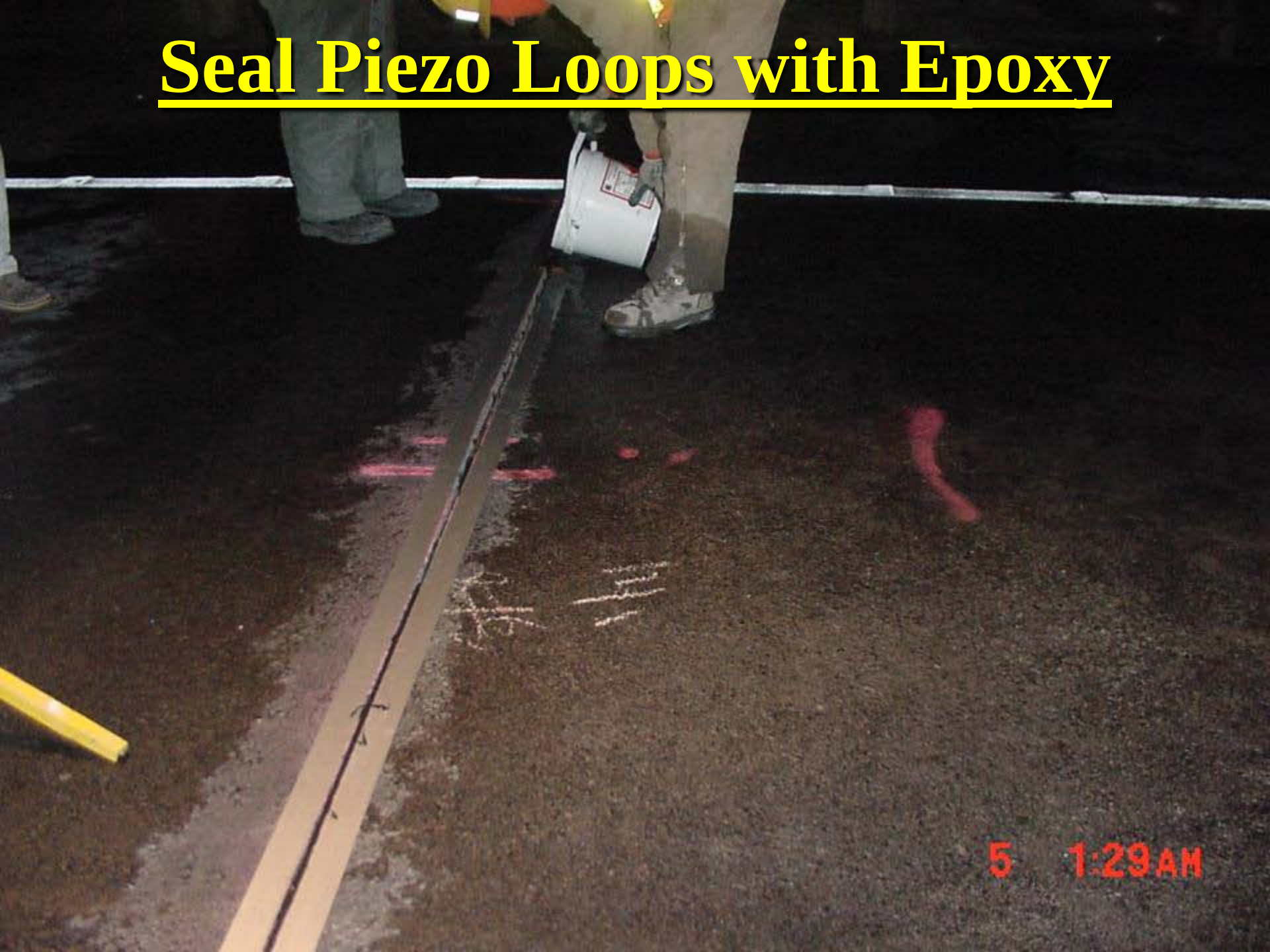
Finished Product Poor Location

Piezo Loop With Clips installed

(Type 1 Counter and Type 2 Counter and Weight)

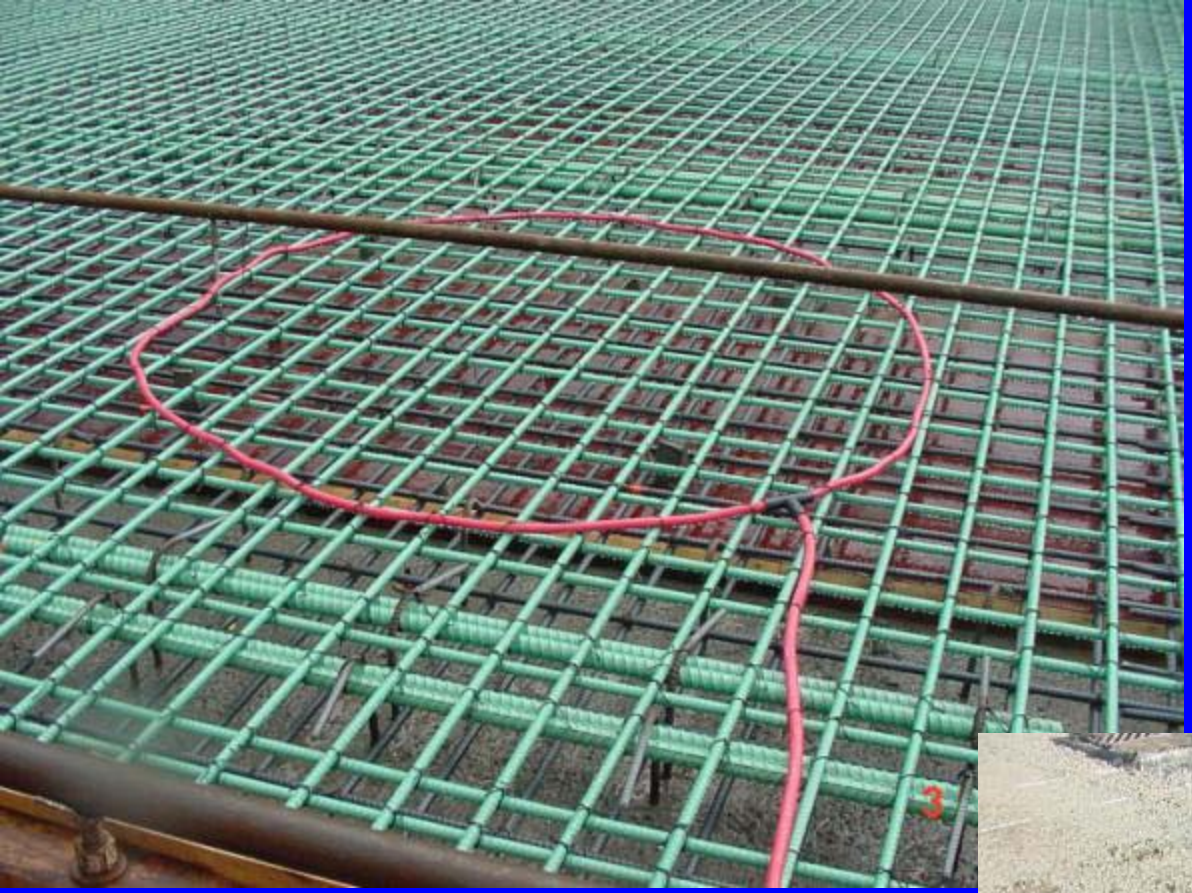
Piezo Loop /Coil of Coax

Seal Piezo Loops with Epoxy



Seal Coax With 3M 5000

Pre-form Loops



Pre-form loop homerun.

Spare Loop Stub for Future with PVC Sleeve

Pre-form Header Loops

Loop Splicing

Solder

Tape

J-8d Sheet 2
Splice Detail

Loop and Magnetometer Splices

8-20.3(8)
Page 8-81

- All splices in induction loop circuits and Magnetometer circuits shall be in junction boxes and are only allowed where the lead in conductors are spliced to the Shielded lead in cable. The splices shall be:
  - Heat shrink type with moisture blocking, material sized for the conductors, epoxy filled clear rigid mold splice kits or rigid re-enterable type splice kits.
  - The splices shall be soldered.
  - The connection shall use copper crimped connectors. All connectors installed in splices shall be wrapped with two layers of electrical tape.
  - All epoxy splice kits shall be physically separated from other splices and wirings within the junction box to avoid damage from heat during the casting process.

Video Detection Cameras

(Look at Contract Specials for Camera Owners)

Video detection monitor target.

Test for Induction Loops and Lead-in Cables

Standard Specifications

- **8-20.3(14)d**

Loop Analyzer

Record loop test data sheet.

Form in check lists.

Loop Test 8-20.3(14) D (2006) **Date:** _____

Location: _____ **Contract Number:** _____

Taken By:

		Test A	Test B	Test C
Loop Number	Loop Type 3, 3A, 3B	Ohms. <= 10	Meg. Test Loop/Gr. >= 100	M. Henry R1 >= 75 R3 >= 150
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				
21)				
22)				
23)				
24)				
25)				
26)				
27)				
28)				
29)				
30)				
31)				
32)				
33)				
34)				
35)				
36)				
37)				

Test "A" for long ITS loops should not exceed the values calculated using the formula below:

Resistance per 1000 ft of #14 AWG, R = 3.16 ohms / 1000 ft

$$\frac{R = 3.16 \times \text{distance of lead-in cable (ft)}}{1000 \text{ ft}}$$

Traffic Signal Turn-on Checklist,

Signal Turn-on Process Flow

& Loop Installation Checklist

- Provided in Note book

Sign Structures

NEC Articles 250, 300 & 600

Standard Specifications

- **8-21**

Sign Lighter

Sign Lighter 9-28.15 2004 SS
Moved to 9-29.10(5) in the 2006 SS

Sign Lighter Open

V.M.S. Sign

Inside VMS

Sign Bridge

TRAFFIC ADVISORY
TUNE 530 AM
WHEN FLASHING
405
Everett
Renton
1 MILE

Putting Sign Bridge Together

Vibration Damper

Isolation Switch

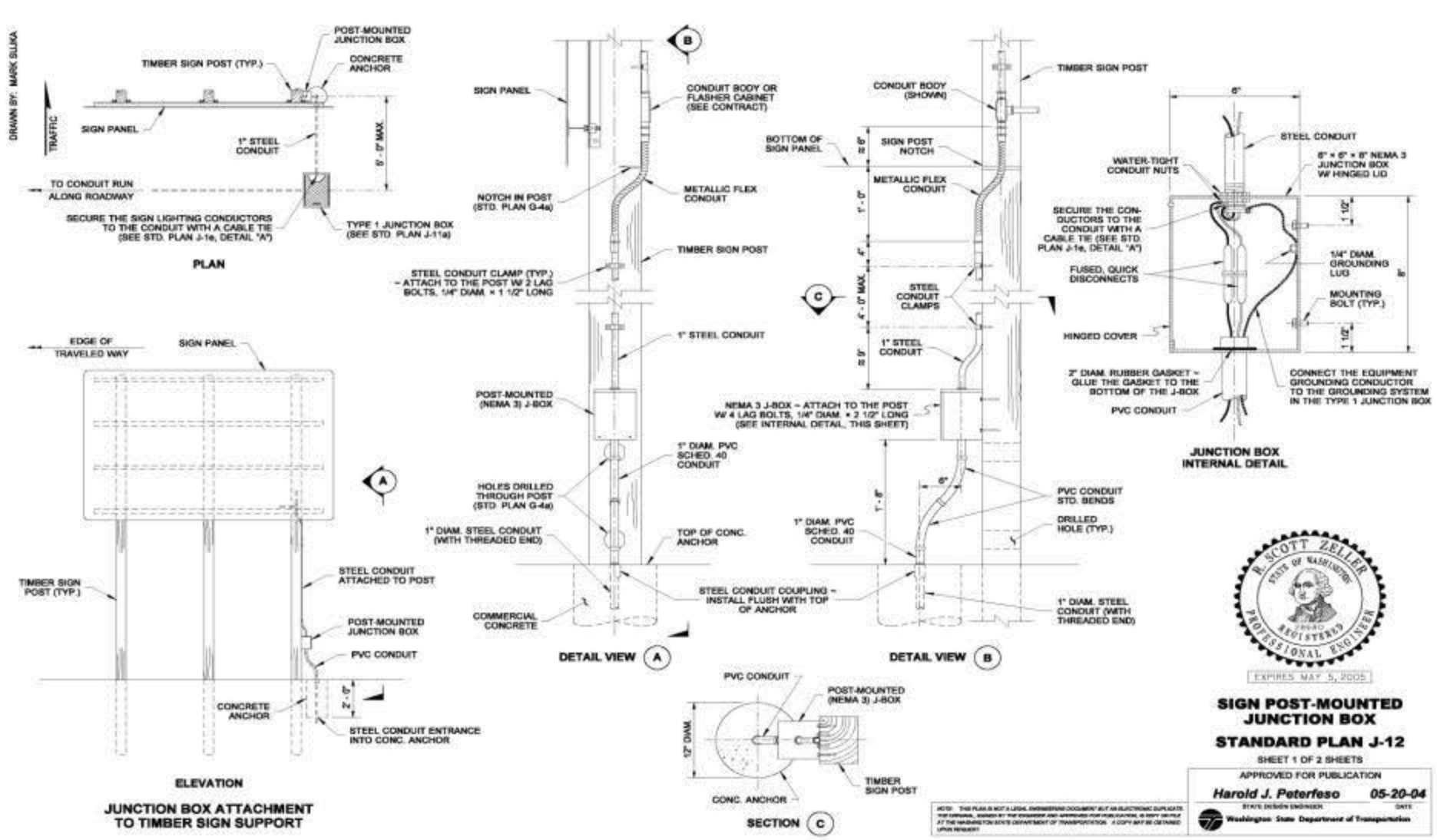
Inside Isolation Switch

9-29.10(5)A

Post Mounted Sign With Light and Flasher

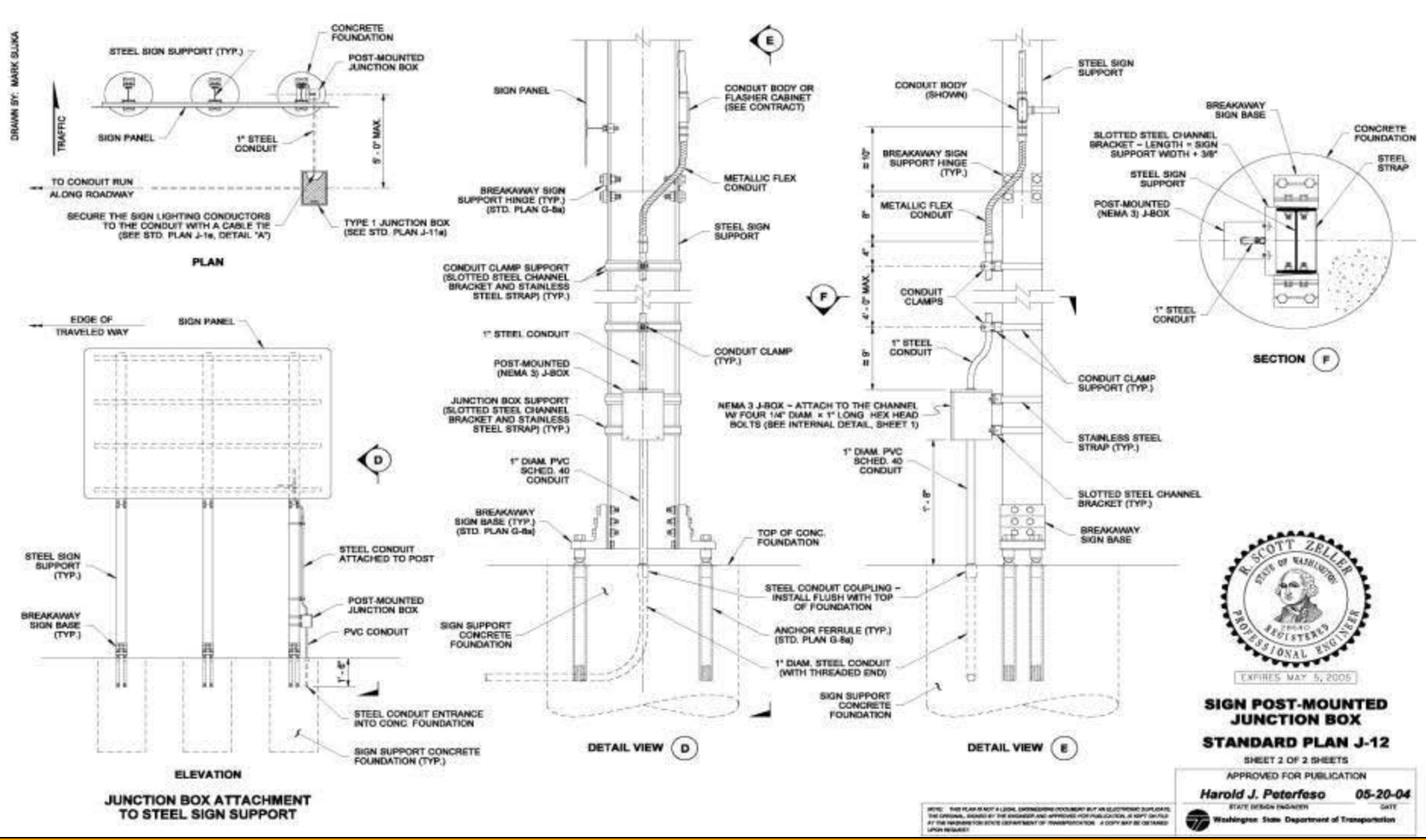
Flashing Signal Heads on Sign

Post Mounted Conduit Break-away



Standard Plan J-12 sheet 1 of 2

Post Mounted Conduit Break-away



Standard Plan J-12 sheet 2 of 2

Grout

Standard Specifications

- **8-20.3(15)**

Grout Pad Signal Pole Base

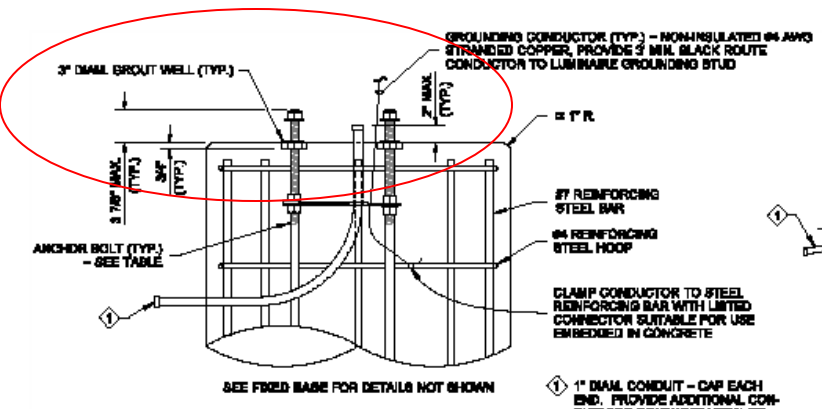
Grout Pad Luminaire Base.

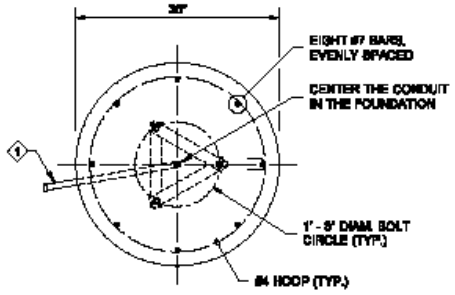
Too much grout.

Good Looking Grout Pad!

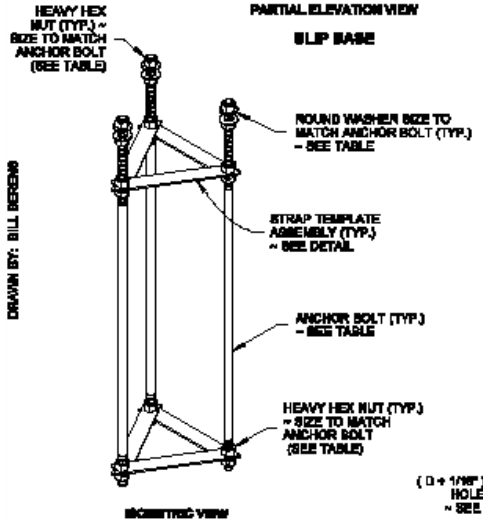
J-28.30 1 of 2

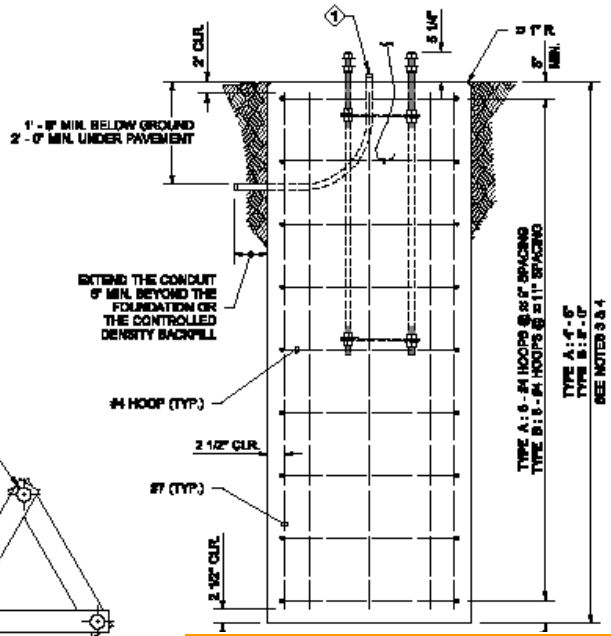
3 X ¾ - inch diam. grout well around each bolt / slip base foundations

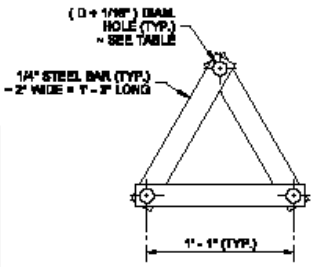




① 1" DIAM. CONDUIT – CAP EACH END. PROVIDE ADDITIONAL CONDUIT FOR COMMUNICATION OR SIGNAL CABLE WHERE SHOWN IN THE CONTRACT.







ANCHOR BOLT TABLE			
LUMINAIRE HEIGHT (mt)	MAST ARM TYPE	MAST ARM LENGTH	ANCHOR BOLT DIAMETER "D"
20' TO 30'	SINGLE	6' TO 16'	1"
20' TO 30'	DOUBLE	6' TO 8'	1"
20' TO 40'	DOUBLE	10' TO 16'	1"
40' TO 50'	DOUBLE	10' TO 16'	1 1/8"

NOTES

1. See Standard Plan J-28.40 for luminaire pole base mounting details.
2. The Strap Template shall be held in place by nuts, 6" from the top of the foundation and 3" from the bottom of the anchor bolts. 16 heavy duty hex nuts and 8 round washers are required for a Slip Base assembly. 16 heavy duty hex nuts and 8 plate washers are required for a Fixed Base assembly.
3. Use Steel Light Standard Foundation Type A on level ground or slopes not exceeding 4H:1V. Use Type B for slopes steeper than 4H:1V, but not exceeding 2H:1V. Slopes steeper than 2H:1V shall require a special design.
4. These foundations are designed for a minimum of 2,000 PSF (TYPE A) or 1,500 PSF (TYPE B) allowable lateral bearing pressure for the soil. A special foundation shall be required for soil with lower allowable lateral bearing pressure than 1,500 PSF.
5. The Luminaire Pole height shall not exceed 50' (H1).
6. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.
7. Slip Bases are not required on poles placed outside of the Design Clear Zone, nor on poles installed behind traffic barrier.
8. Foundations constructed within Ecology Embankments shall be increased in depth by the depth of the Ecology Embankment.
9. Exposed portions of the foundation shall be formed to create a smooth finished surface. All forming shall be removed upon completion of foundation construction.
10. For excavation, concrete placement, and backfill options, see METHOD 1 and METHOD 2 on Sheet 2 of 2.
11. The Anchor Bolts shall be high strength steel, manufactured from ASTM A449, with heavy hex nuts and hardened washers. Galvanize the Anchor Bolts according to AASHTO M232.
12. The foundation shall meet the requirements of Standard Specification Sect. 8-20.3(9).
13. See Standard Plan C-8b and C-14h for steel light standards on traffic barrier.

ANCHOR BOLT LAYOUT

DRAWN BY: BILL BERGEMO

RICHARD P. ZELDENRUST — STATE OF WASHINGTON — 28470 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES NOVEMBER 11, 2008

STEEL LIGHT STANDARD FOUNDATION TYPES A & B

STANDARD PLAN J-28.30-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Pasco Bakotich III 08-07-07
Washington State Department of Transportation

Standard Plan J-28.30

Rat Screen

More Rat Screen

Safety

For Safety Sake Tie Off

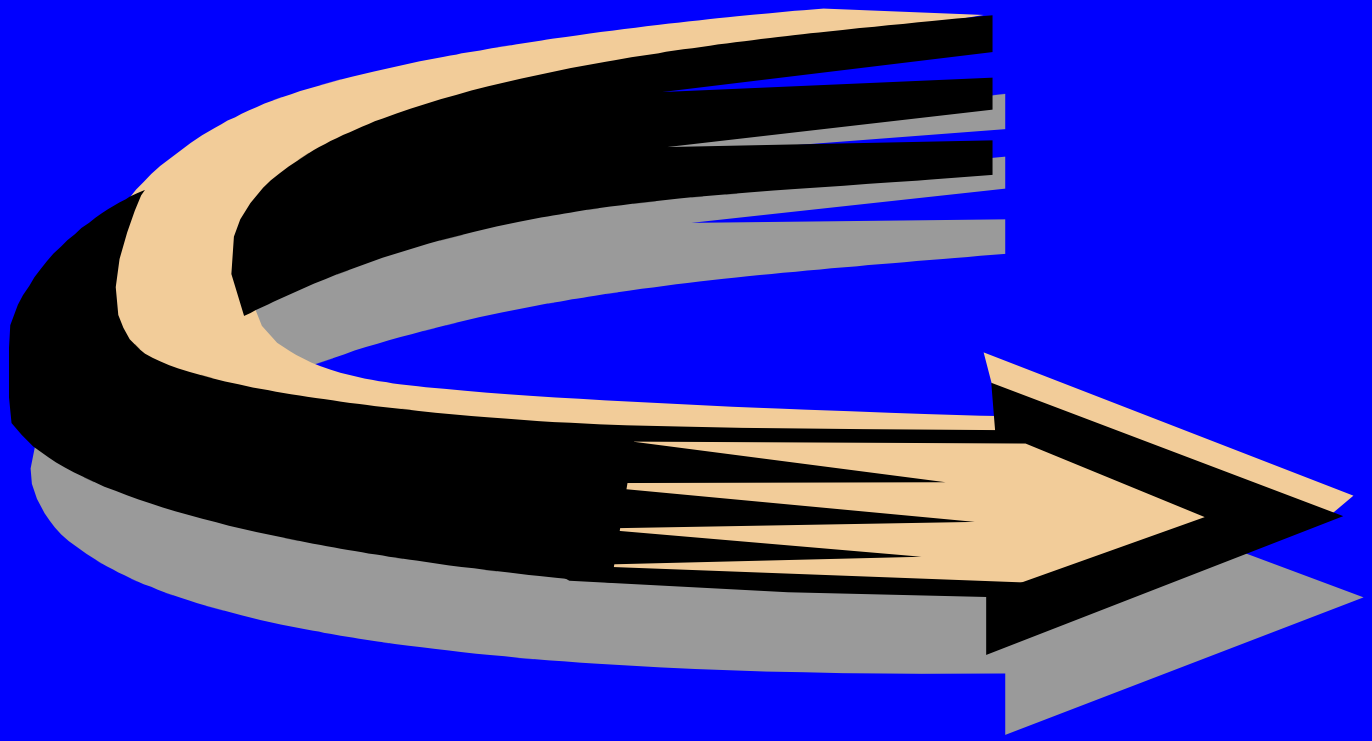
Always Assure Safety

Neutral Wire Touching Pole

Safety First

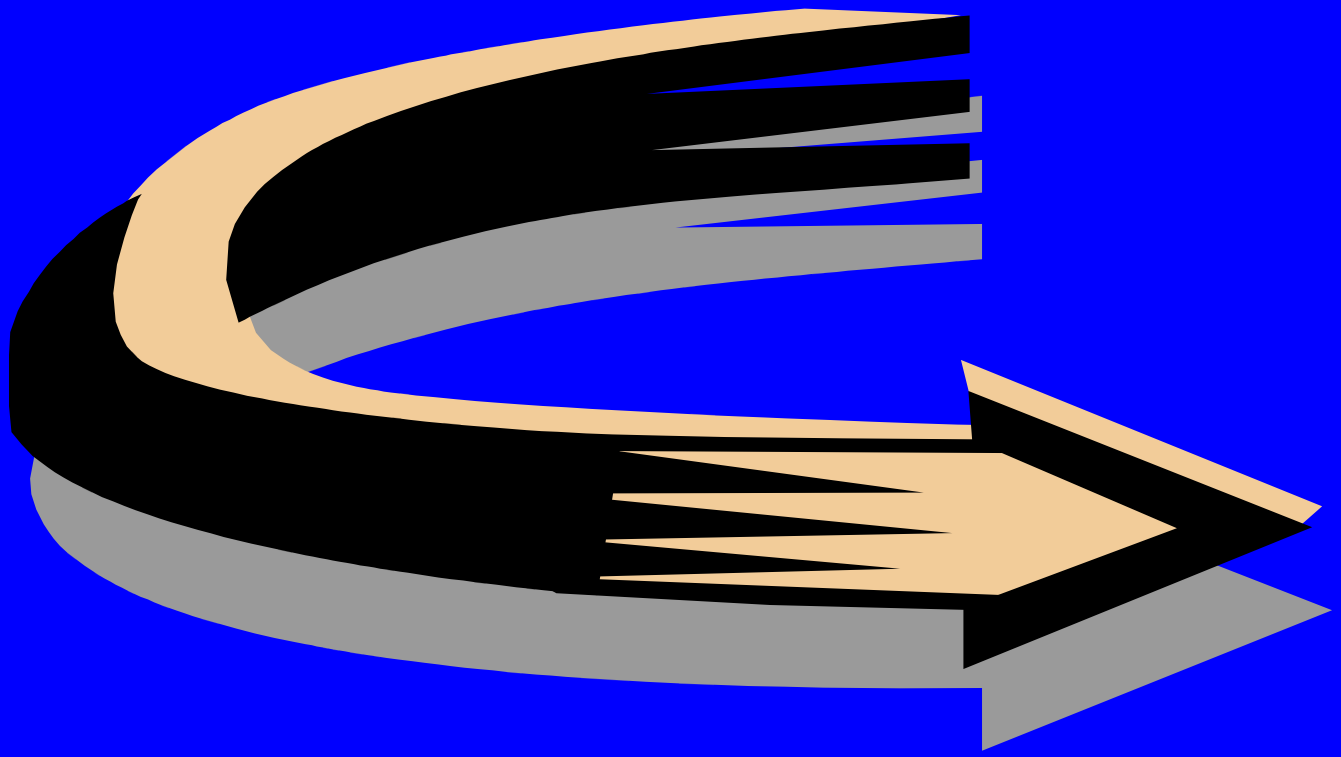
Winners of the Contest

The Fourth Place Winner Is:



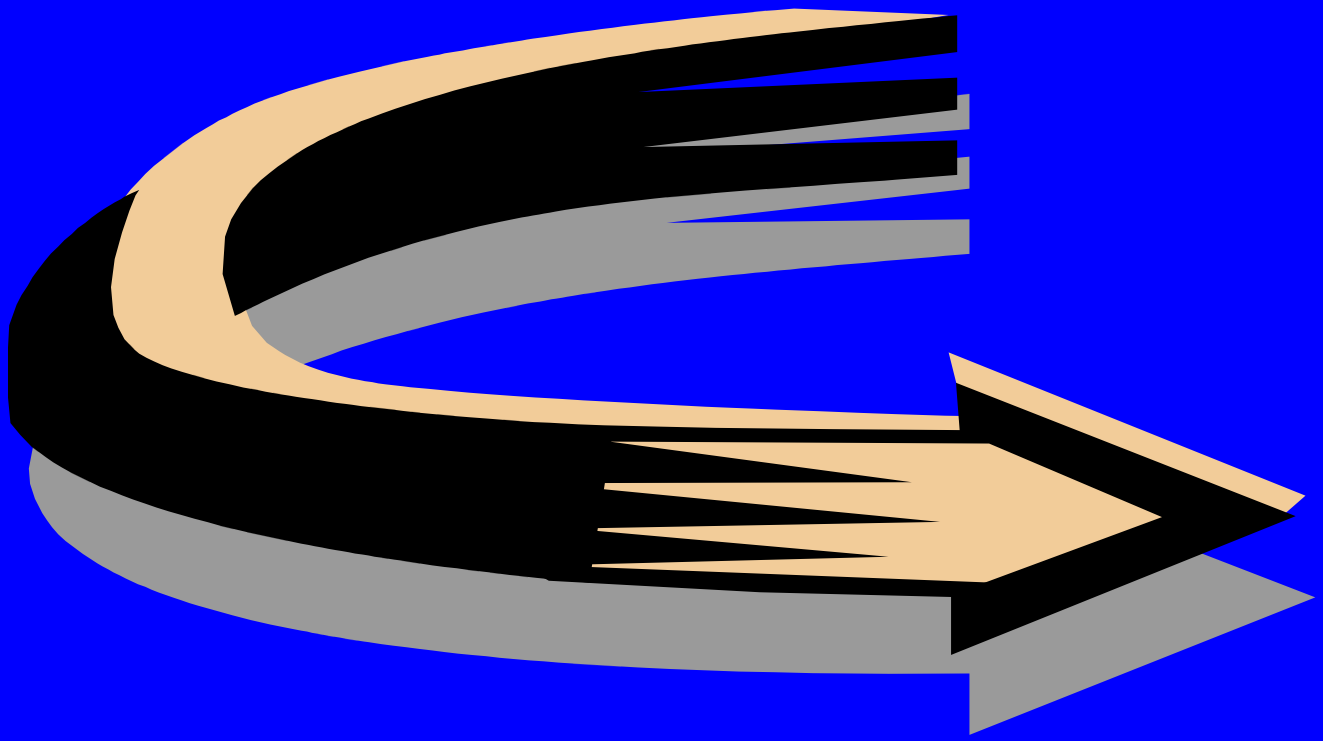
Make Sure You Have The Right Tool For The Job!

And In Third Place



Always Look Like You Know What Your Doing!

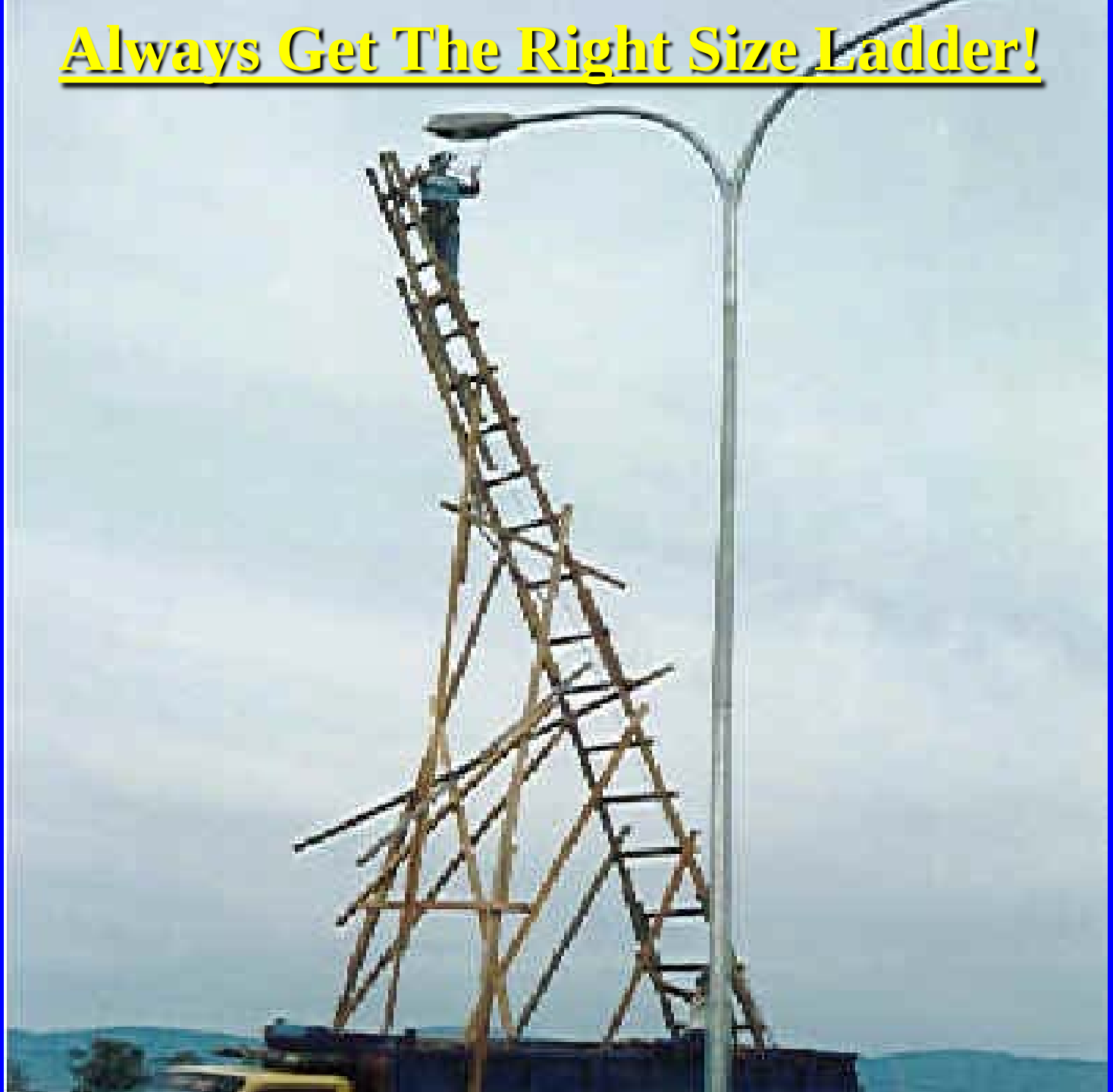
Second Place Is a Winner in Itself



Be Sure To Have Help In Case You Need It!

Now For Our Grand Prize Winner

Always Get The Right Size Ladder!



Testing Requirements

Standard Specifications

- **8-20.3(8)**
- **8-20.3(11)**
- **8-20.3(14)A**
- **8-20.3(14)D**
- **Special Provisions**

Check List of Testing Data

- The list is to remind us of what tests are required.
- The list may have tests not required on some projects.
- List provided in Check lists.

Checklists

Quiz Answer Sheets