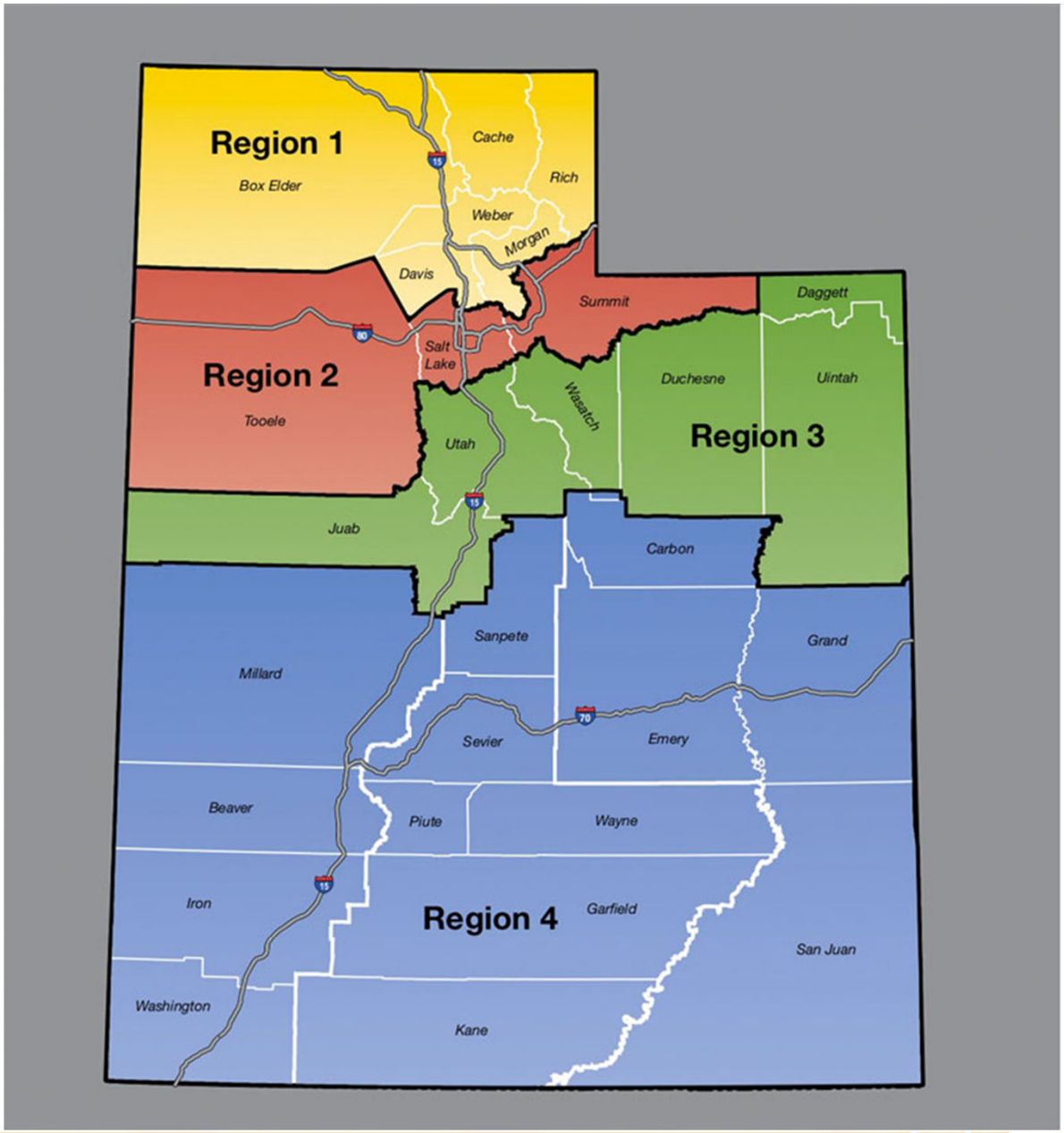
UDOT's Region Four Variable Speed Limit (VSL) I-15 Corridor in Rural Utah

Troy C. Torgersen, PE
Region 4 ITS Project Manager/Signal Engineer

State of Utah Map & UDOT Regions



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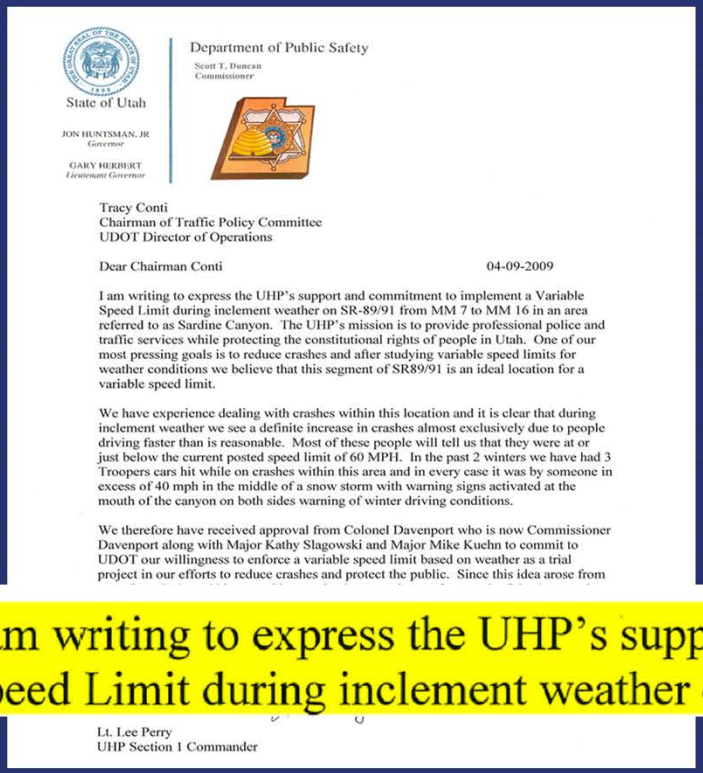
History in Utah



State of Utah

JON HUNTSMAN, JR
Governor

GARY HERBERT
Lieutenant Governor

Department of Public Safety

Scott T. Duncan
Commissioner

Tracy Conti
Chairman of Traffic Policy Committee
UDOT Director of Operations

Dear Chairman Conti 04-09-2009

I am writing to express the UHP's support and commitment to implement a Variable Speed Limit during inclement weather on SR-89/91 from MM 7 to MM 16 in an area referred to as Sardine Canyon. The UHP's mission is to provide professional police and traffic services while protecting the constitutional rights of people in Utah. One of our most pressing goals is to reduce crashes and after studying variable speed limits for weather conditions we believe that this segment of SR89/91 is an ideal location for a variable speed limit.

We have experience dealing with crashes within this location and it is clear that during inclement weather we see a definite increase in crashes almost exclusively due to people driving faster than is reasonable. Most of these people will tell us that they were at or just below the current posted speed limit of 60 MPH. In the past 2 winters we have had 3 Troopers cars hit while on crashes within this area and in every case it was by someone in excess of 40 mph in the middle of a snow storm with warning signs activated at the mouth of the canyon on both sides warning of winter driving conditions.

We therefore have received approval from Colonel Davenport who is now Commissioner Davenport along with Major Kathy Slagowski and Major Mike Kuehn to commit to UDOT our willingness to enforce a variable speed limit based on weather as a trial project in our efforts to reduce crashes and protect the public. Since this idea arose from

Lt. Lee Perry
UHP Section 1 Commander

- November 2008 – Formal UHP Request
- April 2009 - UDOT to Implement a VSL System on US 89/91 between Brigham City and Logan, known as Sardine Cyn.

I am writing to express the UHP's support and commitment to implement a Variable Speed Limit during inclement weather on SR-89/91 from MM 7 to MM 16 in an area

UDOT Keeping Utah Moving

History in Utah Cont.

May 2012 – I-80 VSL Operations Workshop

October 2012 – VSL Sign Design Concepts

November 2012 – VSL Project Kickoff meeting

January 2013 – Region Two Leadership's support to move forward with I-80 VSL

August 2013 – VSL Construction begins

January 2014 – VSL Testing/Commissioning complete, Ready for operation.

System Details

The I-80 Parley's VSL system consists of:

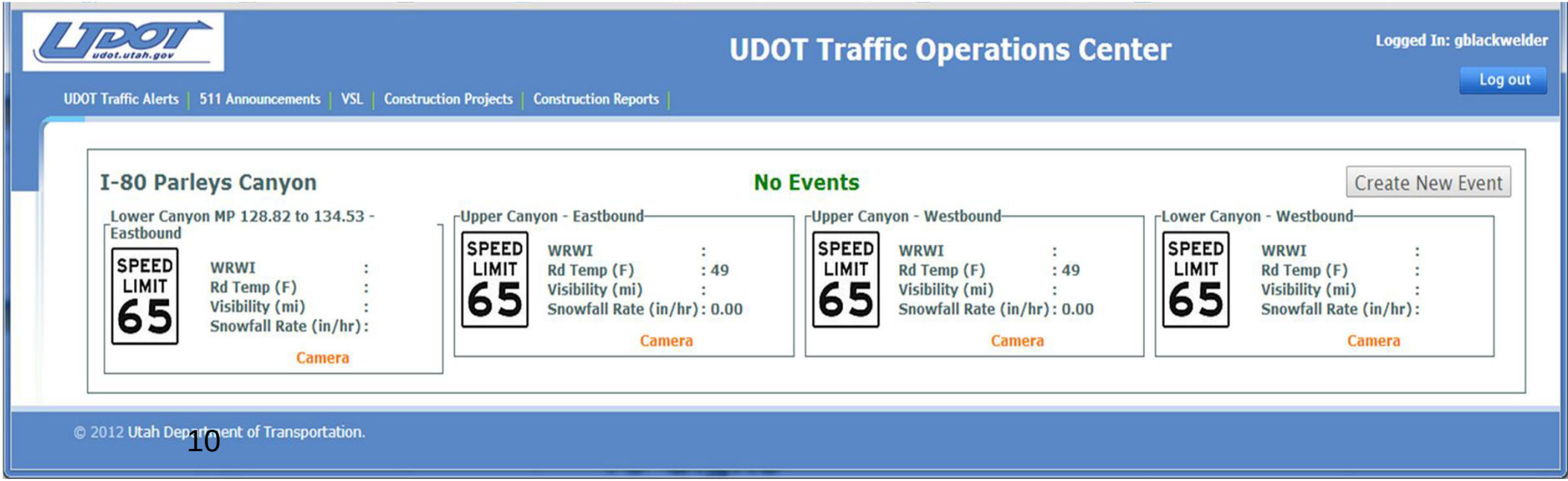
- 15 Signs
- Arranged in 4 zones
- 2 zones - westbound
- 2 zones - eastbound
- Upper and lower canyon zones

VSL Software and Implementation

Software Process

The software creates a record of speed limit decisions in a weather event.

An event is triggered when requested by UDOT or UHP staff.



Version 1 Software Example

TransSuite Sign Control

Traveler Information System

Changing the Speed

- Two Parts
  - Engineering & Policy
    - Region Traffic Operations Engineer
    - Traffic Engineer Order – UDOT process for traffic regulations
  - Mechanical
    - Operator in the Control Room can make the change as directed by the TOE & TEO
    - The TOE can use the Decision Support Software

Implementing the Speed Limit

Steps to Finalize Speed Limit

- Engineer enters selected speed and reason
- Signs change
- Automatic email to UDOT and UHP
- The TOC operators notify dispatch (start of event only)
- TOC operators post on overhead VMS

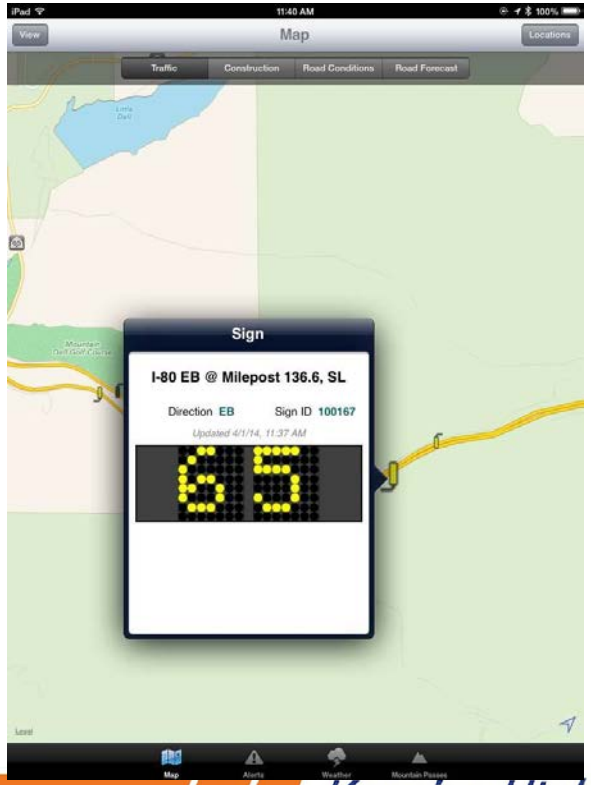
Photo: Chris Siavrakas

End of the Event

A VSL event ends when the speed returns to free-flow (above 65 mph in left lane) and there is no further weather expected.

14

Photo: UDT



I-80 Design Process

Design Process

VSL Types

Advisory Speed vs. Regulatory Speed

Full matrix vs. Hybrid

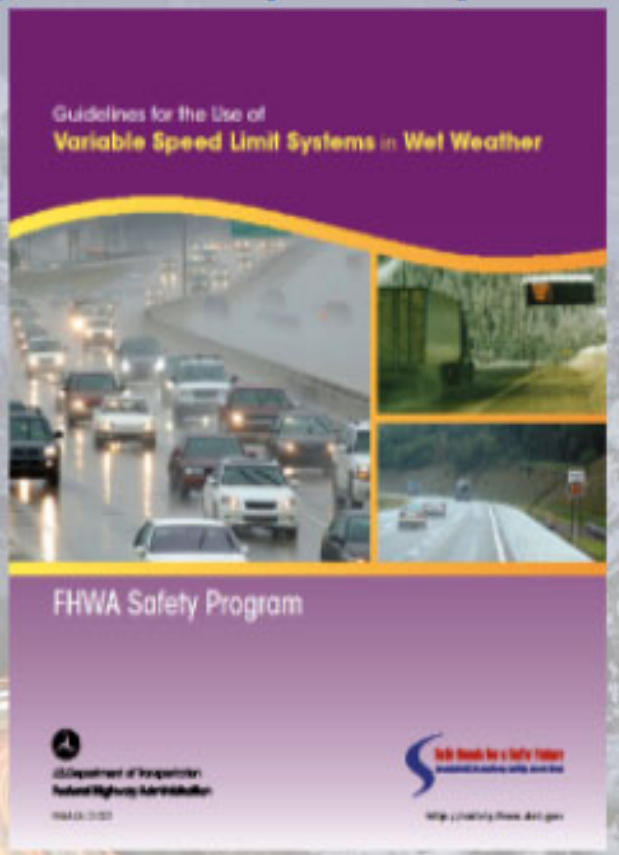
Solar vs. hard-wired

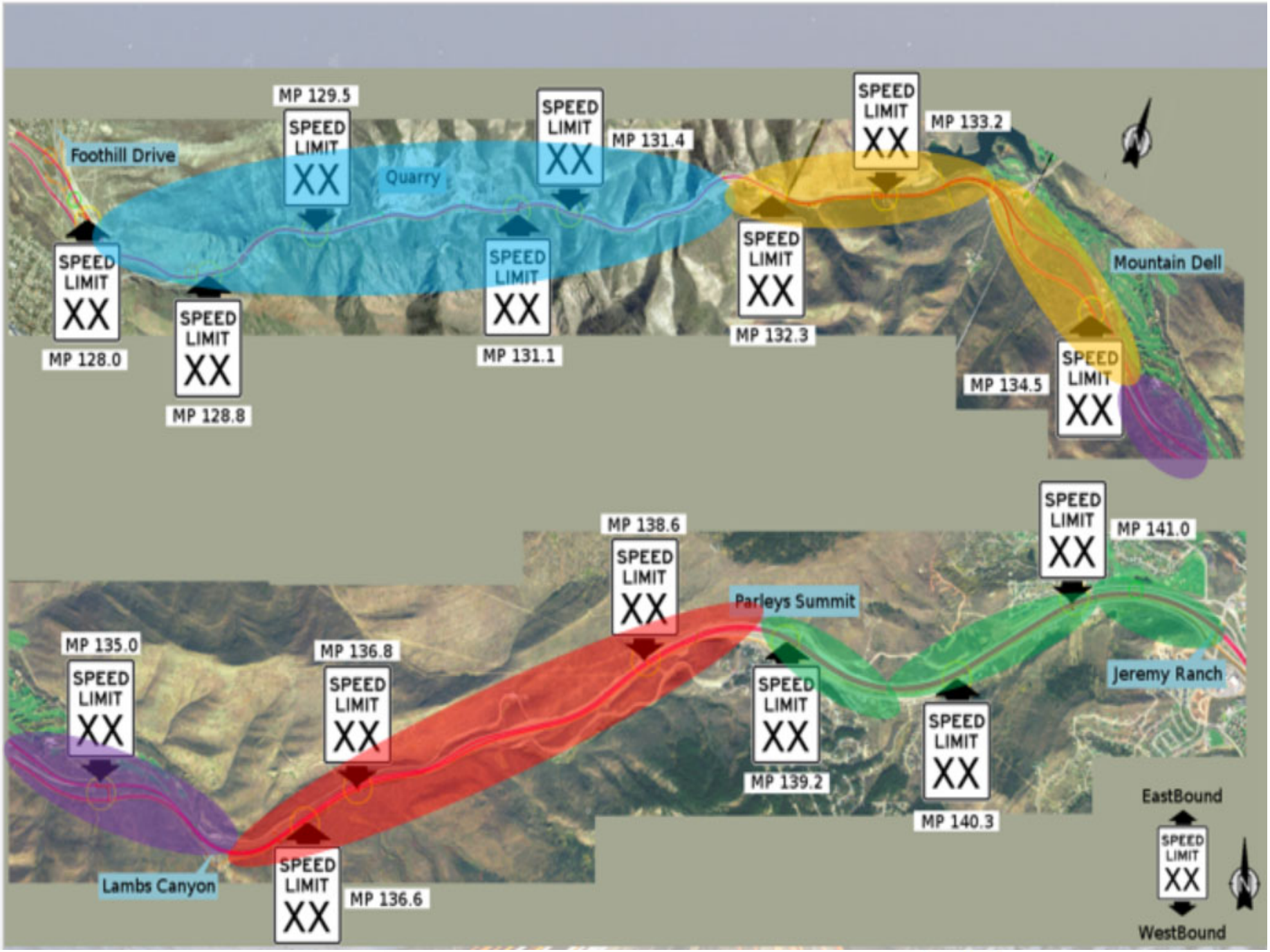
Design Process

- VSL signs would be regulatory (enforceable)
- Hybrid VSL signs
- Utilize existing ATMS infrastructure for power and communications
- CCTV Infrastructure for verification

Laying the Groundwork

- Guidelines for VSL was being developed by FHWA (not released yet)
- UDOT developed process
  - Type of VSL Sign
  - Locations
  - Operations




MP 129.5
SPEED LIMIT XX
Foothill Drive
Quarry
SPEED LIMIT XX
MP 131.4
SPEED LIMIT XX
MP 133.2
SPEED LIMIT XX
MP 128.0
SPEED LIMIT XX
MP 128.8
SPEED LIMIT XX
MP 131.1
SPEED LIMIT XX
MP 132.3
Mountain Dell
MP 134.5
SPEED LIMIT XX
MP 138.6
SPEED LIMIT XX
SPEED LIMIT XX
MP 141.0
Parleys Summit
MP 135.0
SPEED LIMIT XX
MP 136.8
SPEED LIMIT XX
SPEED LIMIT XX
MP 139.2
SPEED LIMIT XX
MP 140.3
Jeremy Ranch
EastBound
SPEED LIMIT XX
WestBound
Lambs Canyon
SPEED LIMIT XX
MP 136.6


INTERSTATE
UTAH
80
EAST
VARIABLE
SPEED
ZONE
AHEAD
I-80 EAST
CLOSED
1½ MILES


SPEED
LIMIT
55


VARIABLE
SPEED
ZONE
AHEAD


SPEED
LIMIT
SPEED
LIMIT
65


SPEED
LIMIT

Lessons Learned on I-80 Project

Information Display Company VS-M signs are variable speed limit signs with full-matrix white LED digits. The VS-M-18 sign includes 18" speed display digits which mimic the MUTCD Series E fonts for regulatory signs.

Two sign face configurations are available – 36" x 48", and 48" x 60". The mounting, operation, maintenance and troubleshooting instructions are contained in this manual.

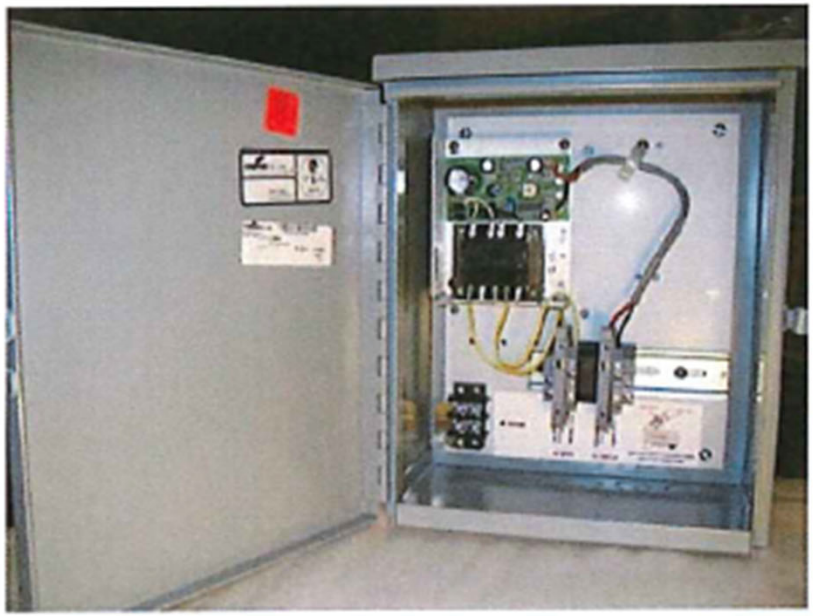
36" x 48"
Aspect

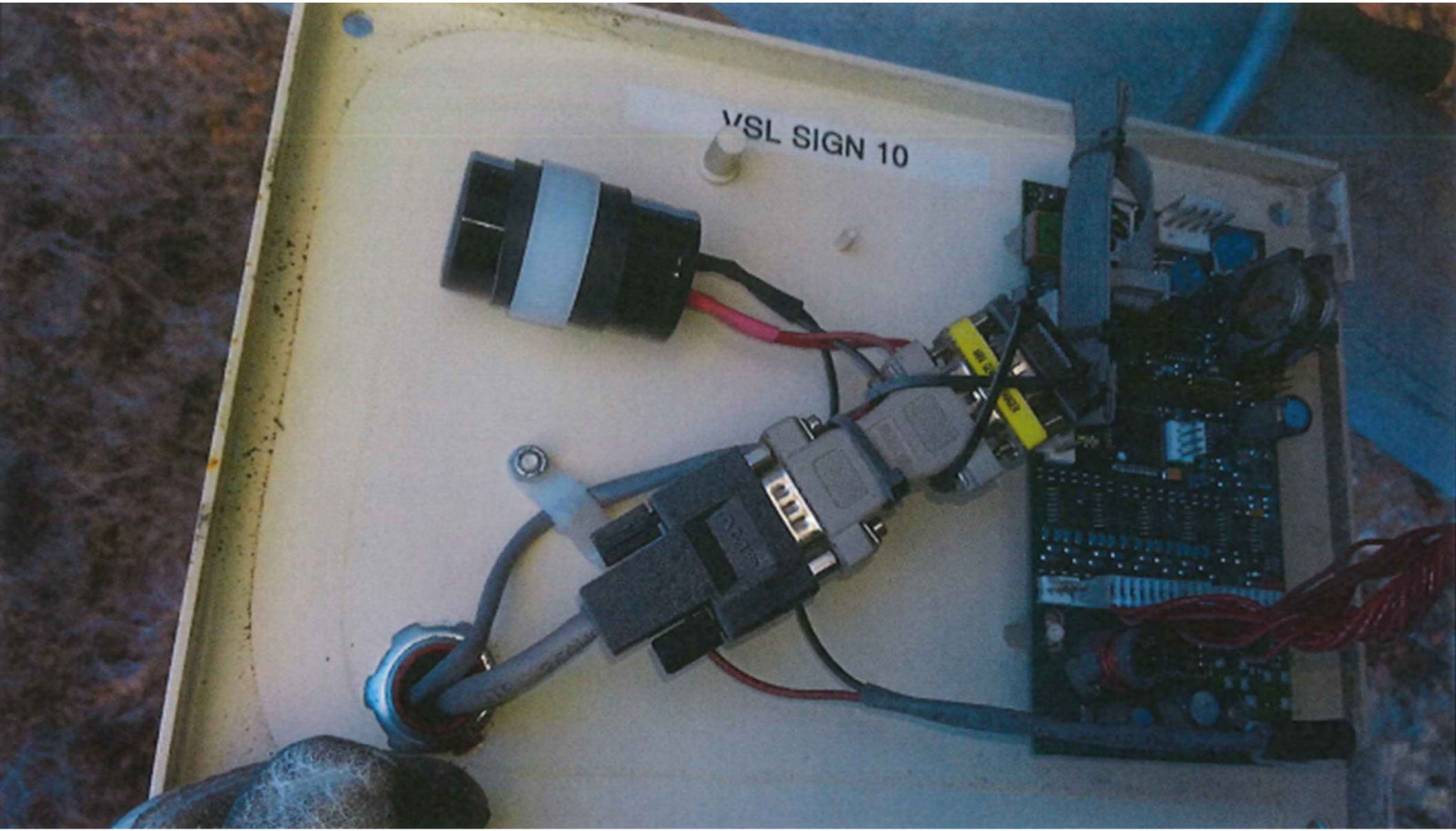
48" x 60"
Aspect

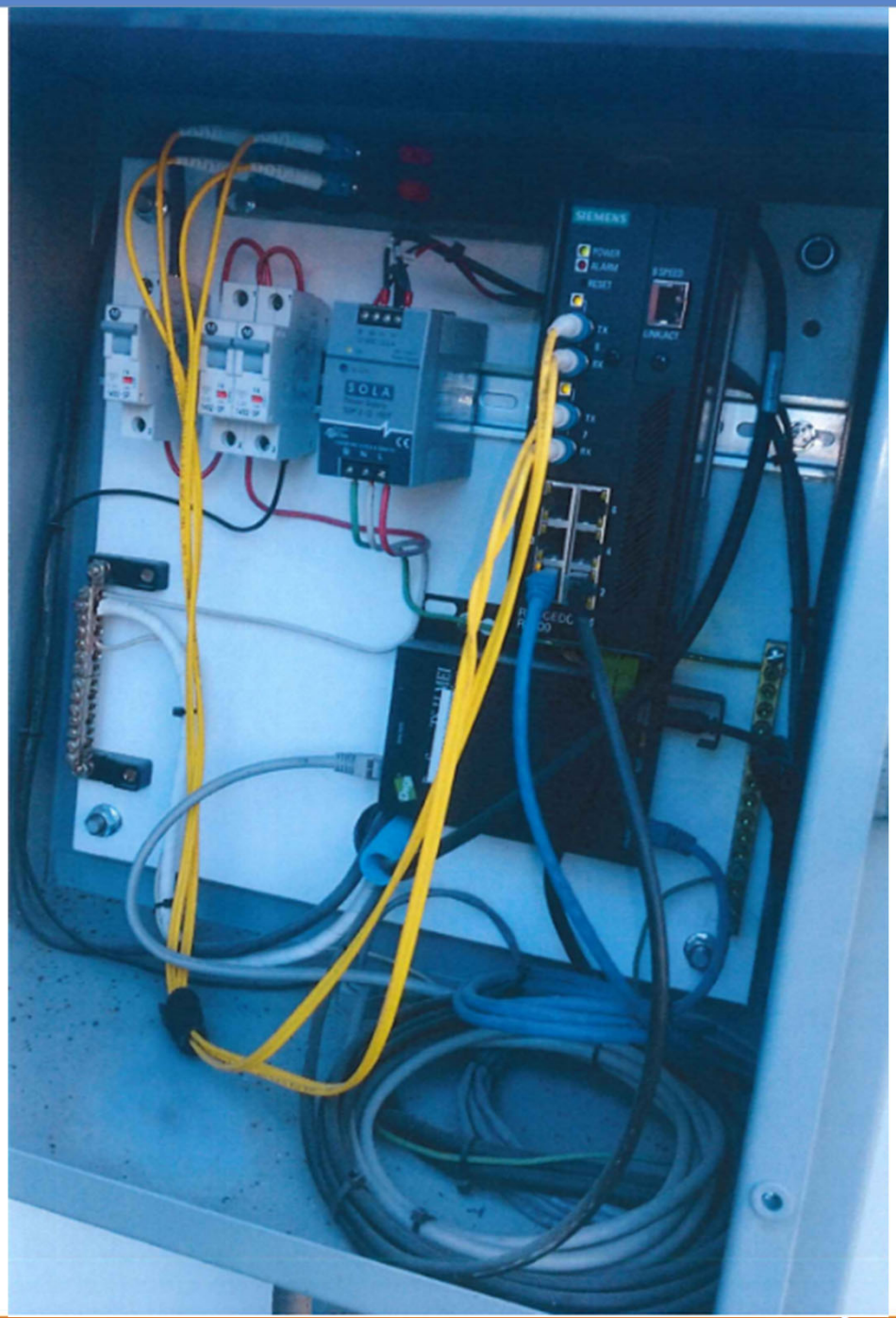
Mounting bracket sets are available for mounting VS-18-M signs on round poles of between 4" and 9" diameter. Larger configurations and grade tilt can be accommodated with available flat-surface mounting and tilt bracket sets.

Pole Mounted AC Power Supply Box

A separate AC power supply enclosure is supplied with 110 volt AC systems. This converts AC power to 12 volts DC needed to operate the sign. Connections and fuses are contained within the enclosure for AC main connection and sign power.



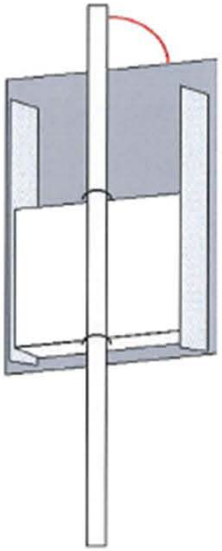

VSL SIGN 10


SIEMENS
POWER
ALARM
RESET
SOLA

Sign Installation and Alignment

Direct the sign into the roadway toward traffic as shown in the illustration; it should aimed at a point 200 ft. ahead of the sign.

Typically, the sign is mounted between 5 feet and 12 feet from the roadside.

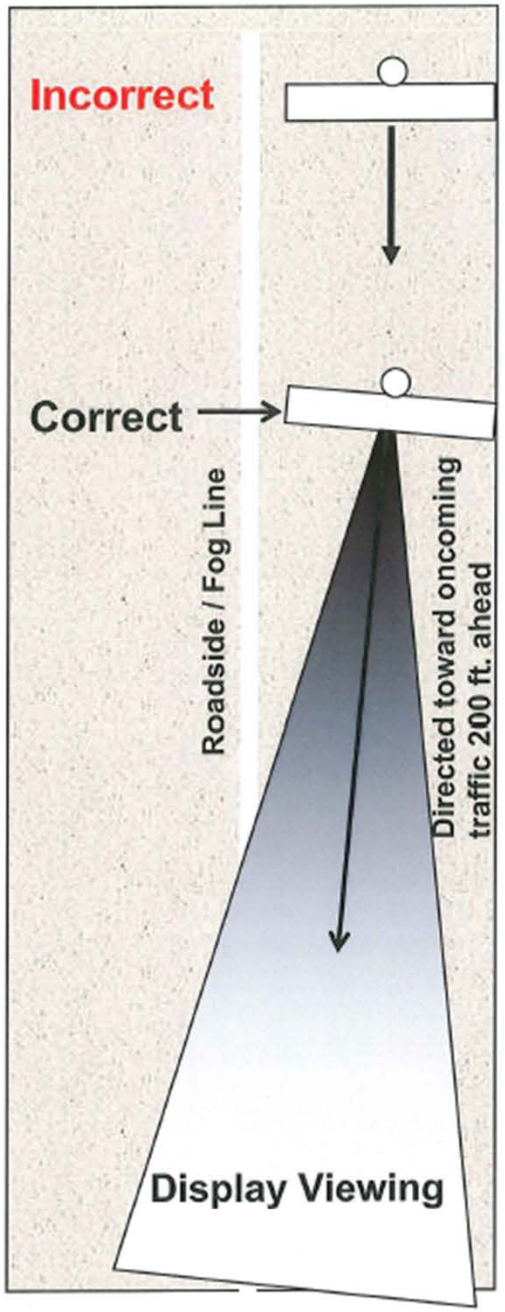


Mounting brackets are designed to provide forward tilt, which prevents reflections of the sun or sky from being seen from a vehicle

Driver's line of sight

Sky Reflections: The sign mounting brackets are designed to provide forward tilt, which prevents reflections of the sun or sky from being seen from a vehicle.

The sign viewing angle needs to be in clear view of oncoming traffic with no obstructions, such as trees, signs, buildings, etc. Additional consideration should be made for road curvature.



I-80 VSL Sign Issues

- Communication loss was biggest issue
- Sign would not reset itself or blank out with no Comm
- Fiber Optic Channel had no redundancy
  - Lose one device may lose everything downstream
- VSL signs used white LEDs
  - Poor visibility during daytime hours during snow storms or when signs were dirty
  - Freezing snow would coat sign and remain on until scraped off
  - Electric components on sign. A knockdown was total loss


SPEED
LIMIT
65

New Technology Enhancements

- Sign procurement – New vendor contract.
- Lab Testing of sign and communications plan.
- Integration into TransSuite – new device driver.
- Decision support software.

VARIABLE SPEED LIMIT SIGN (VSLS) / Front Access Amber or White

General

- Variable Speed Limit
- Amber or White
- MUTCD Compliant
- Access Type: Front

Construction

- 5052 aluminum alloy
- NEMA 3R
- Structural: AASHTO D1.2-120 mph
- MUTCD code: R2-1

Dimensions

Matrix

- Height: 23" (584 mm)
- Length: 32" (813 mm)
- Depth: 4.25" (107.28 mm)
- Weight: 30 lbs. (13.6 Kg)

Full Sign

- Length: 48" (1219.2 mm)
- Height: 60" (1524 mm)

Electrical Requirements

- 120/240 VAC
- Typical Power: 20W
- Max Power: 70W

Environmental

- Operating Temperature: -30°F to +165°F (-34°C to +74°C)
- Storage Temperature: -40°F to +185 °F (-40°C to +85°C)
- Humidity: 0% to 99% non-condensing

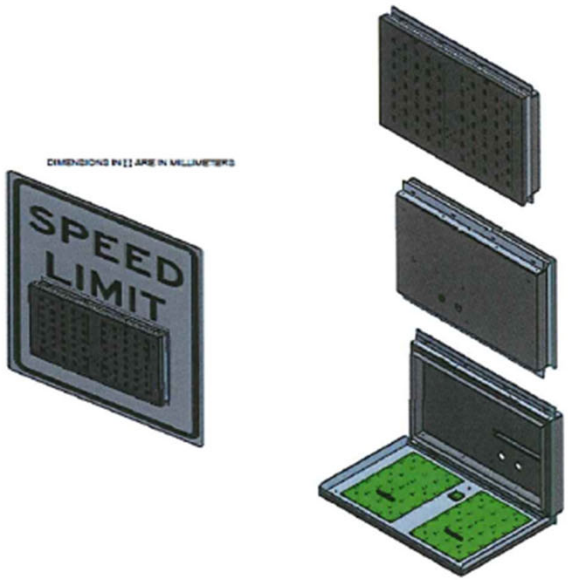
Standards

NEMA: All TS4 requirements met or exceeded including:

- Section 2 Environmental Requirements
- Mechanical construction
- Electronics and electrical
- Performance monitoring

Optical Performance

- Color: Amber (590 nm ±5nm)
- Or White: 6500k+nm
- Viewing Angle: 30°
- Luminance: 16,100 cd/m^2

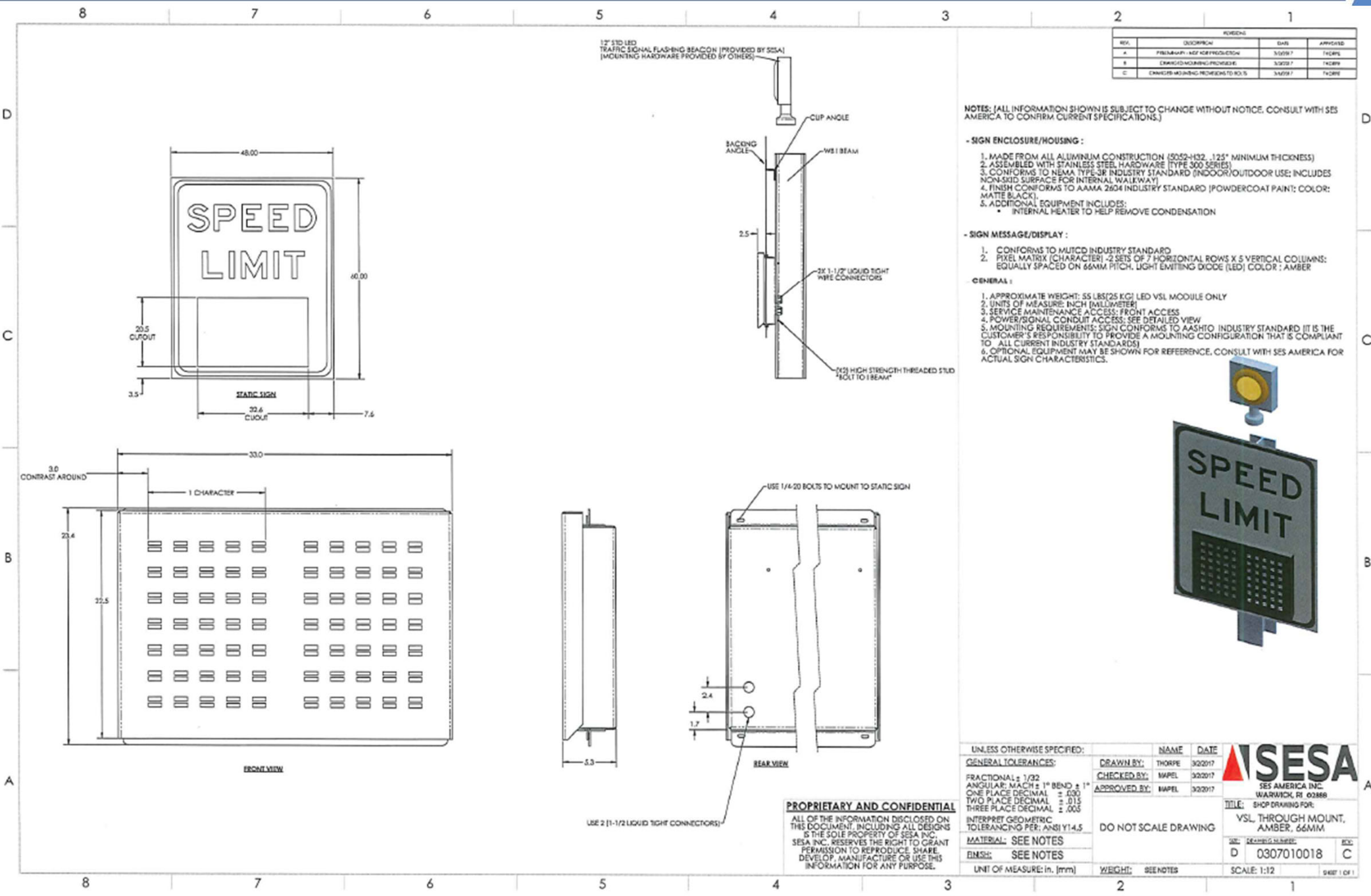


Notes:

- Typical power is calculated as 100% of equipment and 50% of pixels on at 50% brightness.
- Max power is calculated as 100% of equipment and 100% pixels on at 100% brightness

Note: SESA policy is to constantly improve its product, all product descriptions are subject to change

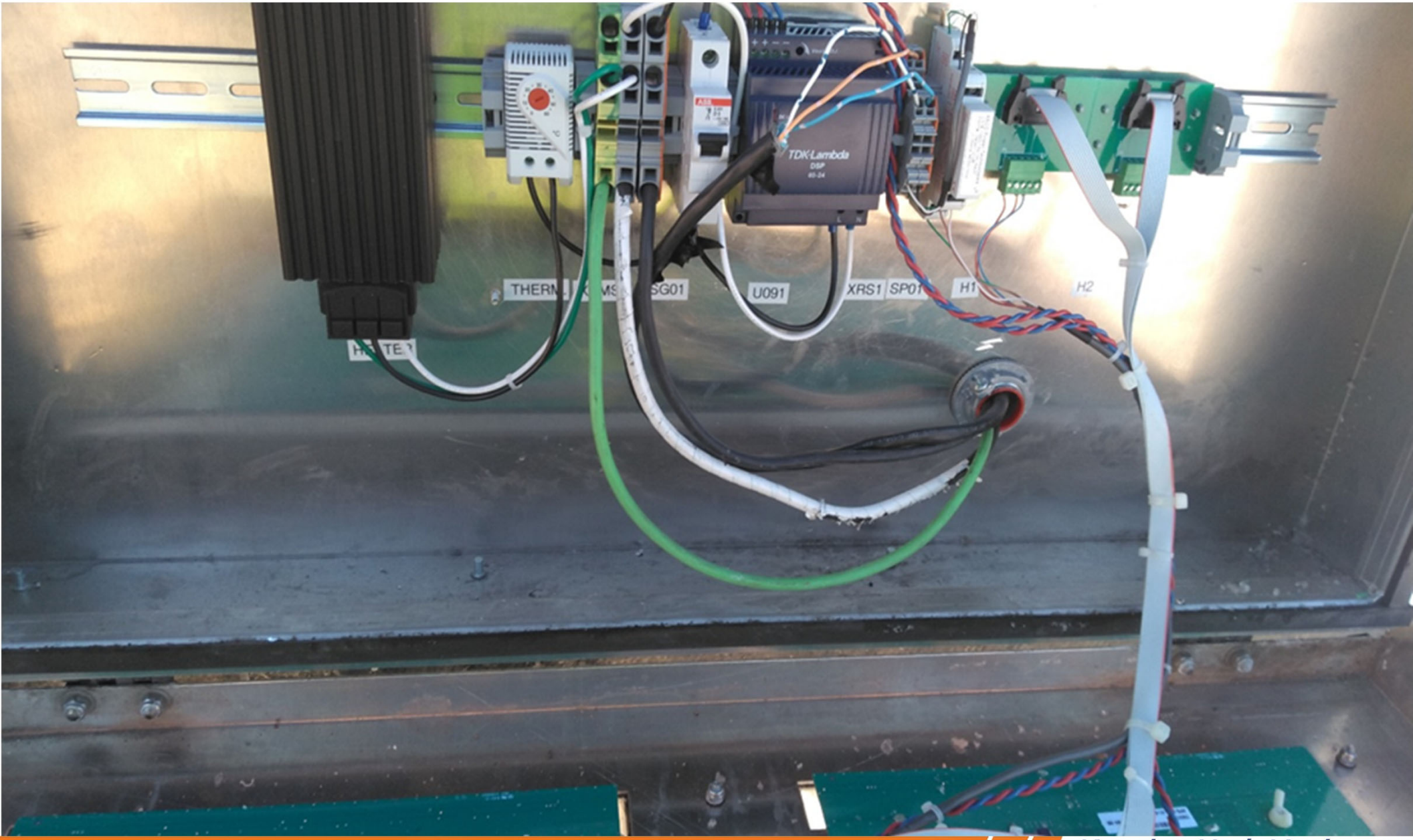
SES America, Inc
21 Quinton Street, Warwick, RI 02888
401.232.3370 www.sesamerica.com


SPEED LIMIT
48.00
60.00
20.5 CUTOUT
3.5
32.6 CUOUT
7.6
STATIC SIGN
12" STD LED TRAFFIC SIGNAL FLASHING BEACON (PROVIDED BY SESA) (MOUNTING HARDWARE PROVIDED BY OTHERS)
CLIP ANGLE
BACKING ANGLE
W8 I BEAM
2.5
2X 1-1/2" LIQUID TIGHT WIRE CONNECTORS
(X2) HIGH STRENGTH THREADED STUD "BOLT TO I BEAM"
33.0
3.0 CONTRAST AROUND
1 CHARACTER
23.4
22.5
FRONT VIEW
USE 1/4-20 BOLTS TO MOUNT TO STATIC SIGN
2.4
1.7
5.3
REAR VIEW
USE 2 (1-1/2 LIQUID TIGHT CONNECTORS)
NOTES: (ALL INFORMATION SHOWN IS SUBJECT TO CHANGE WITHOUT NOTICE. CONSULT WITH SES AMERICA TO CONFIRM CURRENT SPECIFICATIONS.)
- SIGN ENCLOSURE/HOUSING :
1. MADE FROM ALL ALUMINUM CONSTRUCTION (5052-H32, .125" MINIMUM THICKNESS)
2. ASSEMBLED WITH STAINLESS STEEL HARDWARE (TYPE 300 SERIES)
3. CONFORMS TO NEMA TYPE-3R INDUSTRY STANDARD (INDOOR/OUTDOOR USE; INCLUDES NON-SKID SURFACE FOR INTERNAL WALKWAY)
4. FINISH CONFORMS TO AAMA 2604 INDUSTRY STANDARD (POWDERCOAT PAINT; COLOR: MATTE BLACK).
5. ADDITIONAL EQUIPMENT INCLUDES:
• INTERNAL HEATER TO HELP REMOVE CONDENSATION
- SIGN MESSAGE/DISPLAY :
1. CONFORMS TO MUTCD INDUSTRY STANDARD
2. PIXEL MATRIX (CHARACTER) -2 SETS OF 7 HORIZONTAL ROWS X 5 VERTICAL COLUMNS; EQUALLY SPACED ON 66MM PITCH. LIGHT EMITTING DIODE (LED) COLOR : AMBER
GENERAL :
1. APPROXIMATE WEIGHT: 55 LBS(25 KG) LED VSL MODULE ONLY
2. UNITS OF MEASURE: INCH (MILLIMETER)
3. SERVICE MAINTENANCE ACCESS: FRONT ACCESS
4. POWER/SIGNAL CONDUIT ACCESS: SEE DETAILED VIEW
5. MOUNTING REQUIREMENTS: SIGN CONFORMS TO AASHTO INDUSTRY STANDARD (IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE A MOUNTING CONFIGURATION THAT IS COMPLIANT TO ALL CURRENT INDUSTRY STANDARDS)
6. OPTIONAL EQUIPMENT MAY BE SHOWN FOR REFEERENCE. CONSULT WITH SES AMERICA FOR ACTUAL SIGN CHARACTERISTICS.
SPEED LIMIT
REVISIONS
REV. DESCRIPTION DATE APPROVED
A PRELIMINARY - NOT FOR PRODUCTION 3/2/2017 THORPE
B CHANGED MOUNTING PROVISIONS 3/2/2017 THORPE
C CHANGES MOUNTING PROVISIONS TO BOLTS 3/4/2017 THORPE
PROPRIETARY AND CONFIDENTIAL
ALL OF THE INFORMATION DISCLOSED ON THIS DOCUMENT, INCLUDING ALL DESIGNS IS THE SOLE PROPERTY OF SESA INC. SESA INC. RESERVES THE RIGHT TO GRANT PERMISSION TO REPRODUCE, SHARE, DEVELOP, MANUFACTURE OR USE THIS INFORMATION FOR ANY PURPOSE.
UNLESS OTHERWISE SPECIFIED:
GENERAL TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ± 1° BEND ± 1°
ONE PLACE DECIMAL ± .030
TWO PLACE DECIMAL ± .015
THREE PLACE DECIMAL ± .005
INTERPRET GEOMETRIC TOLERANCING PER: ANSI Y14.5
MATERIAL: SEE NOTES
FINISH: SEE NOTES
UNIT OF MEASURE: in. (mm)
NAME DATE
DRAWN BY: THORPE 3/2/2017
CHECKED BY: MAPEL 3/2/2017
APPROVED BY: MAPEL 3/2/2017
DO NOT SCALE DRAWING
WEIGHT: SEE NOTES
SESA
SES AMERICA INC.
WARWICK, RI 02888
TITLE: SHOP DRAWING FOR:
VSL, THROUGH MOUNT, AMBER, 66MM
SIZE: D
DRAWING NUMBER: 0307010018
REV: C
SCALE: 1:12
SHEET 1 OF 1

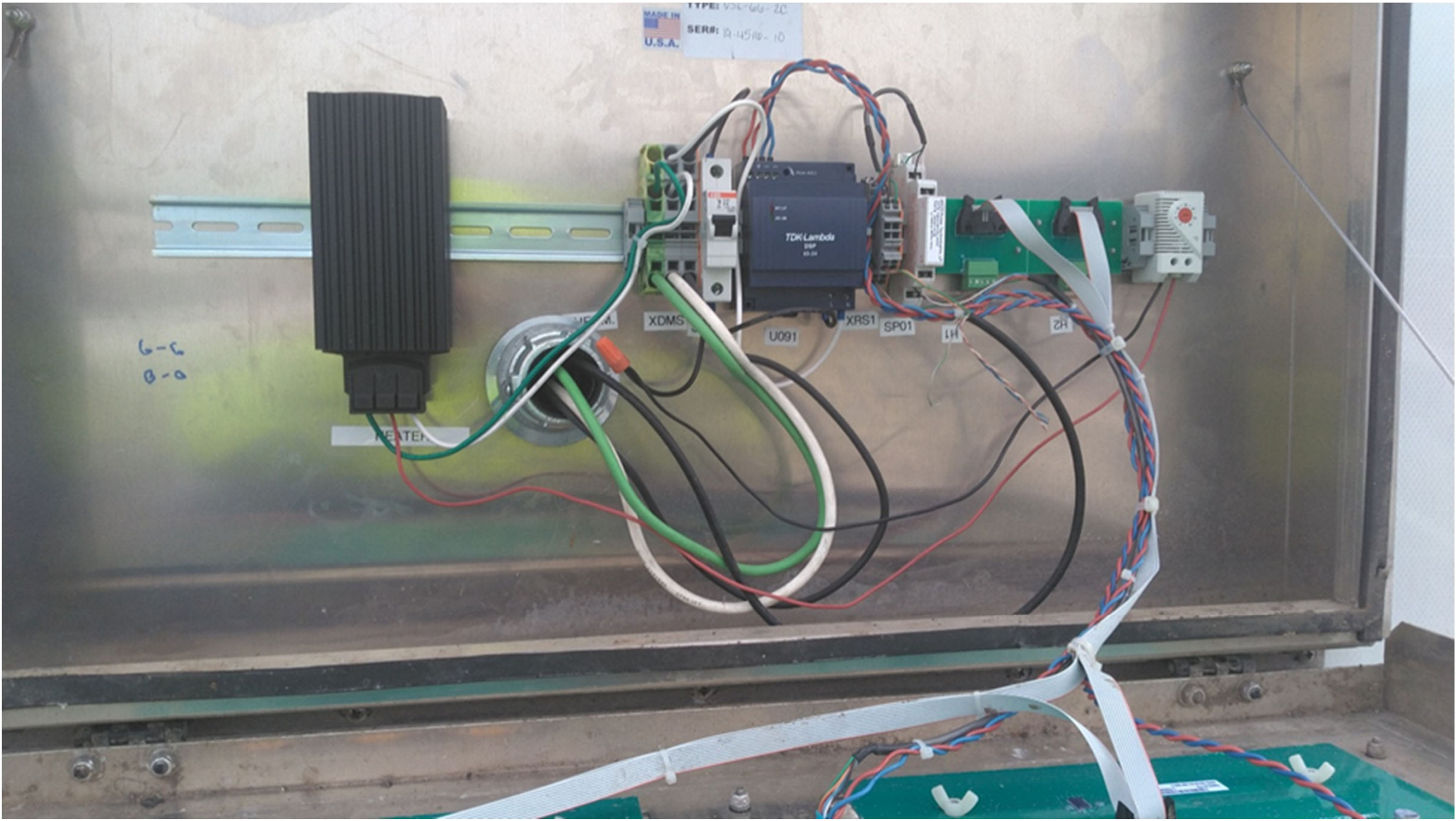
SESA Sign Issues

- The sign had to be assembled (very labor-intensive)
- Ran into issues with the design of the sign and several modifications had to be done to get the sign to work out in the field.
- The existing layout had the heater placed right next to the thermostat this caused the heater to cycle and never heating up the box to melt snow off the front display panel. This was fixed by relocating the heater or adding two heaters to the existing system.

Existing Layout



Setup with relocated Thermostat

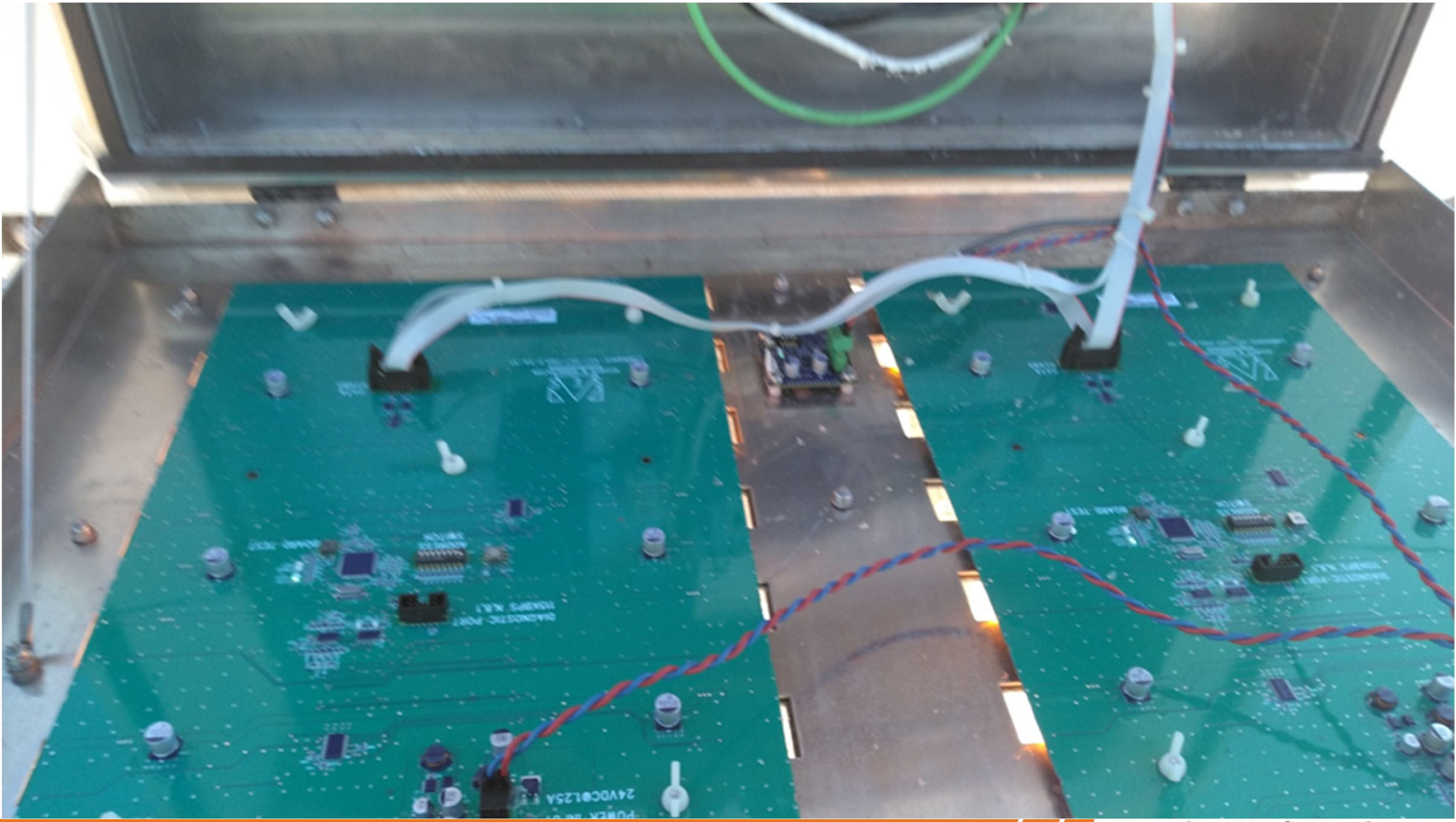


Setup with two heaters

SESA Sign Issues Cont.

- The type of connector used on back of the display boards where the red and blue wire plugs in. Is not secure and will come unplugged when the sign gets hit with snow. To fix the problem a dab of silicone was used on the connector to hold it in place during the snowstorms. (Connector type needs to be modified before next order)

Connector Issue Picture



SESA Sign Issues Cont.

- Snow building on top of the display panel leaked through the seals and shorted out display boards.
- To eliminate this problem a bracket was designed that would be mounted on top and attached to the sign itself.
- All modifications were approved by the Manufacturer to not void the Sign Warranty

Moisture Issue

Moisture Issue Solution

New VSL Sign Benefits

Internal Heater – stops snow and ice buildup

Sign will blink if communication is lost or blank out

- No false display

Sign only displays a message

Hardware is not located with sign setup

- Sign damaged, only replace the board or housing

LEDs are yellow and at 30° view

- Better visibility for traveling public

We have done research and we found a sign made by SES America contract number 159663

1. This sign has a heater inside that will take care of the snow and ice buildup during snowstorms.
2. The sign has the capability of blinking itself communication is lost it will not put up a message until communication has been restored. (No false display)
3. The signs will only display a message, all the hardware is located at another location that is well protected from the snowplow. (If sign gets damage all we need to do is replace the display boards or housing)
4. LED are now yellow and are at 30° which makes better visibility for the motoring public.

Picture the new display

Future of VSL in Utah

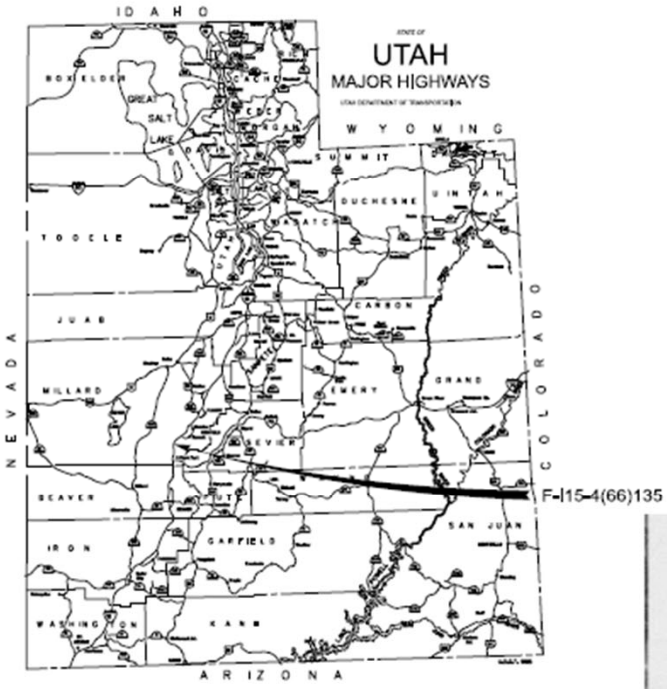
- Will not build where the problems are localized (needs to be corridor-wide)
- Will not build another system until we can automate operation – currently studying automation
- Believe systems are more beneficial when there is a large speed range
- Looking to implement on an 80 mph VSL Corridor

Future of VSL Cont.

Future VSL locations suggestions:

- Sardine Canyon (original proposed location)
- Provo Canyon (has necessary infrastructure)
- I-15 in southern Utah (highest summits along I-15)
- Salt Creek Canyon (near Nephi)

I-15 Baker Cyn. Plan Sheet Examples



Plan Sheet for Project.

UTAH
DEPARTMENT OF TRANSPORTATION

SEE SHEET 1A FOR INDEX TO PLAN

SHEET NO. 1

U.S. Standard Units (Inch-Pound Units)

ALL UNITS IN FEET UNLESS OTHERWISE NOTED

PLANS OF PROPOSED STATE ROAD

FEDERAL AID PROJECT

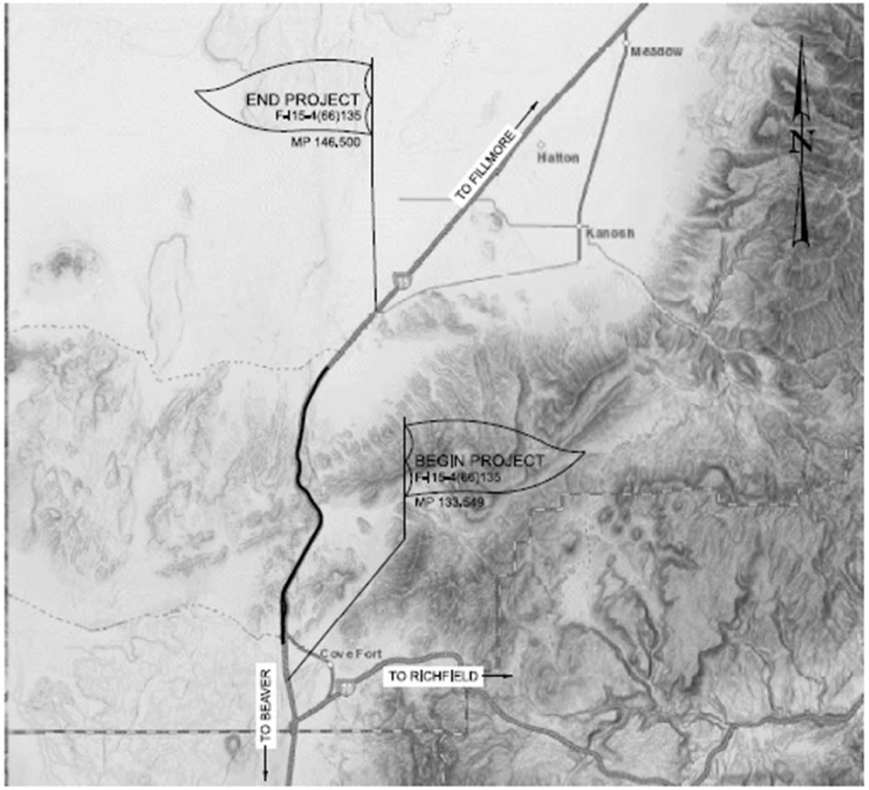
F-I15-4(66)135 PIN: 15735

I-15; MP 135 TO MP 142.5, CLIMBING LANES

PASSING LANE

MILLARD COUNTY

LENGTH 15.000 MILES



PROFESSIONAL ENGINEER
No. 9097171-2202
DEREK HISS
ELECTRONIC SEAL
STATE OF UTAH

THIS SEAL APPLIES TO ALL SHEETS CONTAINING THIS SIGNATURE

VERIFIED FOR SUBMISSION FOR ADVERTISEMENT

DESIGN ENGINEER

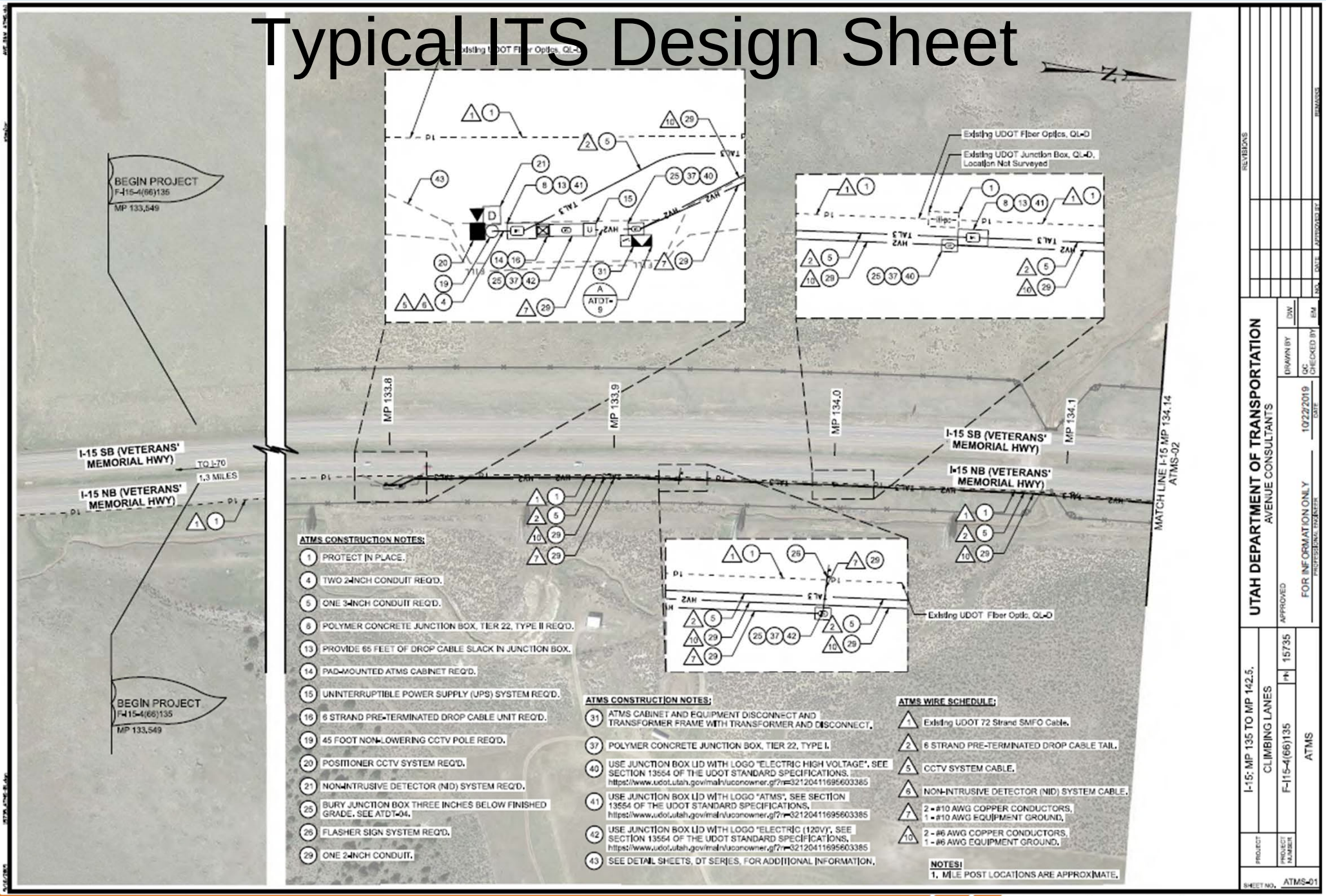
UTAH DEPARTMENT OF TRANSPORTATION

APPROVED FOR USE BY UDOT

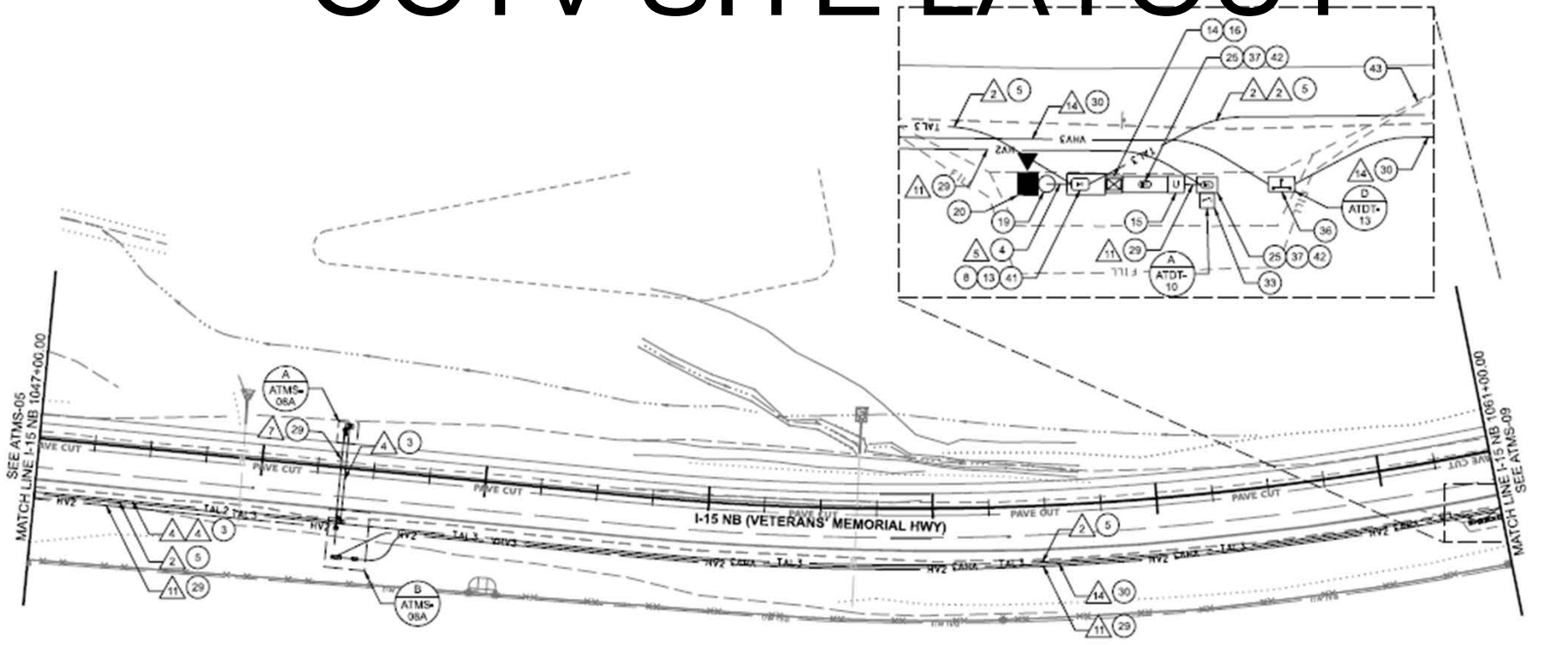
Digitally signed by Branden E. Anderson
Date: 2020.01.14 10:02:48 -0700'

REGION FOUR PRECONSTRUCTION ENGINEER

Typical ITS Design Sheet



CCTV SITE LAYOUT



ATMS CONSTRUCTION NOTES:

3. ONE 2-INCH CONDUIT REQ'D.
4. TWO 2-INCH CONDUIT REQ'D.
5. ONE 3-INCH CONDUIT REQ'D.
6. POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE II REQ'D.
13. PROVIDE 65 FEET OF DROP CABLE SLACK IN JUNCTION BOX.
14. PAD-MOUNTED ATMS CABINET REQ'D.
15. UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM REQ'D.

ATMS CONSTRUCTION NOTES CONTINUED:

16. 6 STRAND PRE-TERMINATED DROP CABLE UNIT REQ'D.
19. 45 FOOT NON-LOWERING CCTV POLE REQ'D.
20. POSITIONER CCTV SYSTEM REQ'D.
25. BURY JUNCTION BOX THREE INCHES BELOW FINISHED GRADE. SEE ATDT-04.
29. ONE 2-INCH CONDUIT.
30. ONE 3-INCH CONDUIT.
33. ATMS CABINET AND EQUIPMENT DISCONNECT AND TRANSFORMER FRAME WITH DISCONNECT.

ATMS CONSTRUCTION NOTES CONTINUED:

36. PAD MOUNTED TRANSFORMER, SEE ATDT-07.
37. POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE I.
41. USE JUNCTION BOX LID WITH LOGO "ATMS". SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385
42. USE JUNCTION BOX LID WITH LOGO "ELECTRIC (120V)". SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385
43. SEE DETAIL SHEETS, DT SERIES, FOR ADDITIONAL INFORMATION.

ATMS WIRE SCHEDULE:

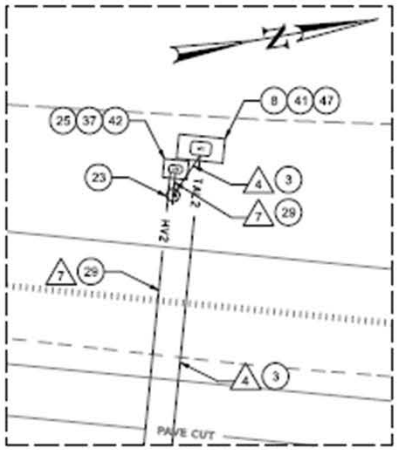
2. 6 STRAND PRE-TERMINATED DROP CABLE TAIL.
4. VSL FIBER OPTIC COMMUNICATION CABLE.
5. CCTV SYSTEM CABLE.
7. 2 - #10 AWG COPPER CONDUCTORS, 1 - #10 AWG EQUIPMENT GROUND.
11. 2 - #4 AWG COPPER CONDUCTORS, 1 - #4 AWG EQUIPMENT GROUND.
14. 1 - #1/0 AWG 15KV AL 133% MV105 EPR.

REVISIONS

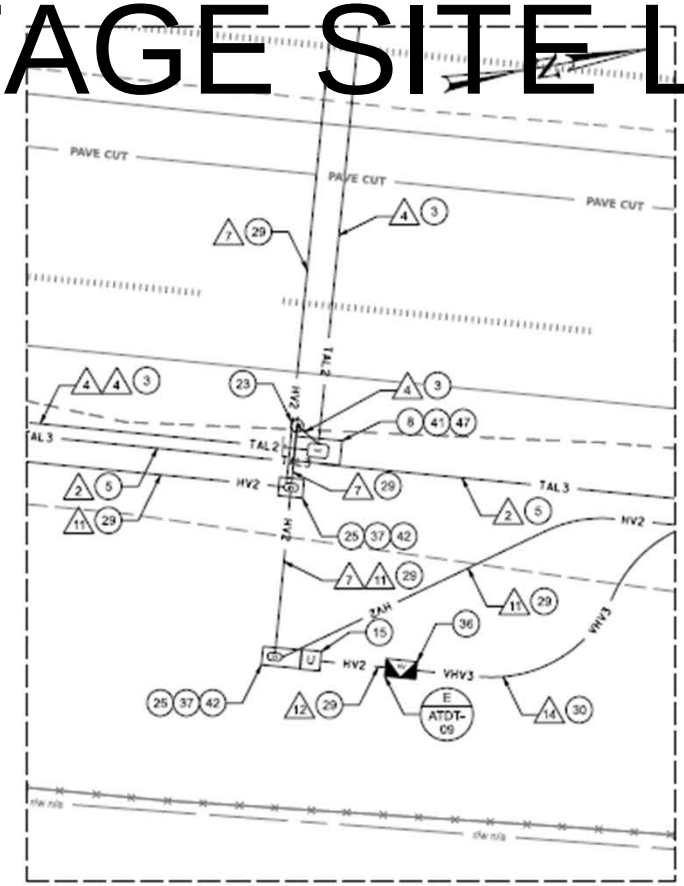
UTAH DEPARTMENT OF TRANSPORTATION
AVENUE CONSULTANTS
APPROVED
FOR INFORMATION ONLY
10/22/2019
DRAWN BY DW
QC CHECKED BY EM

I-15; MP 135 TO MP 142.5;
CLIMBING LANES
PROJECT NUMBER F-I15-4(66)135 PIN 15735
ATMS
SHEET NO. ATMS-08

HIGH VOLTAGE SITE LAYOUT



A ATMS DETAIL
I-15 NB, MP 135,64



B ATMS DETAIL
I-15 NB, MP 135,64

ATMS CONSTRUCTION NOTES:

(3) ONE 2-INCH CONDUIT REQ'D.

(5) ONE 3-INCH CONDUIT REQ'D.

(8) POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE II REQ'D.

(15) UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM REQ'D.

(23) VARIABLE SPEED LIMIT (VSL) SIGN SYSTEM REQ'D.

(25) BURY JUNCTION BOX THREE INCHES BELOW FINISHED GRADE. SEE ATDT-04.

(29) ONE 2-INCH CONDUIT.

ATMS CONSTRUCTION NOTES CONTINUED:

(30) ONE 3-INCH CONDUIT.

(36) PAD MOUNTED TRANSFORMER. SEE ATDT-07.

(37) POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE I.

(41) USE JUNCTION BOX LID WITH LOGO "ATMS". SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385

(42) USE JUNCTION BOX LID WITH LOGO "ELECTRIC (120V)". SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385

(47) PROVIDE 50 FEET OF VSL CABLE SLACK IN JUNCTION BOX.

ATMS WIRE SCHEDULE:

△2 6 STRAND PRE-TERMINATED DROP CABLE TAIL.

△4 VSL FIBER OPTIC COMMUNICATION CABLE.

△7 2 - #10 AWG COPPER CONDUCTORS, 1 - #10 AWG EQUIPMENT GROUND.

△11 2 - #4 AWG COPPER CONDUCTORS, 1 - #4 AWG EQUIPMENT GROUND.

△12 3 - #4 AWG COPPER CONDUCTORS, 1 - #4 AWG EQUIPMENT GROUND.

△14 1 - #1/0 AWG 15KV AL 133% MV105 EPR.

REVISIONS

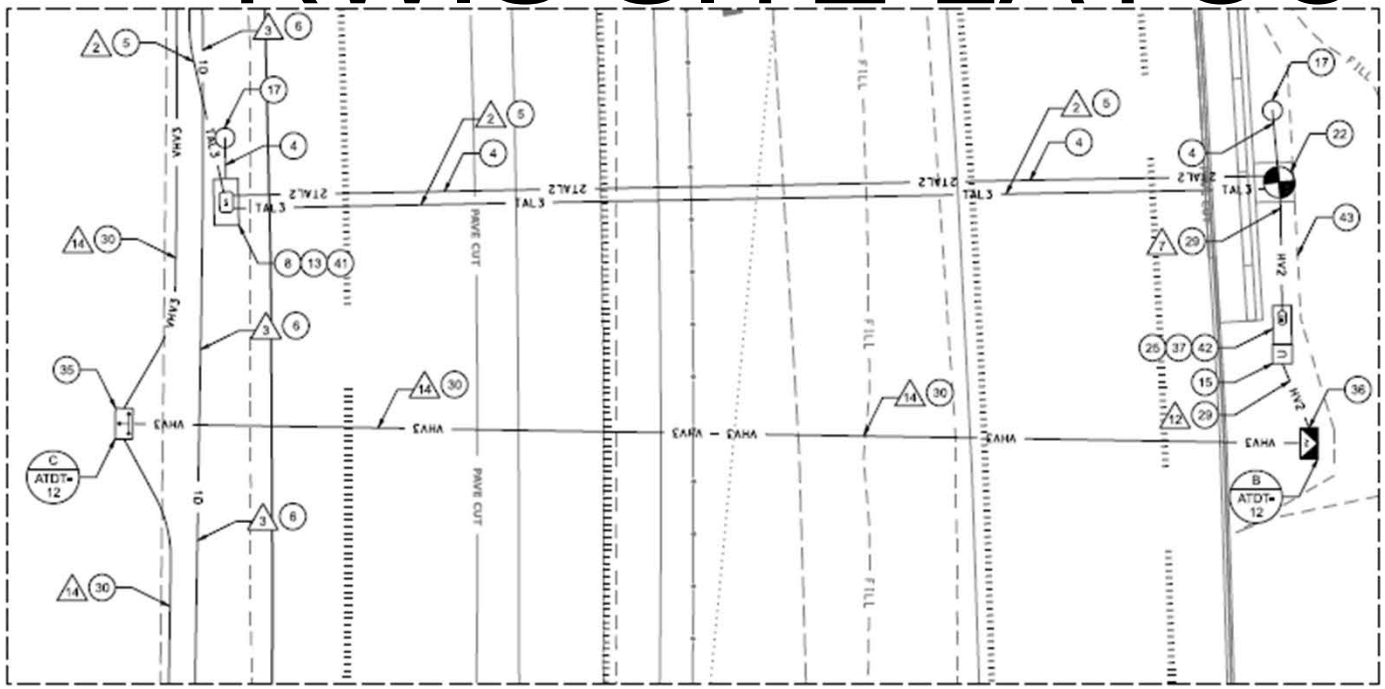
UTAH DEPARTMENT OF TRANSPORTATION
AVENUE CONSULTANTS

APPROVED
FOR INFORMATION ONLY
PROFESSIONAL ENGINEER
10/22/2019
DATE

DRAWN BY DW
CHECKED BY EM
QC
NO. | DATE | APPROVED BY | REMARKS

I-15; MP 135 TO MP 142.5;
CLIMBING LANES
PROJECT
F-I15-4(66)135
PROJECT NUMBER
15735
ATMS
SHEET NO. ATMS-08A

RWIS SITE LAYOUT



A ATMS DETAIL
I-15 MP 139.88

ATMS CONSTRUCTION NOTES:

(4) TWO 2-INCH CONDUIT REQ'D.
(5) ONE 3-INCH CONDUIT REQ'D.
(6) 1D CONDUIT REQ'D.
(8) POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE II REQ'D.
(13) PROVIDE 65 FEET OF DROP CABLE SLACK IN JUNCTION BOX.
(15) UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM REQ'D.
(17) 30 FT HIGHWAY LUMINAIRE POLE (SLIP BASE) REQ'D.
(22) RWIS-ESS SITE PREPARATION REQ'D.
(25) BURY JUNCTION BOX THREE INCHES BELOW FINISHED GRADE, SEE ATDT-04.

ATMS CONSTRUCTION NOTES CONTINUED:

(29) ONE 2-INCH CONDUIT.
(30) ONE 3-INCH CONDUIT.
(35) SECTIONALIZER, SEE ATDT-08.
(36) PAD MOUNTED TRANSFORMER, SEE ATDT-07.
(37) POLYMER CONCRETE JUNCTION BOX, TIER 22, TYPE I.
(41) USE JUNCTION BOX LID WITH LOGO "ATMS", SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385
(42) USE JUNCTION BOX LID WITH LOGO "ELECTRIC (120V)", SEE SECTION 13554 OF THE UDOT STANDARD SPECIFICATIONS. https://www.udot.utah.gov/main/uconowner.gf?n=32120411695603385
(43) SEE DETAIL SHEETS, DT SERIES, FOR ADDITIONAL INFORMATION.

ATMS WIRE SCHEDULE:

(2) 6 STRAND PRE-TERMINATED DROP CABLE TAIL.
(3) 144 STRAND SMFO CABLE REQ'D.
(7) 2 - #10 AWG COPPER CONDUCTORS, 1 - #10 AWG EQUIPMENT GROUND.
(12) 3 - #4 AWG COPPER CONDUCTORS, 1 - #4 AWG EQUIPMENT GROUND.
(14) 1 - #1/0 AWG 15KV AL 133% MV105 EPR.

UTAH DEPARTMENT OF TRANSPORTATION
AVENUE CONSULTANTS
APPROVED
FOR INFORMATION ONLY
DRAWN BY DW
CHECKED BY EM
DATE 10/22/2019
I-15; MP 135 TO MP 142.5;
CLIMBING LANES
PROJECT NUMBER F-I15-4(66)135
PROJECT 15735
ATMS
SHEET NO. ATMS-25A

VSL Design Power Component


WARNING
BURIED
UTILITIES

Disconnects and 7200 Volt Transformers


PROPERTY OF UTAH
DEPARTMENT OF
TRANSPORTATION
TRANSFORMER MP 135.50


DOE COMPLIANT
HOWARD HI INDUSTRIES
LAUREL, MS U.S.A.
25 kVA 2.3% imp 85 °C
555 lbs.
ADDITIVE POLARITY
H V 12470GRDY/7200
L V 240/120
READ INSTRUCTIONS HI-104 BEFORE OPERATING
SINGLE PHASE TRANSFORMER
GAL OIL= 23
CLASS ONAN 60 HERTZ CONT. 65 ° RISE OIL: TYPE II
AL AL
BAYONET
ISOL LINK
H1B
H1A
X3
X1
X2
04/21
CONTAINS NO DETECTABLE LEVEL OF PCB (LESS THAN 2PPM) AT THE TIME OF MANUFACTURE
MFR. HI SER NO. 1746821521
MP 135.5
-45

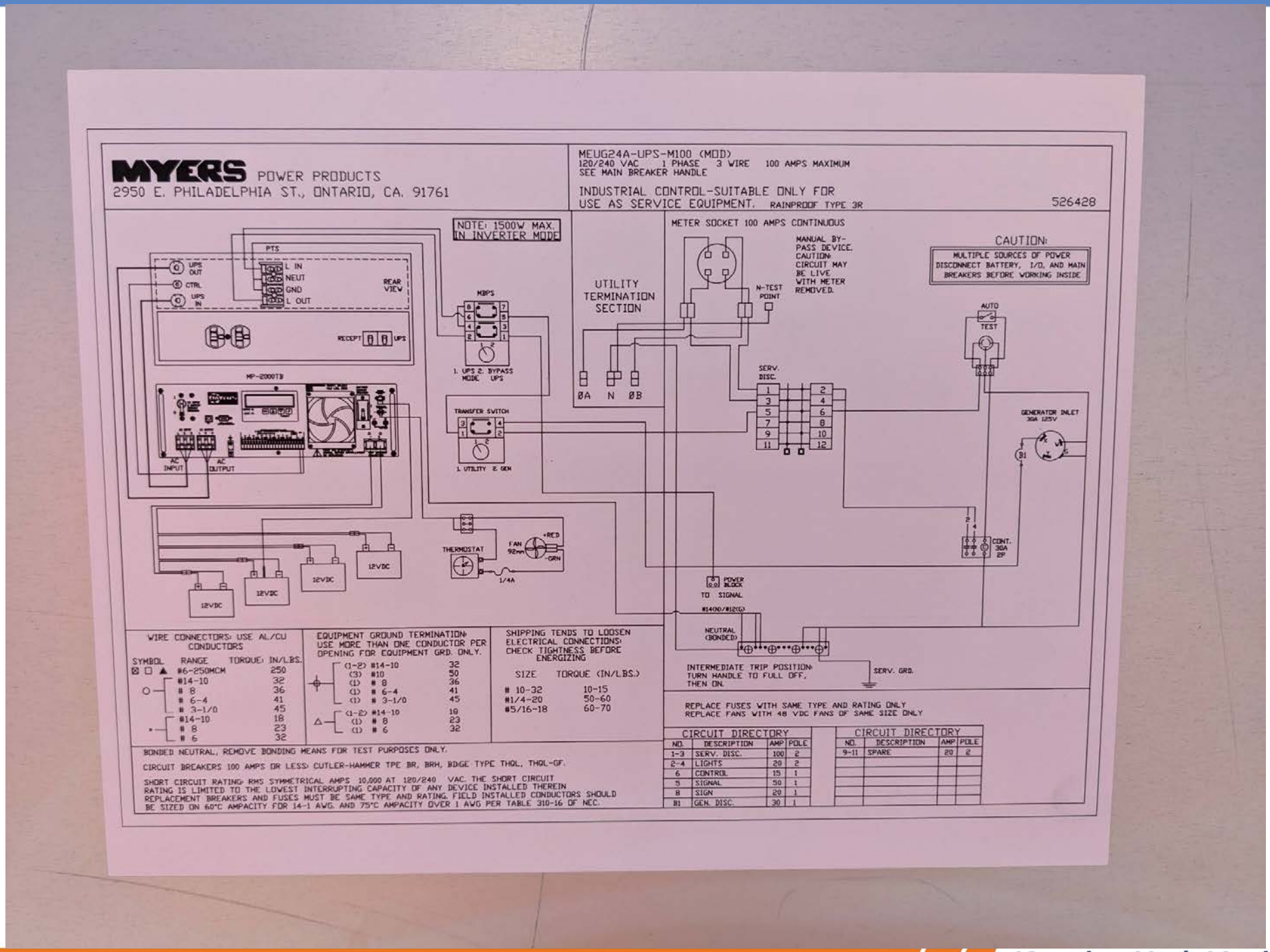

SECTIONALIZER MP 135.95
7200 VOLTS
DANGER
Hazardous voltage.
Keep out!
If open or unlocked, immediately call your electric power and light company.
Will shock, burn or cause death.
PELIGRO
Voltaje peligroso.
¡No entrar!
Si abre o desatrancó, llama inmediatamente su energía eléctrica y la compañía ligera.
Producirá choques eléctricos, quemaduras, y causará la muerte.


MILE
136


DROWSY DRIVERS
USE NEXT EXIT
FATIGUED DRIVING
There IS Evidence
for GOD!
(83) FOR-TRUTH
ON
OFF

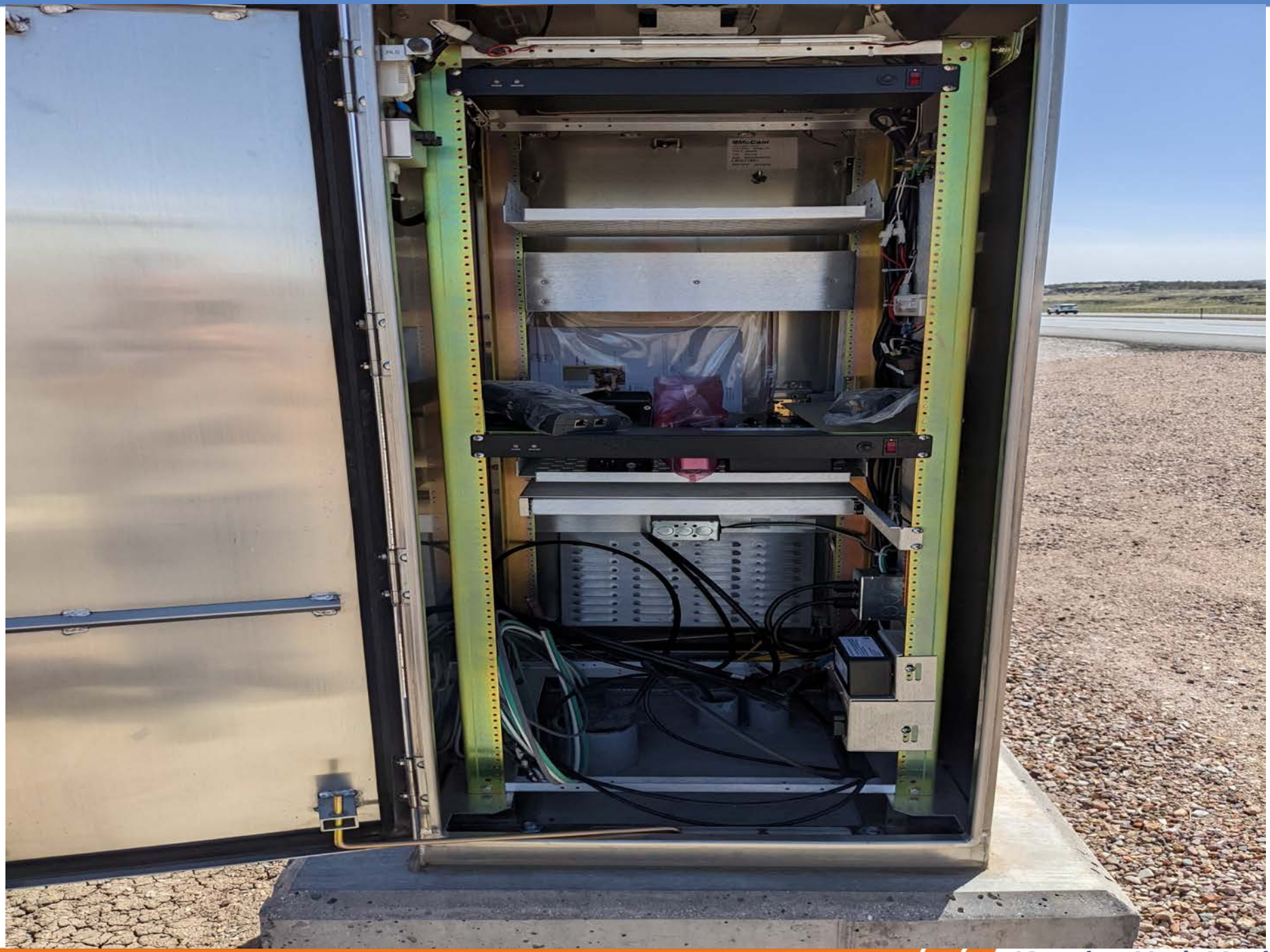
VSL Design Communication Component

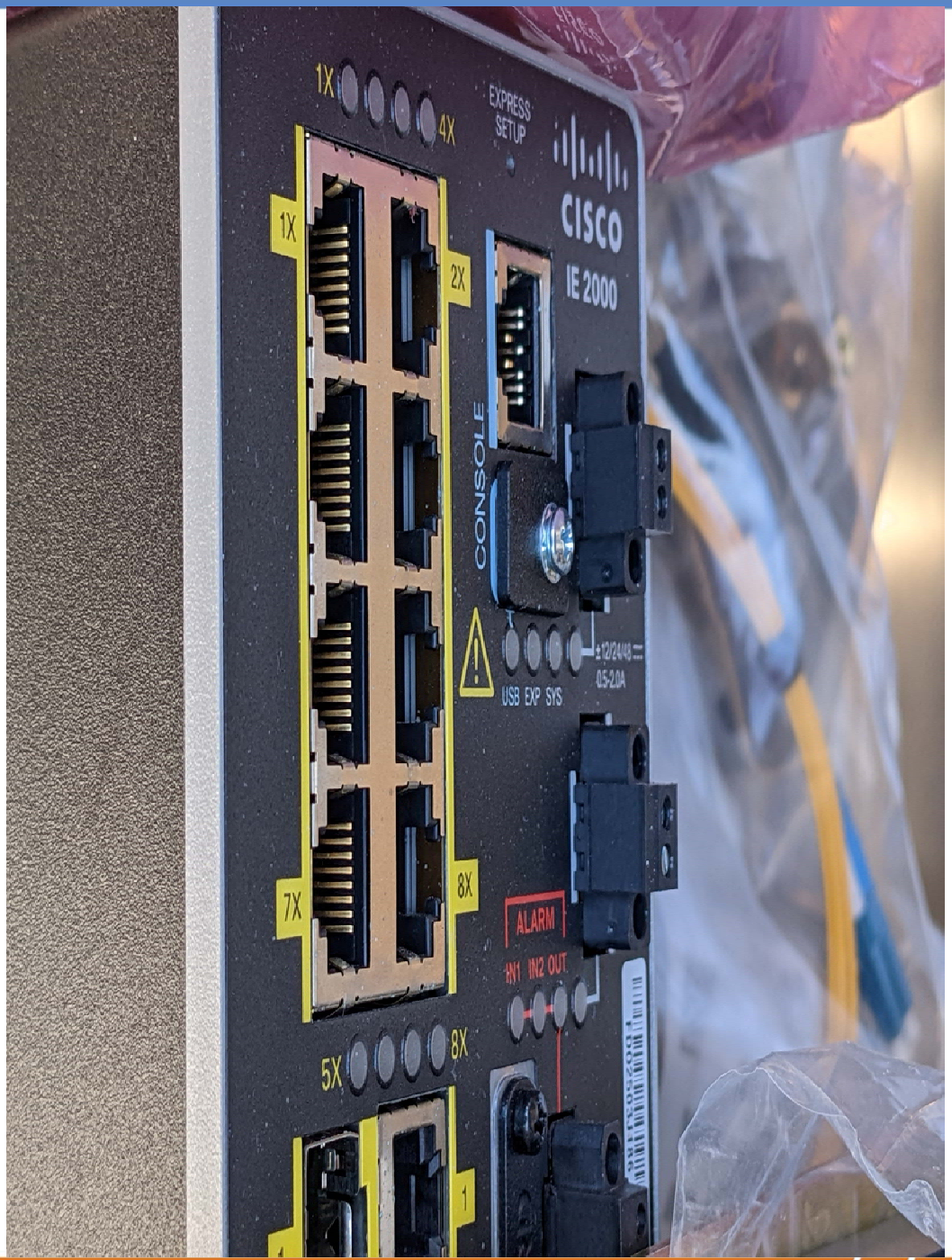

(866) MY MYERS
www.myerspowerproducts.com
020-121-B
MYERS
Power Products, Inc.
INDUSTRIAL CONTROL PANEL
SUITABLE ONLY FOR USE AS SERVICE EQUIPMENT
NUMBER 526428 S.O. SM126065
120/240 VAC 1 PHASE 3 WIRE 100 AMPS MAX
MODEL MEUG24A-UPS-M100 (MOD)
ENCLOSURE TYPE 3R RAINPROOF

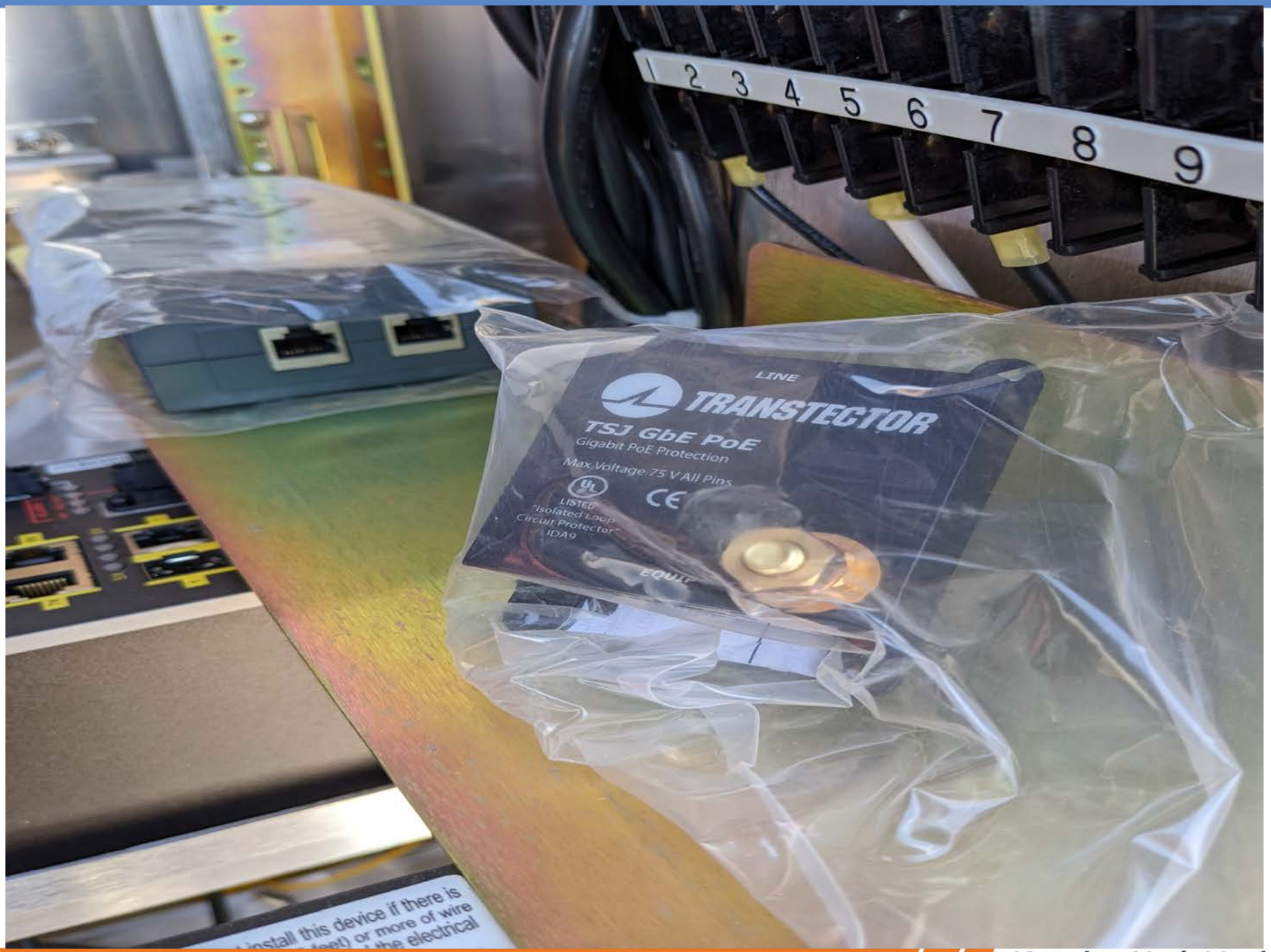

MYERS POWER PRODUCTS
2950 E. PHILADELPHIA ST., ONTARIO, CA. 91761
MEUG24A-UPS-M100 (MOD)
120/240 VAC 1 PHASE 3 WIRE 100 AMPS MAXIMUM
SEE MAIN BREAKER HANDLE
INDUSTRIAL CONTROL-SUITABLE ONLY FOR
USE AS SERVICE EQUIPMENT. RAINPROOF TYPE 3R
526428
NOTE: 1500W MAX. IN INVERTER MODE
METER SOCKET 100 AMPS CONTINUOUS
MANUAL BY-PASS DEVICE. CAUTION: CIRCUIT MAY BE LIVE WITH METER REMOVED.
CAUTION:
MULTIPLE SOURCES OF POWER DISCONNECT BATTERY, I/O, AND MAIN BREAKERS BEFORE WORKING INSIDE.
UTILITY TERMINATION SECTION
ØA N ØB
N-TEST POINT
SERV. DISC.
AUTO TEST
GENERATOR INLET 30A 125V
CONT. 30A 2P
PTS
L IN
NEUT
GND
L OUT
UPS OUT
CTRL
UPS IN
REAR VIEW
RECEPT
MBPS
1. UPS 2. BYPASS MODE UPS
MP-2000TB
AC INPUT
AC OUTPUT
TRANSFER SWITCH
1. UTILITY 2. GEN
12VDC
THERMOSTAT
FAN 92mm
+RED
-GRN
1/4A
POWER BLOCK
TO SIGNAL
#14OD/#12(G)
NEUTRAL (BONDED)
SERV. GRD.
INTERMEDIATE TRIP POSITION: TURN HANDLE TO FULL OFF, THEN ON.
REPLACE FUSES WITH SAME TYPE AND RATING ONLY
REPLACE FANS WITH 48 VDC FANS OF SAME SIZE ONLY
WIRE CONNECTORS: USE AL/CU CONDUCTORS
SYMBOL RANGE TORQUE: IN/LBS.
#6-250MCM 250
#14-10 32
8 36
6-4 41
3-1/0 45
#14-10 18
8 23
6 32
EQUIPMENT GROUND TERMINATION: USE MORE THAN ONE CONDUCTOR PER OPENING FOR EQUIPMENT GRD. ONLY.
(1-2) #14-10 32
(3) #10 50
(1) # 8 36
(1) # 6-4 41
(1) # 3-1/0 45
(1-2) #14-10 18
(1) # 8 23
(1) # 6 32
SHIPPING TENDS TO LOOSEN ELECTRICAL CONNECTIONS: CHECK TIGHTNESS BEFORE ENERGIZING
SIZE TORQUE (IN/LBS.)
10-32 10-15
#1/4-20 50-60
#5/16-18 60-70
BONDED NEUTRAL, REMOVE BONDING MEANS FOR TEST PURPOSES ONLY.
CIRCUIT BREAKERS 100 AMPS OR LESS: CUTLER-HAMMER TYPE BR, BRH, BIDGE TYPE THQL, THQL-GF.
SHORT CIRCUIT RATING: RMS SYMMETRICAL AMPS 10,000 AT 120/240 VAC. THE SHORT CIRCUIT RATING IS LIMITED TO THE LOWEST INTERRUPTING CAPACITY OF ANY DEVICE INSTALLED THEREIN REPLACEMENT BREAKERS AND FUSES MUST BE SAME TYPE AND RATING. FIELD INSTALLED CONDUCTORS SHOULD BE SIZED ON 60°C AMPACITY FOR 14-1 AWG. AND 75°C AMPACITY OVER 1 AWG PER TABLE 310-16 OF NEC.
CIRCUIT DIRECTORY
NO. DESCRIPTION AMP POLE
1-3 SERV. DISC. 100 2
2-4 LIGHTS 20 2
6 CONTROL 15 1
5 SIGNAL 50 1
8 SIGN 20 1
B1 GEN. DISC. 30 1
CIRCUIT DIRECTORY
NO. DESCRIPTION AMP POLE
9-11 SPARE 20 2


MYERS
1.UTILITY 2.GEN.
DANGER:


W-08
TRANSFER SWITCH
TEST
AUTO
DANGER:
TURN OFF POWER
SERV. DISC.
SIGNAL
SPARE
LIGHTS
CONTROL
SIGN
GENERATOR DISC.




1X
4X
EXPRESS SETUP
CISCO
IE 2000
1X
2X
CONSOLE
USB EXP SYS
7X
8X
ALARM
IN1 IN2 OUT
5X
8X
1


1 2 3 4 5 6 7 8 9
LINE
TRANSTECTOR
TSJ GbE PoE
Gigabit PoE Protection
Max Voltage 75 V All Pins
LISTED
Isolated Loop
Circuit Protector
IDA9
install this device if there is
or more of wire
the electrical

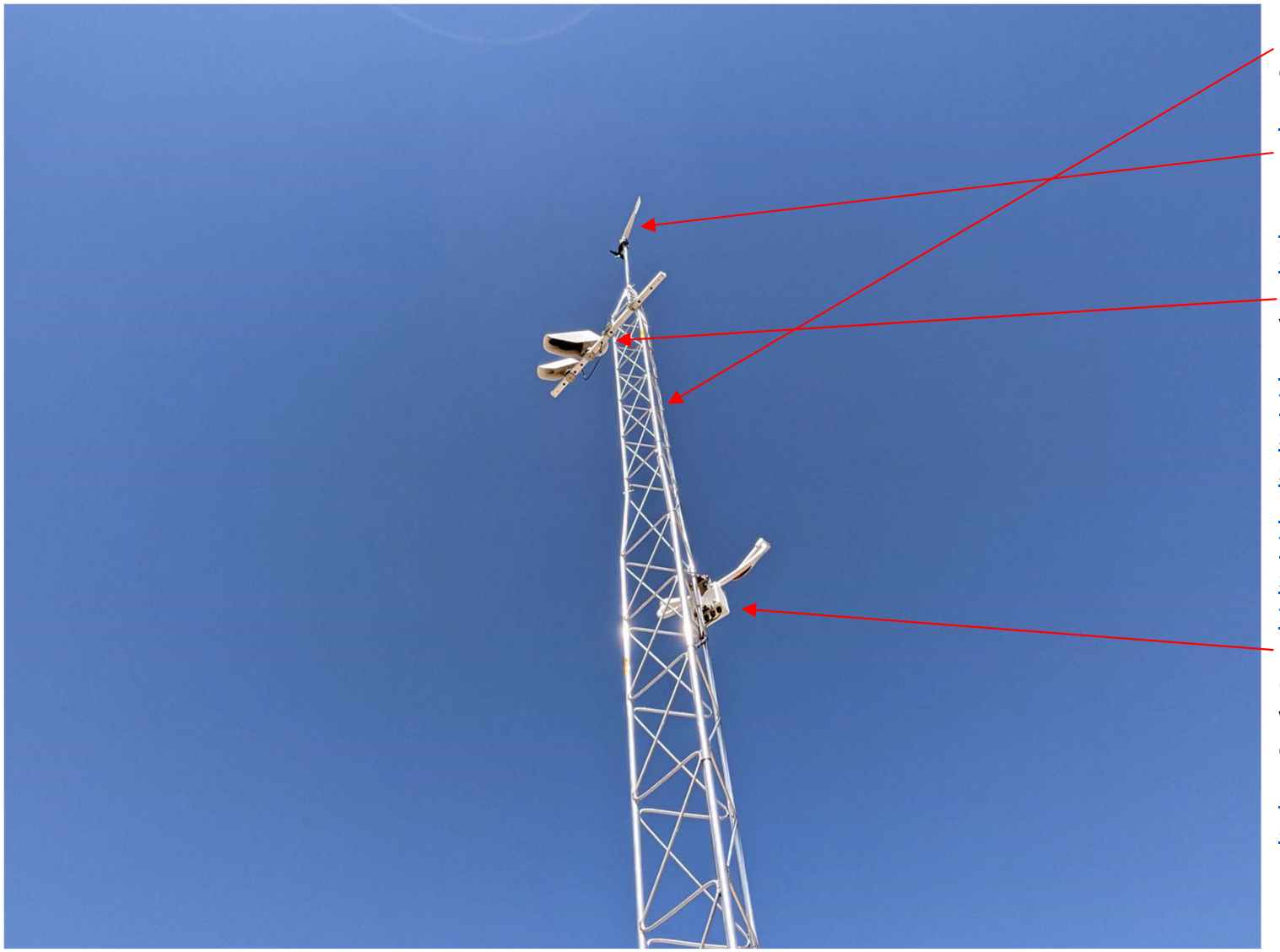

PD-9601G
Microsemi.


SURGE
GROUND
McCain
LOCATION:


EATON

VSL Design Weather Components


TRANSFORMER MP 139.90

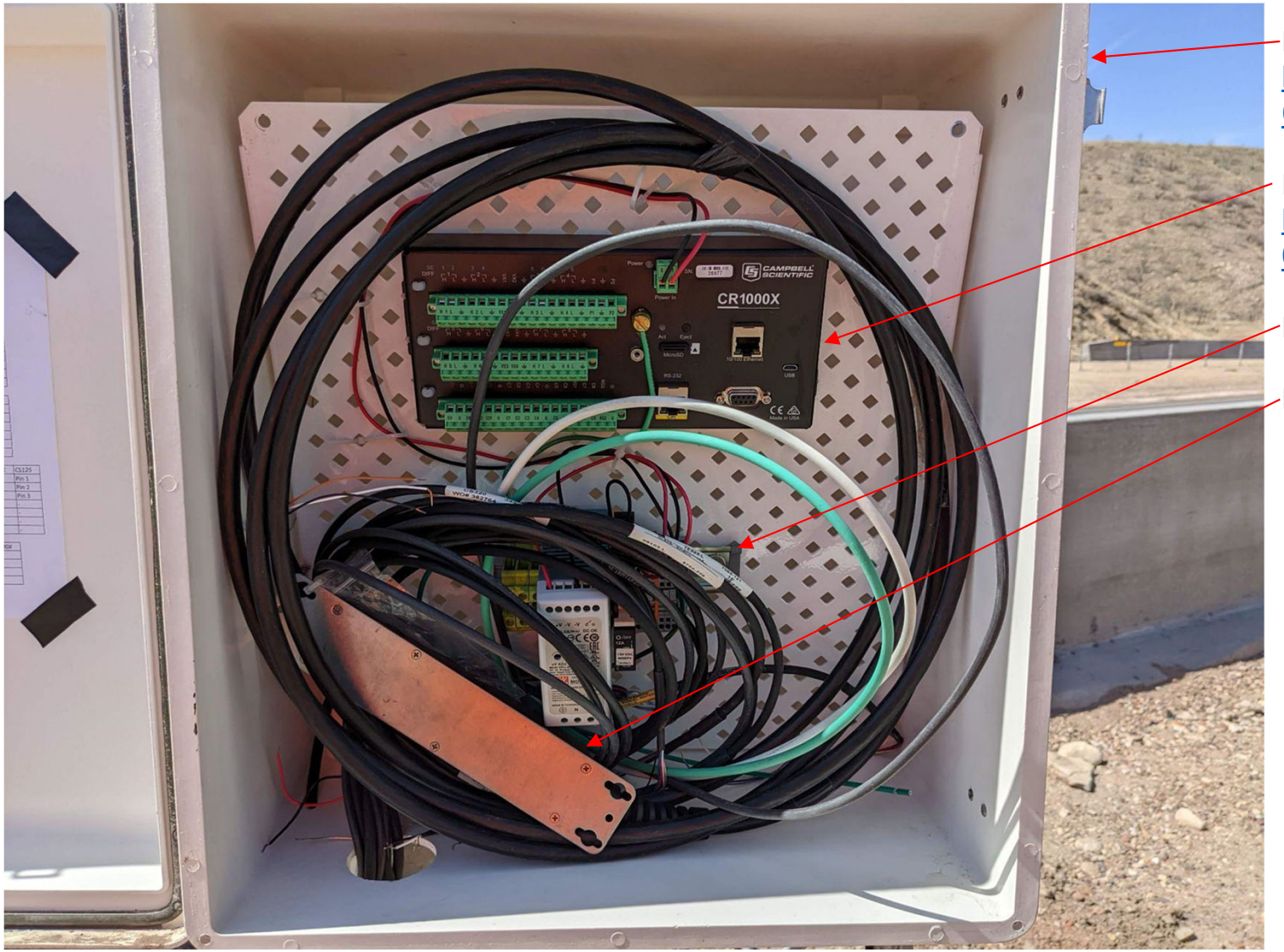


Standard RWIS-ESS tower - "**UT30**"
https://www.campbellsci.com/ut30

RM Young Anemometer - "**05013**"
https://www.campbellsci.com/05103-l

Vaisala "**DSC**"/"**DST**" road sensors
https://www.vaisala.com/en/products/weather-environmental-sensors/remote-surface-state-sensor-dsc211
https://www.vaisala.com/en/products/weather-environmental-sensors/remote-road-surface-temperature-sensor-dst111

Campbell Scientific Present Weather and Visibility Sensor - "**CS125**"
https://www.campbellsci.com/cs125

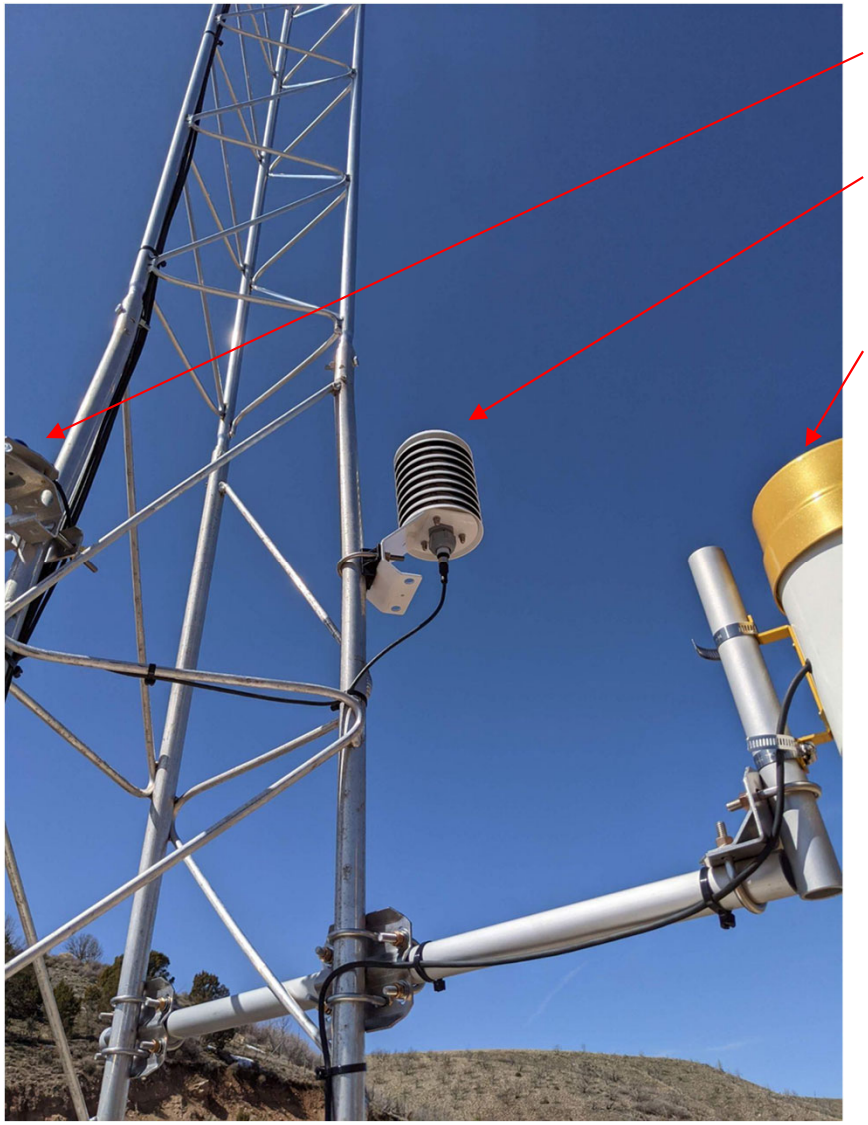


RWIS-ESS Cabinet - “**ENC16/18**”
https://www.campbellsci.com/enc16-18

Datalogger - “**CR1000X**”
https://www.campbellsci.com/cr1000x

Power management

Fiber “Gator Patch”



Campbell Scientific Pyranometer - “**CS320**”
https://www.campbellsci.com/cs320

Campbell Scientific Temp. and RH Sensor (with radiation shield) - “**HygroVUE5**”
https://www.campbellsci.com/hygrovue5

Texas Electronics Rain Gage - “**TE525**”
https://www.campbellsci.com/te525-l

Master CR1000X Program Wiring Diagram: Updated 10/14/2019

RMYoung Anemometer	*Black Box*	*CR1000X*
Green	WD Sig (4)	SE 1
Blue	WD Exc (5)	EX 1 (VX 1)
Red	WS Sig (6)	P 1
White	WD Ref (3)	SG
Black	WS Ref (2)	SG
Clear or Yellow	Shield (1)	PG

Vaisala Non-Invasive DSC/DST	*CR1000X*
Black	C5 (Tx)
White	C6 (Rx)
Grey	PG
Brown	12V
Blue	PG

High Sierra Non-Invasive IceSight	*CR1000X*
Red (6-wire: Yellow)	C5 (Tx)
White (6-wire: Blue)	C6 (Rx)
Red	12V
Black	PG

CC640 Camera	*CR1000X*	*MD485*
BL	-	B
YL	-	A
GN	-	SG
BK	PG	-
RD	12V	-
WH	C8	-

LI200X Pyranometer	*CR1000X*
Red	SE 5
Black	SE 6
White	SG
Clear	SG

CS125 Present Wx Sensor	*CR1000X*
Blue	C1
White	C2
Red	12V
Black	PG
Green	PG
Clear (can be snipped)	PG

DRD11A Precip Sensor	*CR1000X*
Blue (Analog Rain Y/N)	SE 10
Yellow (Lt/Mod/Hvy)	SE 9
Red	12V
Black	PG
Brown	PG
Green & White	not used

SR50 Snow Depth Sensor	*CR1000X*
Green	C7
Red	12V
Black	PG
White	PG
Clear	SG

TE525 Precip Bucket	*CR1000X*
Black	P2
White	SG
Clear	SG

107 Ground Temp Subprobe	*CR1000X*
Black	EX 1 (VX 1)
Red	SE 2
Purple	SG
Clear	SG

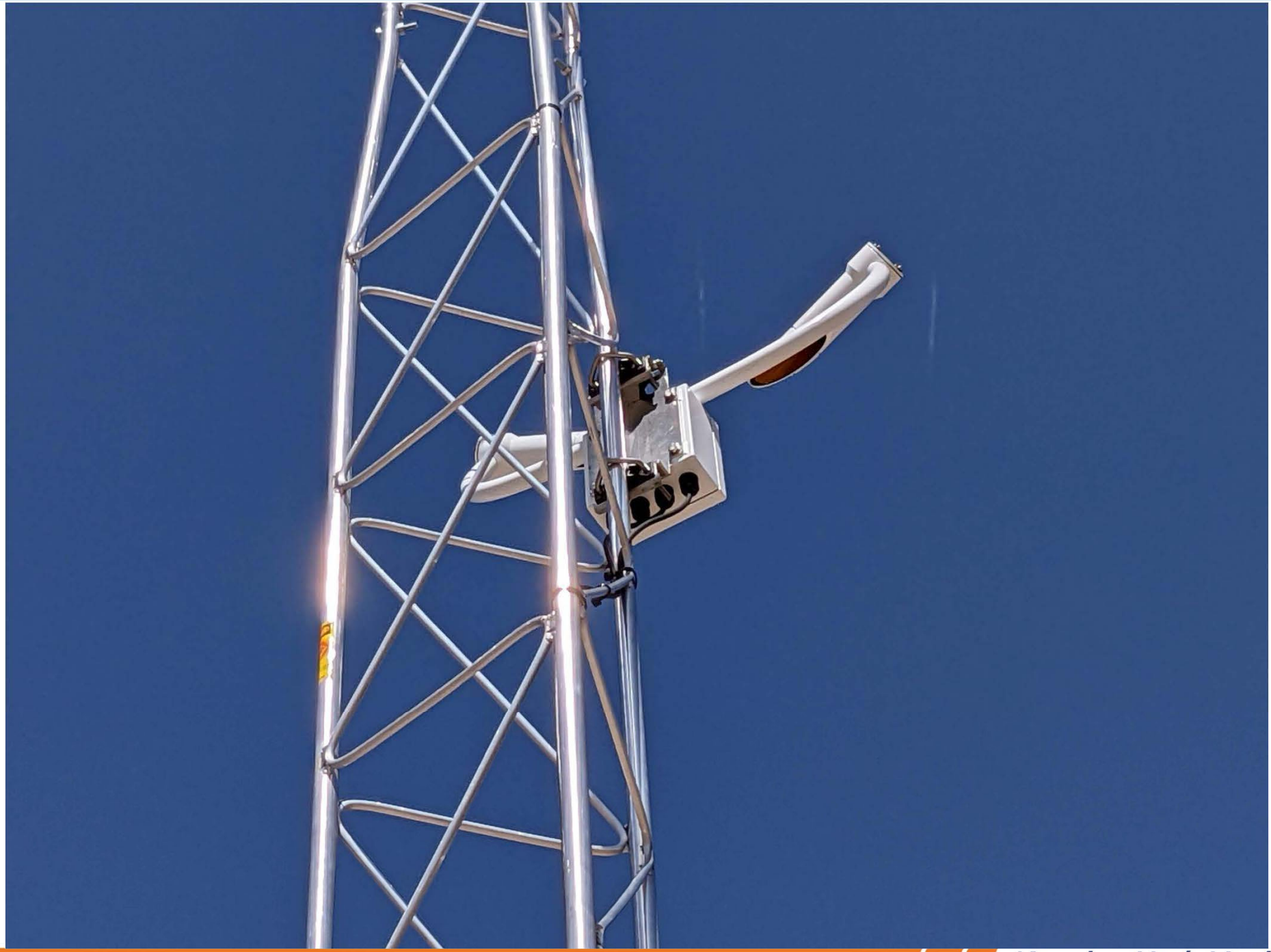
EE181 Temp/RH	*CR1000X*
Yellow	SE 3
Blue	SE 4
Red	12V
Clear	PG
Black	PG

Rotronic HC2S3 Temp/RH	*CR1000X*
Brown (Temp)	SE 3
White (RH)	SE 4
Green	12V
Grey	PG
Yellow	SG
Clear	SG

HMP45C Temp/RH	*CR1000X*
Yellow	SE 3
Blue	SE 4
Red	12V
Black	PG
White	SG
Clear	SG

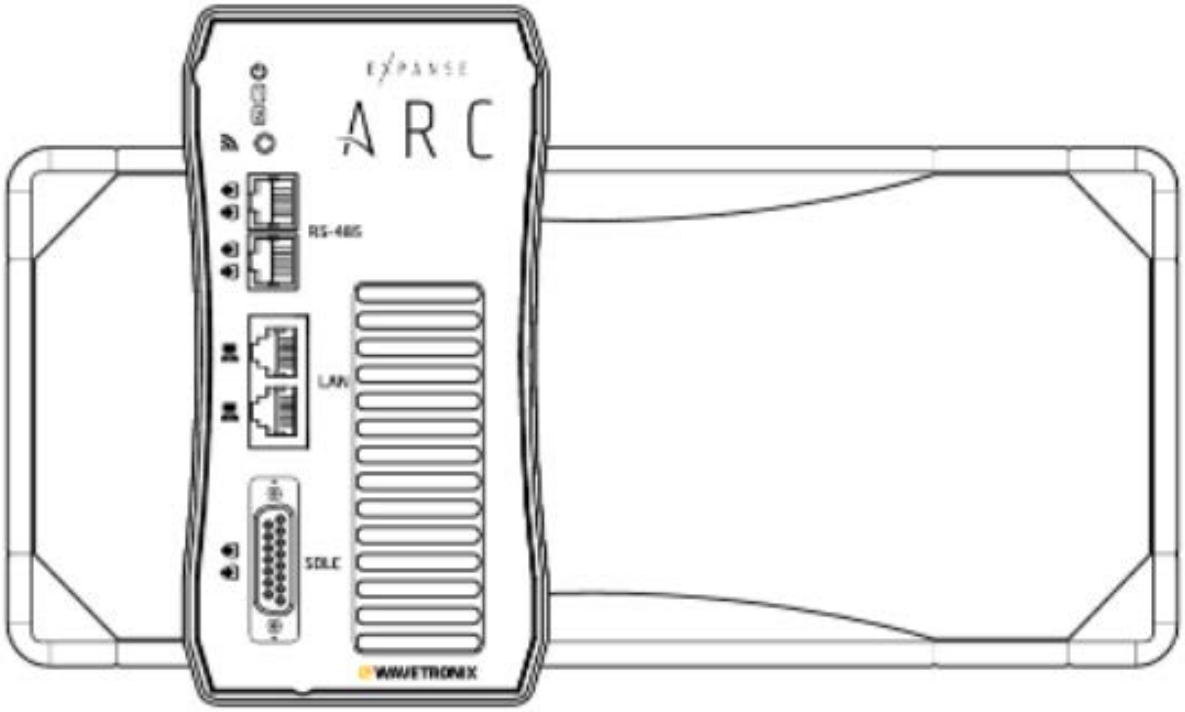
CS215 Temp/RH	*CR1000X*	*CS125*
Red	-	Pin 1
Green	-	Pin 2
Black/White/Clear	-	Pin 3
Red	12V	-
Green	C1	-
Black/White/Clear	PG	-
Clear	SG	-

Hygrovue 10	*CR1000X*
White	C3
Brown	12V
Black	PG
Clear	PG




CLIMBING
LANE
1/4 MILE

VSL Design Wavetronix Components


EXPANSE
ARC
RS-485
LAN
SDLC
WAVETRONIX


Arc
Surge
WAN

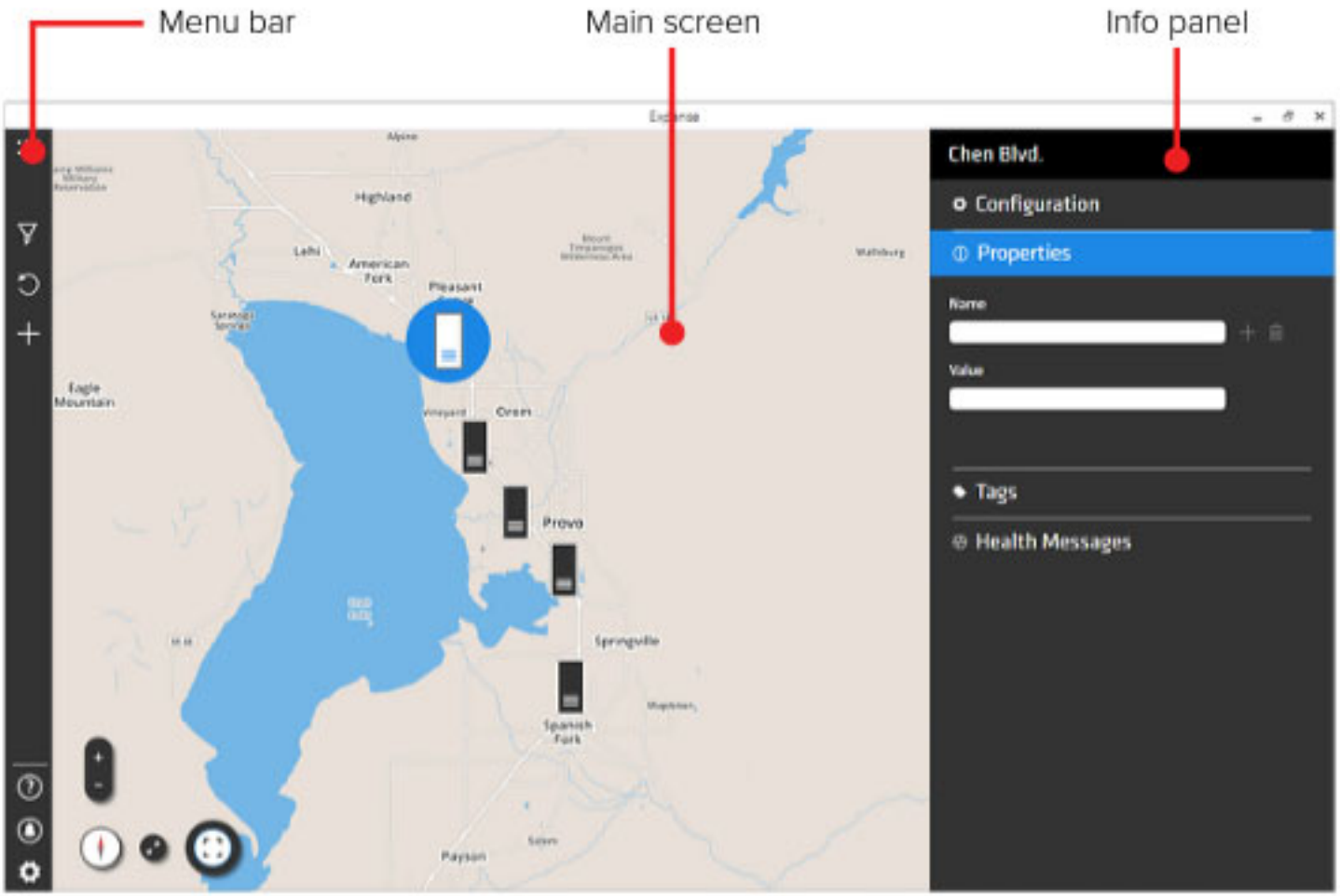


Figure 20. Parts of Expanse software

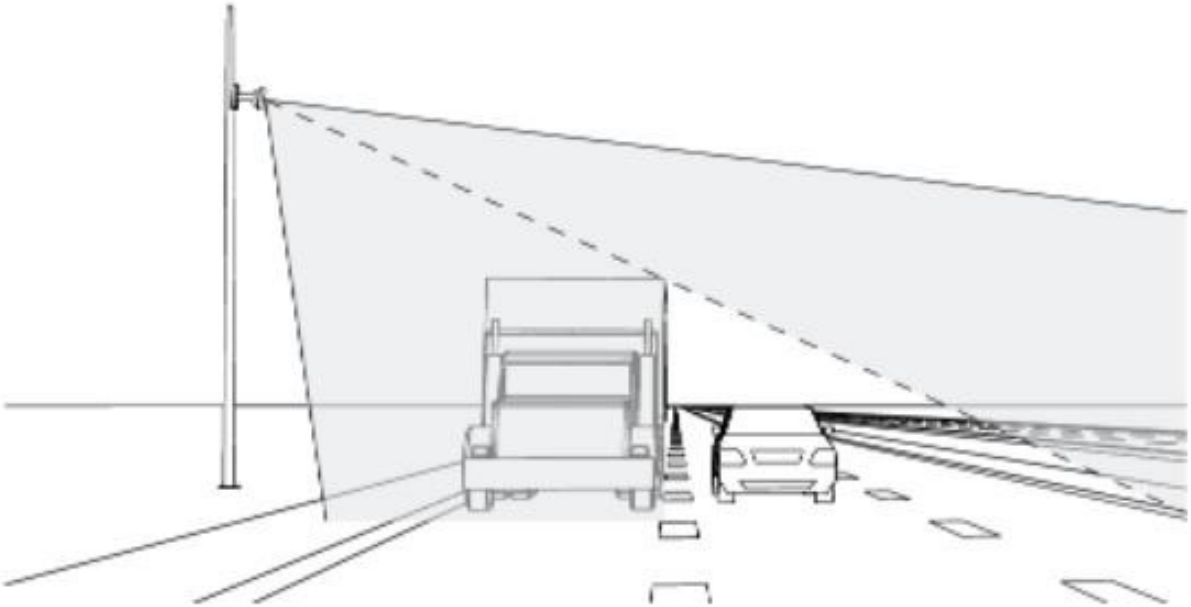


Figure 4. Occlusion

Occlusion occurs when one object blocks another object from the sensor's view, as shown above. This can happen with

- Tall vehicles like semi trucks
- Signs
- Barriers and sounding walls
- Trees and more

VSL Design Axis CCTV

AXIS Q6215-LE PTZ Network Camera

Heavy-duty PTZ camera with OptimizedIR

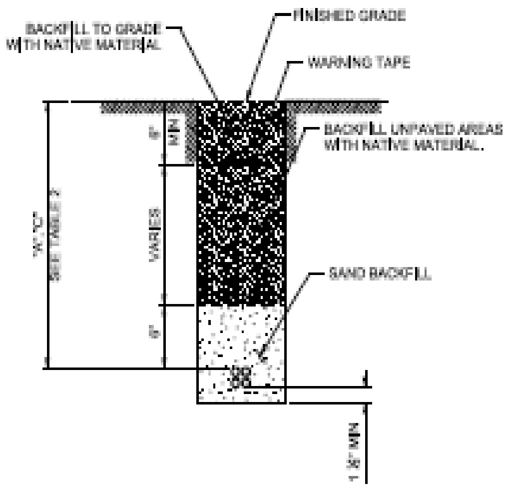
AXIS Q6215-LE PTZ Network Camera has a ½-inch sensor and combines great image quality with fast panning, tilting, and zooming. Its powerful, built-in IR illumination allows for an impressive viewing range in total darkness (up to 400 m or 1300 ft). This camera is ideal for open-area surveillance, since its robust design can withstand the toughest weather conditions including wind speed up to 245 km/h (150 mph). AXIS Q6215-LE is compliant with IP66, IP68, IK10, and NEMA 4X. It can be mounted facing up or down and comes equipped with a wiper to remove excess water, rain, or snow.

- > HDTV 1080p with 30x zoom
- > Long-range OptimizedIR
- > MIL-STD-810G compliant
- > AXIS Guard Suite analytics
- > Zipstream, Lightfinder, and WDR

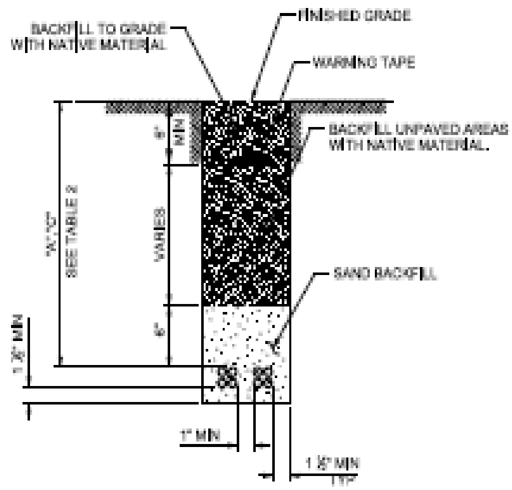
AXIS Q6215-LE PTZ Network Camera

Camera	
Image sensor	1/1.9" progressive scan RGB CMOS
Lens	Zoom lens, 6.7–201 mm, F1.6–5.3 Horizontal field of view: 58.6°–2.2° Vertical field of view: 34.1°–1.2° Autofocus, automatic day/night
Day and night	Automatically removable infrared-cut filter
Minimum illumination	Color: 0.07 lux at 30 IRE F1.6 B/W: 0.008 lux at 30 IRE F1.6, 0 lux with built-in IR illumination Color: 0.1 lux at 50 IRE F1.6 B/W: 0.01 lux at 50 IRE F1.6, 0 lux with built-in IR illumination
Shutter speed	1/30000 s to 1/6 s
Pan/Tilt/Zoom	Pan: 360° endless, 0.05°/s to 150°/s Tilt: –90° to +90°, 0.05°/s to 150°/s Zoom: 30x optical zoom, 21x digital zoom Preset accuracy: 0.10° 256 preset positions, tour recording, guard tour, control queue, orientation aid PTZ
System on chip (SoC)	
Model	ARTPEC-6
Memory	1024 MB RAM, 512 MB Flash
Video	
Video compression	H.264 (MPEG-4 Part 10/AVC), H.264 Main, High and Baseline Profiles Motion JPEG
Resolution	1920x1080 HDTV 1080p to 320x180
Frame rate	Up to 60/50 fps (60/50 Hz) in all resolutions
Video streaming	Multiple, individually configurable streams in H.264 and Motion JPEG Axis Zipstream technology in H.264 Controllable frame rate and bandwidth VBR/ABR/MBR H.264
Image settings	Saturation, brightness, sharpness, noise reduction, WDR – up to 110 dB depending on scene, white balance, day-night shift priority, exposure mode, manual shutter time, defogging, backlight compensation, highlight compensation, compression, fine tuning of low-light behavior, text and image overlay, privacy masks, electronic image stabilization (EIS)[a]
Network	
Security	Password protection, IP address filtering, HTTPS[b] encryption, IEEE 802.1x (EAP-TLS)[b] network access control, digest authentication, user access log, centralized certificate management, brute force delay protection
Supported protocols	IPv4/v6, ICMPv4/ICMPv6, HTTP, HTTP/2, HTTPS[b], TLS[b], QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMPv1/v2/v3, RTCP, ICMP, DHCPv4/v6, ARP, SOCKS, SSH, LLDP, NTCIP, CDP, MQTT v3.1.1, Syslog, Link-Local address (ZeroConf)
System integration	
Application Programming Interface	Open API for software integration, including VAPIX® and AXIS Camera Application Platform, specifications at *axis.com* One-click cloud connection ONVIF® Profile G, ONVIF® Profile M, ONVIF® Profile S, and ONVIF® Profile T, specification at *onvif.org*
Event triggers	Analytics, edge storage events, virtual inputs through API Detectors: day/night mode, live stream accessed, shock detection Hardware: fan, network, temperature Input Signal: virtual inputs, manual trigger MQTT subscribe PTZ: autotracking, error, moving, preset reached, ready Storage: disruption, recording System: system ready Time: use schedule
Event actions	Record video: SD card and network share MQTT publish Upload of images or video clips: FTP, SFTP, HTTP, HTTPS, network share and email Pre- and post-alarm video or image buffering for recording or upload Notification: email, HTTP, HTTPS, and TCP PTZ: PTZ preset, start/stop guard tour, autotracking Overlay text, day/night mode
Data streaming	Event data
Built-in installation aids	Pixel counter Automatic orientation
Analytics	
Applications	**Included** AXIS Motion Guard, AXIS Fence Guard, and AXIS Loitering Guard AXIS Video Motion Detection, autotracking, gatekeeper **Supported** Support for AXIS Camera Application Platform enabling installation of third-party applications, see *axis.com/acap*
General	
Cybersecurity	Signed firmware
Casing	IP66-, IP68-, NEMA 4X- and IK10-rated aluminum casing Color: urban grey NCS S 5502-B Wiper included (silicone wiper blade)
Sustainability	PVC free
Power	High PoE 95 W midspan 1-port: 100–240 V AC, max 1.35 A IEEE 802.3bt Type 4 Class 8 Camera consumption: typical 25 W, max 71 W
Connectors	RJ45 10BASE-T/100BASE-TX/1000BASE-T PoE
IR illumination	OptimizedIR with power-efficient, long-life 850 nm IR LEDs Range of reach 400 m (1300 ft) or more depending on the scene
Storage	Support for SD/SDHC/SDXC card Support for SD card encryption (AES-XTS-Plain64 256bit) Recording to network-attached storage (NAS) For SD card and NAS recommendations, see *axis.com*
Operating conditions	-50 °C to 55 °C (-58 °F to 131 °F) Maximum temperature according to NEMA TS 2 (2.2.7): 74 °C (165 °F) **Arctic Temperature Control:** Start-up as low as -40 °C (-40 °F) Humidity 10–100% RH (condensing) **Wind load (sustained):** 68 m/s (150 mph)
Storage conditions	-40 °C to 65 °C (-40 °F to 149 °F)
Approvals	**EMC** EN 55032 Class A, EN 50121-4, EN 61000-3-2, EN 61000-3-3, EN 55024, EN 61000-6-1, EN 61000-6-2, FCC Part 15 Subpart B Class A, ICES-003 Class A, VCCI Class A, RCM AS/NZS CISPR 32 Class A, KC KN32 Class A, KC KN35 **Safety** IEC/EN/UL 62368-1, IEC/EN/UL 60950-22, IEC/EN 62471 risk group 2, IS 13252 **Environment** IEC/EN 60529 IP66/IP68, NEMA 250 Type 4X, NEMA TS 2 (2.2.7-2.2.9), IEC/EN 62262 IK10, MIL-STD-810G (Method 501.5, 502.5, 506.5, 509.5, 521.3), IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-14, IEC 60068-2-27, IEC 60068-2-78 **Network** NIST SP500-267 **Midspan:** EN 60950-1, GS, UL, cUL, CE, FCC, VCCI, CB
Dimensions	210 x 330 x 313 mm (4 5/16 x 13 x 12 5/16 in)
Weight	8.7 kg (19.3 lb)
Included accessories	Installation Guide, Windows® decoder 1-user license, IK10 bumper, High PoE Midspan 1-port, RJ45 connector push pull plug
Optional accessories	AXIS T95A64 Corner Bracket AXIS T98A15-VE Media Converter Cabinet A For more accessories, see *axis.com*
Video management software	AXIS Companion, AXIS Camera Station, video management software from Axis' Application Development Partners available at *axis.com/vms*
Languages	English, German, French, Spanish, Italian, Russian, Simplified Chinese, Japanese, Korean, Portuguese, Traditional Chinese

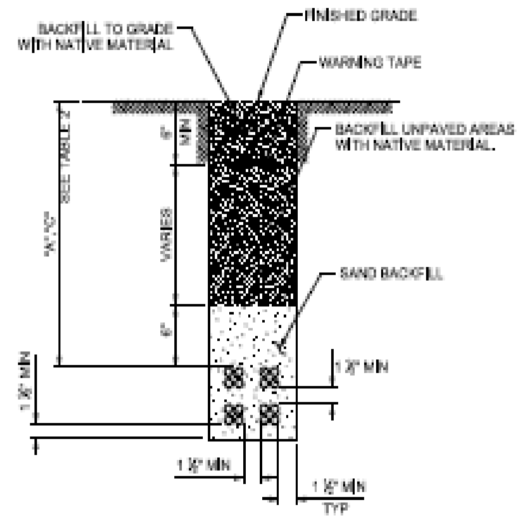
I-15 Baker Canyon Std. Drawings



Ⓐ **1-D MULTIDUCT CONDUIT**



Ⓑ **2-D MULTIDUCT CONDUIT**



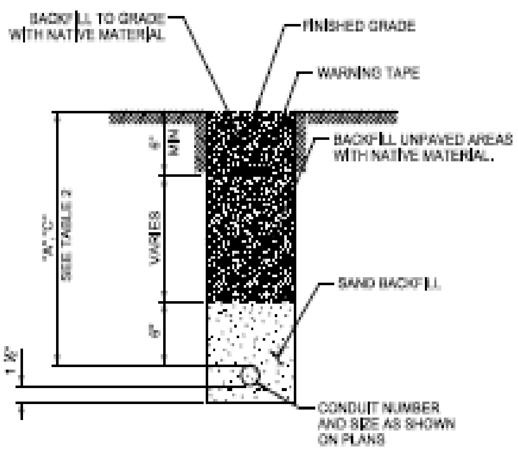
Ⓒ **4-D MULTIDUCT CONDUIT**

TABLE 1, T PATCH RESTORATION

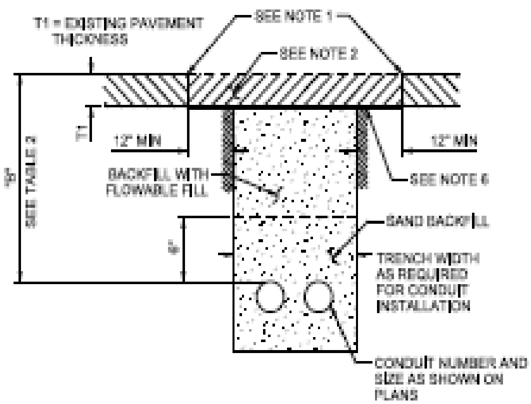
EXISTING ASPHALT PAVEMENT THICKNESS (T1) IN INCHES	RESTORATION T PATCH THICKNESS IN INCHES
0 - 3 ½"	3 ½"
3 ½" - 7"	MATCH EXISTING DEPTH
7" OR GREATER	7"

TABLE 2, MINIMUM CONDUIT DEPTH

	DEPTH IN INCHES	AREA
A	36	OUTSIDE 20 FT OF PAVEMENT EDGE
B	48	HIGHWAY RIGHT-OF-WAY UNDER ASPHALT PAVEMENT SURFACE
C	60	WITHIN 20 FT OF PAVEMENT EDGE



Ⓓ **NON-MULTIDUCT CONDUIT AND BUNDLED MICRODUCT**



Ⓔ **CONDUIT TRENCHED IN ASPHALT PAVEMENT RESTORED WITH T PATCH**

NOTES:

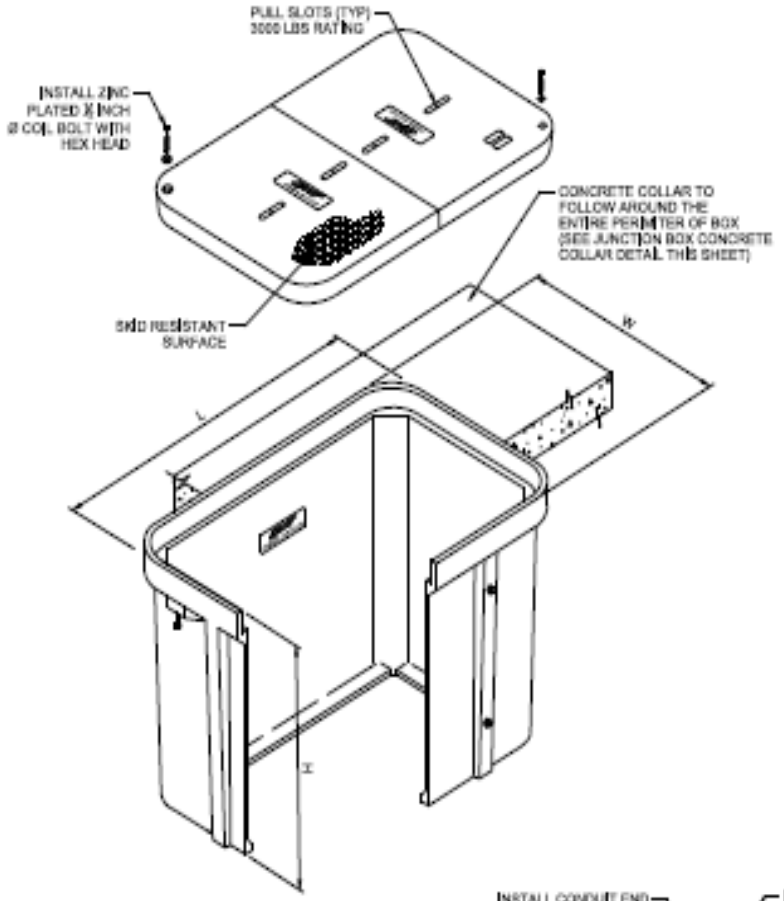
1. SAW CUT PAVEMENT EDGES, APPLY A HOT-POUR RUBBERIZED ASPHALT JOINT SEALANT OR APPROVED EQUAL, APPLIED AFTER PATCH IS INSTALLED.
2. USE HMA MATERIAL FOR T-PATCH, USE OPEN-GRADED SURFACE COURSE FOR THE TOP 1 INCH OF HMA FOR PATCHES GREATER THAN 12 FT WIDE, WHERE OPEN-GRADED SURFACE COURSE EXISTS, MATCH EXISTING PAVEMENT AND CROSS-SECTION.
3. USE SAND BACKFILL AND FLOWABLE FILL WITHIN EXISTING ROADWAY, PROPOSED ROADWAY, AND SIDEWALK PAVEMENT AREAS ONLY.
4. INSTALL DETECTABLE PULL TAPE IN ALL EMPTY CONDUITS.
5. EVENLY APPLY TACK COAT ON FINAL BACKFILL BEFORE INSTALLING T-PATCH.
6. USE ½ INCH MINUS WELL-GRADED SAND.

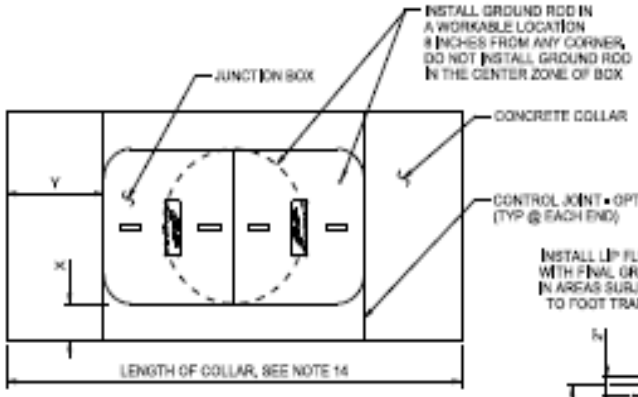
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL 03/17/2021
CHAIRMAN STANDARDS COMMITTEE APPROVED DATE 03/17/2021
DEPUTY DIRECTOR DATE

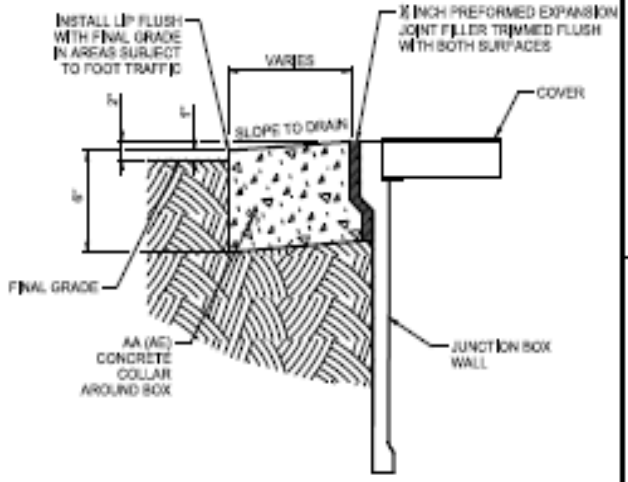
CONDUIT DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
AT 6





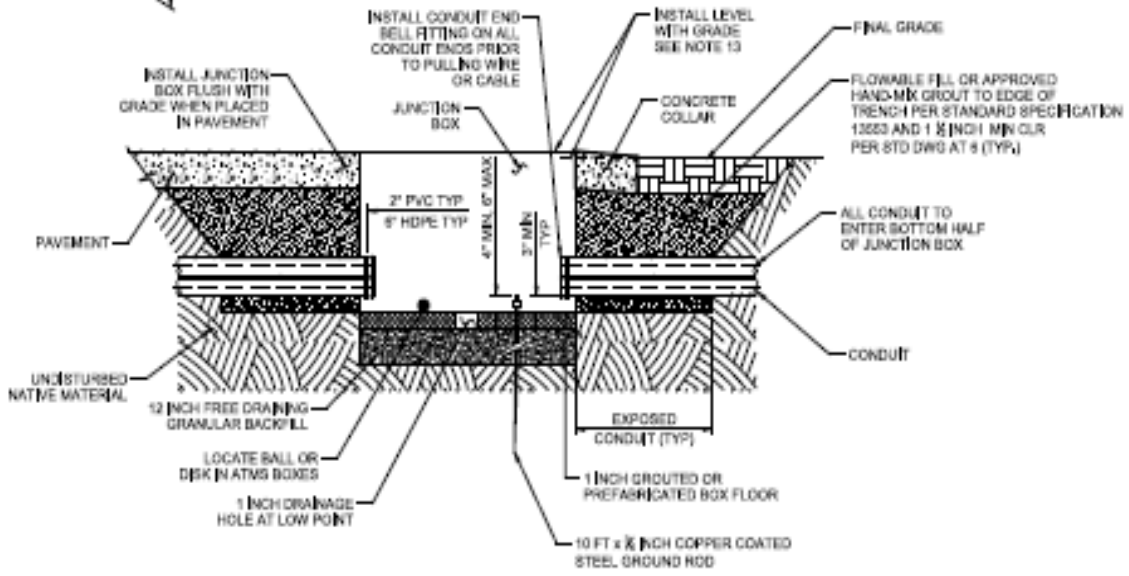
PLAN VIEW - JUNCTION BOX AND CONCRETE COLLAR



JUNCTION BOX CONCRETE COLLAR DETAIL

TABLE OF DIMENSIONS

BOX TYPE	"W" inch	"L" inch	"H" inch	"X" inch	"Y" inch	LOADING
I-PC	13	24	24	10	10	TIER 22
II-PC	24	36	36	10	24	TIER 22
III-PC	30	48	36	10	24	TIER 22



JUNCTION BOX CONDUIT PENETRATION DETAIL

NOTES:

1. BOX LOGO OR NAME PLATE, REFER TO STANDARD SPECIFICATION 13554.
2. DO NOT PLACE JUNCTION BOXES IN THE TRAVELED WAY OR ON FREEWAY SHOULDERS.
3. CONCRETE COLLAR WIDTH VARIES WHEN ADJACENT TO ATMS CABINETS. REFER TO AT AND SL SERIES STD DWGS.
4. PROVIDE CONCRETE COLLARS EXCEPT WITHIN CONCRETE PAVED AREAS.
5. INSTALL CONDUIT PLUG PER STANDARD SPECIFICATION 13554.
6. ALIGN ATMS CONDUIT BY COLOR ON EACH SIDE OF THE JUNCTION BOX.
7. PROVIDE TYPE III-PC JUNCTION BOXES WITH A SPLIT LID.
8. CONFORM TO ANSI/SCTE-77 "SPECIFICATION FOR UNDERGROUND ENCLOSURE INTEGRITY" TIER 22 LOADING FOR ALL JUNCTION BOXES. TIER 22 ID PLATE TO BE VISIBLE ON BOX.
9. EXTEND GROUND ROD A MINIMUM OF 4 INCHES AND A MAXIMUM OF 6 INCHES ABOVE BOTTOM OF JUNCTION BOX.
10. USE INTER SYSTEM GROUNDING BRIDGE CLAMP FOR BONDING TO GROUND ROD. ATTACH NOT MORE THAN 4 WIRES PER CLAMP.
11. DO NOT CUT GROUND RODS.
12. PROVIDE CLEAR SPACE OF AT LEAST 36 INCH FOR PERSONNEL TO PULL LID OFF BOX WITHOUT CONFLICT.
13. PLACE JUNCTION BOXES AND CONCRETE COLLARS LEVEL WITH GRADE ON SLOPES 6:1 OR FLATTER, REFER TO PLANS FOR DETAILS OF JUNCTION BOX PLACEMENTS ON SLOPES STEEPER THAN 6:1, SLOPE CONCRETE COLLAR TO DRAIN AS SHOWN.
14. INSTALL ENTIRE PAD UNIFORMLY TO LONGEST LENGTH WHEN SEVERAL JUNCTION BOXES ARE BEING PLACED ADJACENT TO ONE ANOTHER.

		4/30/25	MAK ADDED "SEE FINAL" TO CONCRETE COLLAR DETAIL
		DATE	APP'D

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

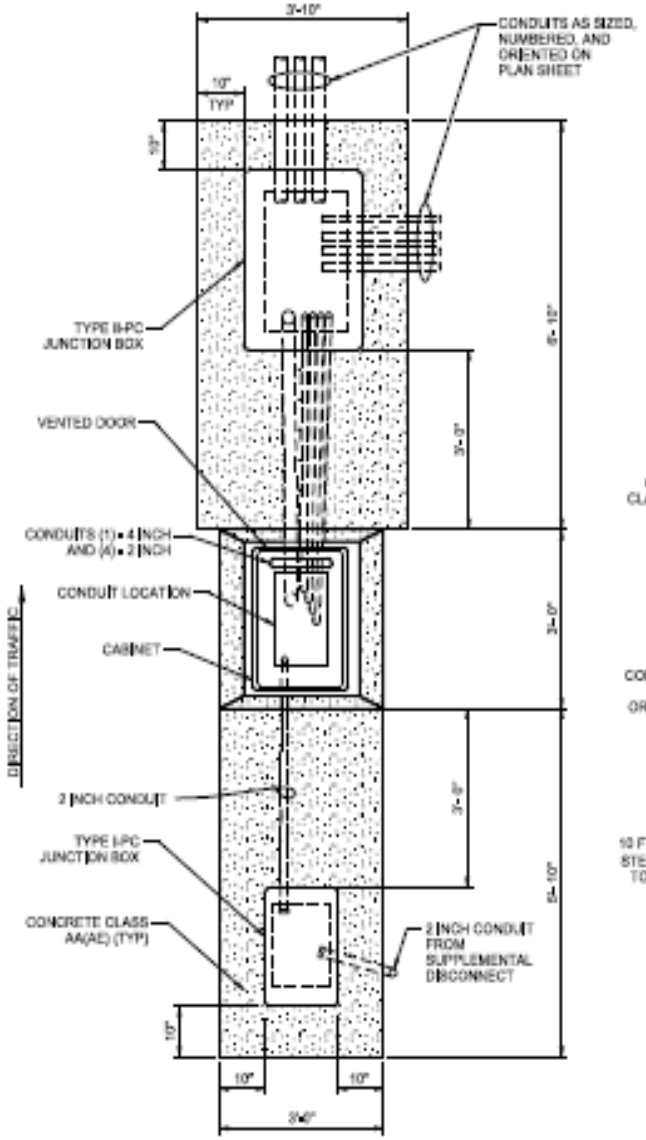
03/17/2021
DATE

03/17/2021
DATE

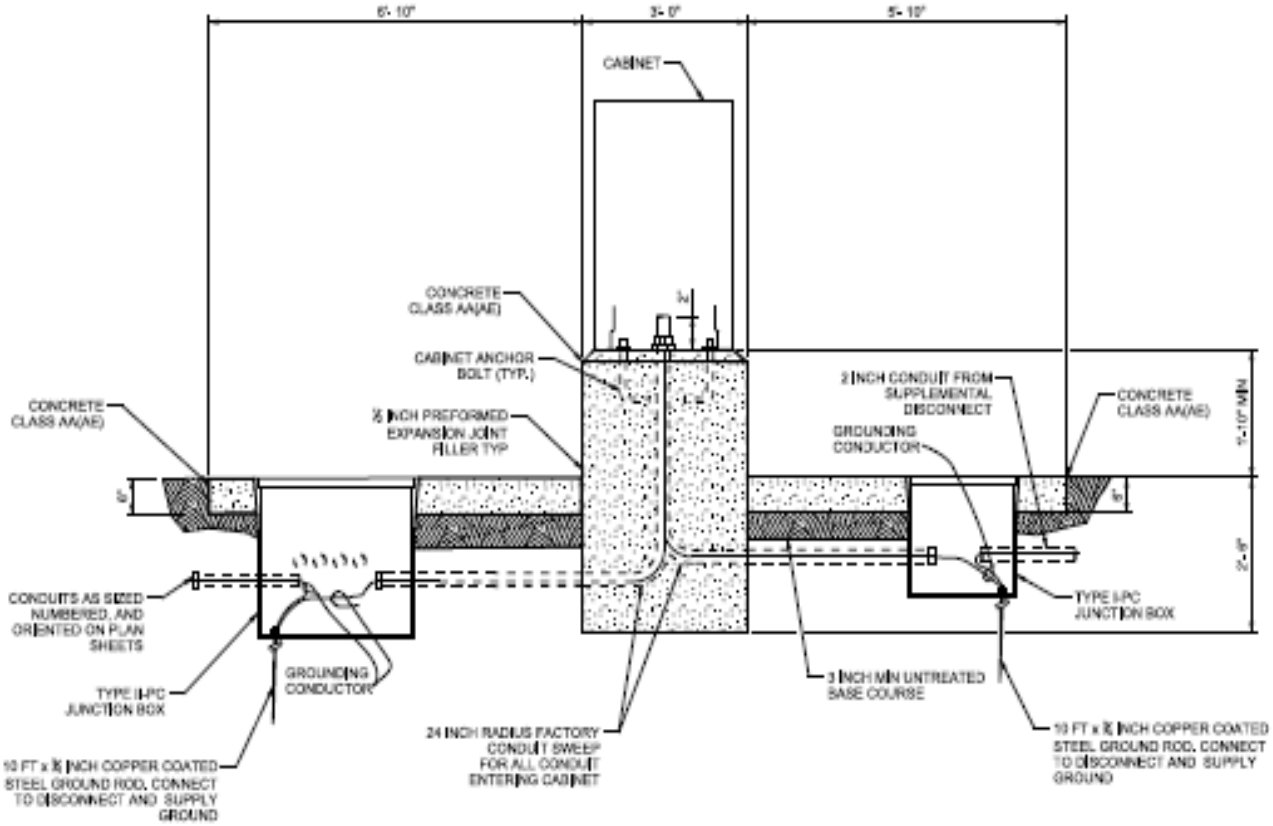
POLYMER CONCRETE JUNCTION BOX DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
AT 7A



PLAN VIEW



SIDE ELEVATION

(A) ATMS CABINET

NOTES:

1. SEE STD DWG AT 9 FOR CABINET DISCONNECT AND TRANSFORMER DETAIL.
2. FIELD VERIFY CONDUIT LAYOUT IN FOUNDATION TO AVOID CONFLICT WITH CABINET.
3. SEE STD DWG AT 7 FOR TYPICAL ATMS JUNCTION BOX INSTALLATION.

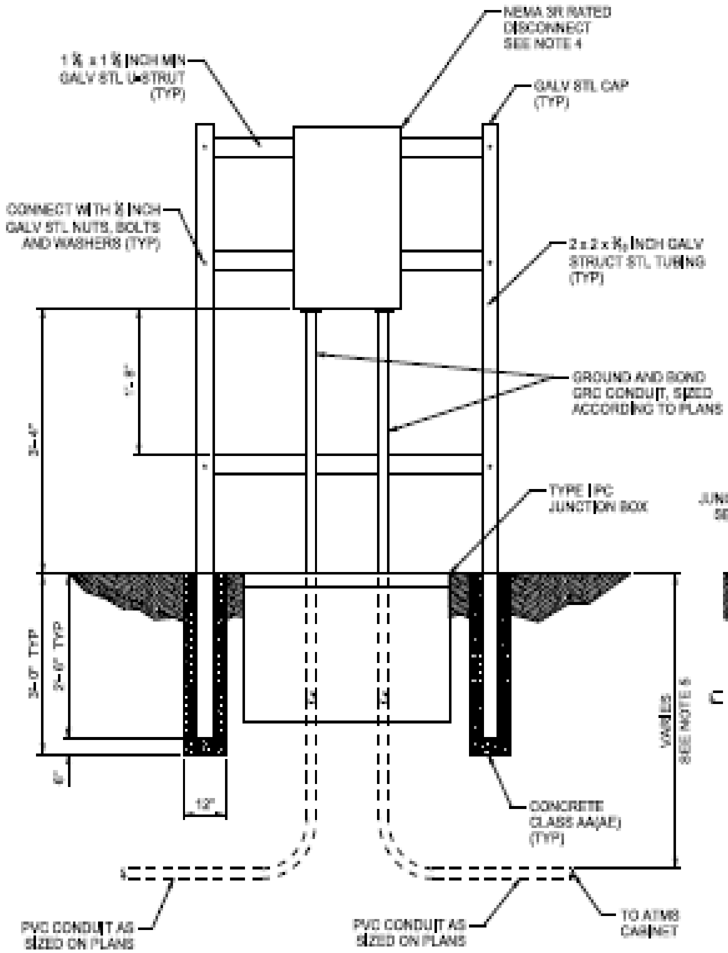
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

03/17/2021
03/17/2021

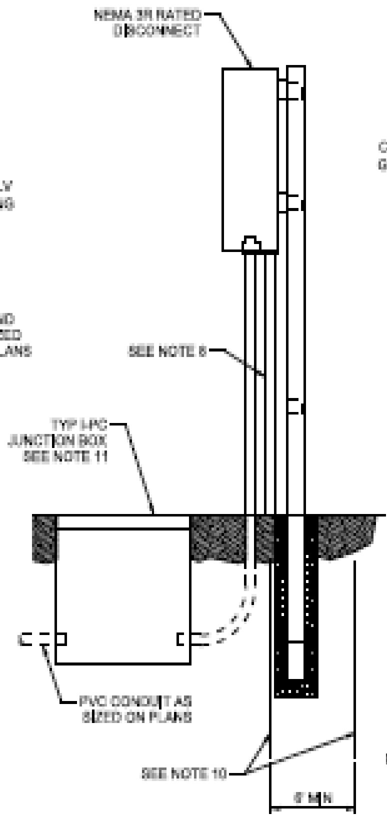
ATMS CABINET

STANDARD DRAWING TITLE

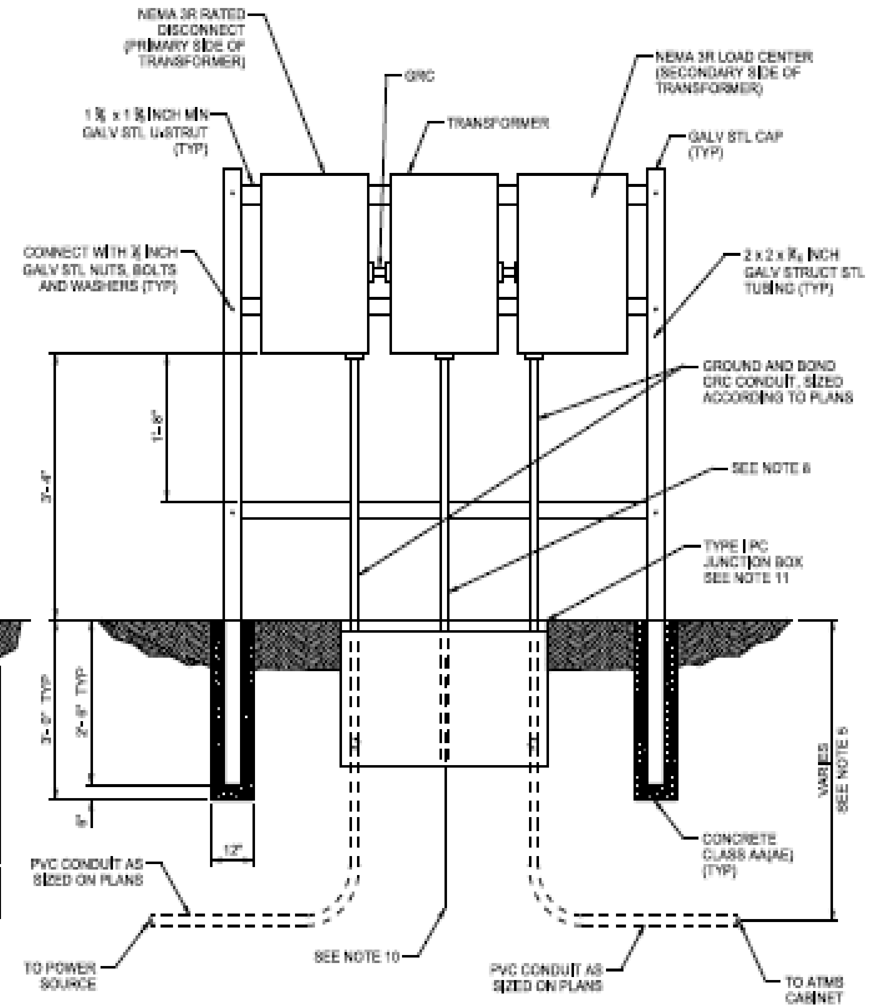
STD. DWG. NO.
AT 8



A SUPPLEMENTAL DISCONNECT FRAME



PROFILE VIEW



B SUPPLEMENTAL DISCONNECT WITH TRANSFORMER FRAME

NOTES:

1. LOCATE FRAME 10 TO 15 FT FROM CABINET AND ATMS EQUIPMENT.
2. ROUND OFF SHARP EDGES OF STRUCTURAL TUBING, PAINT CUT ENDS OF FRAMING STRUTS WITH ZINC RICH PAINT.
3. APPLY CORROSION PROTECTION TO PORTION OF STRUT BELOW GRADE.
4. ATTACH TRANSFORMER, DISCONNECT AND LOAD CENTER TO FRAMING STRUT WITH WATERTIGHT GASKETS AND GALVANIZED HARDWARE.
5. REFER TO STANDARD SPECIFICATION 13553 FOR CONDUIT DEPTH.
6. USE ONLY FACTORY PRODUCED CONDUIT SWEEPS.
7. SIZE ENCLOSURE TO ACCOMMODATE CONDUIT SIZES PER PLAN.
8. INSTALL 1 INCH SCHEDULE 80 PVC AS PROTECTION FOR GROUNDING ELECTRODE CONDUCTOR.
9. ALL MATERIALS USED MUST BE RATED FOR THE VOLTAGE AND CURRENT AS SHOWN.
10. INSTALL 2 EACH 10 FT X 5/8 INCH GROUND RODS DIRECTLY BELOW SUPPORT FRAME, SPACED MINIMUM 6 FT APART AT TRANSFORMER LOCATIONS. INSTALL 6 AWG COPPER GROUNDING ELECTRODE CONDUCTOR BETWEEN GROUND RODS 6 INCHES BELOW GRADE AND BOND TO TRANSFORMER SECONDARY ACCORDING TO NEC ARTICLE 250 REQUIREMENTS.
11. LOCATE TYPE I PC JUNCTION BOX MINIMUM 6 FT AND MAXIMUM 10 FT FROM FRAME.

REVISIONS

NO.	DATE	APPR.	REMARKS
3	5/27/16	MMA	REMOVED SIZE OF GRC IN LEADER
2	[illegible]	JBF	CORRECTED CALL OUT, NOTE 1, ADDED
1	[illegible]	MMA	CORRECTED DIMENSION ERROR, ADDED REFERENCE TO NOTE 11

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

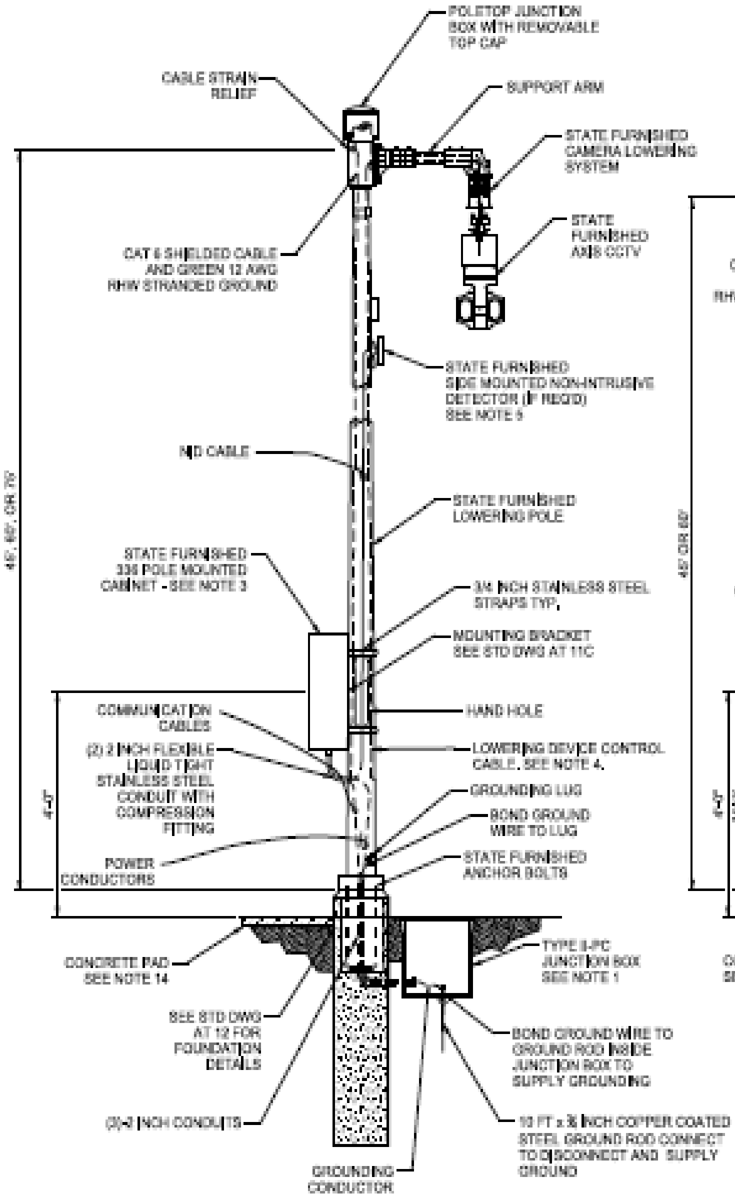
RECOMMENDED FOR APPROVAL: 04/28/2021
CHAIRMAN STANDARDS COMMITTEE
APPROVED: 04/30/2021
DEPUTY DIRECTOR
DATE

ATMS CABINET AND EQUIPMENT DISCONNECT AND TRANSFORMER FRAME

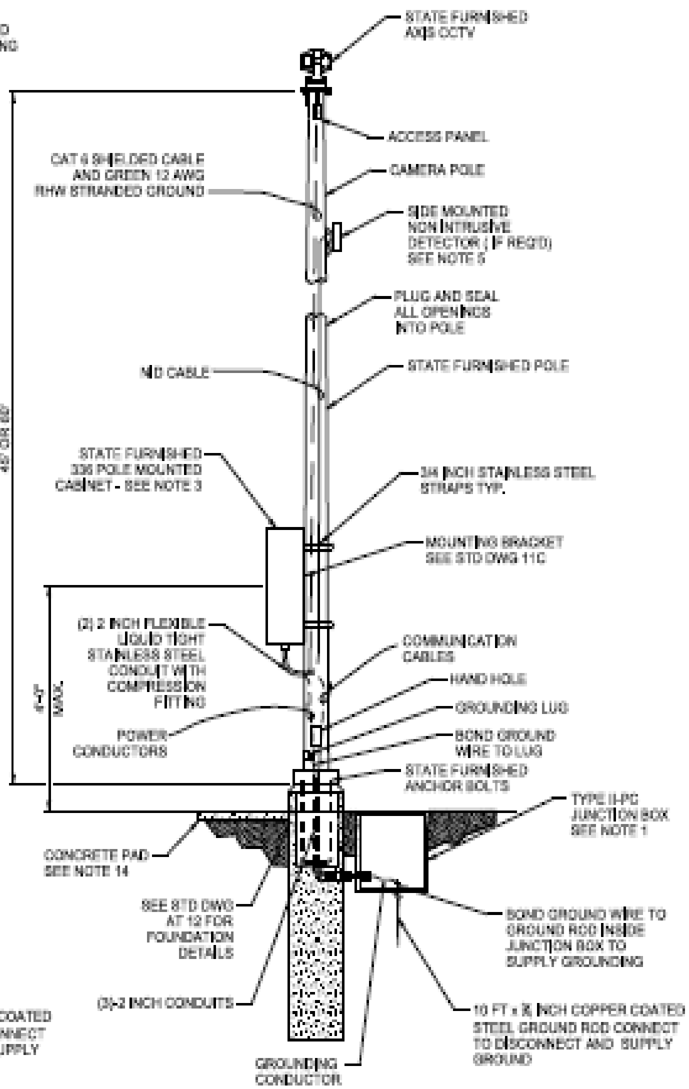
STANDARD DRAWING TITLE

STD. DWG. NO.

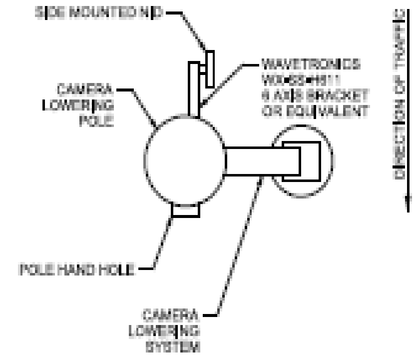
AT 9



(A) CAMERA LOWERING POLE DETAIL



(B) NON-LOWERING CCTV POLE DETAIL



(C) CAMERA LOWERING POLE NID MOUNTING DETAIL TOP VIEW

NOTES:

1. REFER TO STD DWG AT 7 FOR JUNCTION BOX DETAILS.
2. REFER TO STD DWG AT 10A AND 10B FOR CAMERA MOUNTING DETAILS.
3. USE POLE MOUNTED CABINET UNLESS PAD MOUNTED ATMS CABINET IS CALLED FOR ON PLANS.
4. LOWERING CABLE MUST NOT CONTACT ANY OTHER CABLE.
5. MOUNT NID TO NOT INTERFERE WITH CAMERA LOWERING OPERATION. MOUNT NID 30'-0" ABOVE GROUND SURFACE OR AS SPECIFIED.
6. LOCATE POLE AT STATION AND OFFSET AS SHOWN.
7. CABINET MUST NOT INTERFERE WITH CAMERA LOWERING OPERATION.
8. ERECT CAMERA LOWERING POLE WITH HAND HOLE ON DOWN STREAM TRAFFIC SIDE OF POLE.
9. DO NOT INSTALL CAMERA LOWERING SYSTEM OR NID ON SAME SIDE OF POLE AS HAND HOLE.
10. ALL CONDUIT ENTRY MUST BE THROUGH BOTTOM OF CABINET.
11. ALL FLEXIBLE STEEL CONDUIT MUST BE INTENDED FOR OUTDOOR APPLICATION.
12. SEE STD DWG AT 11C FOR CABINET POLE MOUNTING DETAILS.
13. REFER TO STANDARD SPECIFICATION 16530 FOR GROUNDING REQUIREMENTS.
14. PROVIDE AN 8 FT LONG X 3 FT WIDE X 4 INCH DEEP CONCRETE PAD, CENTERED UNDER THE MODEL 336 STATE FURNISHED POLE MOUNTED CABINET.

UTAH DEPARTMENT OF TRANSPORTATION
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SALT LAKE CITY, UTAH

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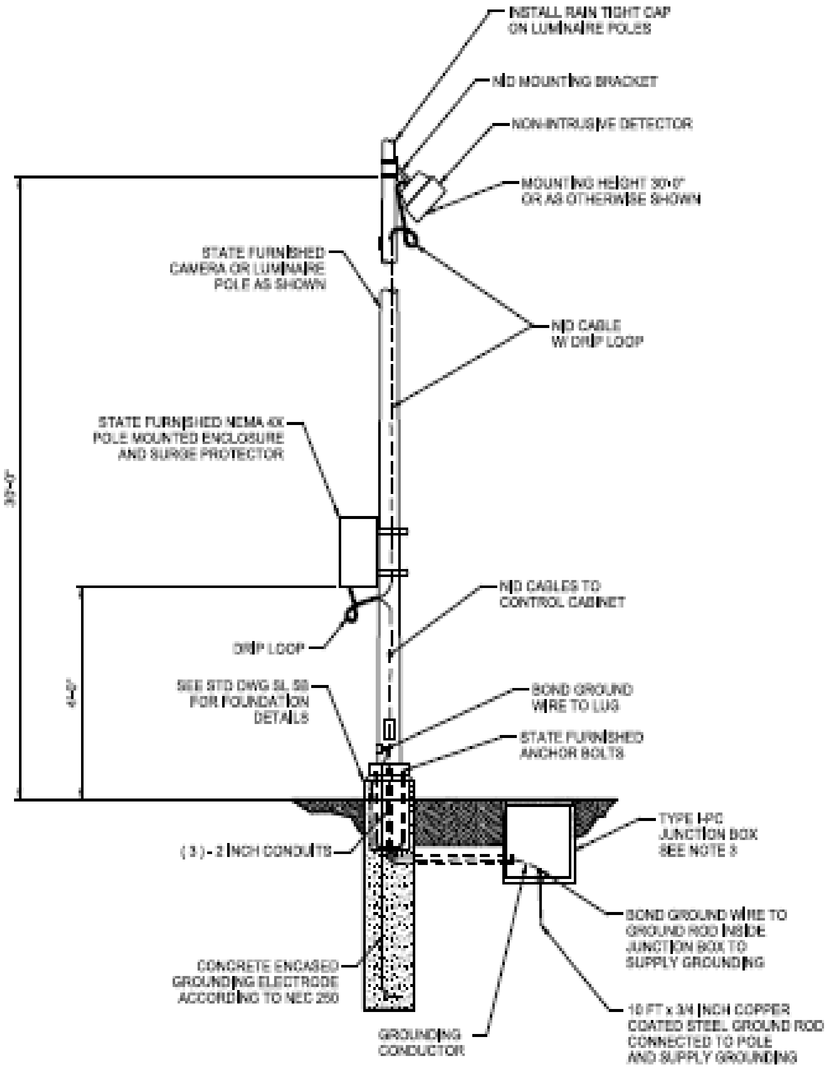
DEPUTY DIRECTOR

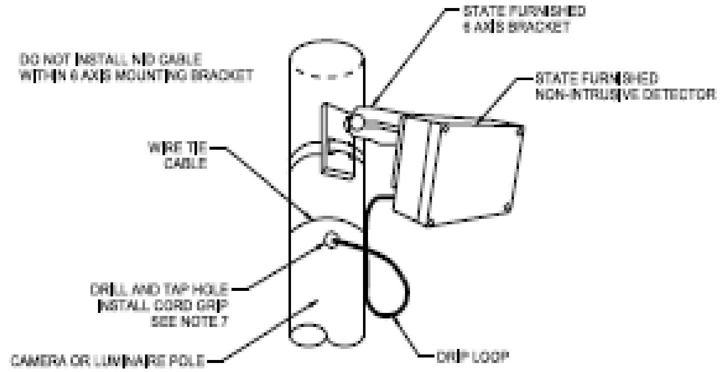
CCTV POLE MOUNTING DETAILS

STANDARD DRAWING TITLE

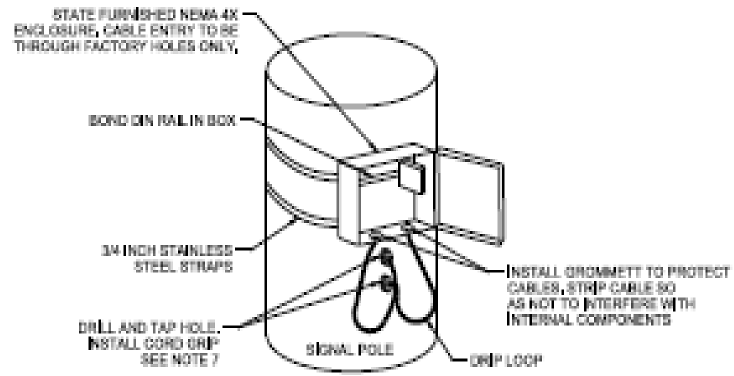
STD. DWG. NO.
AT 11A



(A) NID MOUNTING DETAIL
NON-LOWERING AND LUMINAIRE POLES



(B) NID MOUNT ASSEMBLY DETAILS
NON-LOWERING AND LUMINAIRE POLES



(C) POLE MOUNT ENCLOSURE DETAILS
CABLE ENTRY THROUGH BOTTOM

NOTES:

1. STATION POLE NO MORE THAN 240 FT PERPENDICULAR DISTANCE TO FARTHEST EDGE OF PAVEMENT.
2. LOCATE POLE AT STATION AND OFFSET AS SHOWN.
3. REFER TO STD DWG AT 7 FOR JUNCTION BOX DETAILS.
4. USE TYPE I PC JUNCTION BOX ON POLES USING NEMA 4X BOX, USE TYPE II PC JUNCTION BOX ON POLES USING NEMA 3S OR 336 POLE MOUNTED CABINETS.
5. REFER TO STD DWG SL 5B, SL 5C, AND SL 5D FOR LUMINAIRE POLE DETAILS.
6. REFER TO STD DWG AT 11A AND AT 12 FOR CCTV POLE DETAILS.
7. SUPPLY AND INSTALL CORD CONNECTOR SIZED APPROPRIATELY FOR WIRE. USE THOMAS AND BETTS, REMKE OR, HUBBELL SHC1023 CORD CONNECTORS.
8. USE SIDE MOUNT NID BRACKET ON CAMERA LOWERING POLE. DO NOT MOUNT NID DIRECTLY ABOVE HAND HOLE OR IN THE CAMERA LOWERING PATH.
9. PLACE CABLES INTO POLE MOUNT NEMA 4X ENCLOSURE THROUGH BOTTOM ONLY. DO NOT DRILL HOLES IN BACK OF ENCLOSURE.
10. REFER TO STANDARD SPECIFICATION 16530 FOR CONCRETE ENCASED ELECTRODE REQUIREMENTS.
11. USE EPOXY SPLICE KIT IF DROP CABLE IS TOO SHORT TO REACH CONTROL CABINET. SPLICE NID CABLE IN JUNCTION BOX. LEAVE 6 FT OF SLACK NEATLY STORED IN JUNCTION BOX.
12. INSTALL NEMA 4X ENCLOSURE AND CLICK 200 SURGE PROTECTOR WHEN CONTROL CABINET IS ACROSS THE ROADWAY FROM NID POLE.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

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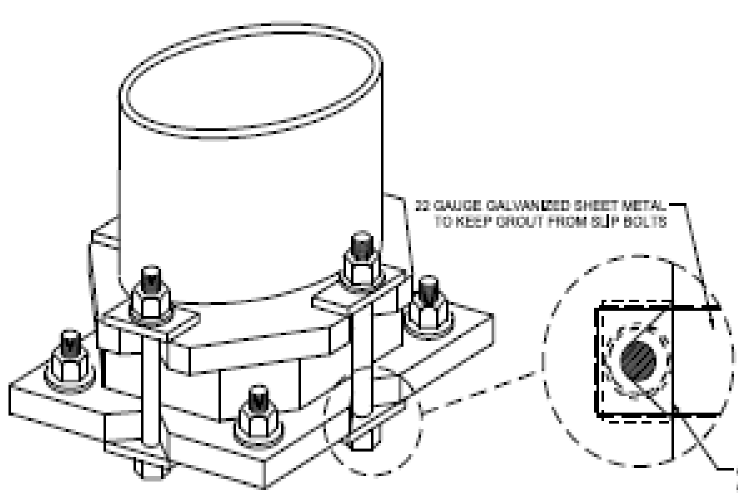
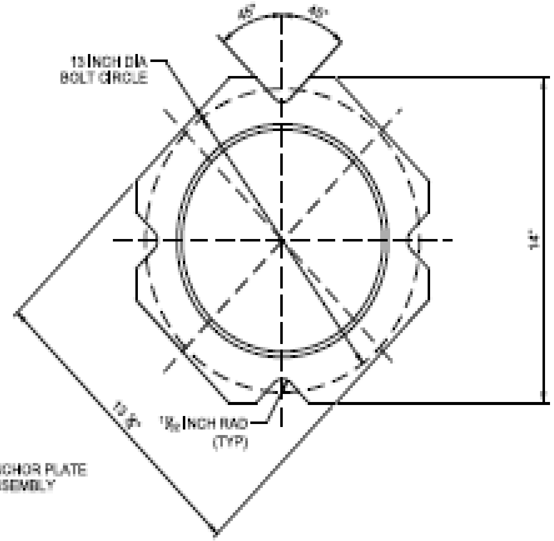
STANDARD DRAWING TITLE

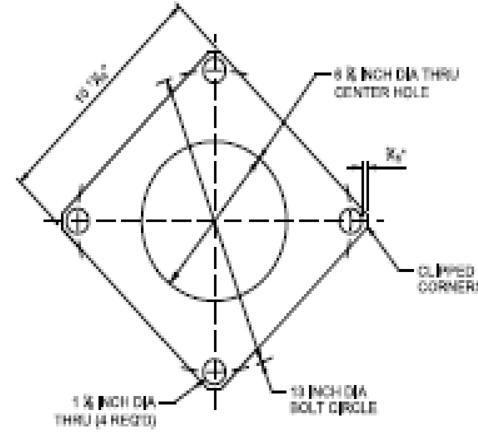
NON-INTRUSIVE DETECTOR MOUNTING DETAILS

STD. DWG. NO.
AT 11B





POLE BASE PLATE



KEEPER PLATE

(28 GAUGE STAINLESS STEEL)

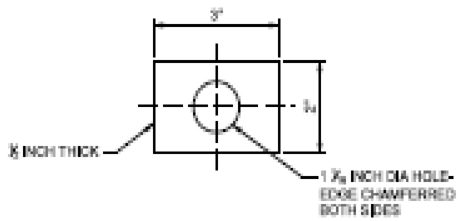
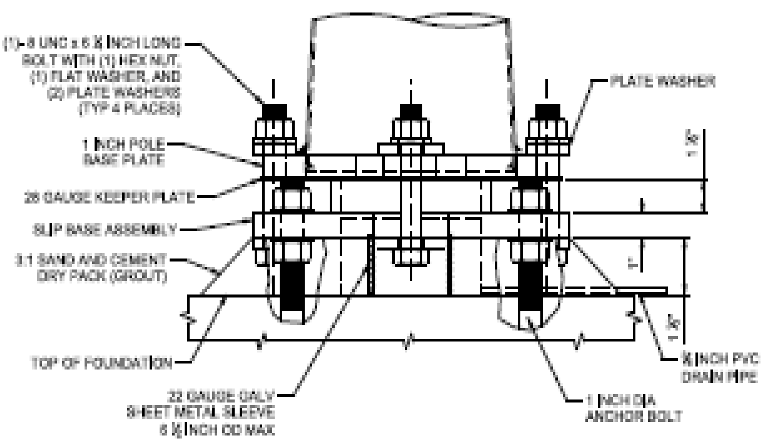
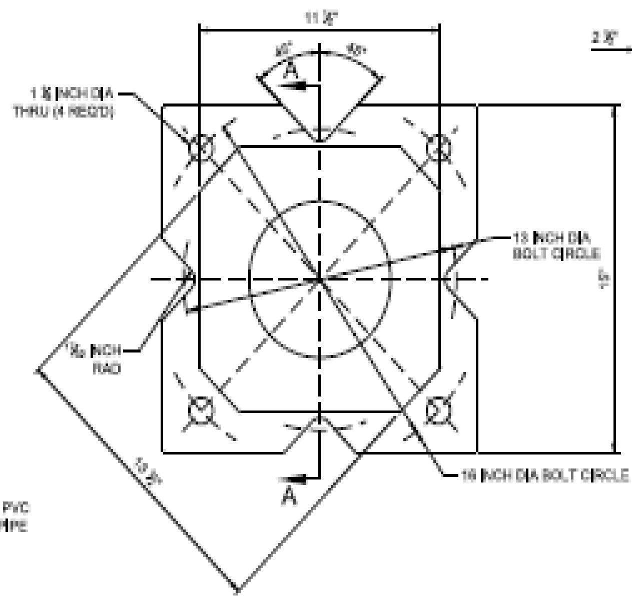


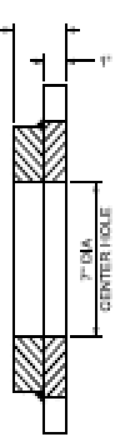
PLATE WASHER



SLIP BASE DETAIL



SLIP BASE ASSEMBLY



SECTION A-A

NOTES:

1. PLACE ANCHOR PLATE ASSEMBLY ON ANCHOR BOLT LEVELING NUTS AND SECURE IN PLACE.
2. ERECT LUMINAIRE POLE AND SECURE WITH 1 INCH DIA HIGH STRENGTH BOLTS. INSTALL BOLTS IN THE SLOTS SO THE BOLT SHANKS ARE IN CONTACT WITH THE LIGHT POLE PLATE AND ANCHOR PLATE ASSEMBLY.
3. ALL STEEL MATERIALS INCLUDING ANCHOR BOLT ARE HOT-DIPPED GALVANIZED. AVOID DAMAGING THE GALVANIZED FINISH OF MATERIALS DURING TRANSPORT AND PLACEMENT.
4. TORQUE ALL SLIP BOLTS TO 80 FT-LBS, RELEASE AND RE-TORQUE TO 70 FT-LBS.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL 03/17/2021

APPROVED 03/17/2021

HIGHWAY LUMINAIRE
SLIP BASE DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
SL 5C

Variable Speed Limit Zone Overview

ITS Component Timeline

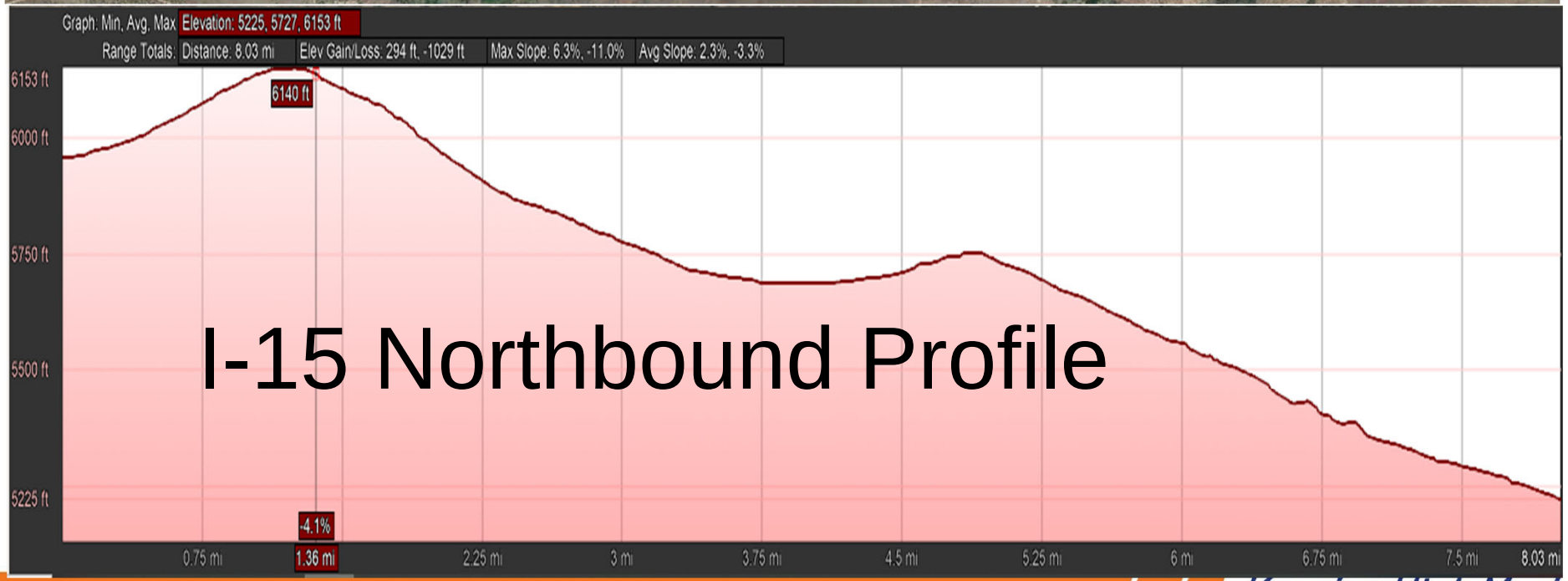
- December 2018 – Plan for future VSL infrastructure
- January 2019 – Geometry Review State
  - CCTVs, Counting Equipment and RWIS Can be accommodated
  - Unsure of power source for northern end of project
- March 2019 – Guidance provided from Region 2

Initial Guidance on ITS Equipment
March 2019

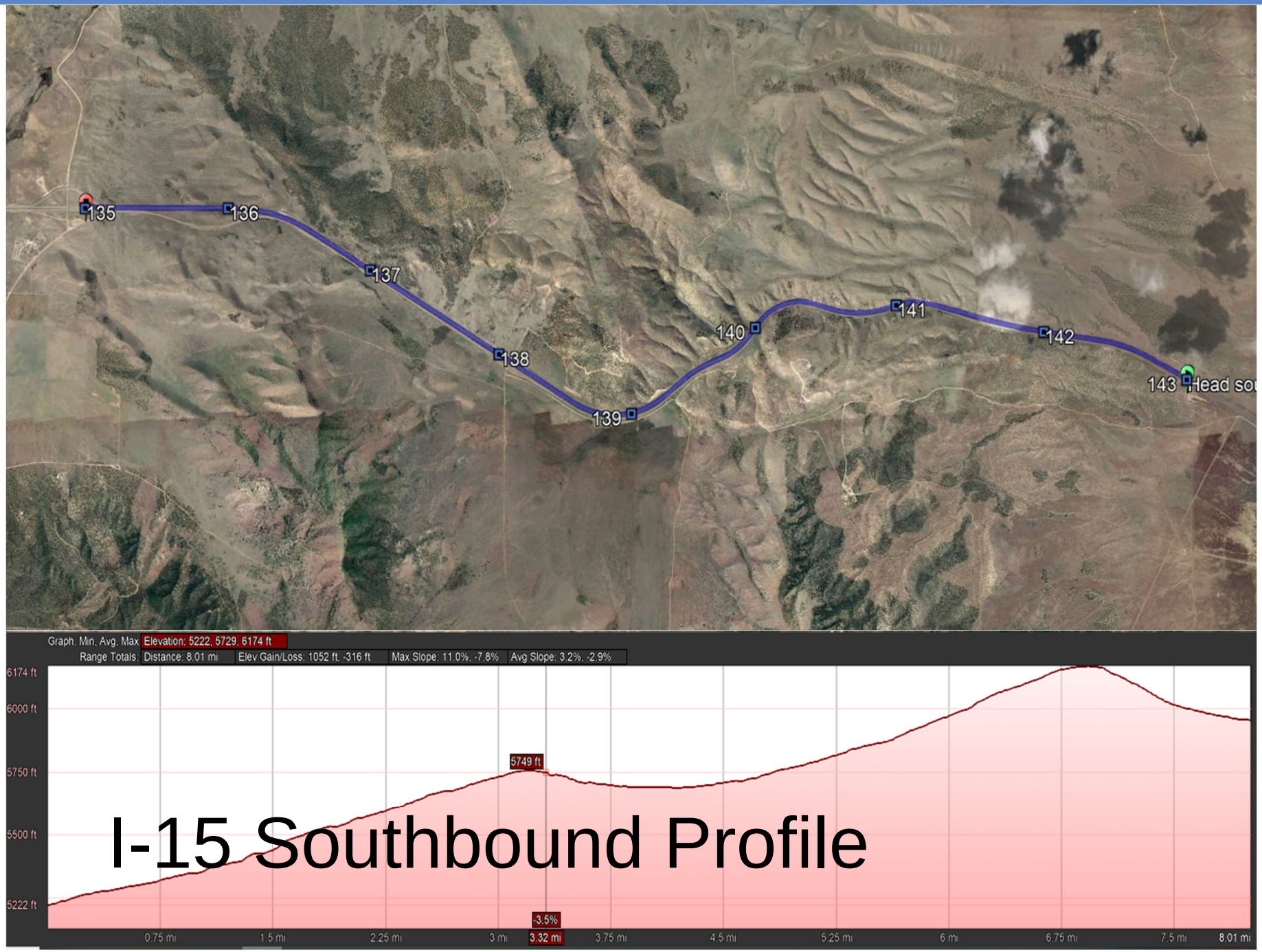
- CCTVs and NID spaced every ½-mile
- VSL Signs should be Black on Yellow
- VMS for NB and SB directions
- VMS signs ½-mile in advance of VSL Segments
- Important to have signs that are visible
- Cabinets have AC Power w/ Battery Backup
- Fiber Communication to system with redundancy

I-15 Baker Cyn. ITS Components

- 10 miles of 144 Count SMFO Micro-fiber
- 8 miles of 72 kV Power feed
- 2 miles of 480 Volt Power feed
- 18 Variable Speed Limit Signs
- 9 Flasher Sign Systems
- 17 NID Wavetronix Speed and Count Detectors
- 12 CCTVs
- 25 High Voltage Sectionalizers
- 17 High Voltage Transformers

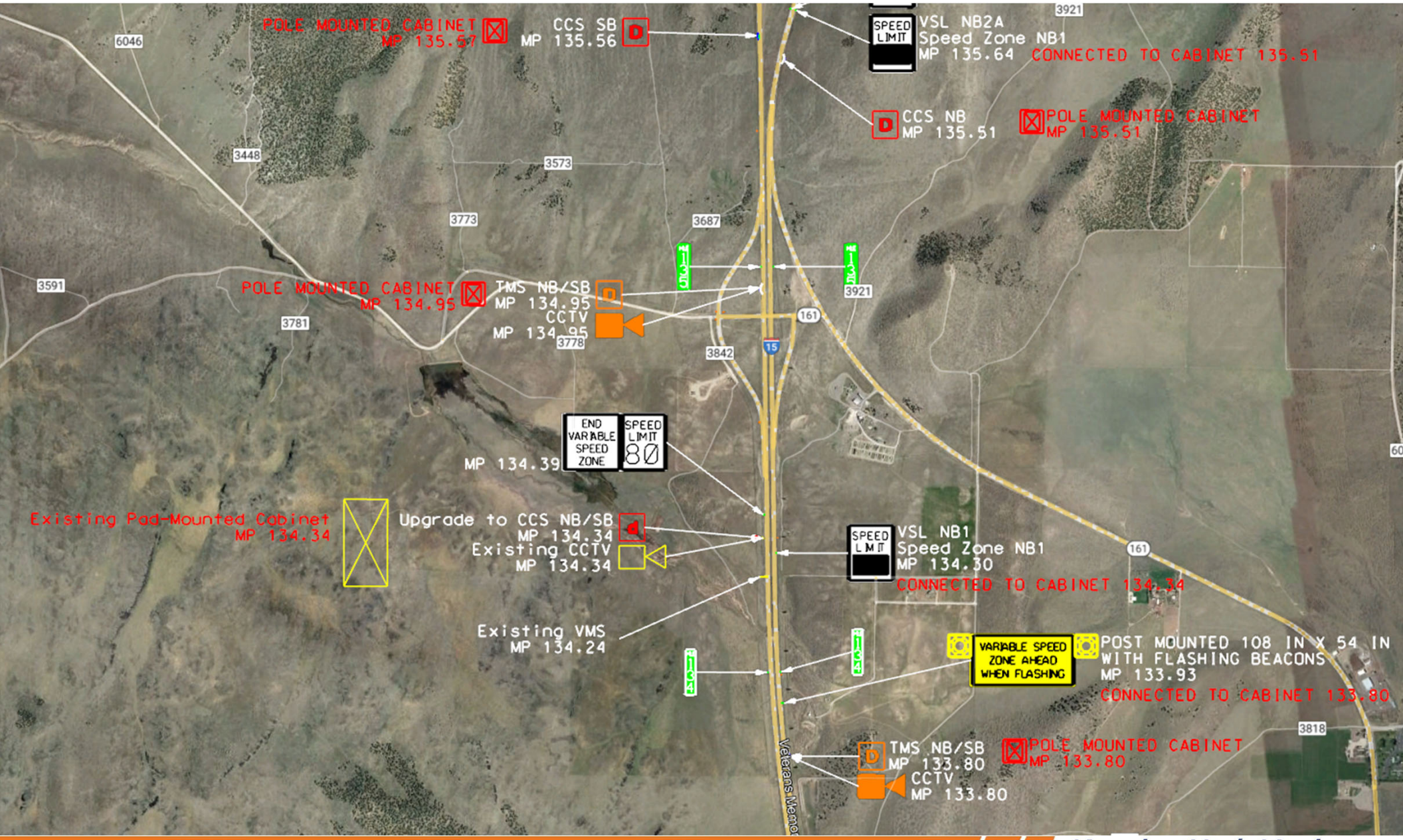


I-15 Northbound Profile



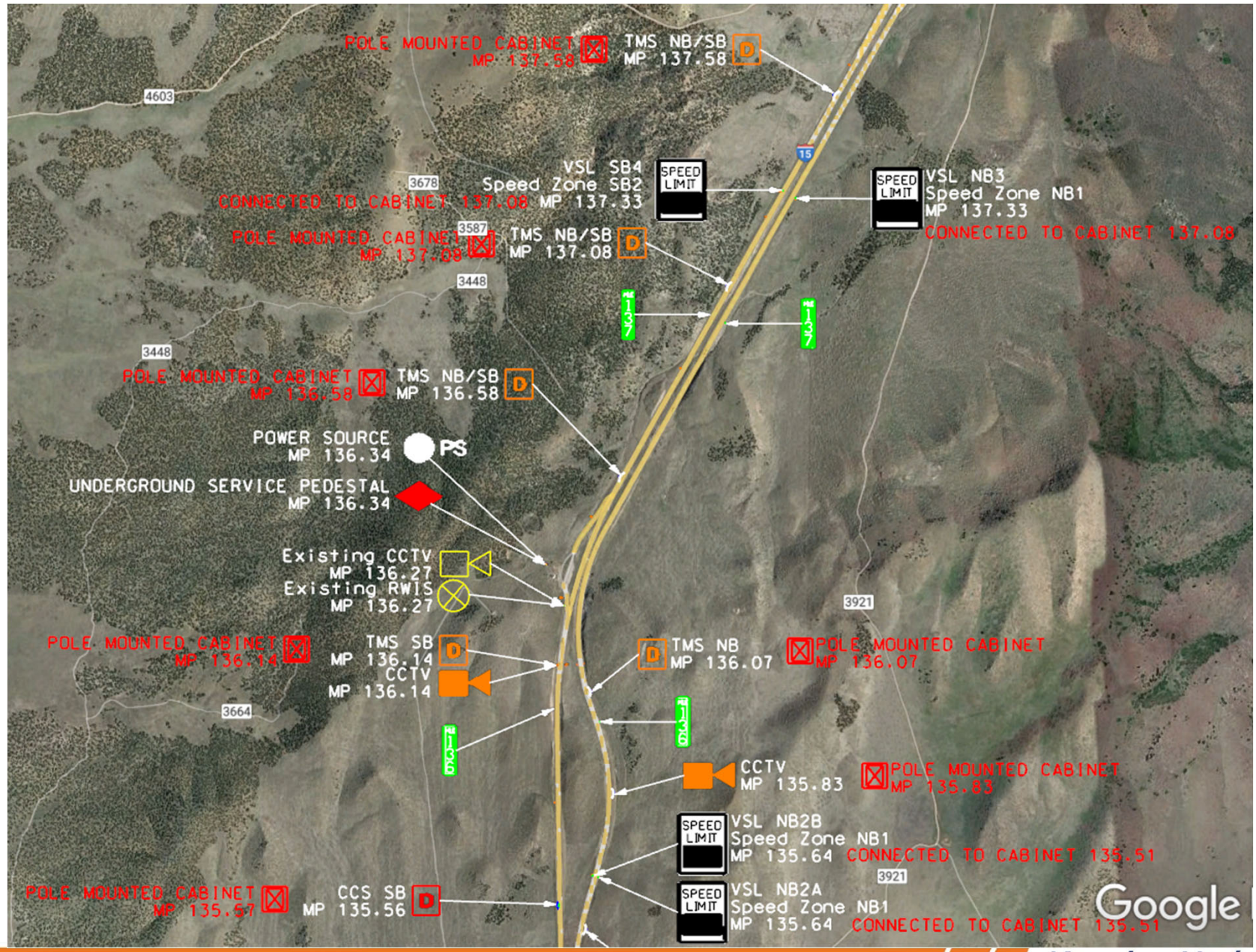
I-15 Southbound Profile

I-15: MP 133.80 to MP 135.64

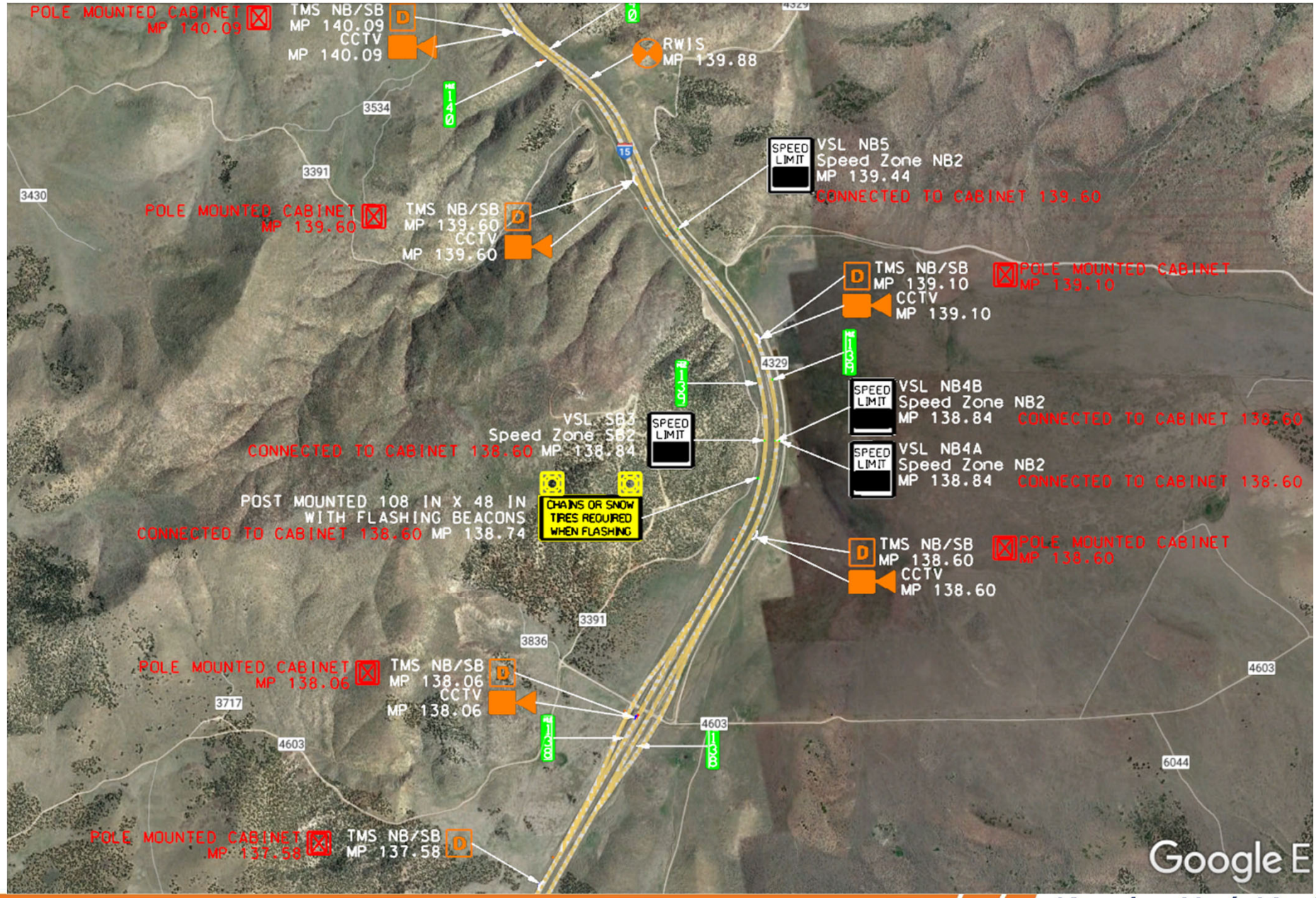


Keeping Utah Moving

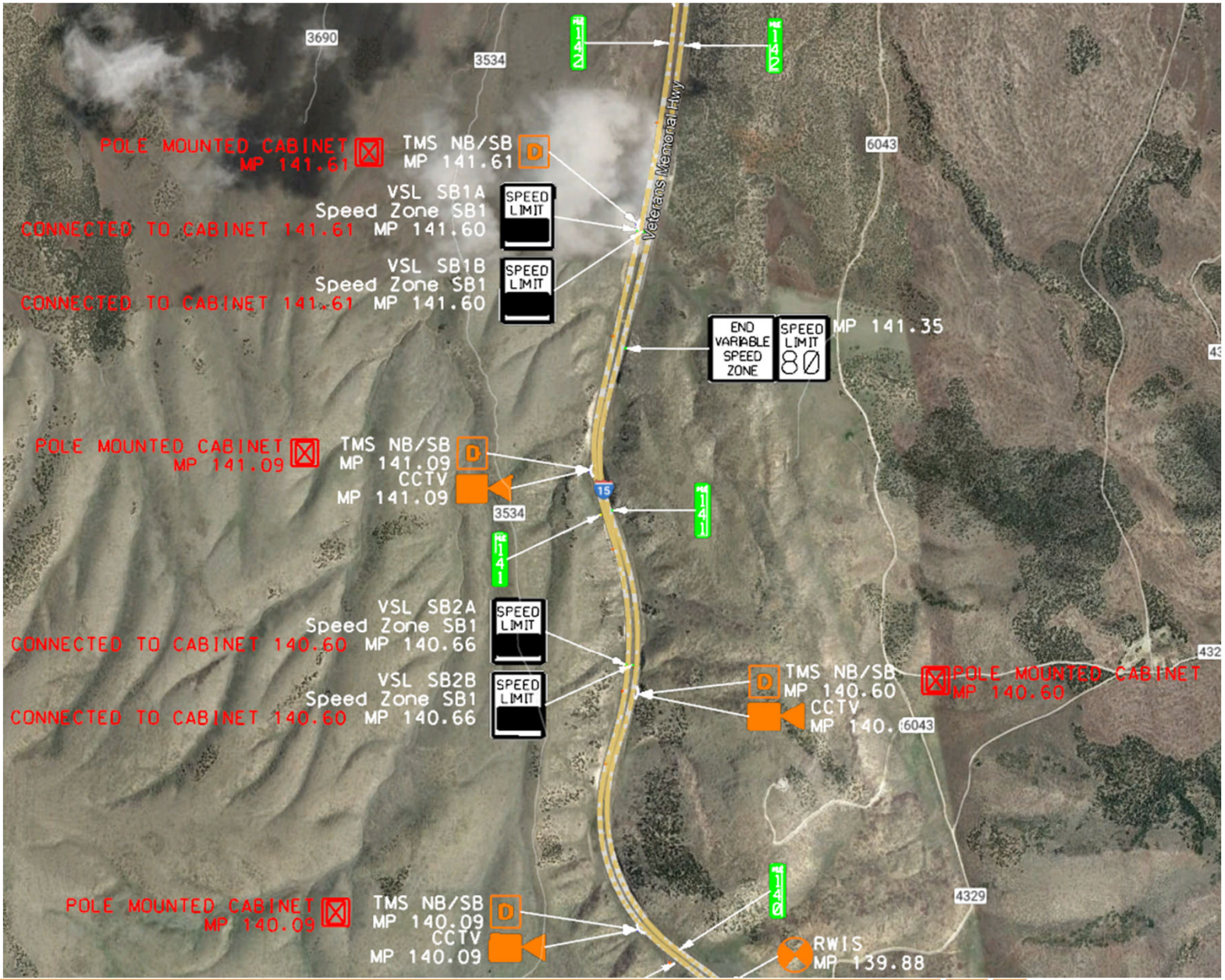
I-15: MP 135.64 to MP 137.58



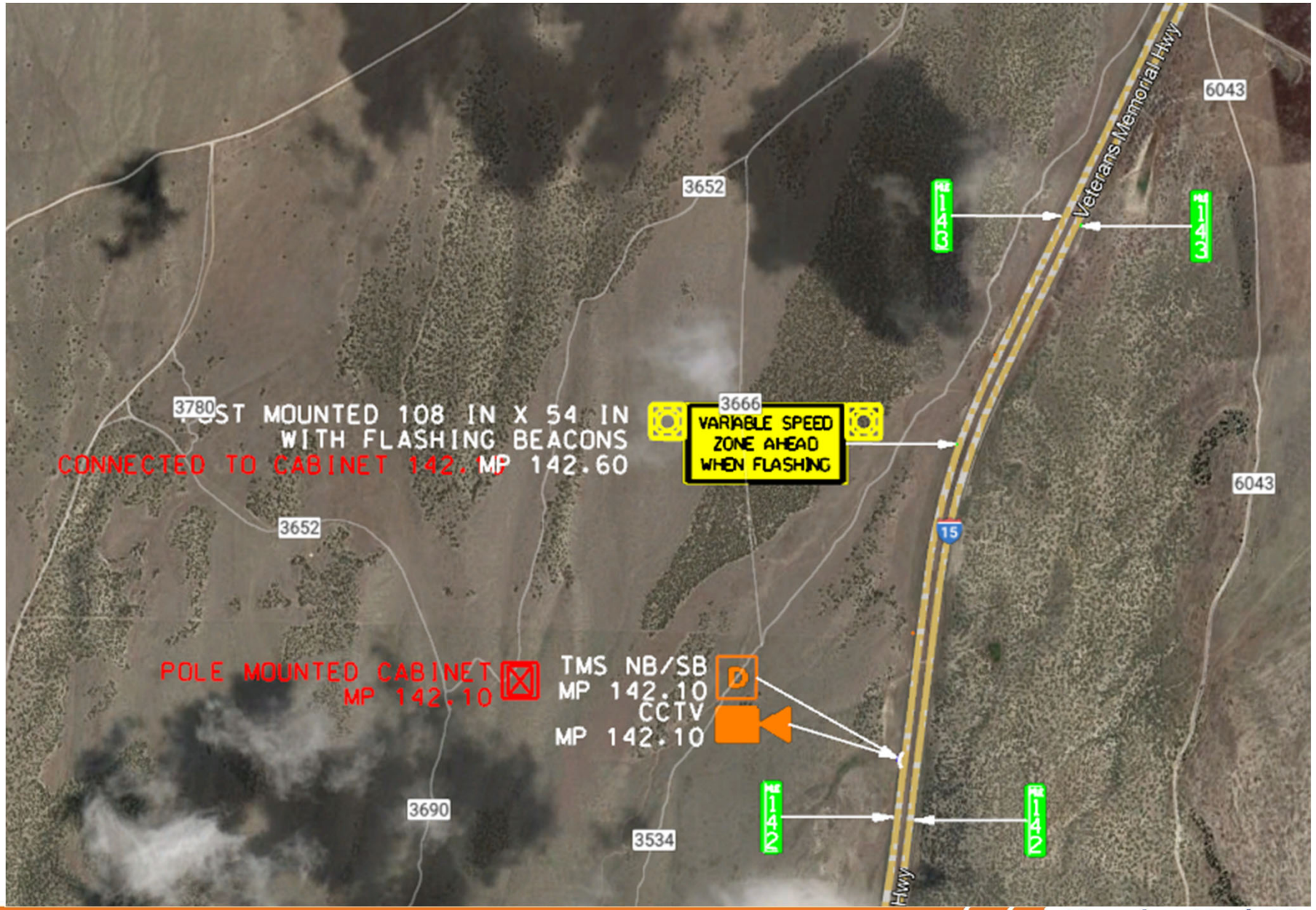
I-15: MP 137.58 to MP 140.09



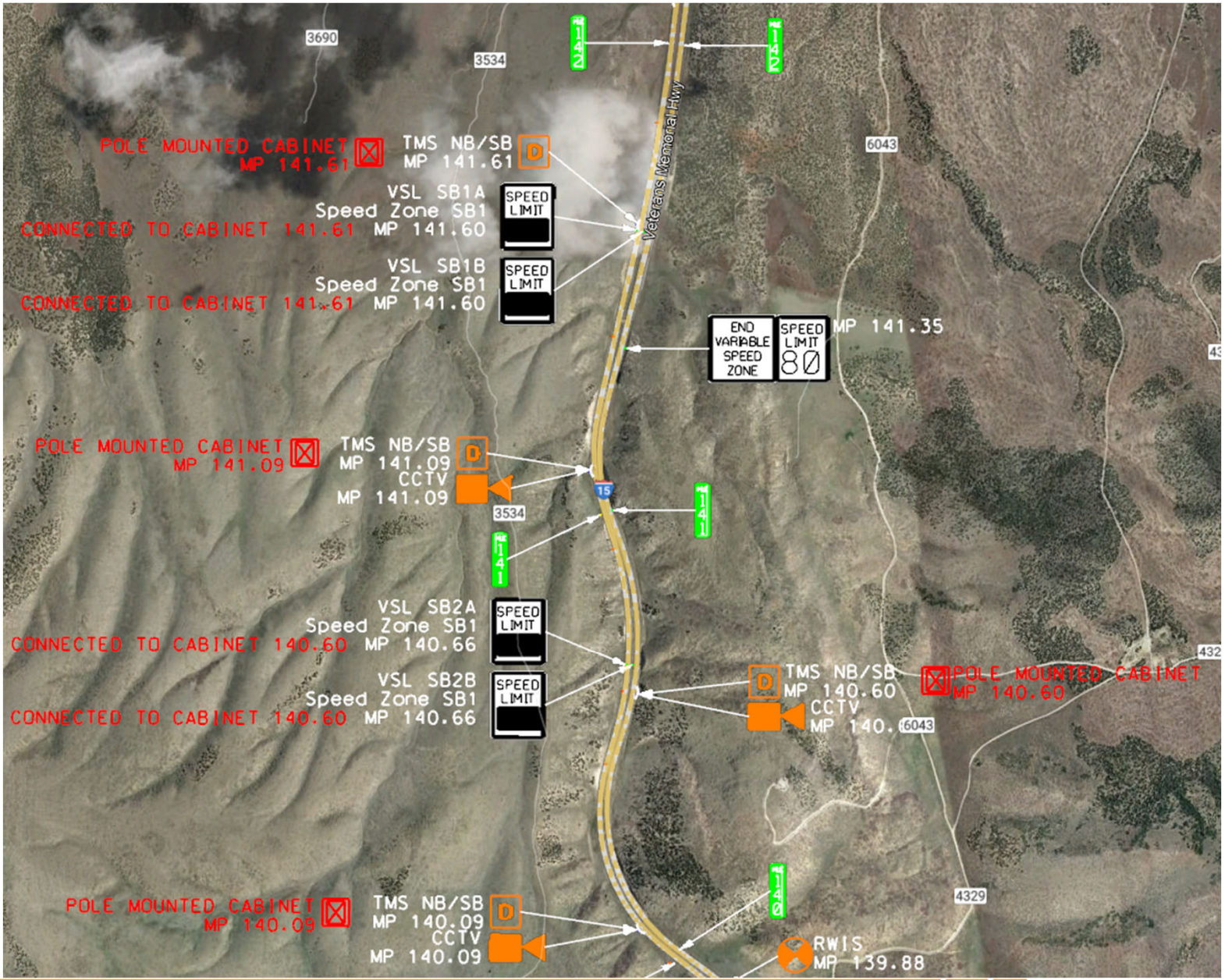
I-15: MP 140.09 to MP 142.00

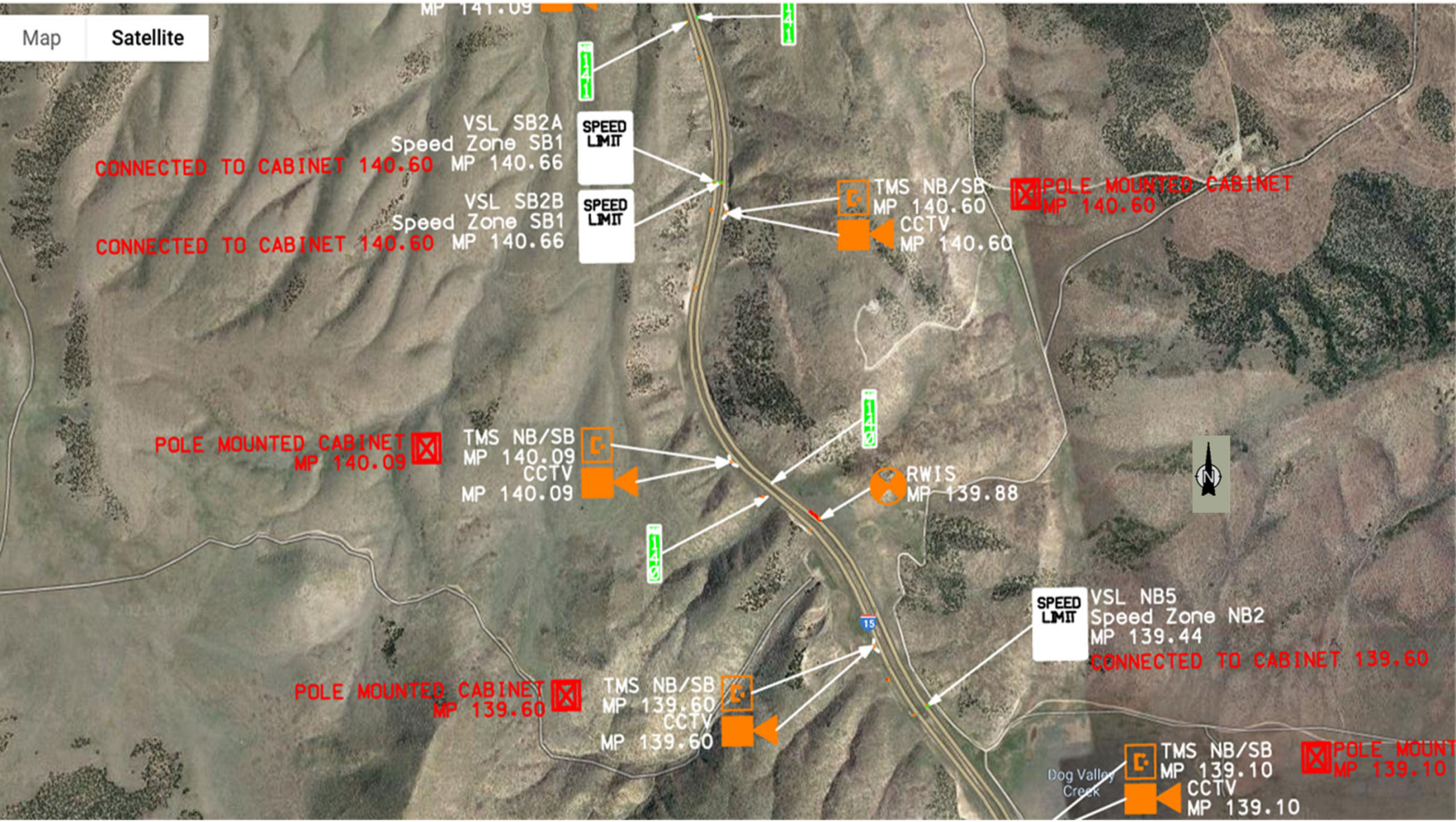


I-15: MP 142.00 to MP 143.00



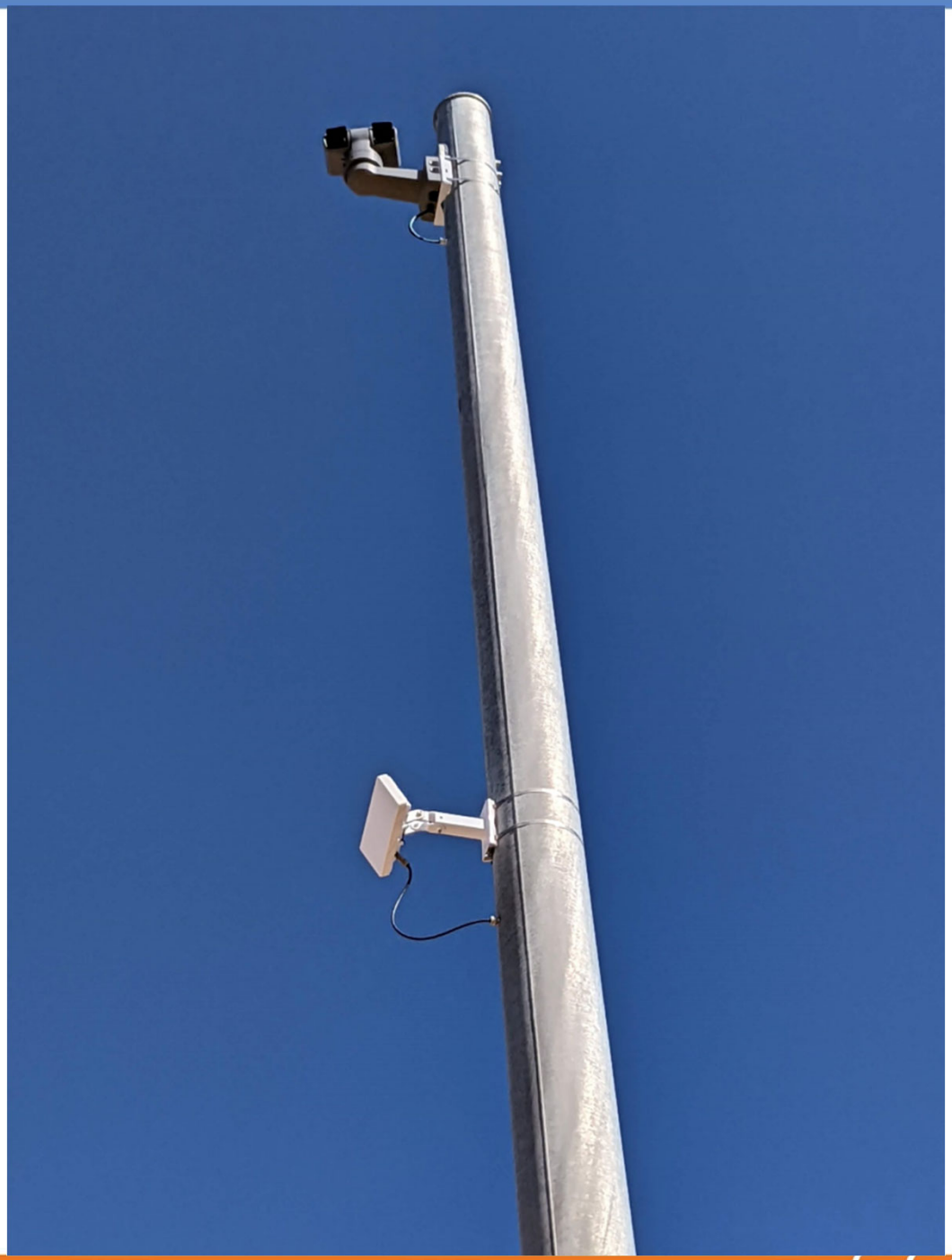
I-15: MP 140.09 to MP 142.00




Map
Satellite
MP 141.09
VSL SB2A
Speed Zone SB1
CONNECTED TO CABINET 140.60 MP 140.66
SPEED LIMIT
VSL SB2B
Speed Zone SB1
CONNECTED TO CABINET 140.60 MP 140.66
SPEED LIMIT
TMS NB/SB
MP 140.60
CCTV
MP 140.60
POLE MOUNTED CABINET
MP 140.60
POLE MOUNTED CABINET
MP 140.09
TMS NB/SB
MP 140.09
CCTV
MP 140.09
RWIS
MP 139.88
SPEED LIMIT
VSL NB5
Speed Zone NB2
MP 139.44
CONNECTED TO CABINET 139.60
POLE MOUNTED CABINET
MP 139.60
TMS NB/SB
MP 139.60
CCTV
MP 139.60
15
Dog Valley Creek
TMS NB/SB
MP 139.10
CCTV
MP 139.10
POLE MOUNT
MP 139.10

VSL Zone Field Equipment Layout


re IS Evidence
for GOD!
(83) FOR-TRUTH




VARIABLE SPEED
ZONE AHEAD
WHEN FLASHING
SUMMIT CREEK
30 Minutes from BYU
SummitCreekUtah.com


VARIABLE
SPEED ZONE
SPEED
LIMITS
SET BY
VARIABLE
SIGNS


BEGIN
VARIABLE
SPEED
ZONE
Chevron
CLEAN
RESTROOMS
EXIT NOW
Fuel • Food • Be


SPEED LIMIT
70

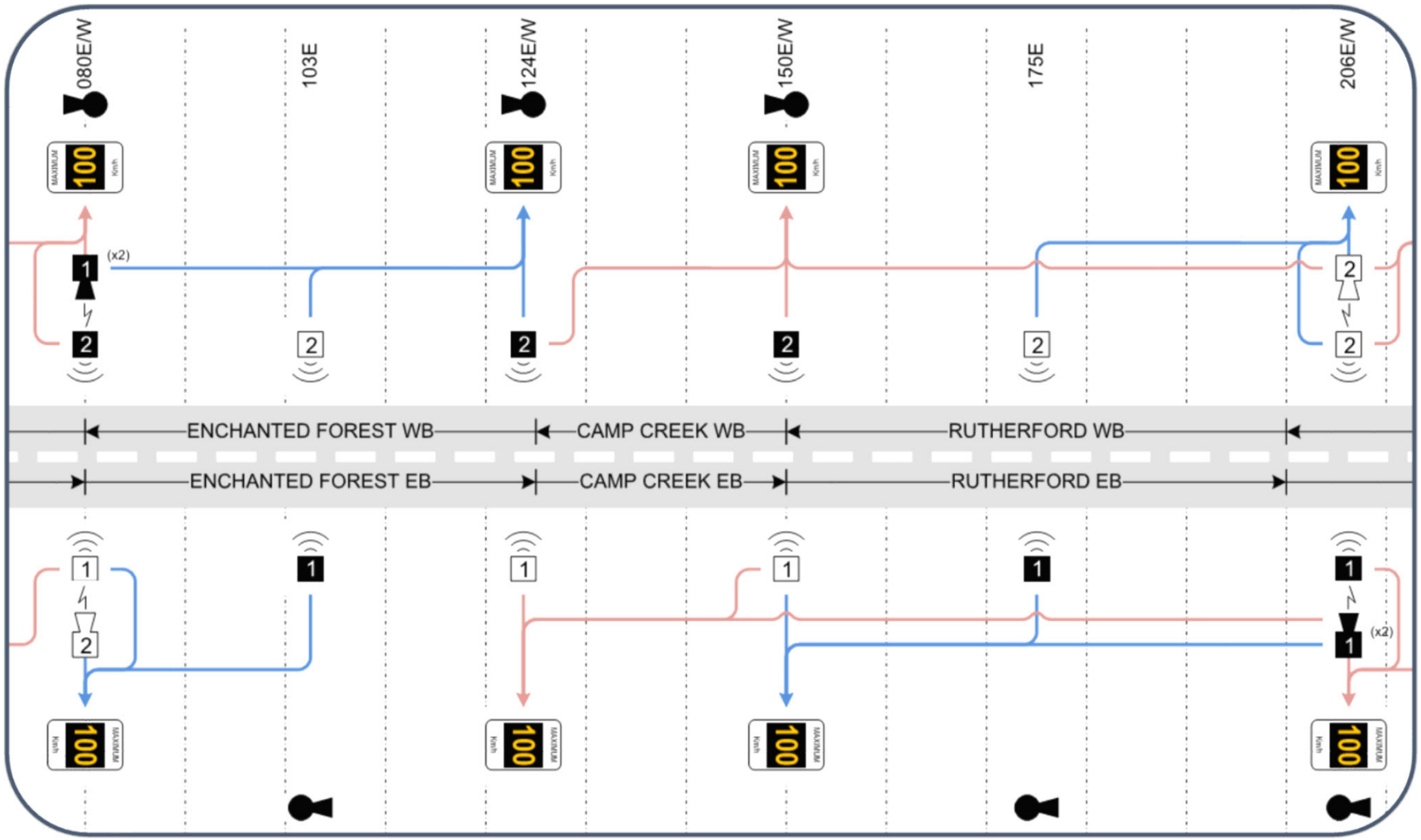

SPEED
LIMIT
80
END
VARIABLE
SPEED
ZONE


EXCEPT
AUTHORIZED
VEHICLES

I-15 Baker Canyon VSL Design

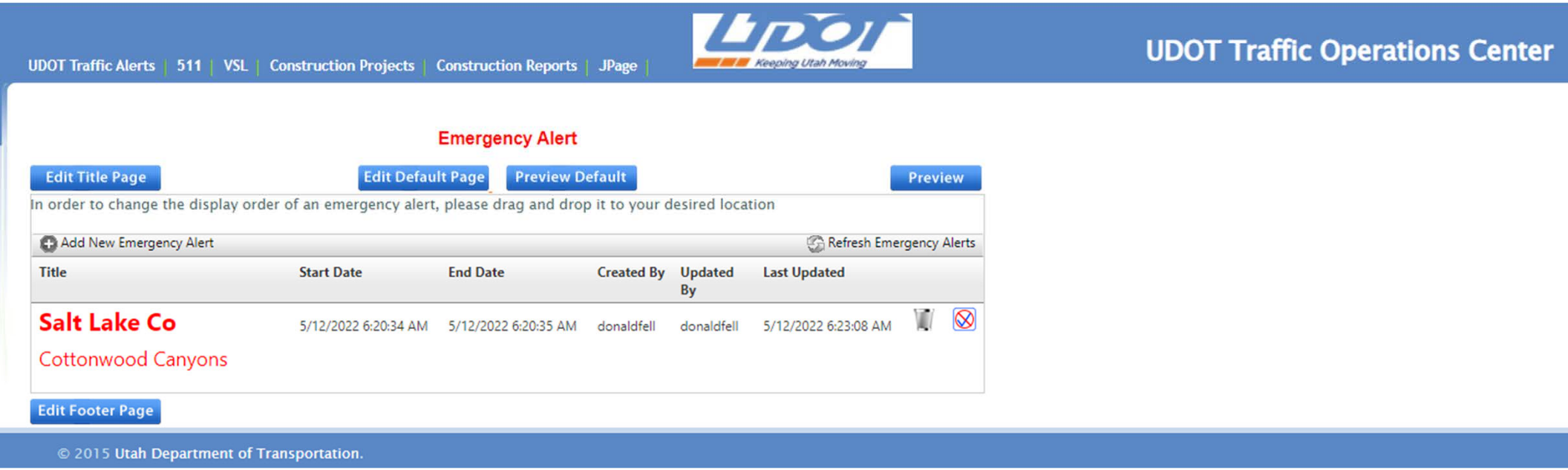
- VSL Automation History
- Baker Canyon VSL Timeline
- Google Form Survey
- Baker Canyon VSL Timeline Cont.

Device Placement – Device Grouping

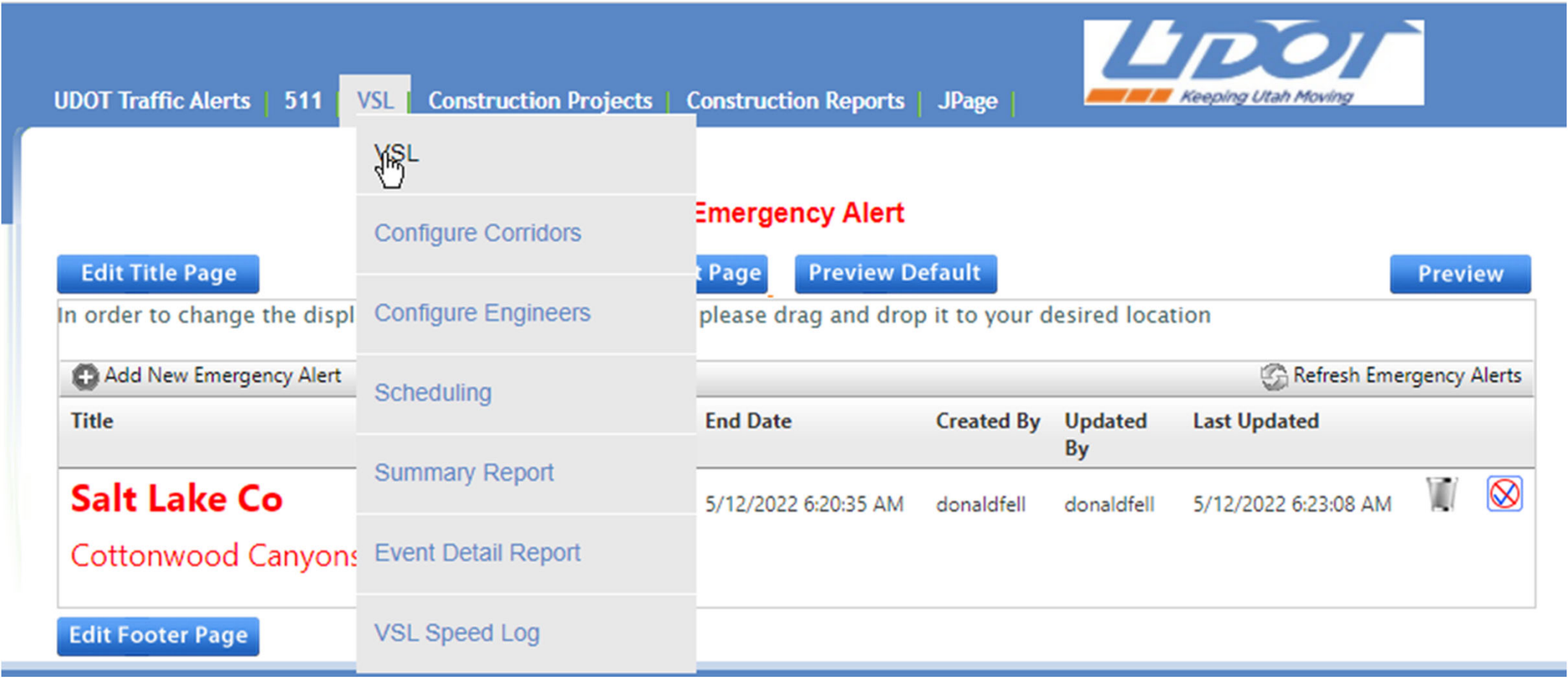


VSL Version 3 Dashboard Review

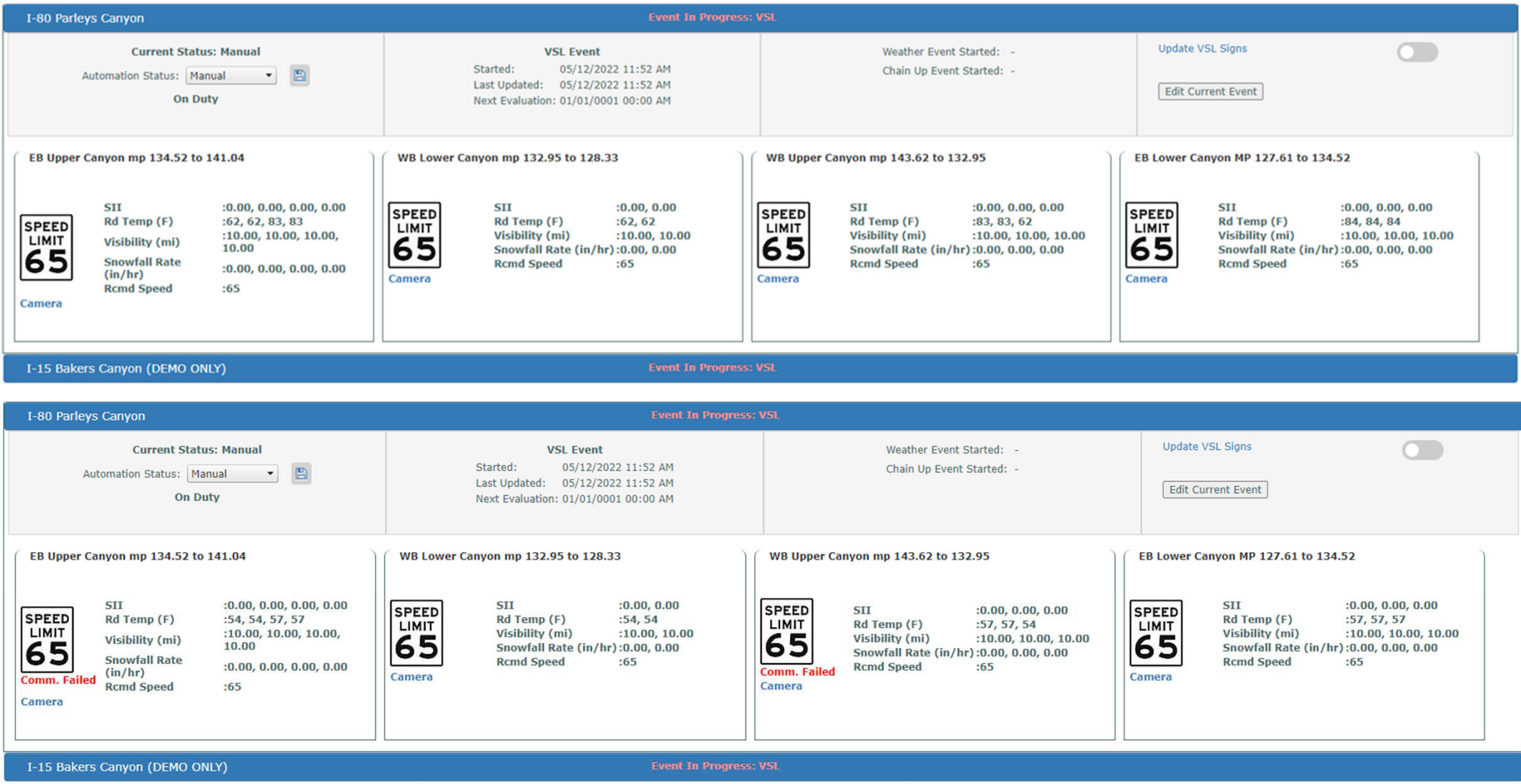
Home Screen Used by Operators



VSL Dashboard Home Screen

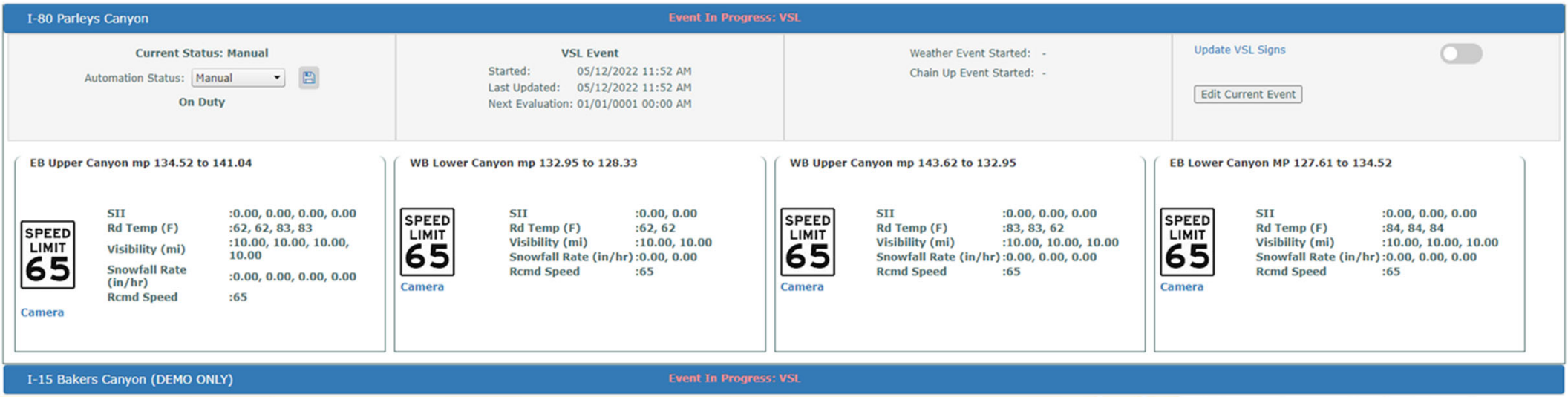


VSL Dashboard Zones View

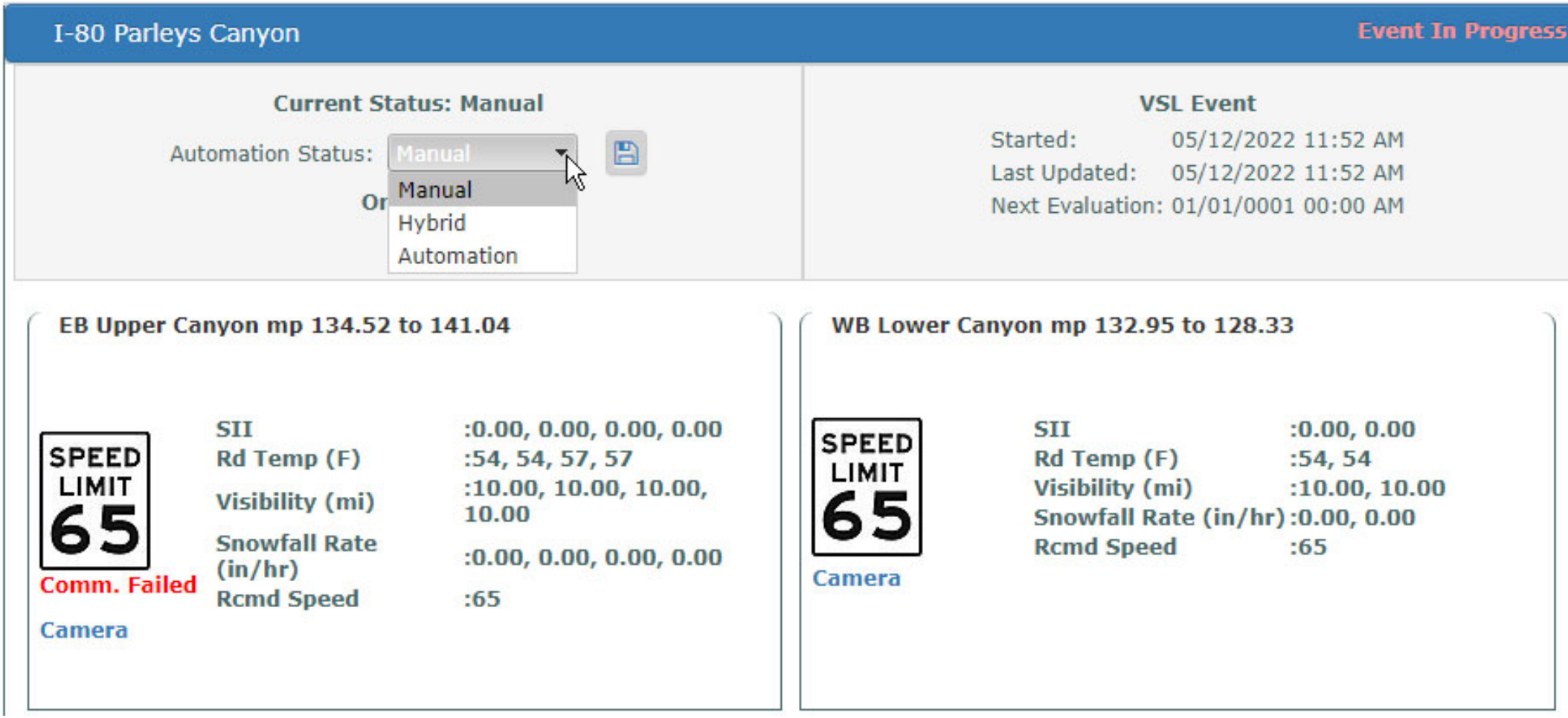


VSL Dashboard - VSL Menu

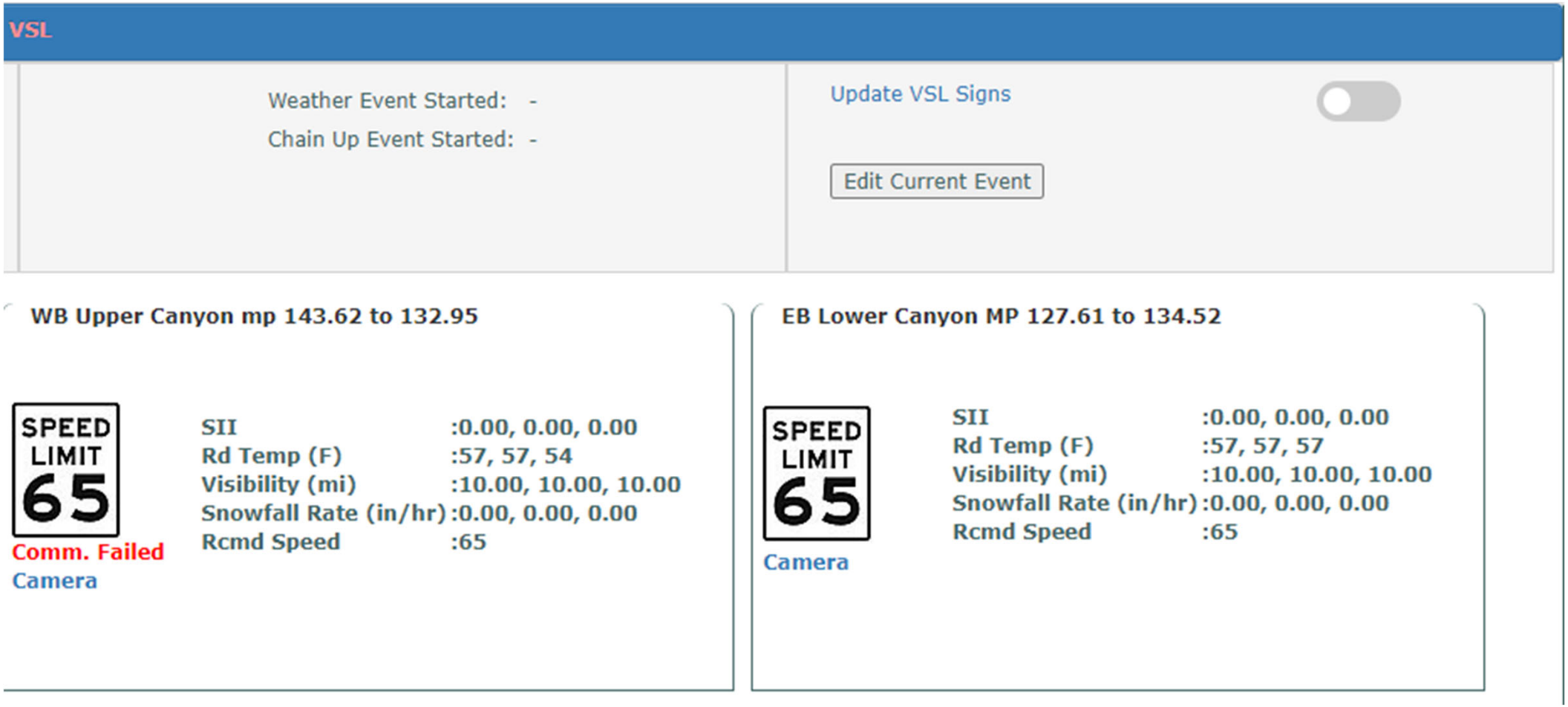
- Current Status is shown
- VSL Event Start and update information
- VSL Zones shown with Speed Limits Shown
- Weather Information and various information visible



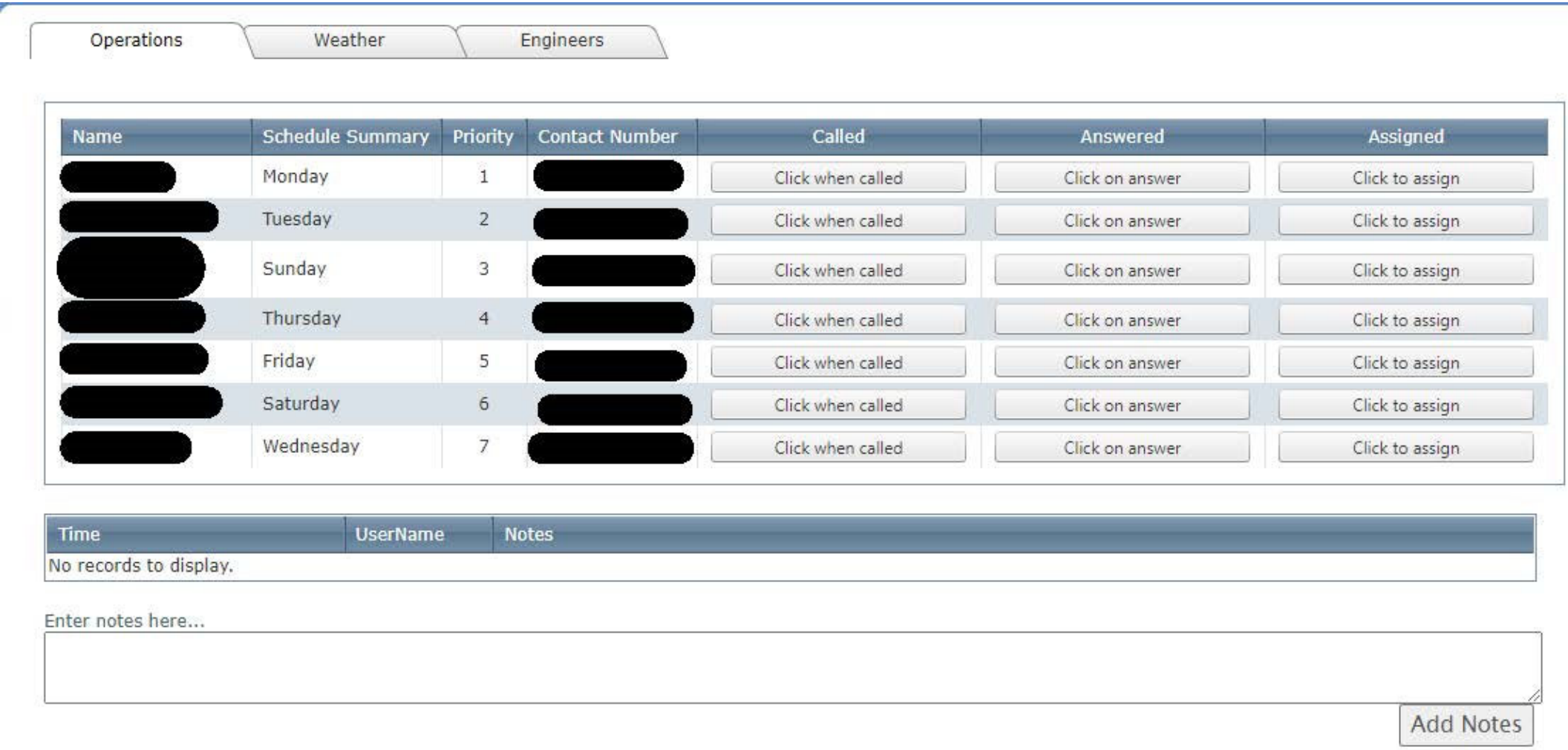
VSL Automation Status



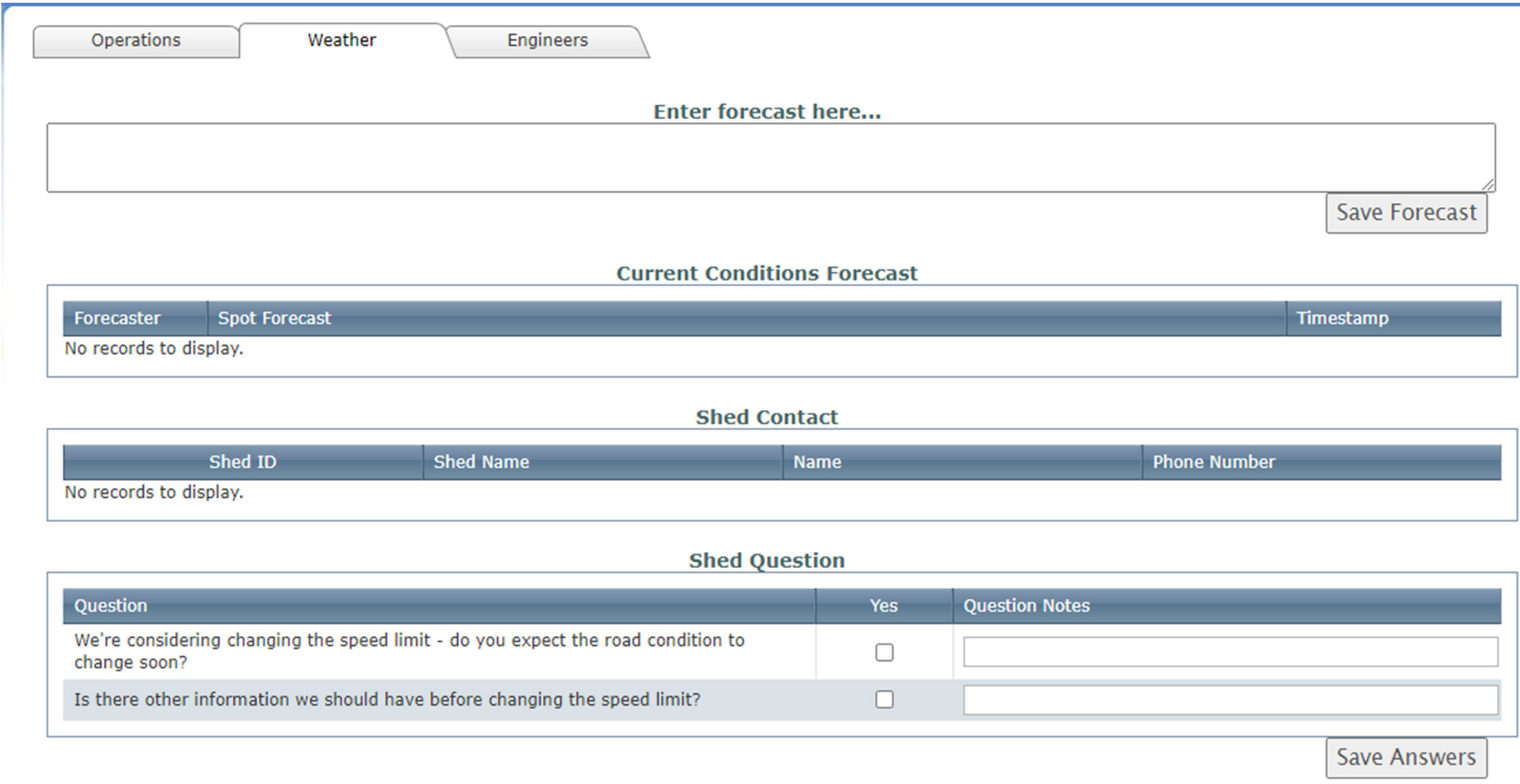
VSL Edit and Update Options



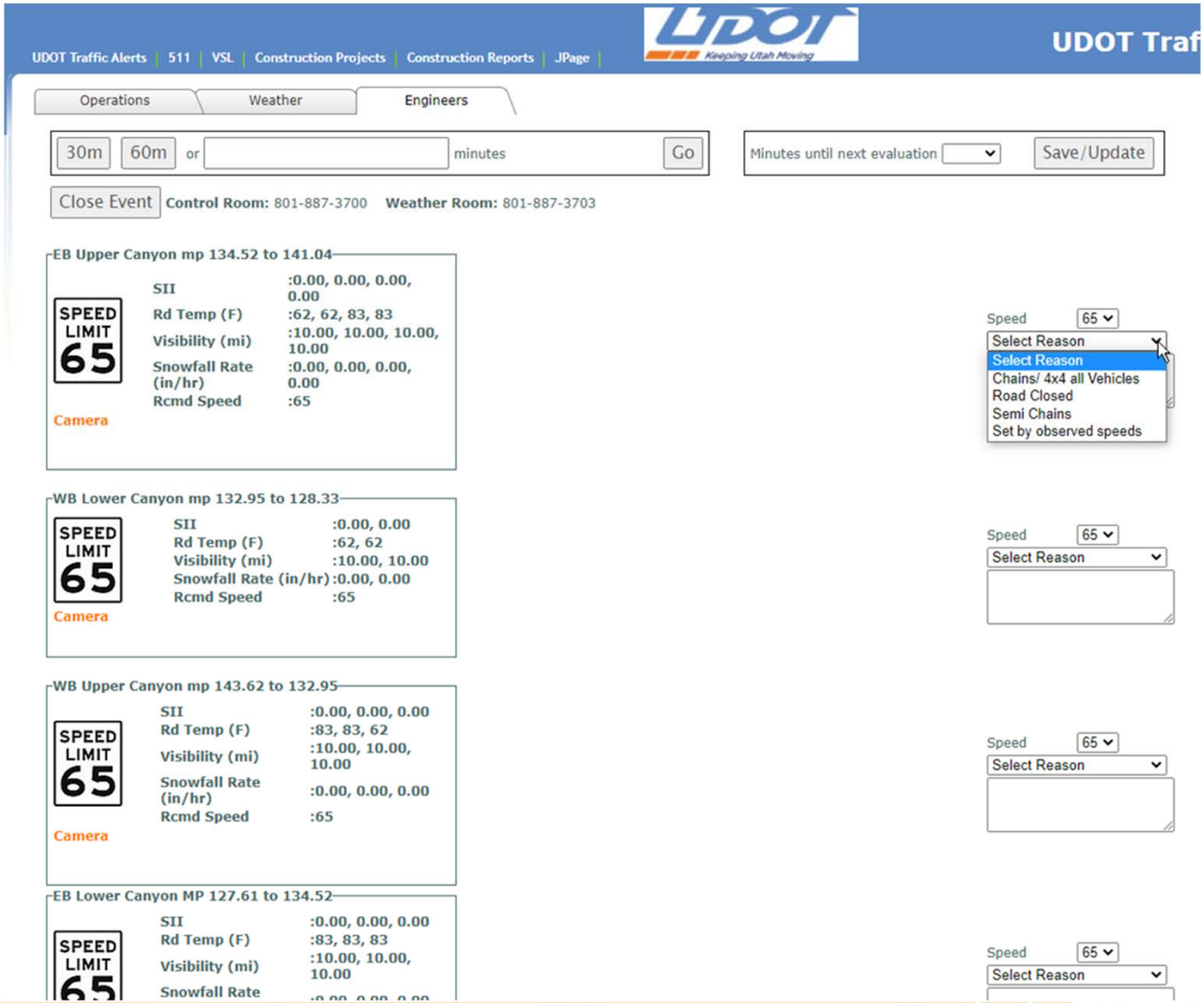
VSL Edit - Operations Tab



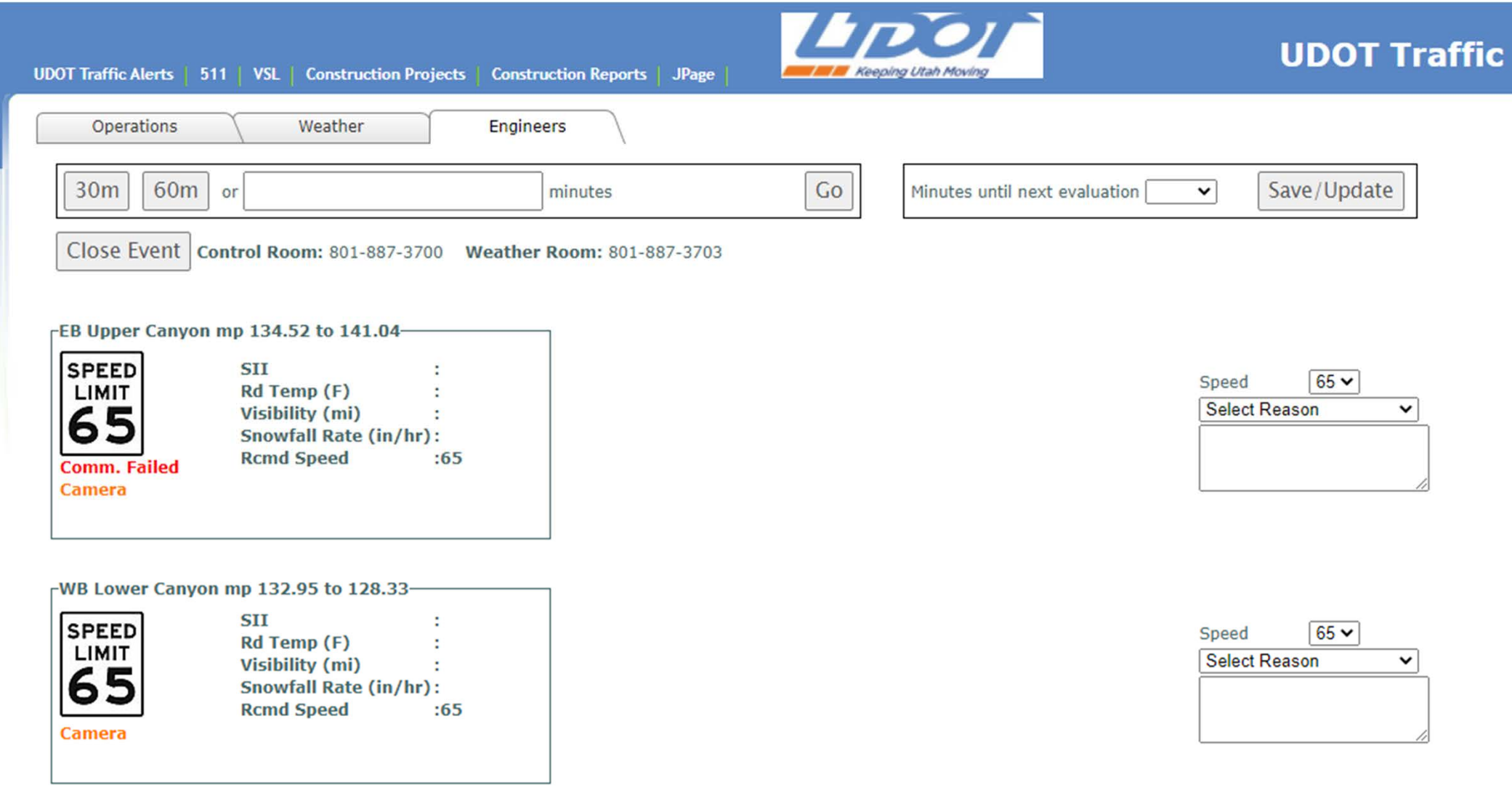
VSL Edit – Weather Tab



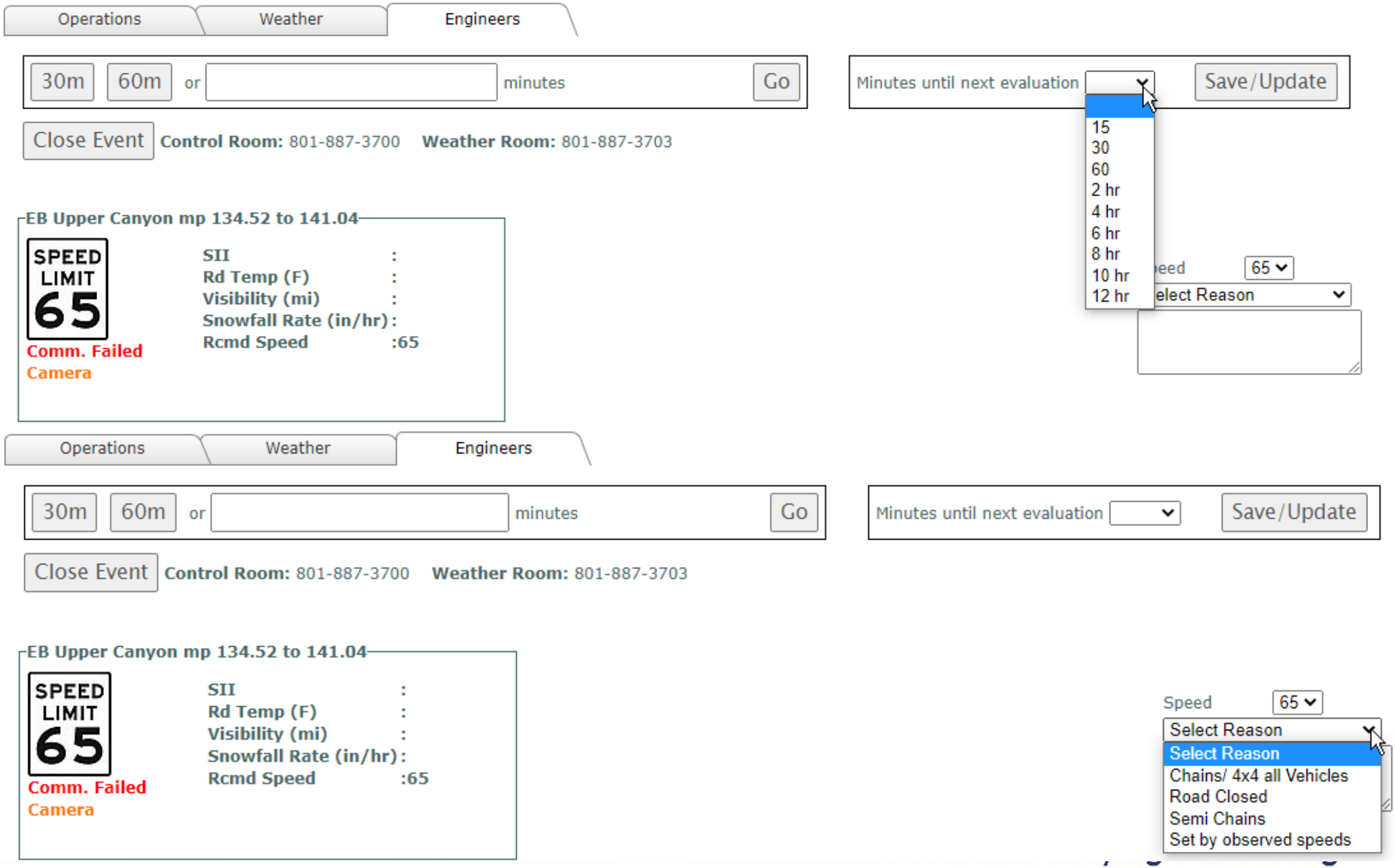
VSL Edit – Engineers Tab



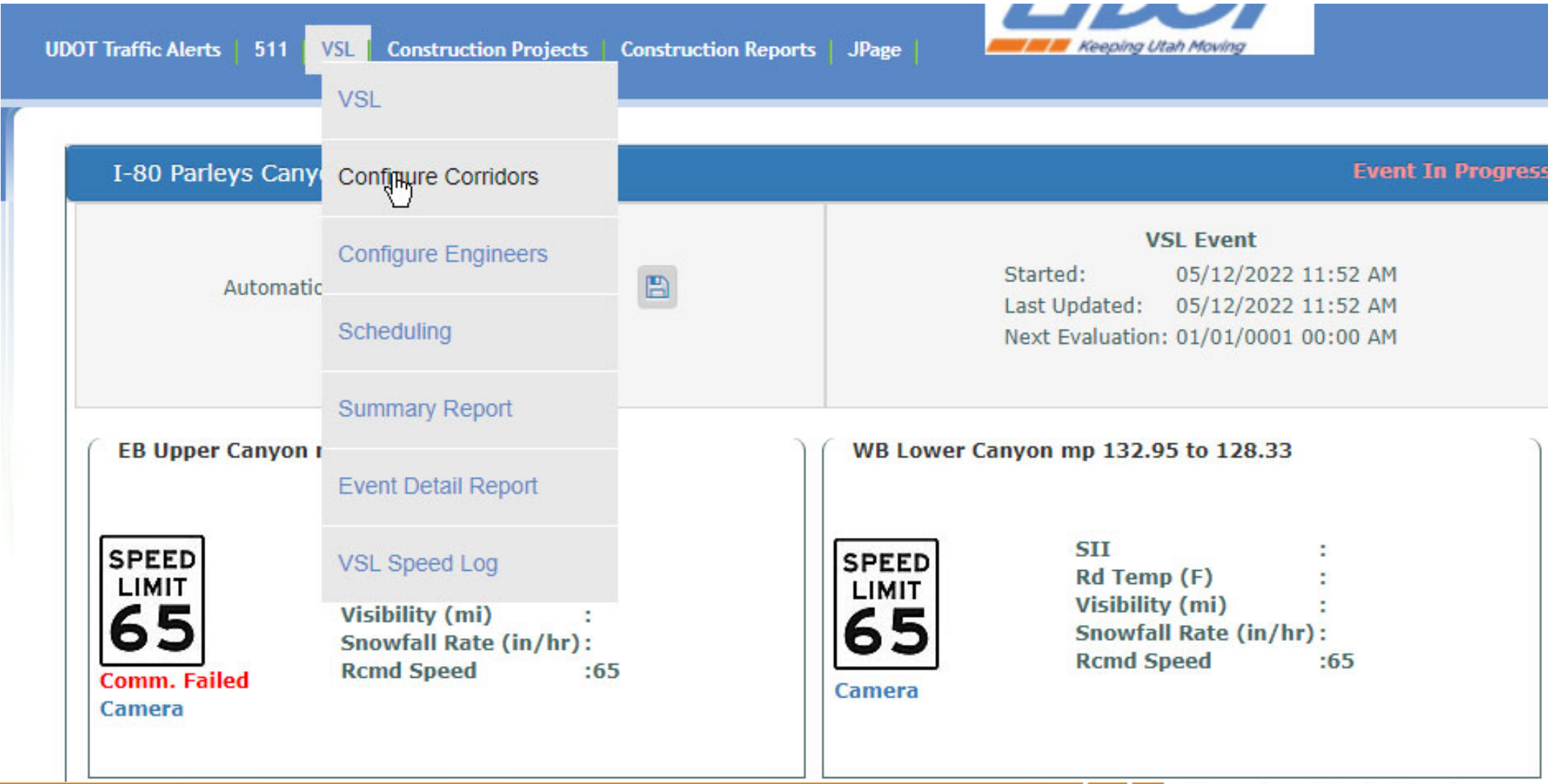
VSL Edit – Engineers Tab



VSL Edit – Engineers Tab Options



VSL – Configure Corridors



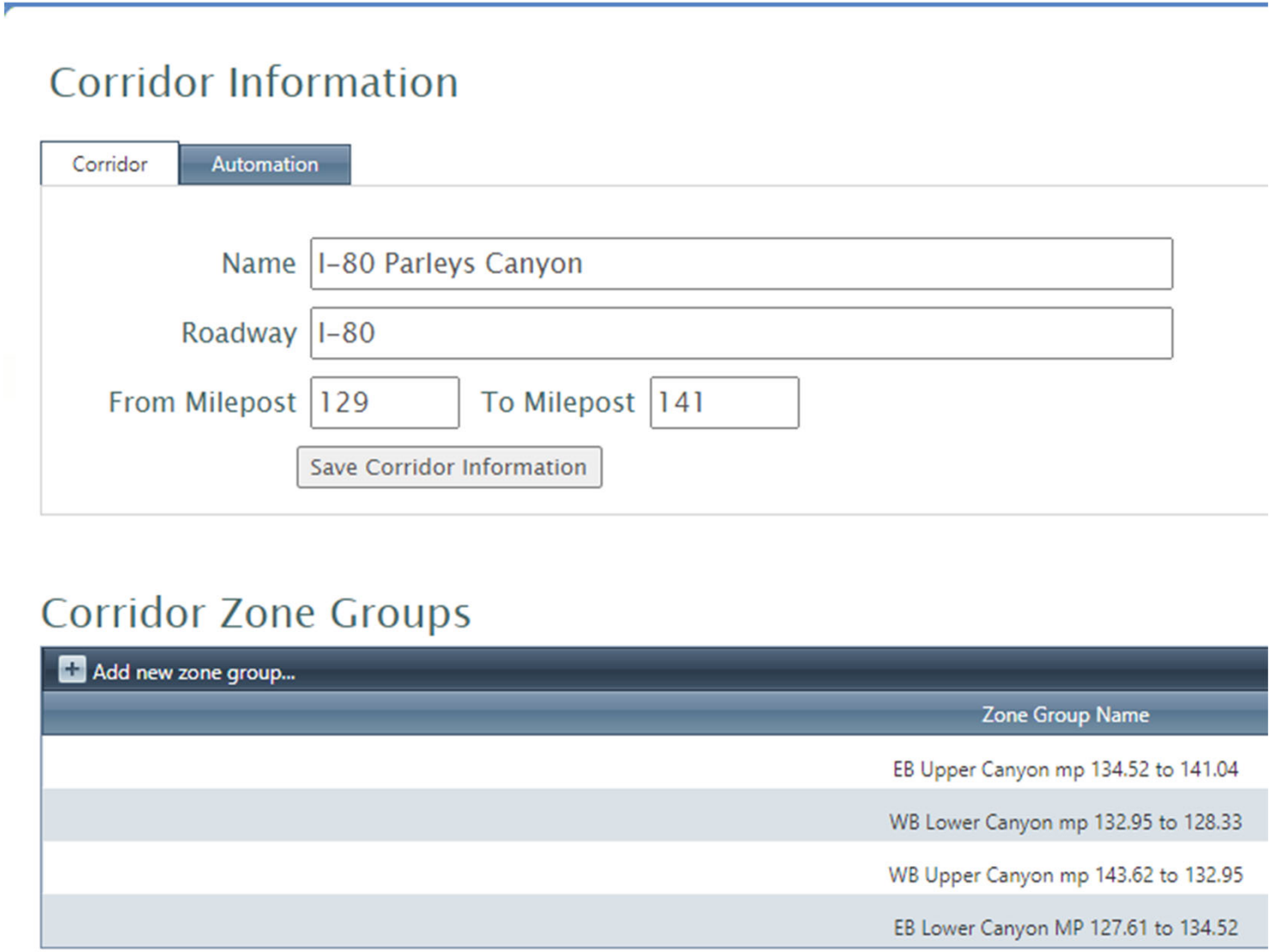
Configure Corridors

Corridors

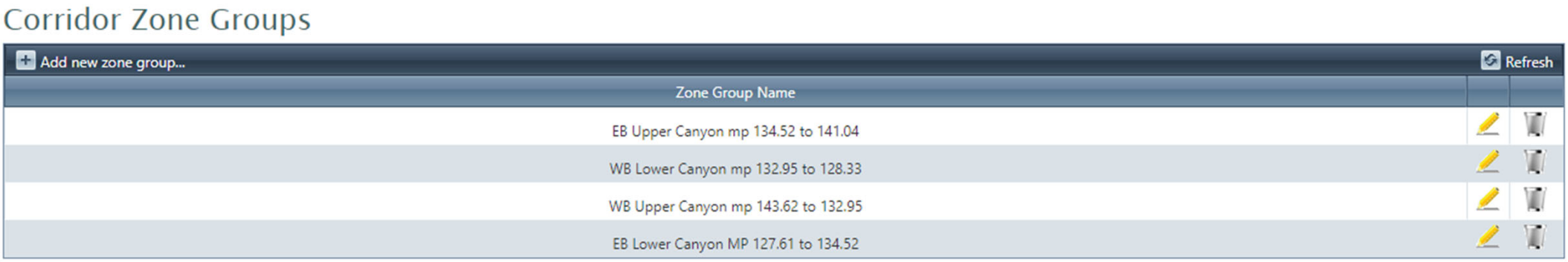
Add new corridor... Refresh

Corridor Name	Roadway	From MP	To MP	Number of Zones		
I-80 Parleys Canyon	I-80	129	141	12		
I-15 Bakers Canyon (DEMO ONLY)	I-15	136.3	138.5	4		

Configure Corridors



Configure Zone Groups



Zone Group Options

ZONE GROUP NAME HERE

Zone Group | Automation

Name: EB Upper Canyon mp 134.52 to 141.04

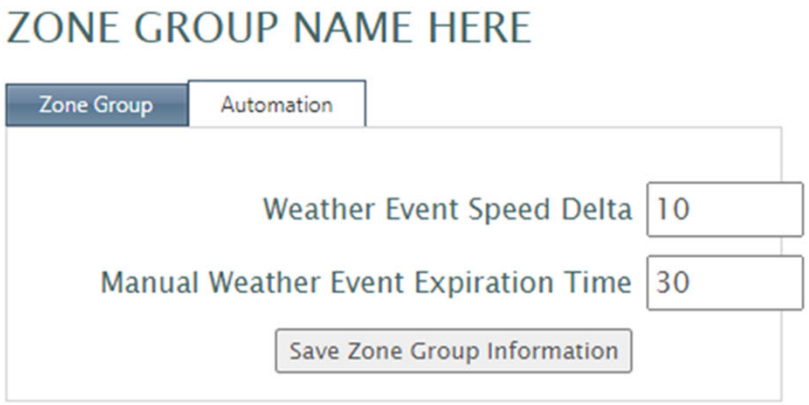
Save Zone Group Information

Zones in Group

Add new record | Refresh

Zone Name	Direction	Speed Limit	MP Start	MP End	Speed Threshold	Visibility Threshold	WRWI Threshold	WashOut Speed	Detection Failing Minutes	Notification Email
EB VSL#4 (MP 134.5)	Eastbound	65	134.52	136.6	65	1000	0.2	15	5	
EB VSL#5 (MP 136.9)	Eastbound	65	136.6	139.38	65			15	5	
EB VSL#6 (MP 139.4)	Eastbound	65	139.38	140.37	65			15	5	
EB VSL#7 (MP 140.3)	Eastbound	65	140.37	142.61	65			15	5	

Zone Group Automation Options



Zones in Group

Add new record | Refresh

Zone Name	Direction	Speed Limit	MP Start	MP End	Speed Threshold	Visibility Threshold	WRWI Threshold	WashOut Speed	Detection Failing Minutes	Notification Email
EB VSL#4 (MP 134.5)	Eastbound	65	134.52	136.6	65	1000	0.2	15	5	
EB VSL#5 (MP 136.9)	Eastbound	65	136.6	139.38	65			15	5	
EB VSL#6 (MP 139.4)	Eastbound	65	139.38	140.37	65			15	5	
EB VSL#7 (MP 140.3)	Eastbound	65	140.37	142.61	65			15	5	

Zone – Group/Conditions/Speed

Zones in Group

Add new record | Refresh

Zone Name	Direction	Speed Limit	MP Start	MP End	Speed Threshold	Visibility Threshold	WRWI Threshold	WashOut Speed	Detection Failing Minutes	Notification Email
EB VSL#4 (MP 134.5)	Eastbound	65	134.52	136.6	65	1000	0.2	15	5	
EB VSL#5 (MP 136.9)	Eastbound	65	136.6	139.38	65			15	5	
EB VSL#6 (MP 139.4)	Eastbound	65	139.38	140.37	65			15	5	
EB VSL#7 (MP 140.3)	Eastbound	65	140.37	142.61	65			15	5	

Zone Group Conditions/Speed

Add new condition... | Refresh

Condition	Speed Limit		
Chains/ 4x4 all Vehicles	35		
Road Closed	25		
Semi Chains	45		
Set by observed speeds	0		

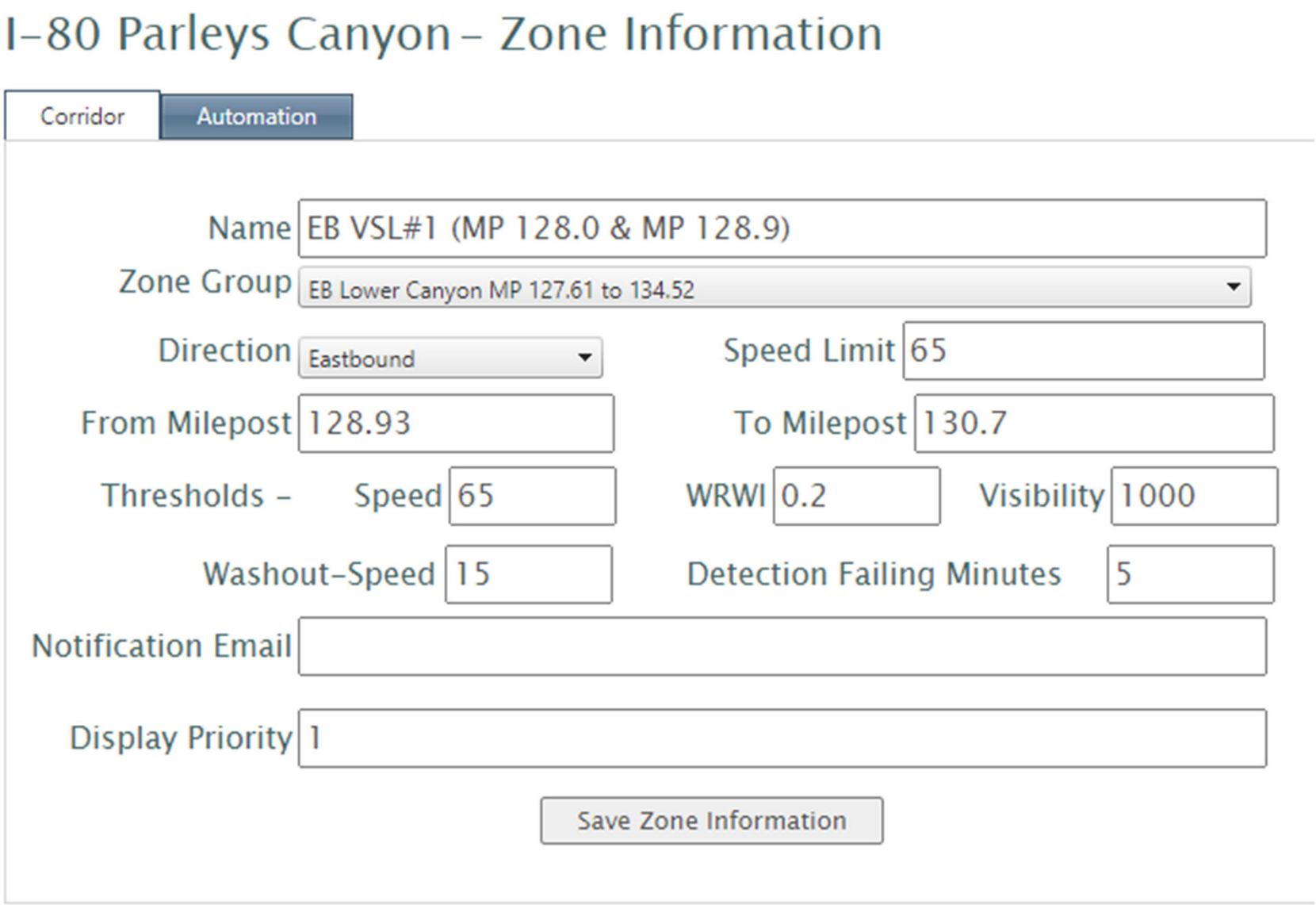
Corridor Zones

Corridor Zones

Add new zone... Refresh

Zone Name	Direction	Speed Limit	MP Start	MP End	Speed Threshold	Visibility Threshold	WRWI Threshold	WashOut Speed	Detection Failing Minutes	Notification Email	Display Priority		
EB VSL#1 (MP 128.0 & MP 128.9)	Eastbound	65	128.93	130.7	65	1000	0.2	15	5		1		
EB VSL#2 (MP 130.7)	Eastbound	65	130.7	132.33	65			15	5		2		
EB VSL#3 (MP 132.3)	Eastbound	65	132.33	134.52	65			15	5		3		
EB VSL#4 (MP 134.5)	Eastbound	65	134.52	136.6	65	1000	0.2	15	5		4		
EB VSL#5 (MP 136.9)	Eastbound	65	136.6	139.38	65			15	5		5		
EB VSL#6 (MP 139.4)	Eastbound	65	139.38	140.37	65			15	5		6		
EB VSL#7 (MP 140.3)	Eastbound	65	140.37	142.61	65			15	5		7		
WB VSL#1 (MP 141.0)	Westbound	65	141.04	138.6	65	1000	0.2	15	5		8		
WB VSL#2 (MP 138.6)	Westbound	65	138.6	136.93	65			15	5		9		
WB VSL#3 (MP 136.9 & MP 135.4)	Westbound	65	136.93	132.95	65			15	5		10		
WB VSL#4 (MP 133.0)	Westbound	65	132.95	131.07	65	1000	0.2	15	5		11		
WB VSL#5 (MP 131.1 & MP 129.5)	Westbound	65	131.07	127.6	65			15	5		12		

Zone Information



Zone Devices and Equipment

Zone Devices and Equipment

Add new device... Refresh

Name	Entity Type	ExtId	
EB I-80 @ WEST OF QUARRY	DetectorStation	239	
I-80 EB Parleys Canyon Chain Up Area - MP 129.5	DetectorStation	600	
EB I-80 @ CHAIN UP AREA	DetectorStation	602	
EB I-80 @ MISC ACCESS AREA	DetectorStation	604	
EB I-80 @ I-80 COLLECTOR	DetectorStation	238	
EB I-80 @ MOUTH OF PARLEY'S CANYON	DetectorStation	237	
I-80 EB MP 128.0 VSL 1	VMS	100158	
I-80 EB MP 128.9 VSL 2	VMS	100159	
I-80 / Parley's Canyon EB @ Chain Up Area East / MP 129.5, SL	VcsCamera	150	
I-80 Parley's Quarry Low Lite	VcsCamera	16233	
I-80 @ Parleys Canyon Quarry	WeatherRwisLocation	27	

Configure Information

Corridor Information

Corridor | Automation

Chain Law/Traction Event Speed Delta

12000+ GVW (Semi-Trucks) 20

All Vehicles 30

Use weather event module ☐

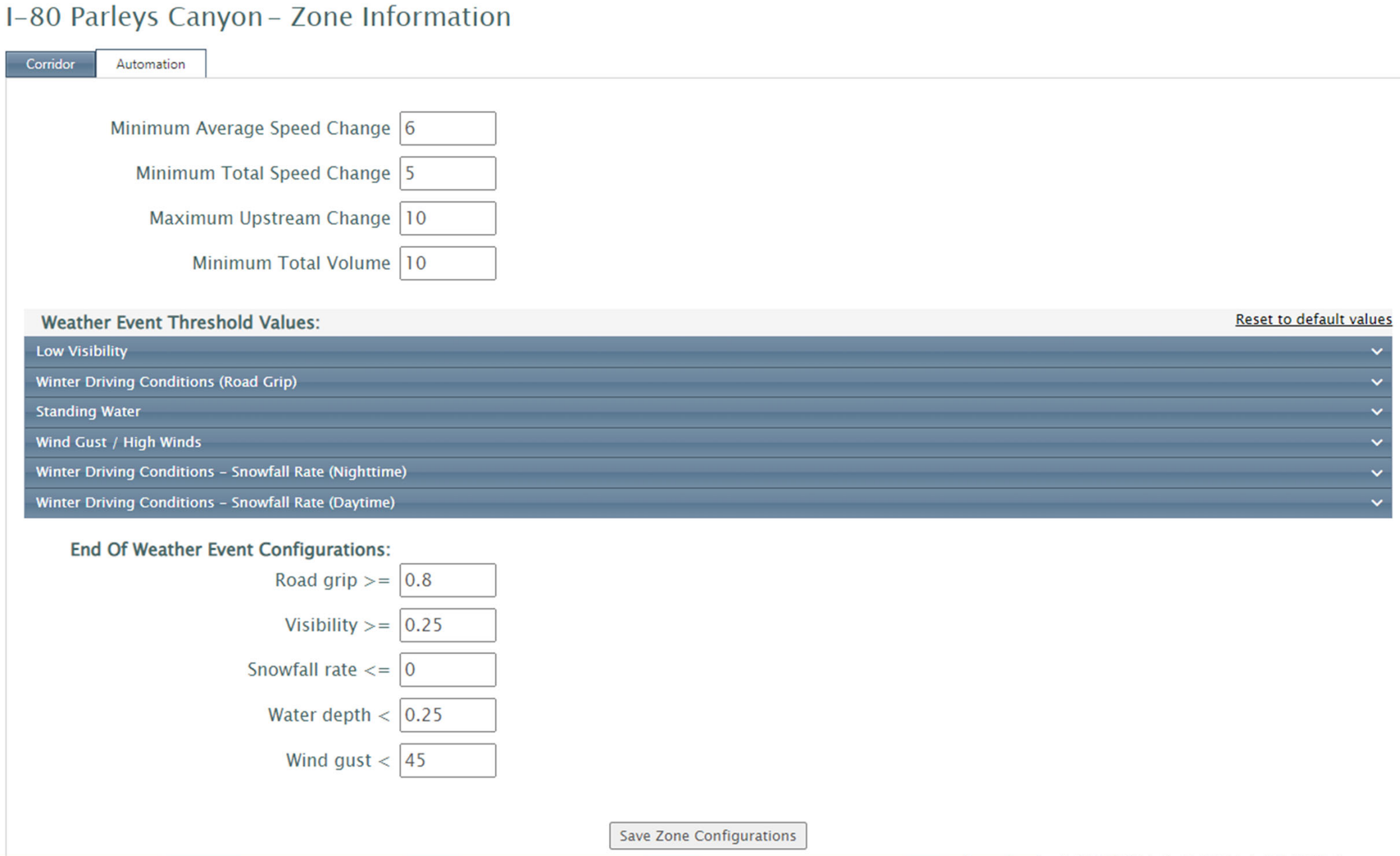
Save Corridor Information

Corridor Zone Groups

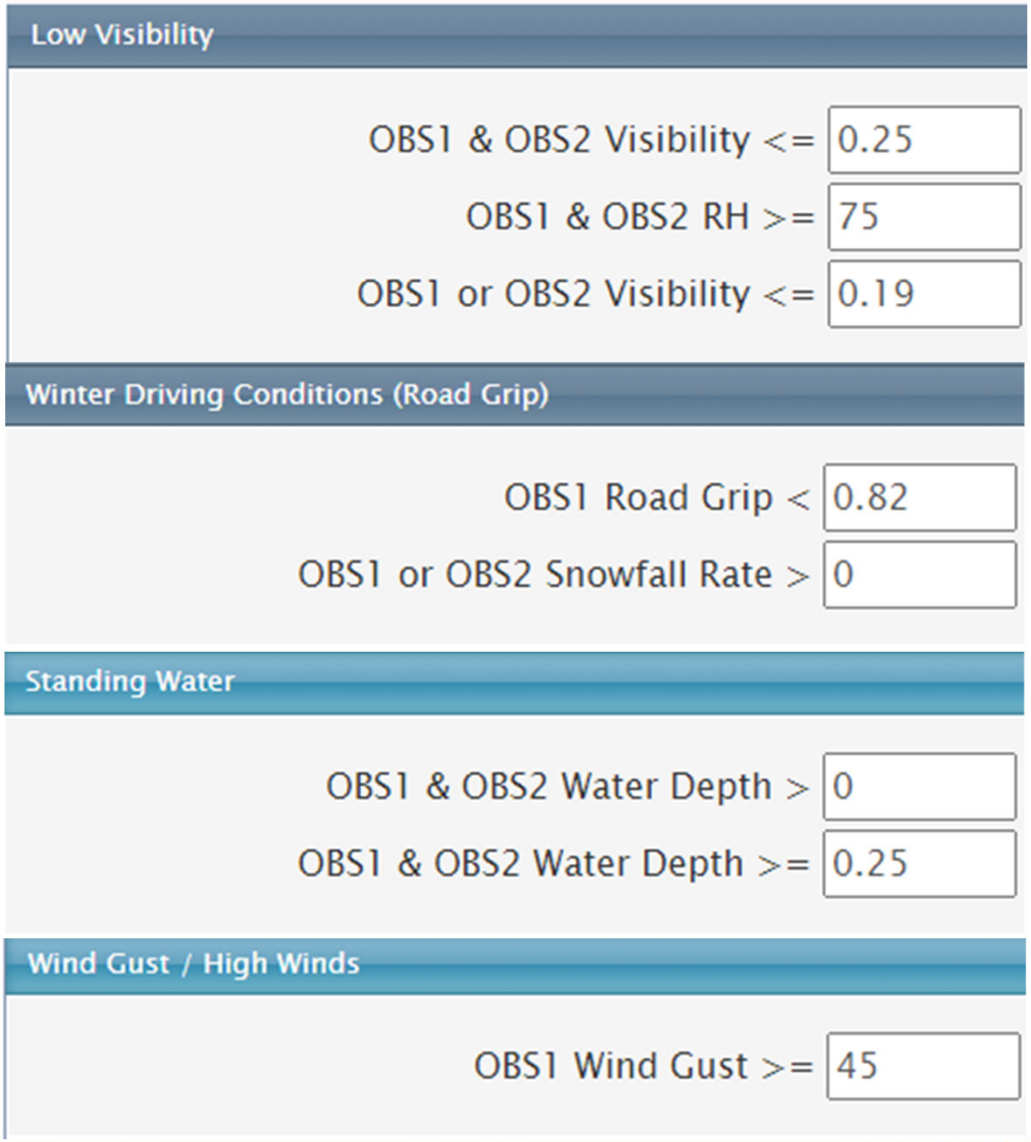
Add new zone group...

Zone Group Name
EB Upper Canyon mp 134.52 to 141.04
WB Lower Canyon mp 132.95 to 128.33
WB Upper Canyon mp 143.62 to 132.95
EB Lower Canyon MP 127.61 to 134.52

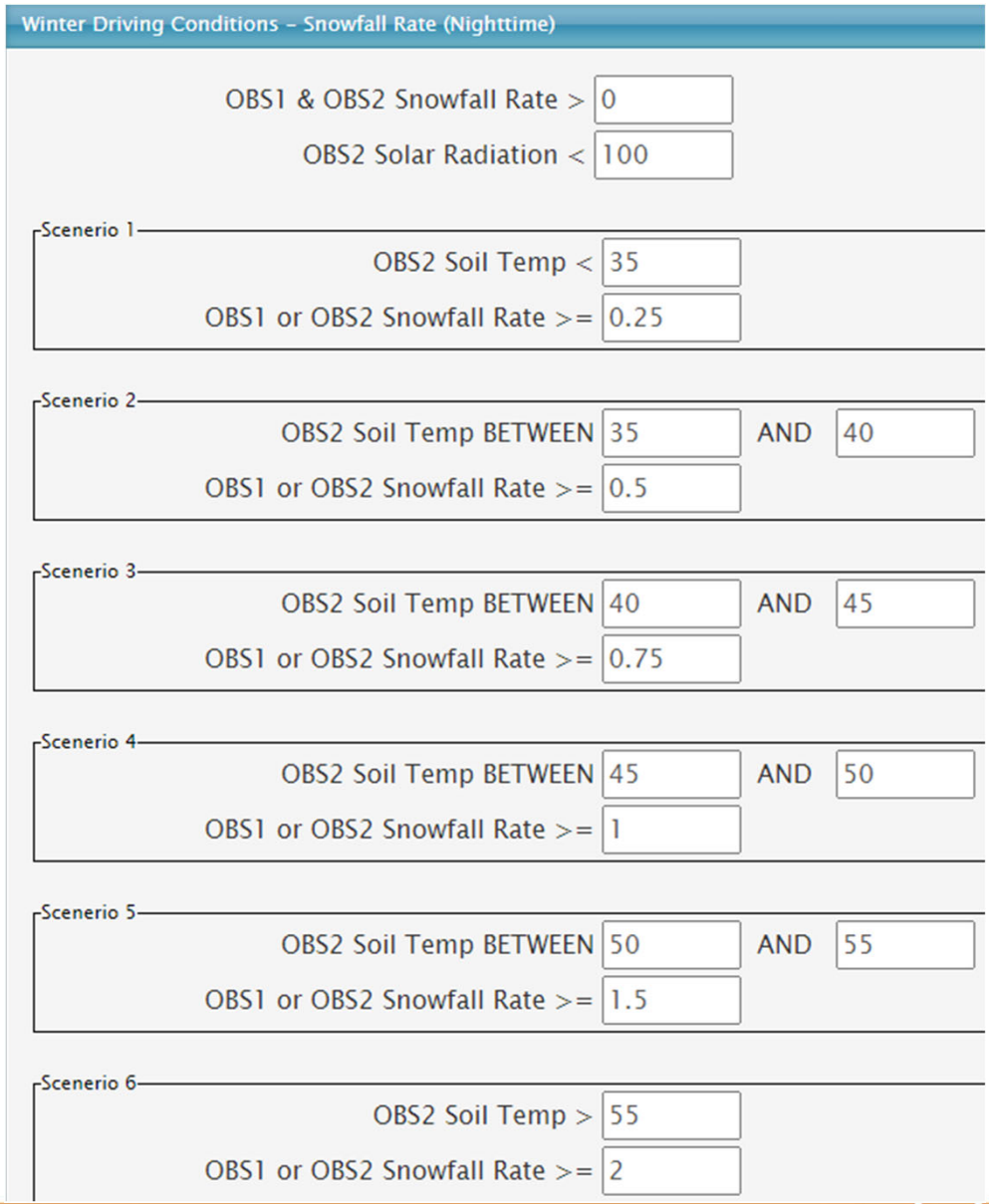
Zone Information - Automation



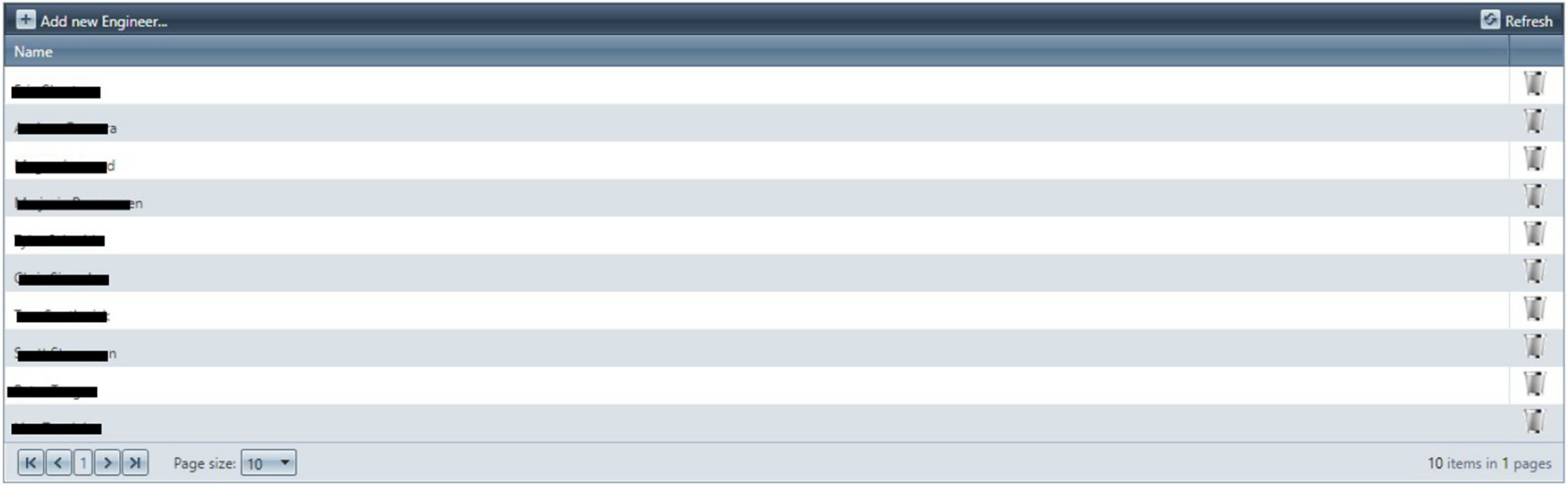
Weather Event Thresholds Values



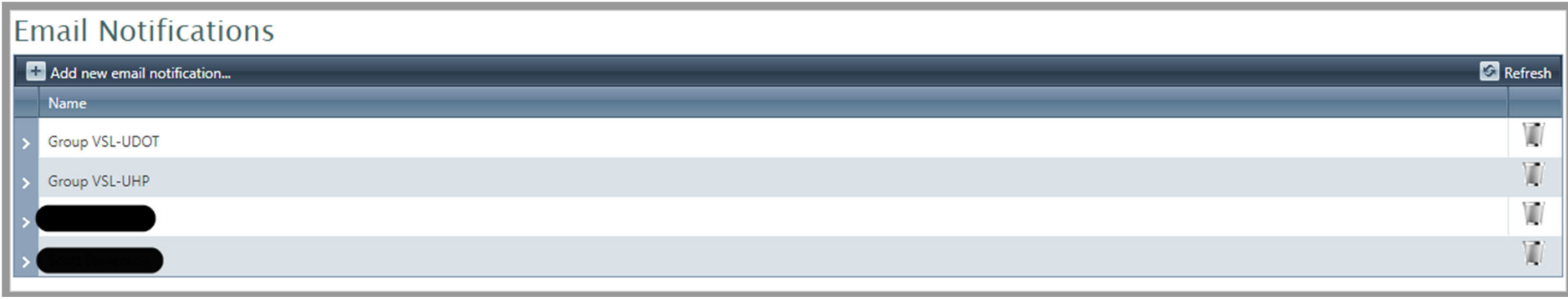
Winter Driving Conditions - Snowfall



Corridor Engineers



Email Notifications



Configure Information

TATS Shed Contact Information

Add new shed contact... Refresh

Shed Name	Name
No records to display.	

Custom Emails

Add new custom email... Refresh

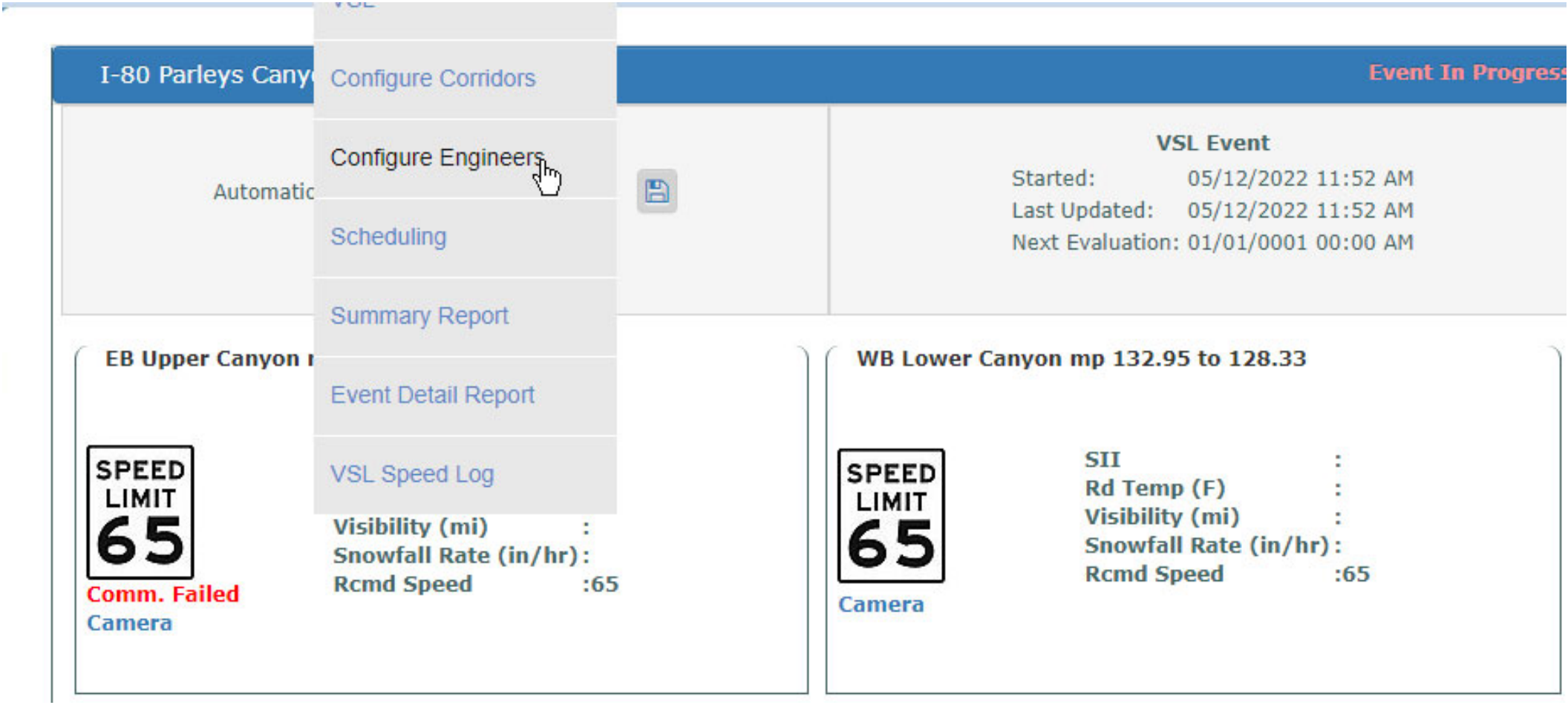
Event Type	Subject	Body
No records to display.		

Question Scripts

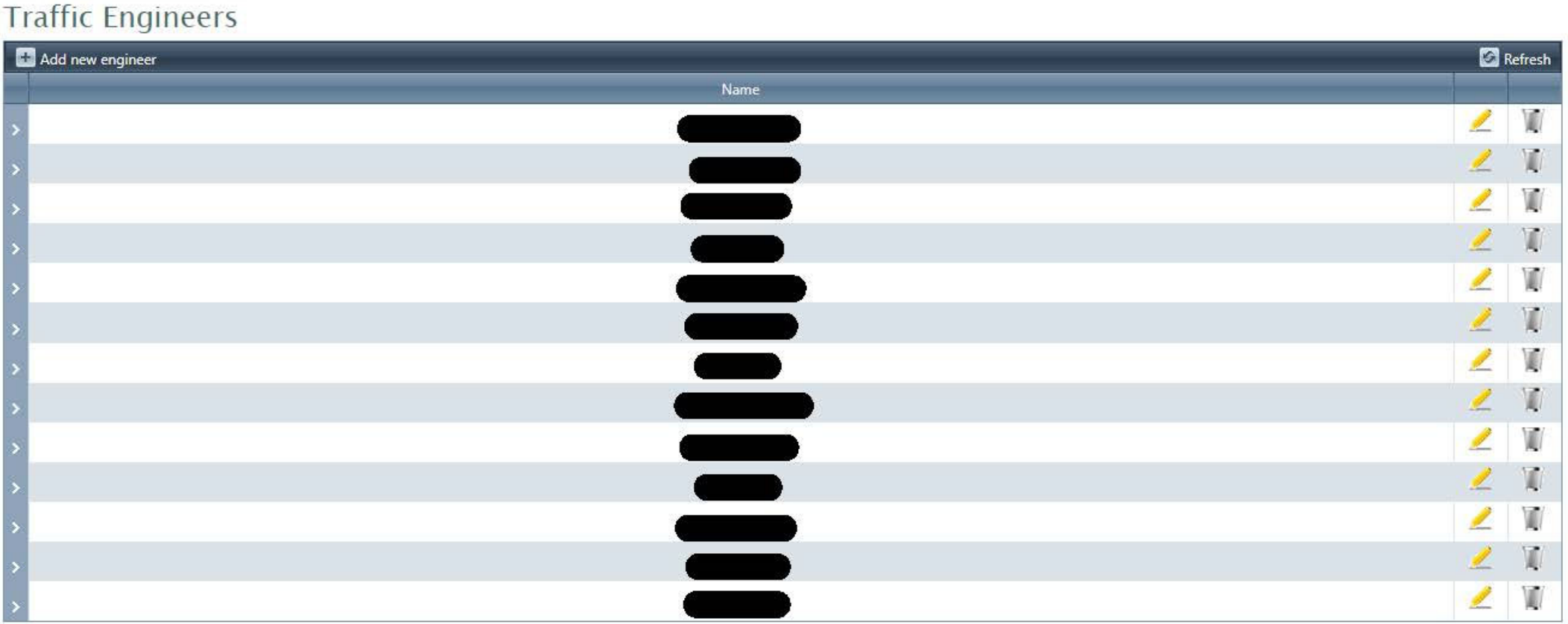
Add new question... Refresh

Display Order	Question
1	We're considering changing the speed limit - do you expect the road condition to change soon?
2	Is there other information we should have before changing the speed limit?

Configure Engineers

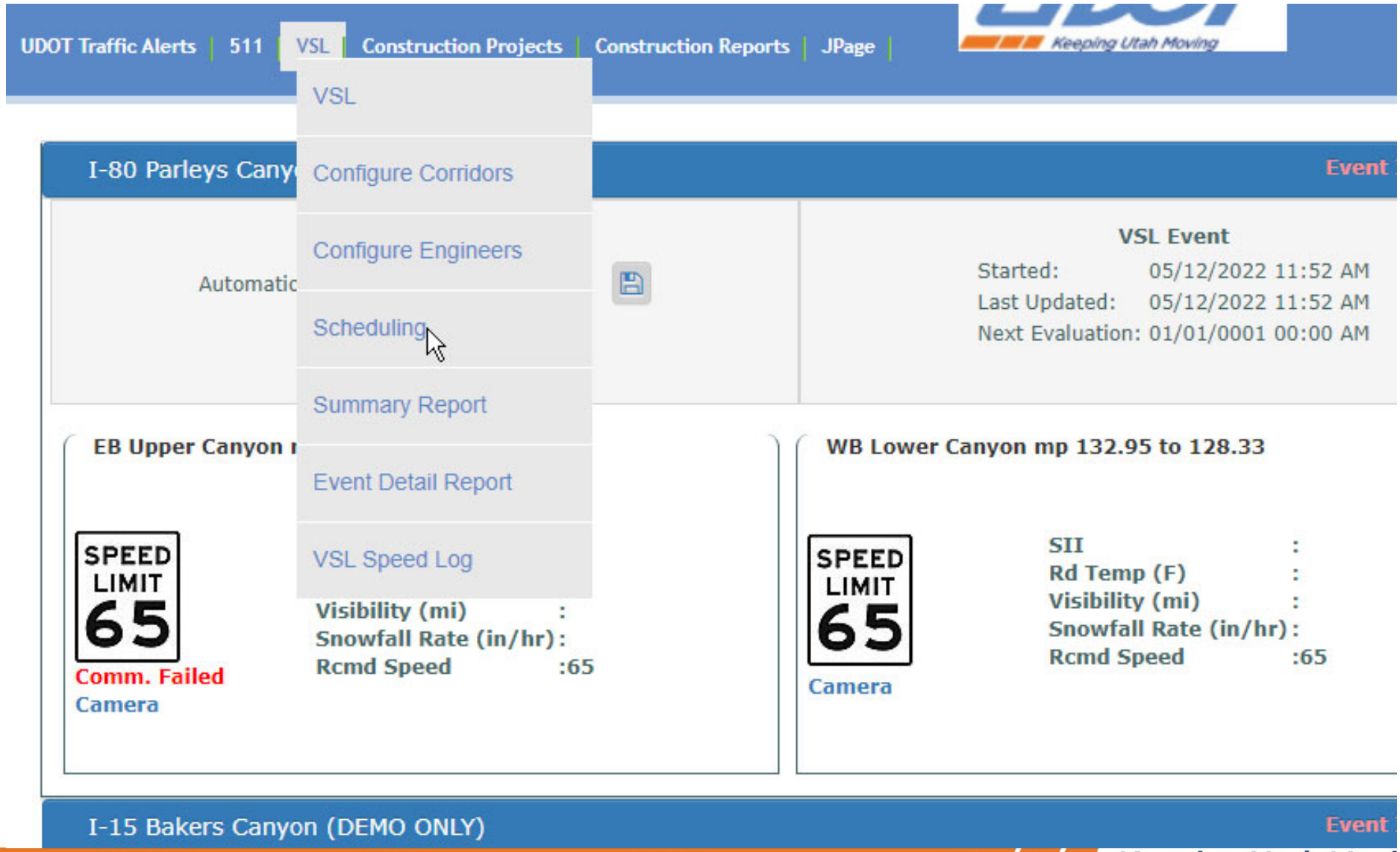


Traffic Engineers List



Configure Engineers – Add New

Scheduling


UDOT Traffic Alerts | 511 | VSL | Construction Projects | Construction Reports | JPage |
Keeping Utah Moving
VSL
Configure Corridors
Configure Engineers
Scheduling
Summary Report
Event Detail Report
VSL Speed Log
I-80 Parleys Cany
Event
Automatic
VSL Event
Started: 05/12/2022 11:52 AM
Last Updated: 05/12/2022 11:52 AM
Next Evaluation: 01/01/0001 00:00 AM
EB Upper Canyon
SPEED LIMIT 65
Comm. Failed
Camera
Visibility (mi) :
Snowfall Rate (in/hr) :
Rcmd Speed :65
WB Lower Canyon mp 132.95 to 128.33
SPEED LIMIT 65
Camera
SII :
Rd Temp (F) :
Visibility (mi) :
Snowfall Rate (in/hr) :
Rcmd Speed :65
I-15 Bakers Canyon (DEMO ONLY)
Event

Scheduling

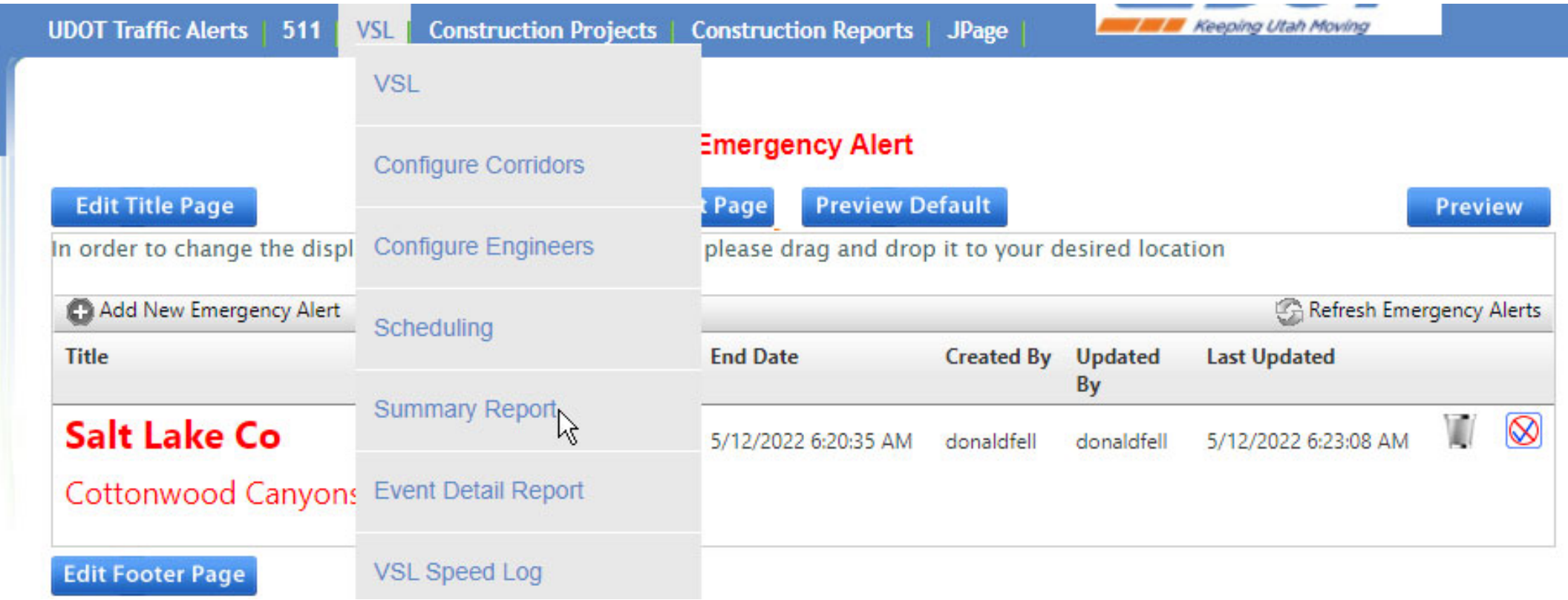
On Duty Schedule

	Corridor
>	I-80 Parleys Canyon
>	I-15 Bakers Canyon (DEMO ONLY)

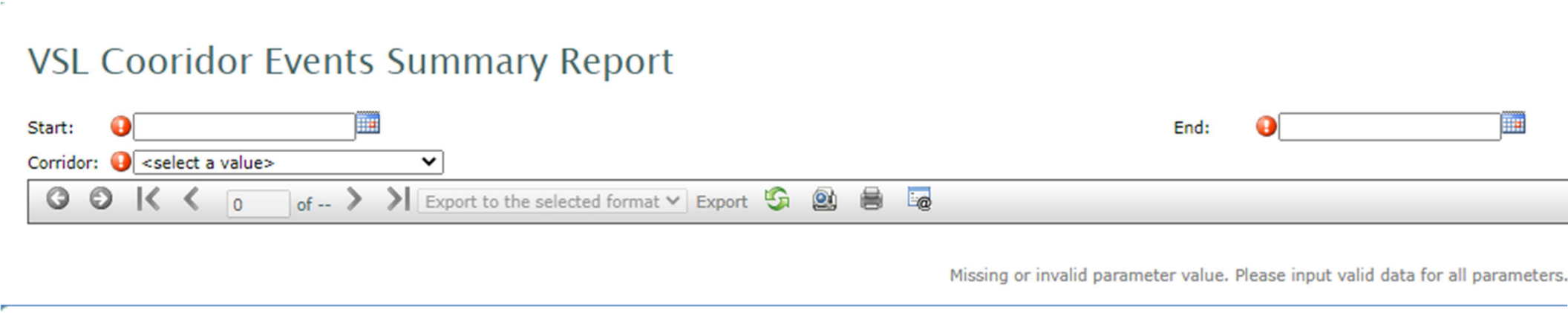
On Duty Schedule

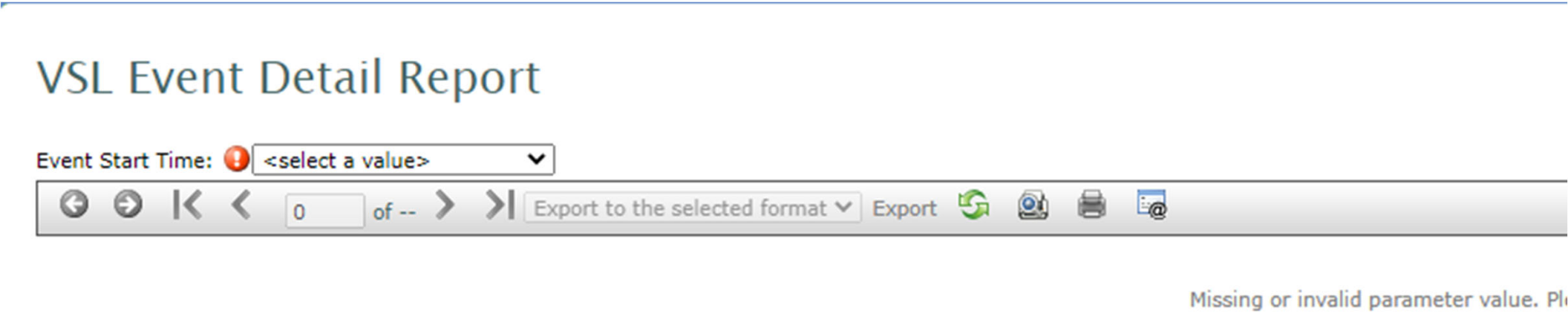
Corridor					
I-80 Parleys Canyon					
Name	Priority	ScheduleNotes	On Duty	Return Date	
[redacted]	7	Wednesday	YES		
[redacted]	2	Tuesday	YES		
[redacted]	6	Saturday	YES		
[redacted]	3	Sunday	YES		
[redacted]	4	Thursday	YES		
[redacted]	0		NO		
[redacted]	5	Friday	YES		
[redacted]	0		NO		
[redacted]	1	Monday	YES		
[redacted]	0		NO		

Summary Report

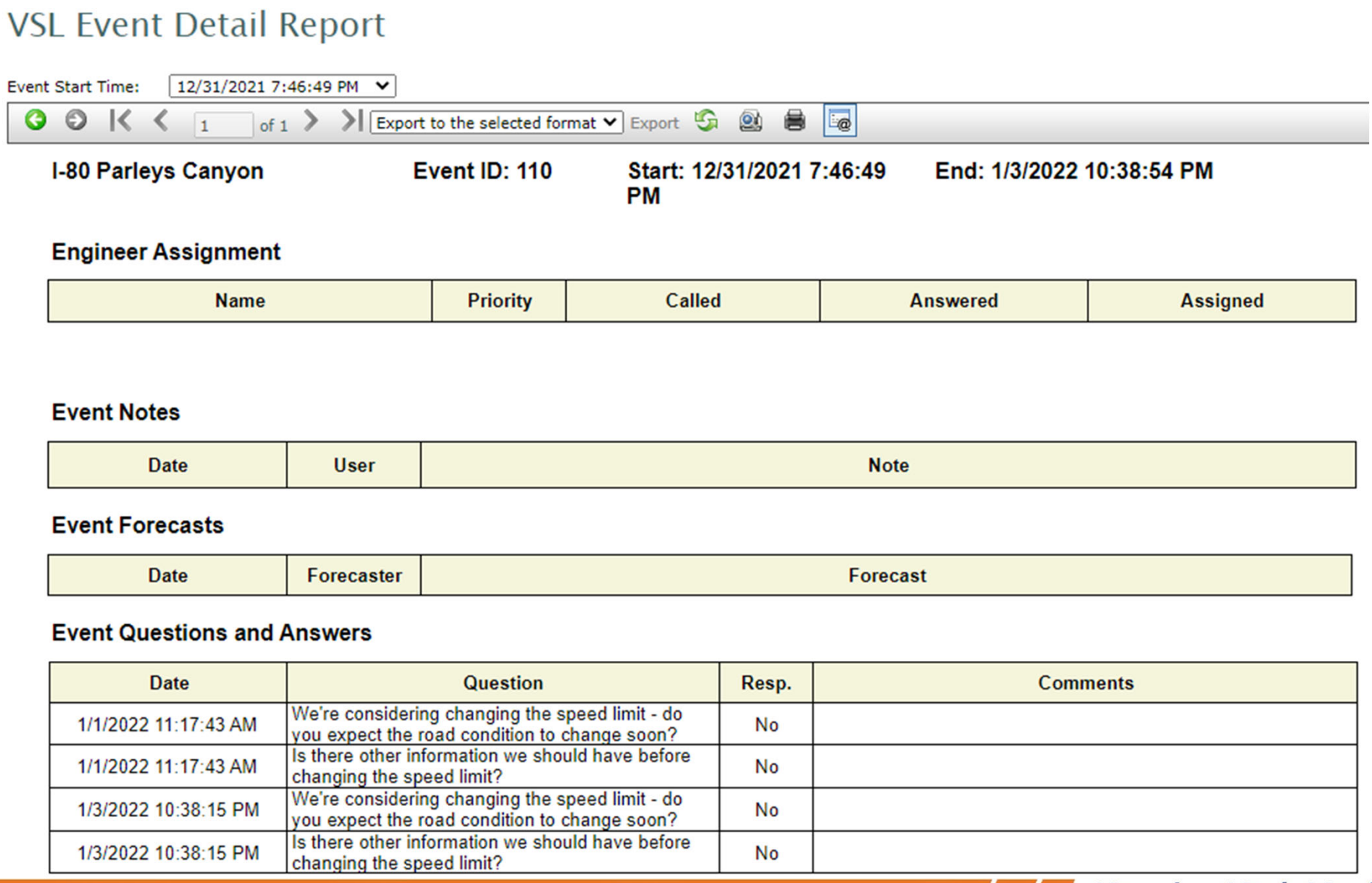


VSL Summary/Detail Reports





VSL Event Detail Report



VSL Event Detail Report

Event Start Time: 12/31/2021 7:46:49 PM

1 of 1 Export to the selected format Export

I-80 Parleys Canyon **Event ID: 110** **Start: 12/31/2021 7:46:49 PM** **End: 1/3/2022 10:38:54 PM**

Engineer Assignment

Name	Priority	Called	Answered	Assigned

Event Notes

Date	User	Note

Event Forecasts

Date	Forecaster	Forecast

Event Questions and Answers

Date	Question	Resp.	Comments
1/1/2022 11:17:43 AM	We're considering changing the speed limit - do you expect the road condition to change soon?	No	
1/1/2022 11:17:43 AM	Is there other information we should have before changing the speed limit?	No	
1/3/2022 10:38:15 PM	We're considering changing the speed limit - do you expect the road condition to change soon?	No	
1/3/2022 10:38:15 PM	Is there other information we should have before changing the speed limit?	No	

VSL Event Detail Report Cont.

Zone Speed Changes

Date	Zone	Speed	Reason	Comments
1/1/2022 11:20:39 AM	EB VSL#1 (MP 128.0 & MP 128.9)	65	Select Reason	
1/1/2022 11:20:45 AM	EB VSL#4 (MP 134.5)	65	Select Reason	
1/1/2022 11:20:51 AM	WB VSL#1 (MP 141.0)	65	Select Reason	
1/1/2022 11:20:56 AM	WB VSL#4 (MP 133.0)	55	Select Reason	Oil spill cleanup
1/1/2022 11:20:42 AM	EB VSL#2 (MP 130.7)	65	Select Reason	
1/1/2022 11:20:44 AM	EB VSL#3 (MP 132.3)	65	Select Reason	
1/1/2022 11:20:46 AM	EB VSL#5 (MP 136.9)	65	Select Reason	
1/1/2022 11:20:48 AM	EB VSL#6 (MP 139.4)	65	Select Reason	
1/1/2022 11:20:49 AM	EB VSL#7 (MP 140.3)	65	Select Reason	
1/1/2022 11:20:52 AM	WB VSL#2 (MP 138.6)	65	Select Reason	
1/1/2022 11:20:53 AM	WB VSL#3 (MP 136.9 & MP 135.4)	65	Select Reason	
1/1/2022 11:20:56 AM	WB VSL#5 (MP 131.1 & MP 129.5)	55	Select Reason	Oil spill cleanup

VSL Event Detail Report Cont.

Weather Data

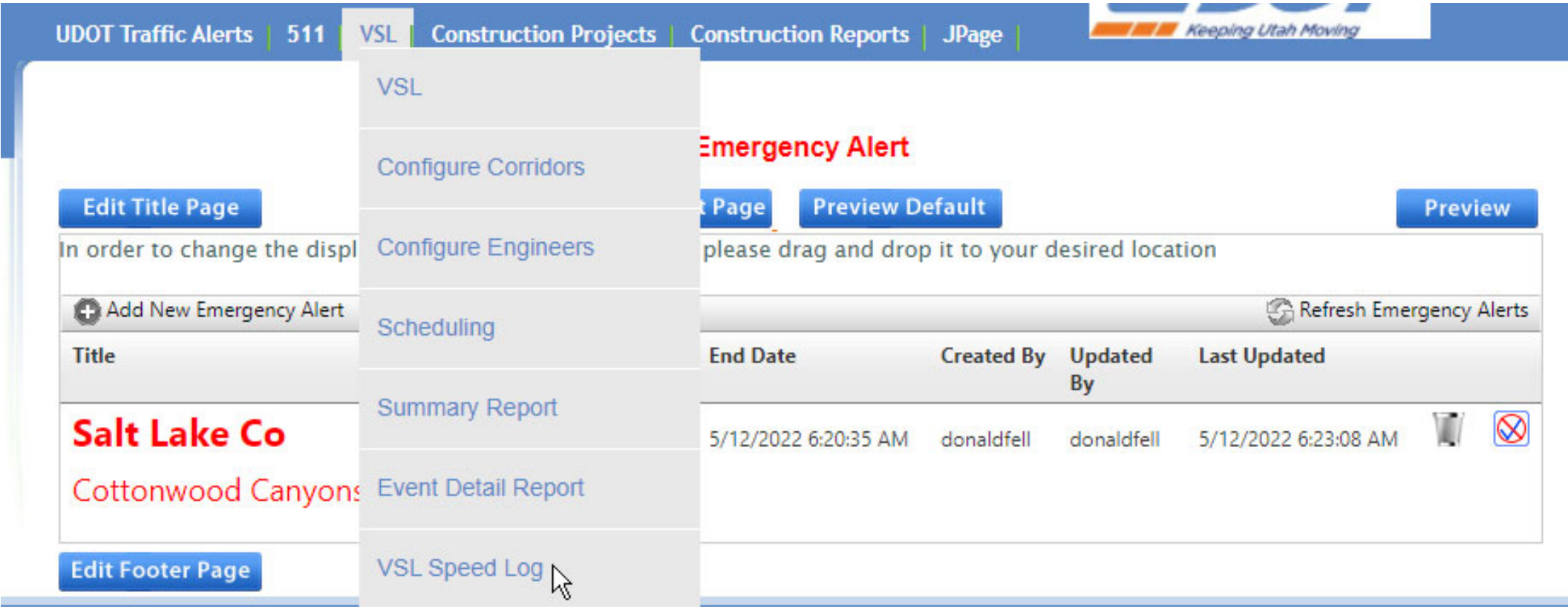
Date	Zone	Precip	Road Temp	Road Status	Visibility	WRWI
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.06	Dry	10.00	0.00
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.06	Dry	10.00	0.00
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.06	Dry	10.00	0.00
1/1/2022 10:55:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 10:55:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 10:55:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 11:00:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 11:00:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 11:00:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.42	Dry	10.00	0.00
1/1/2022 11:05:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00
1/1/2022 11:05:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00
1/1/2022 11:05:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00
1/1/2022 11:10:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00
1/1/2022 11:10:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00
1/1/2022 11:10:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	False	17.60	Dry	10.00	0.00

VSL Event Detail Report Cont.

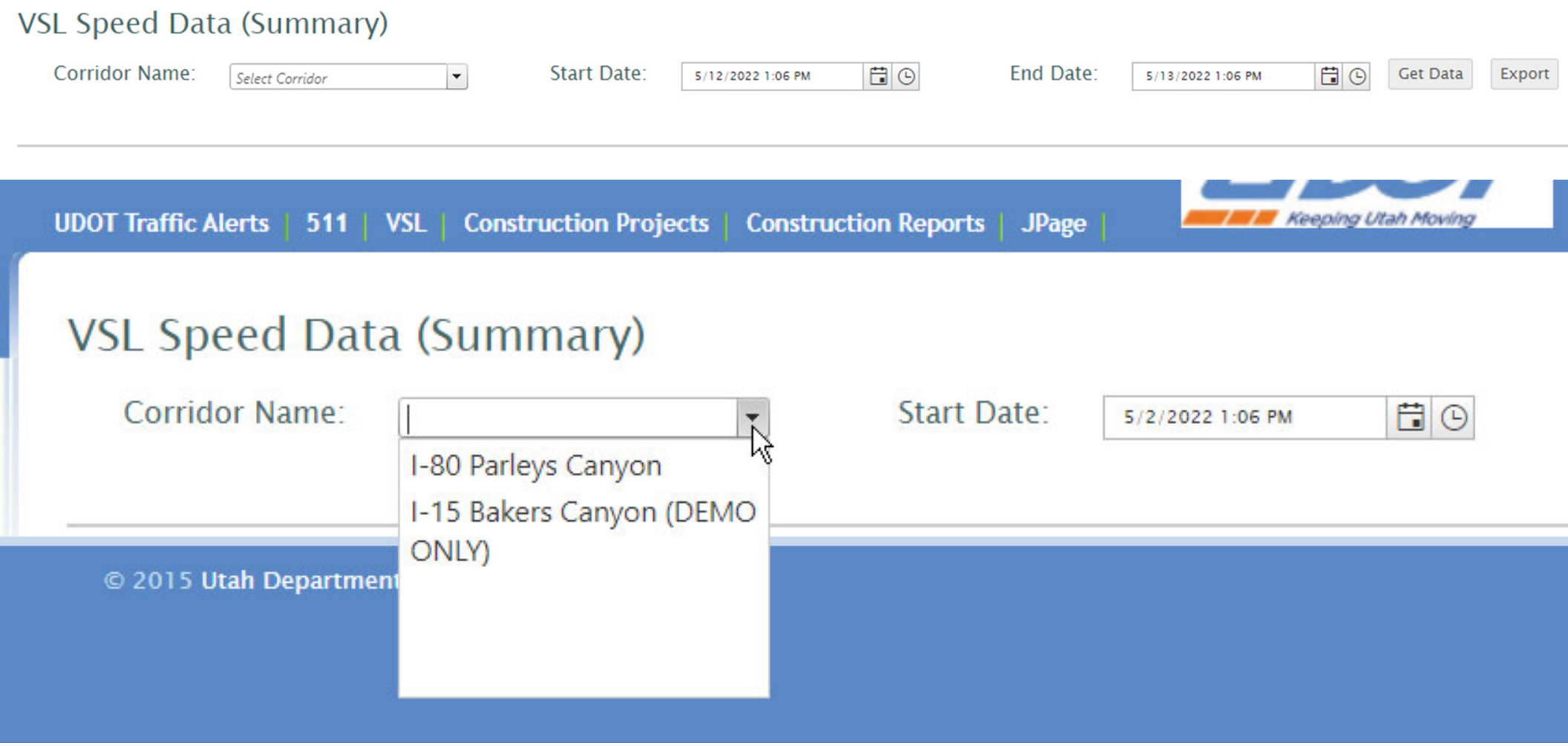
Speed Data

Date	Zone	DS Intld	Lane	Duration (sec)	Smoothed Speed	Smoothed Volume
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	5	300	77	462
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	6	300	71	698
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	7	300	70	374
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	1748	5	300	74	434
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	1748	6	300	68	717
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	1748	7	300	66	356
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	314	5	300	74	484
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	314	6	300	69	699
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	314	7	300	68	366
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	136	5	300	61	468
1/1/2022 10:45:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	136	6	300	56	481
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	5	300	76	518
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	6	300	71	784
1/1/2022 10:50:00 AM	EB VSL#1 (MP 128.0 & MP 128.9)	138	7	300	69	291

VSL Speed Log



VSL Speed Log



Lessons Learned – Construction


VARIABLE SPEED
ZONE AHEAD
WHEN FLASHING
SUMMIT CREEK
30 Minutes from BYU
SummitCreekUtah.com
YESCO


75
M. P. H.


SPEED LIMIT
70


BEGIN
VARIABLE
SPEED
ZONE
SPEED
LIMIT
65


Dog Valley
Summit
6180 FT

Lessons Learned - Materials

Order state furnished materials as soon as possible.

- This caused some issues as far as conduit placement in foundations for the Uninterrupted Power Supply (UPS) cabinets.

Stainless Steel Sectionalizers

- Stainless Steel Sectionalizers added substantial cost (approximately 4 times the cost) and delays in receiving them.
- Delay was related to COVID-19. An epoxy composite would have been one fourth the cost and as corrosive resistant.

Lessons Learned – Materials Cont.

- Low voltage wiring (120/240 VAC)
  - Would have specified aluminum conductors.
  - One fourth the cost plus wire theft would be reduced.
- Utility service
  - The original plans showed a HV feed from Utility provider.
  - More expensive than the traditional 120/240 VAC feed due to special requirements for metering.
  - Would require special equipment and expertise for disconnecting the HV cutouts.
  - After a change order, have a 120/240 VAC service from utility then, steps up voltage to 72KV for distribution.
  - Disconnecting power in the event of Sectionalizer or Transformer being hit is much easier.

Lessons Learned – Materials Cont.

- Conduits bends
  - The contractor did a poor job keeping conduit bends to a minimum mainly around junction boxes. This became apparent when proofing conduits.
  - Blue Staking of existing Utilities
    - Not always done when requested or, markings were destroyed
    - Utility contractor hit active fiber line
      - 14,000 feet of fiber had to be replaced, twice.
      - Delays in getting fiber and finding time to perform work
      - UDOT ended up paying half of fiber repair because UDOT couldn't prove the Blue Staking was in placed at time of the hit.
      - Fiber hit and the contractor didn't notify UDOT. Found while testing fiber.
    - Utility contractor hit conductors for Interchange Lighting

Questions?

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Thank You!