UDOT's Region Four Rural Intersection Conflict Warning Systems (RICWS) Design and Implementation

Presenters

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Traffic Operations Engineer

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Vice President

RURAL INTERSECTION CONFLICT WARNING SYSTEM GUIDELINES

INTRODUCTION and BACKGROUND

- Crashes at rural intersections account for a large portion of fatalities and serious injuries across the country.
- The Federal Highway Administration reports roughly 40% of all crashes, mostly from left turns, with roughly 20% of fatal crashes occurring at intersections
- Much of UDOT's Region Four is rural
- UDOT Region 4 decided to research what other state DOT's have implemented to reduce the number of serious crashes at rural intersections.
- The research resulted in a report that guided the design and deployment of RICWS for three rural intersections.

- **Advanced LED Warning System for Rural Intersections: Phase 2 (ALERT-2)**
- **Improving Safety at Rural Intersections: A Guide to Current Technology**
- **ENTERPRISE Intersection Conflict Warning Systems Study**

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UDOT Rural Intersection Warning Project

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Highway Safety Improvement Program (HSIP)

- **Requirements for HSIP Funding**
  - **Be on a public roadway**
  - **Be in a location with a correctable crash history**
  - **Be expected to reduce crashes at or near the project location**
  - **Have a positive estimated benefit/cost ration or qualify as a systemic safety project**

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UDOT Project Locations

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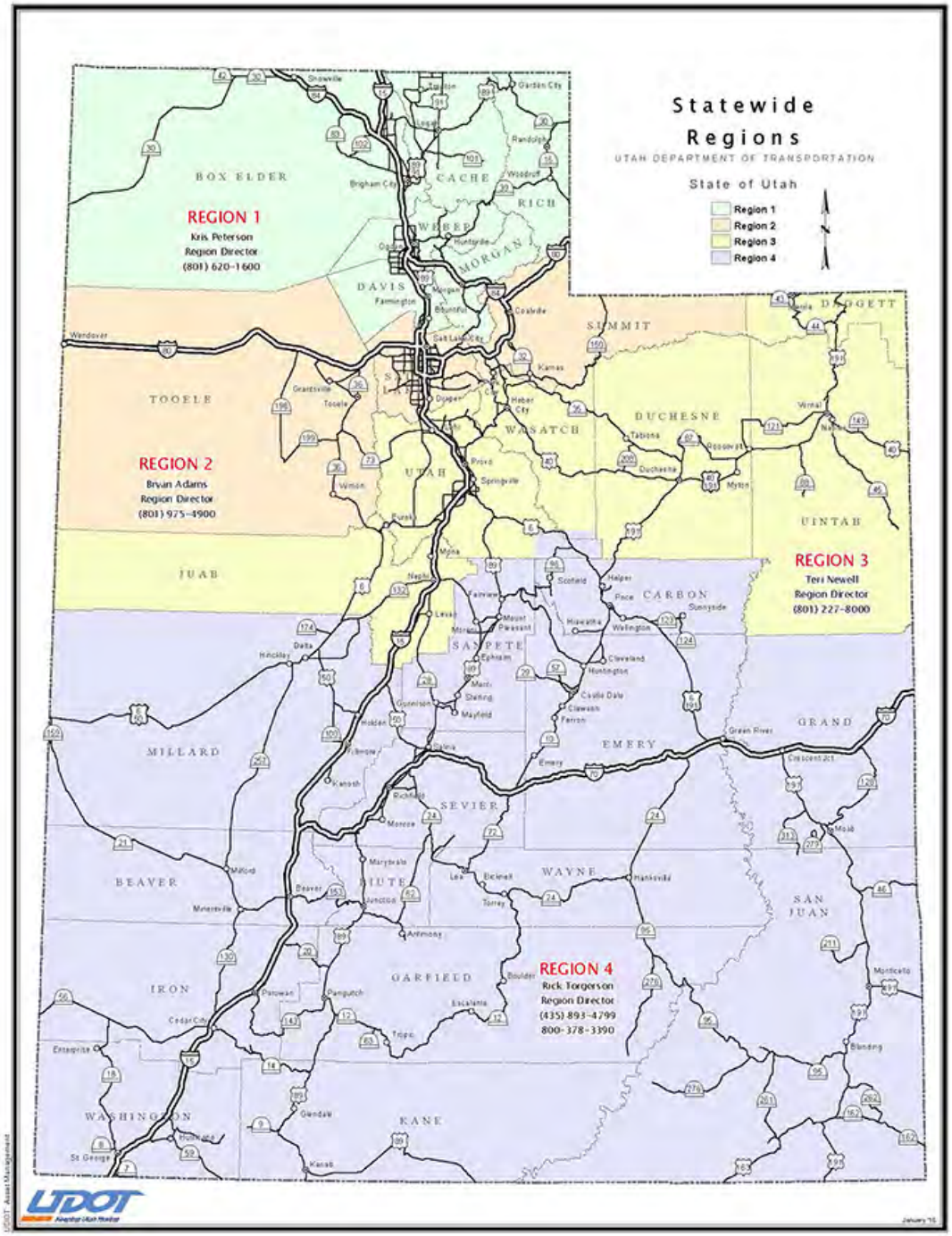

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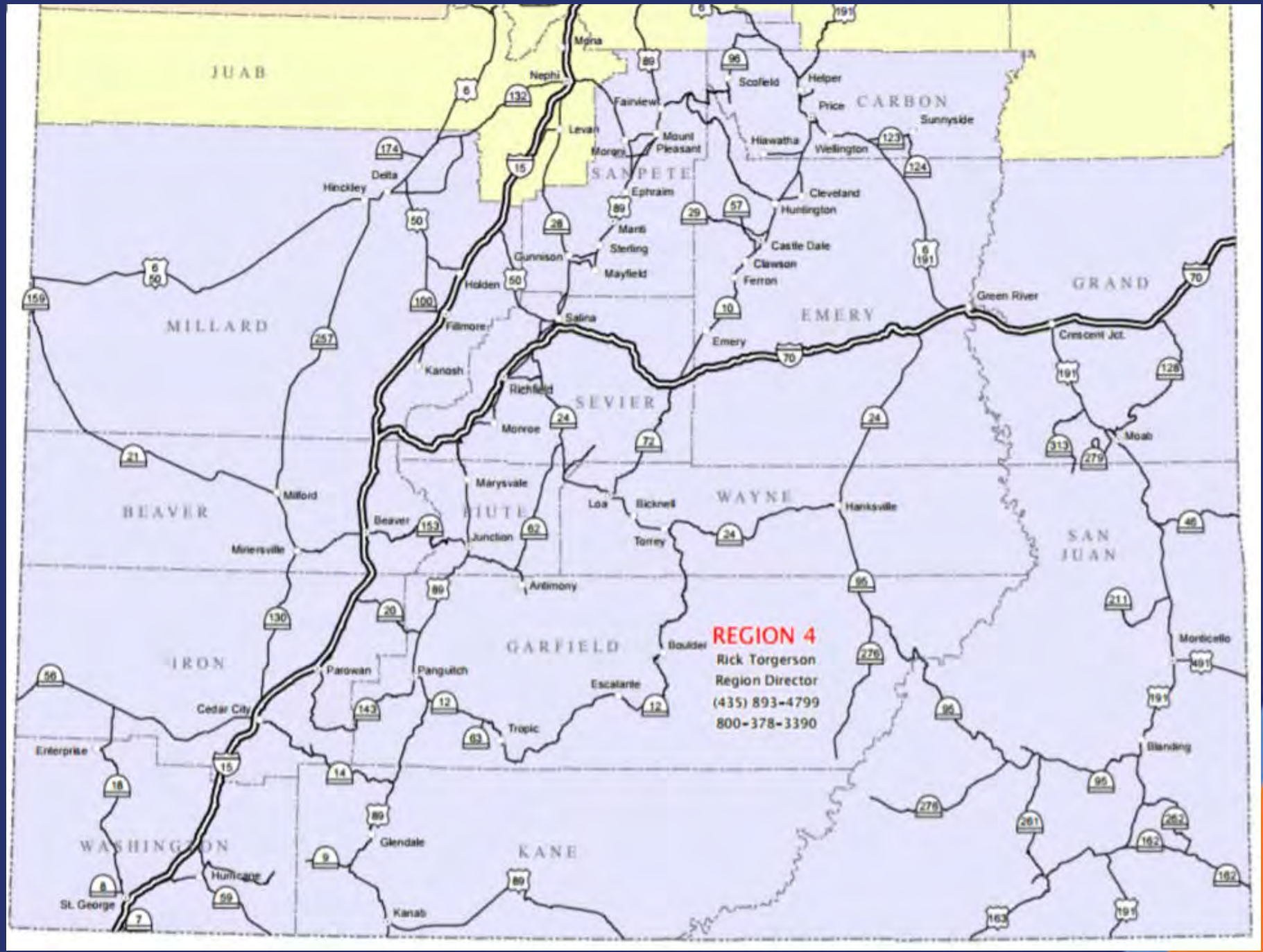
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Scofield
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Rick Torgerson
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800-378-3390
GARFIELD
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IRON
Cedar City
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WASHINGTON
Hurricane
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Glendale
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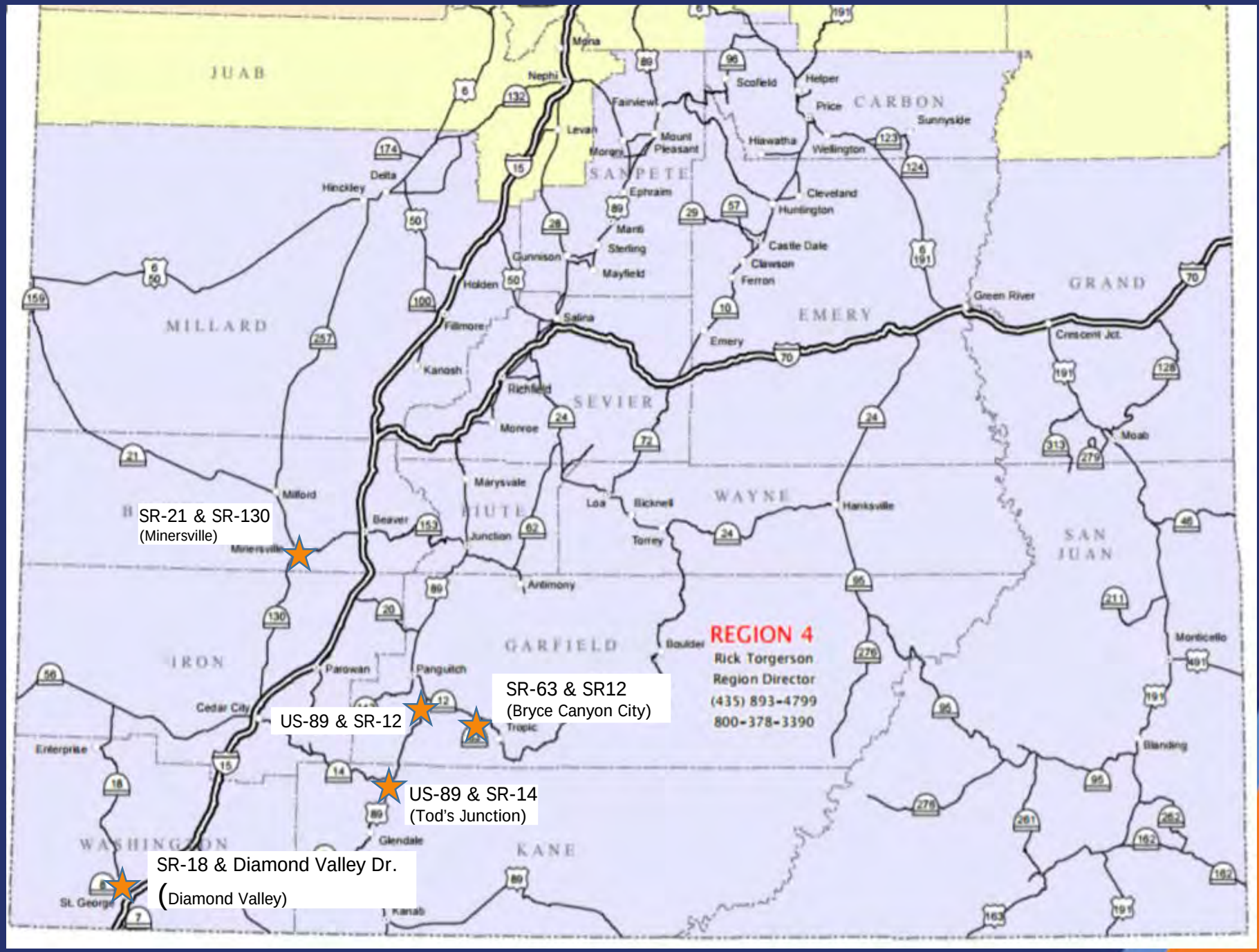
SR-21 & SR-130
(Minersville)
US-89 & SR-12
SR-63 & SR12
(Bryce Canyon City)
US-89 & SR-14
(Tod's Junction)
SR-18 & Diamond Valley Dr.
(Diamond Valley)
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Rick Torgerson
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Glendale
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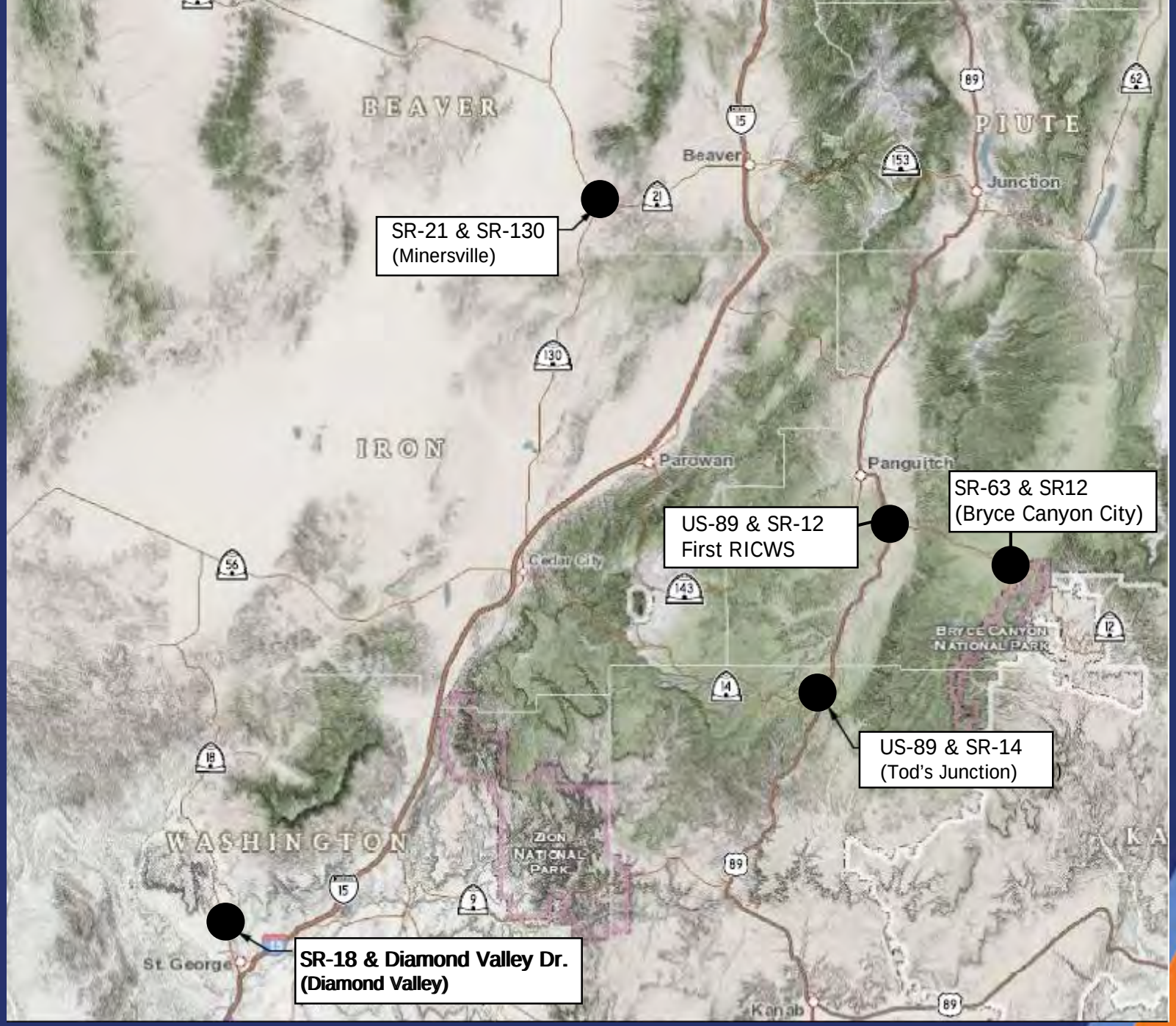
SR-21 & SR-130
(Minersville)
US-89 & SR-12
First RICWS
SR-63 & SR12
(Bryce Canyon City)
US-89 & SR-14
(Tod's Junction)
SR-18 & Diamond Valley Dr.
(Diamond Valley)
BEAVER
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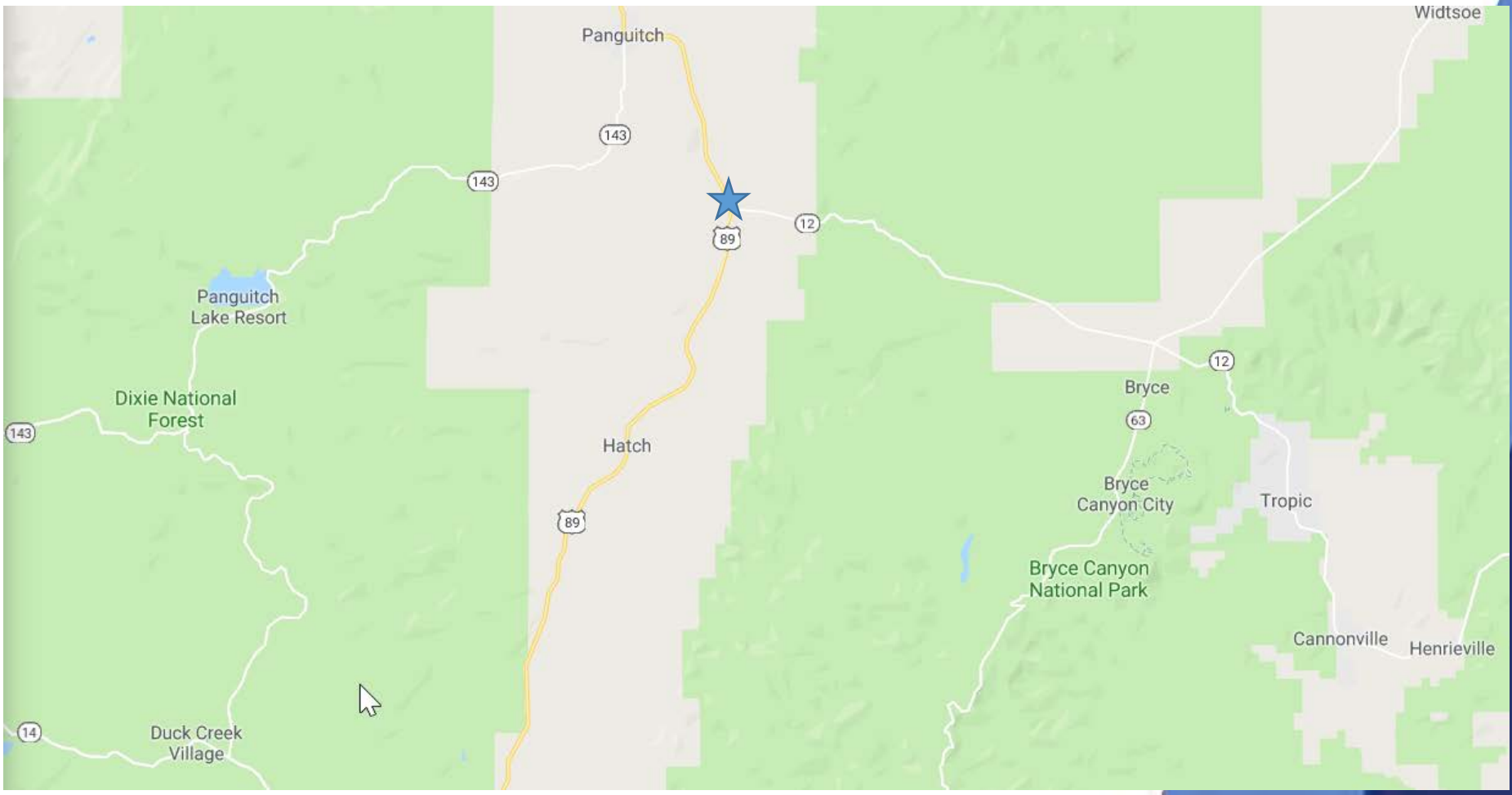
WASHINGTON
PIUTE
Beaver
Junction
Parowan
Panguitch
Cedar City
St. George
Kanab
ZION NATIONAL PARK
BRYCE CANYON NATIONAL PARK

Intersection of US-89 & SR-12



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Intersection of SR-12 and SR-63


12
63

Intersection of SR-21 and SR-130

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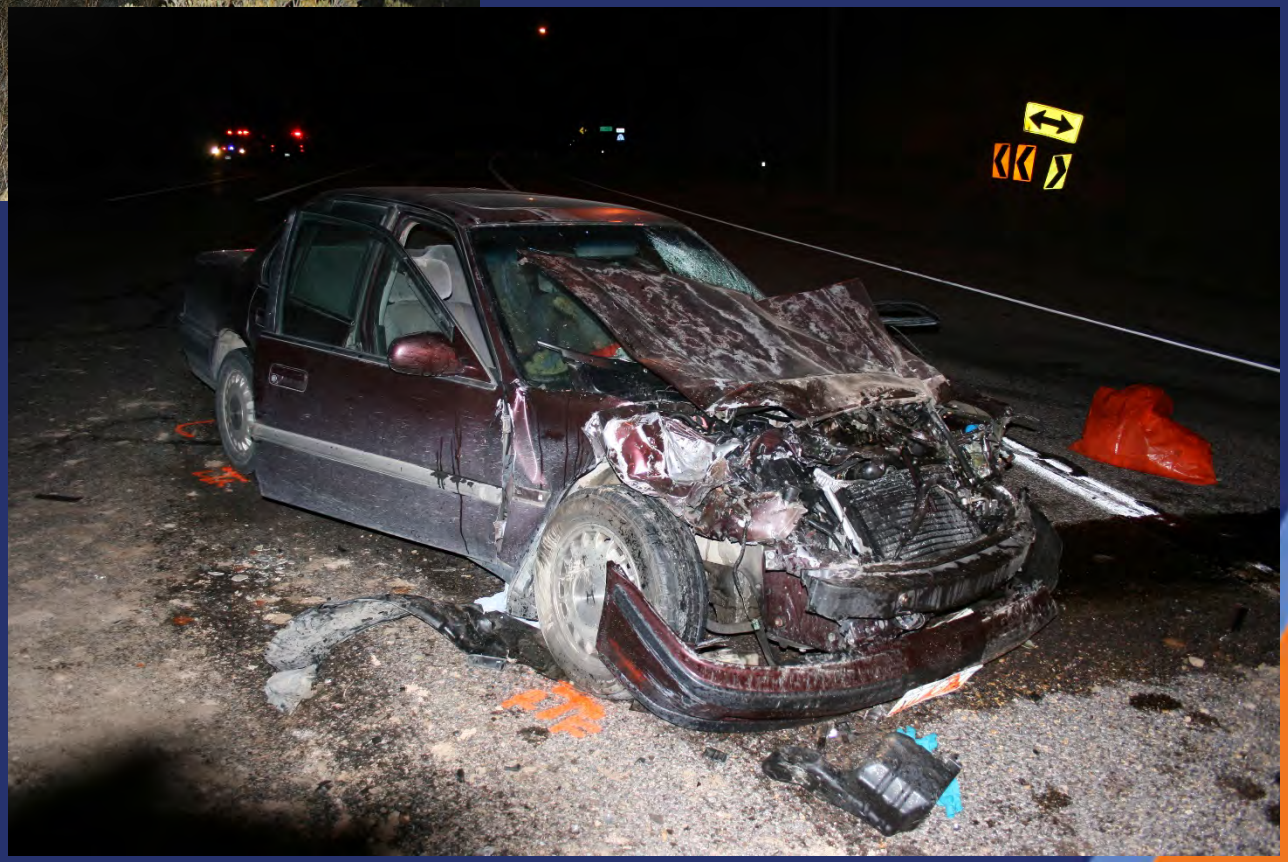

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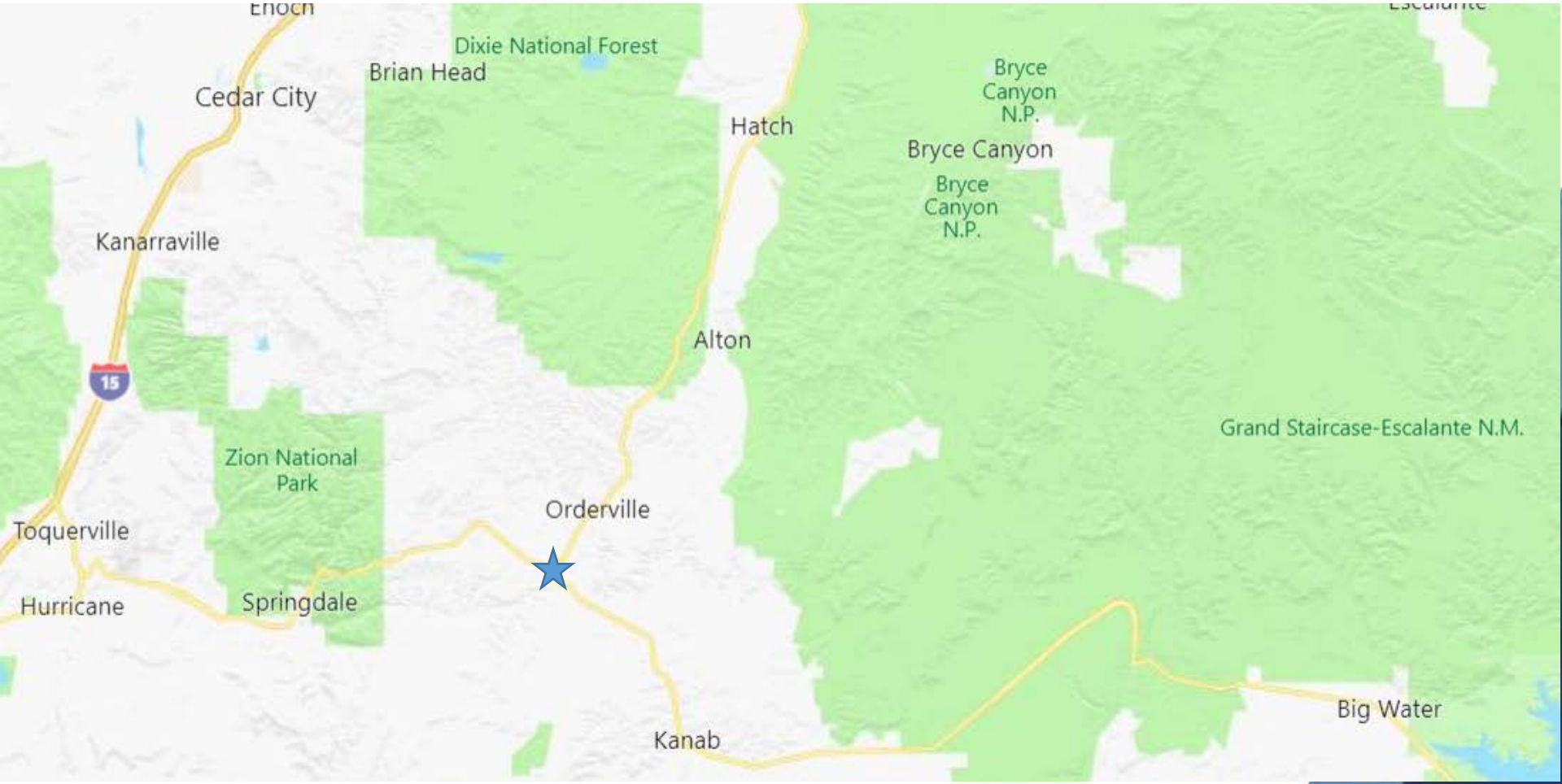
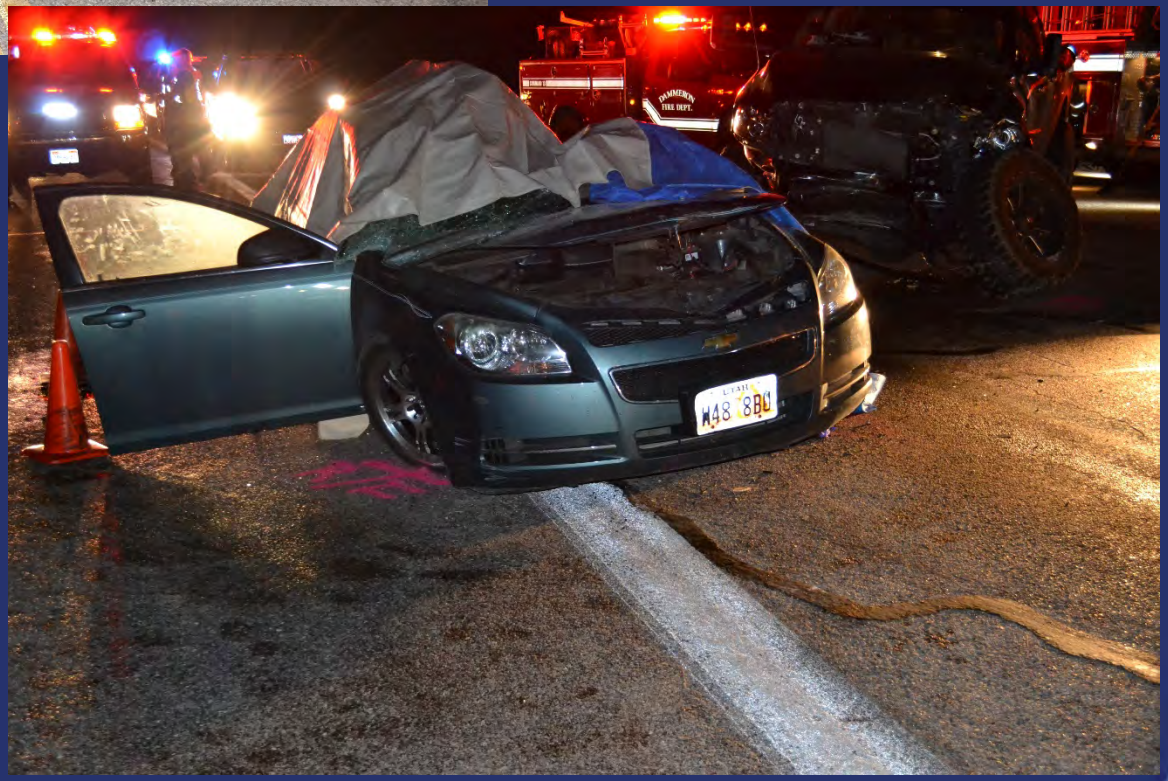
Intersection of US-89 and SR-14




14
U.S. Hwy 89

Intersection of SR-18 and Diamond Valley Drive


18
W Diamond Valley Dr



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RICWS WARRANTS

RICWS Warrants

Reactive Approach

Identifies specific intersections with a history of accidents and therefore warrant an immediate remedy to mitigate safety issues.

Proactive Approach

A set of criteria is used to rank an intersection. The proactive approach is a risk assessment of factors related to fatal/serious injury and crash potential, with a focus on low cost mitigation

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RICWS Warrants

Proactive Approach

- Traffic Volumes
- Engineering Judgment
- Intersection Sight Distance / Gap Acceptance
- Intersection Skew Angle
- Horizontal / Vertical Curvature
- Railroad Crossings
- Adjacent Property Development
- High Crash Rate

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RURAL INTERSECTION CONFLICT WARNING SYSTEM GUIDELINES

RICWS Guideline Sections

1. Intersection Scenario Identification
2. Sign Type, Placement, and Message Selection
3. Detection Type
4. Power Supply Assessment
5. System Monitoring, Communication, & Data Management

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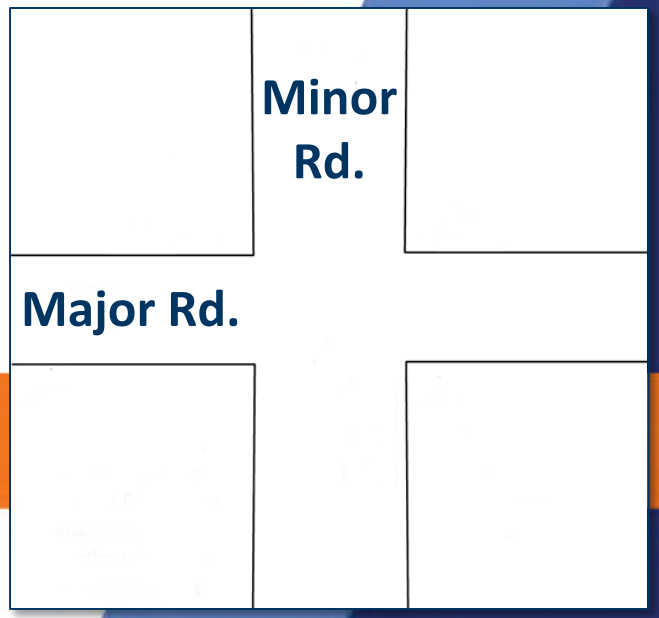
1. Intersection Scenarios

Scenario 1 – Minor Road Alert Only

Scenario 2 – Minor Road Alert Only (Divided)

Scenario 3 – Major Road Alert Only

Scenario 4 – Minor and Major Alert



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1. Intersection Scenarios

- Minor road ONLY alert may be most effective where major road volumes are less than 3,000 AADT.
- Major road ONLY alert most effective where major road volumes are above 3,000 AADT and less than 10,000 AADT.
- Major AND minor road alerts most effective where major road volumes are above 10,000 AADT and less than 12,000 AADT.

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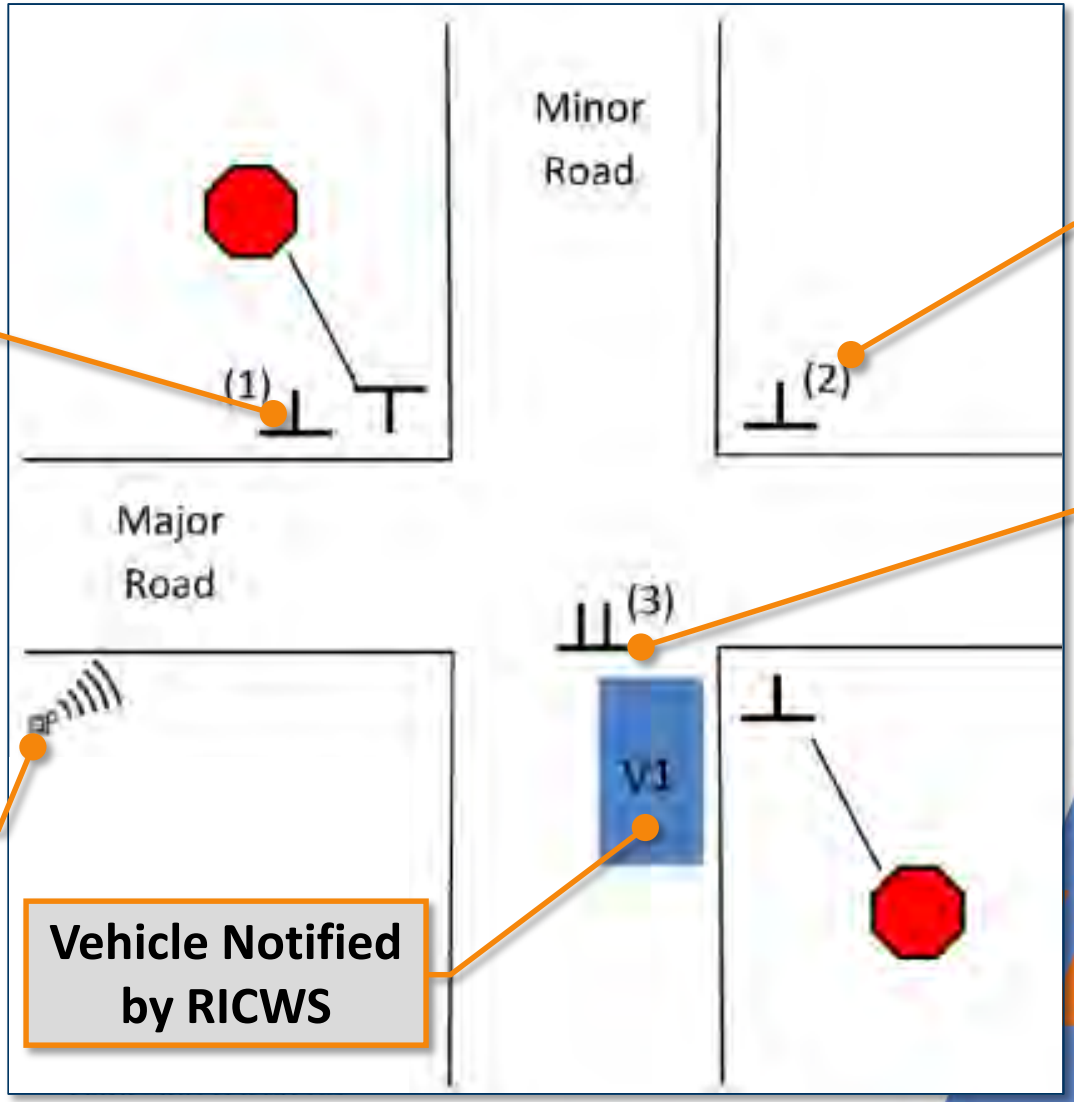
Scenario 1 - Minor Road Only



Post-Mounted RICWS Sign

(1) (2) (3) Optional RICWS Sign Locations

Overhead RICWS Sign

Traffic Detection

Vehicle Notified by RICWS

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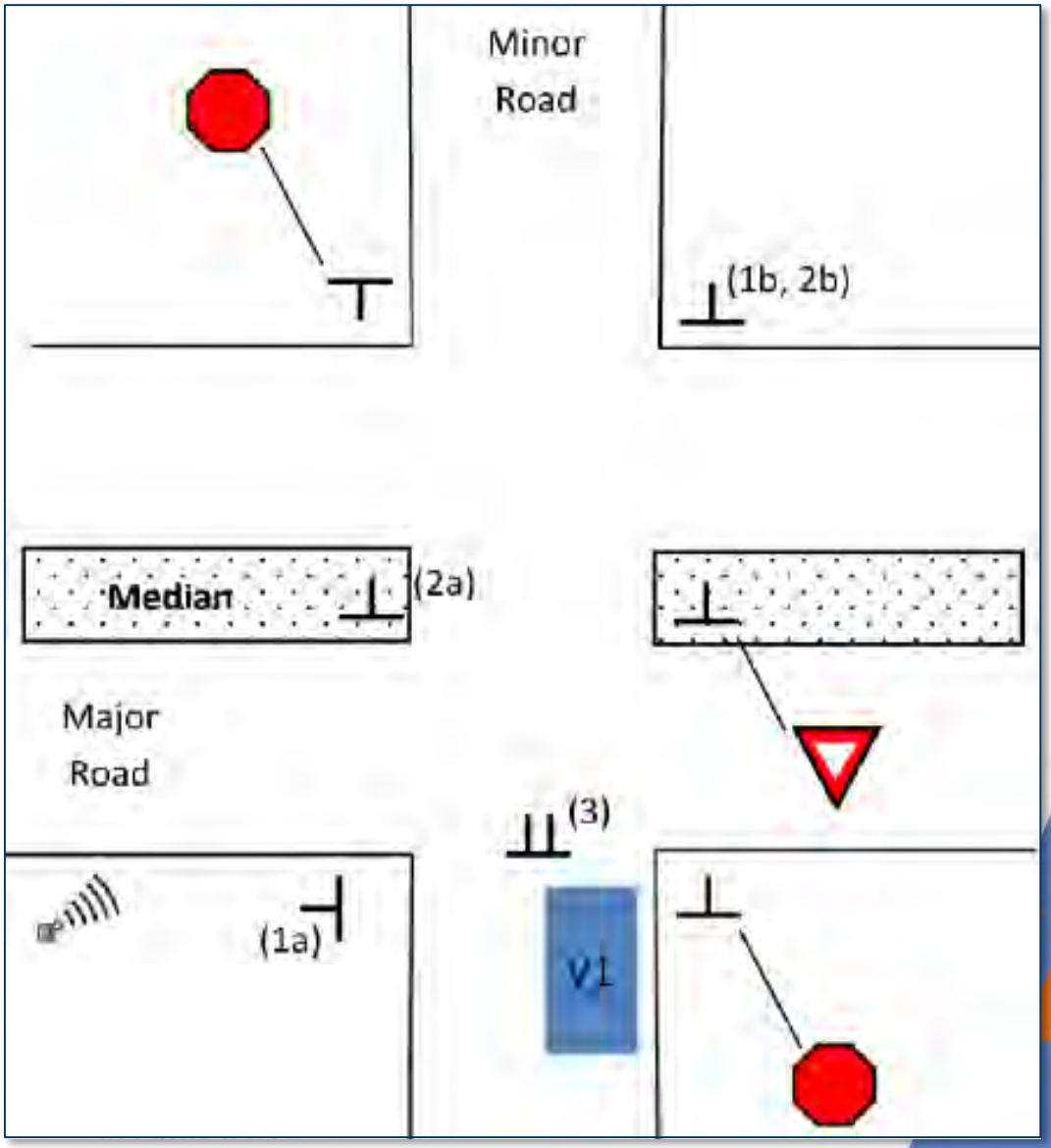
Scenario 2 - Minor Road (Divided)



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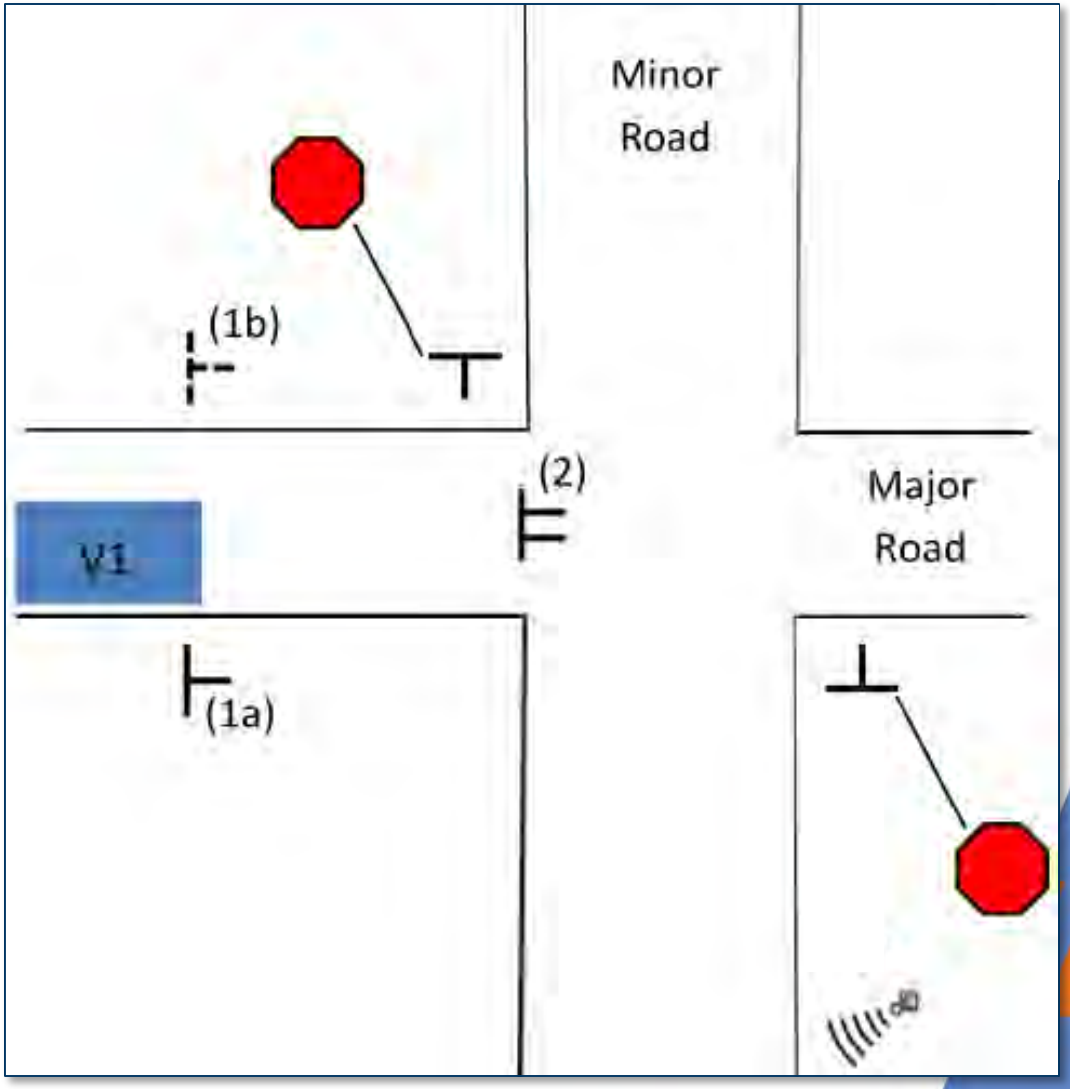
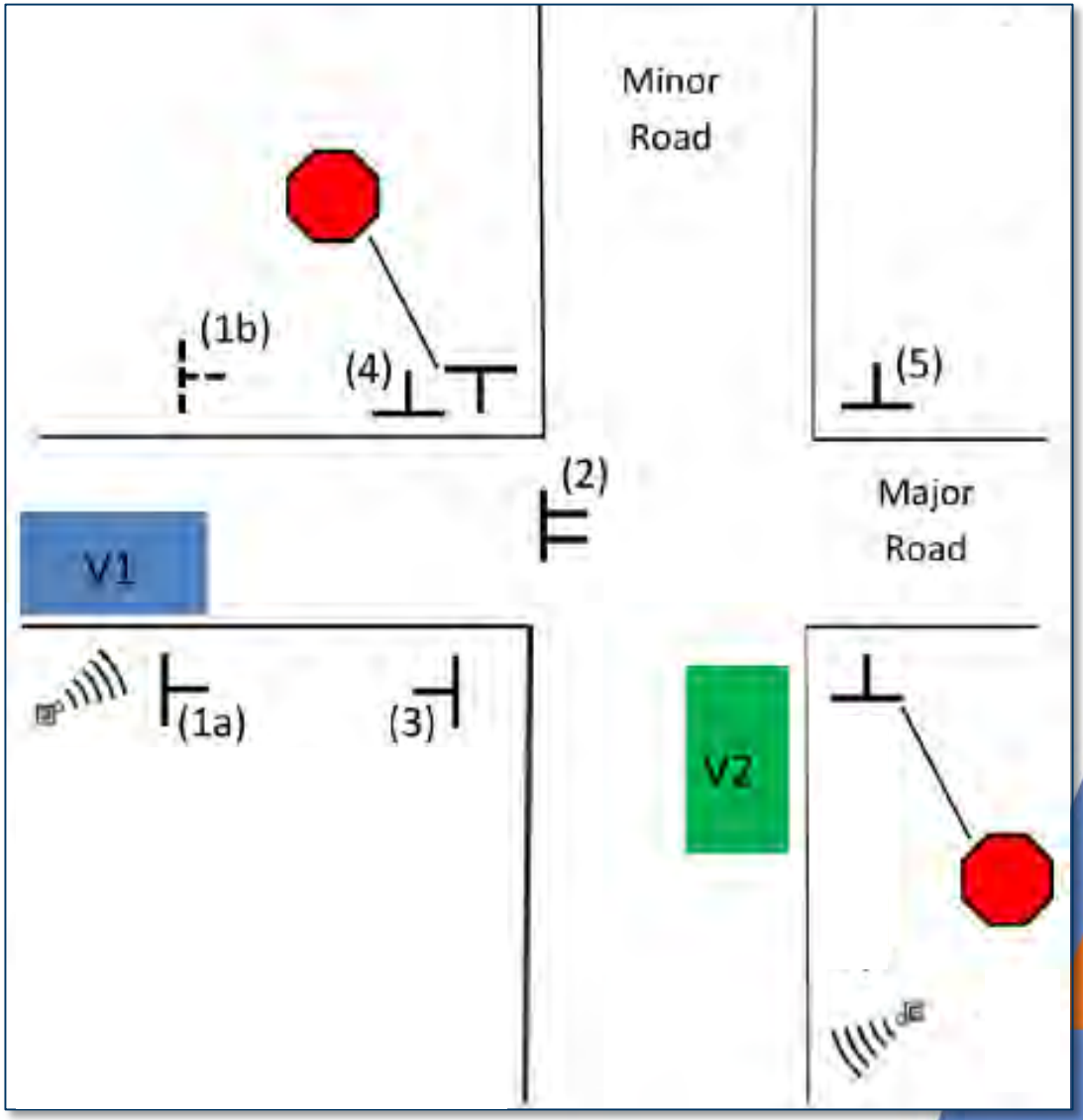
Scenario 3 - Major Road Only



Scenario 4 – Major & Minor Road



2. Sign Type, Placement, and Message Selection

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Sign Type and Placement

Static vs. Dynamic Blank-out

- Crash reduction numbers don't appear to differentiate between static and blank-out signs
- Blank-out sign reliability appears to still be an issue
- Blank-out signs in theory capture the attention of motorists more so than static signs

Post Mounted vs. Overhead

- Overhead signs are not as effective on the major road
- Overhead signs are more expensive to install and maintain
- Post mounted signs appear to achieve positive crash reduction numbers

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System Redundancy and Malfunction

A key component of the signing and notification system needs to include a level of redundancy if the system is not functioning properly, and an active warning protocol should the system malfunction.

Warning systems that do not function fail to alert the traveling public to potential dangers, and limit confidence and willingness to comply with the warning system.

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Minor Road Signing Options

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Minor Road Signing Options

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Major Road Signing Options

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3. Detection Type

Timed Detection

- Single detection component placed at a determined distance away from the intersection
- Does not account for speed changes after initial detection (higher than the posted speed limit), and the system must be replaced when posted speed limits change

Speed & Distance Detection

- Dual detection system placed further back to better detect traffic and to accommodate changes to speed
- Dual functionality allows the system to better track accurate speeds and distance from the intersection

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Detection System Options

Type of Detection	Intended Use	Remarks
1. Inductive Loop: 6-ft x 6-ft square or 6-ft diameter circle under the pavement for vehicle detection.	Loops, along with radar, are the most common type of detection system. May be used on either major or minor road.	The most accurate among detection technologies. Requires underground wiring. UDOT recommends installation only in new pavement applications.
2. Wireless Magnetometer (Puck): In-pavement-mounted magnetic sensors to detect vehicles using low-power radio technology.	Use for roads in place of saw cutting. Allows for easy installation and can be used for other types of detection.	Has the same detection characteristics as a 6-ft x 6-ft induction loop. No longer recommended by UDOT for new construction.
3. Wireless Radar: Radar unit is mounted and will detect vehicles on approach to provide feedback to warning system.	Radar, along with loops, is the most common type of detection system. May be used on either major or minor road.	The location of radar detectors upstream of the intersection and in relation to the stop bar on the minor road varies greatly between different example sites. Radar provides for greater system flexibility.

4. Power Supply Assessment

AC Power

Solar (PV) Power

Remember

A warning system that does not function consistently loses effectiveness and user confidence.

5. System Monitoring, Communication, & Data Mgmt.

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System Monitoring and Communication

- The ability to monitor the systems operation, especially in a remote location, allows for timely and efficient maintenance
- Options range from simple low maintenance/low complexity systems to more complex, real-time monitoring systems
- Consider accessibility, available telecommunication infrastructure, and power source

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Data Management

- Collection of system data should be considered for various reasons including system optimization, upgrades, and research
- Provide the ability to run diagnostics and identify system failures and malfunctions in a timely manner, to keep the overall system functioning in a consistent way that fosters confidence in the traveling public

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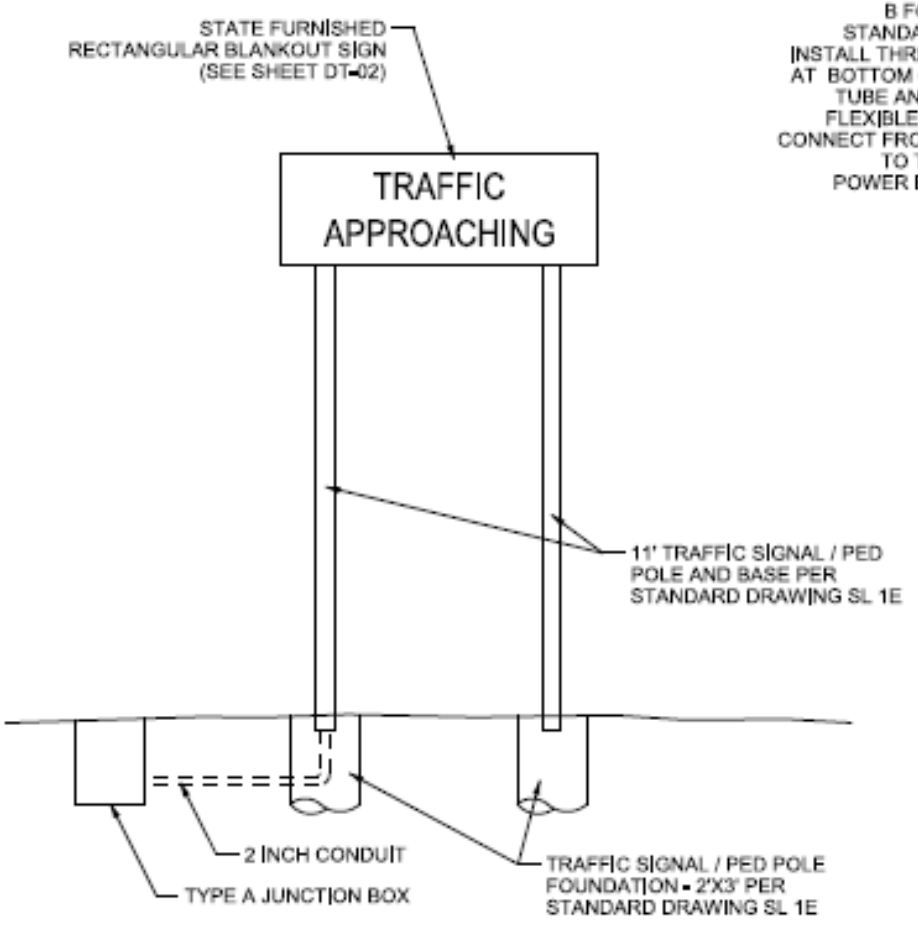
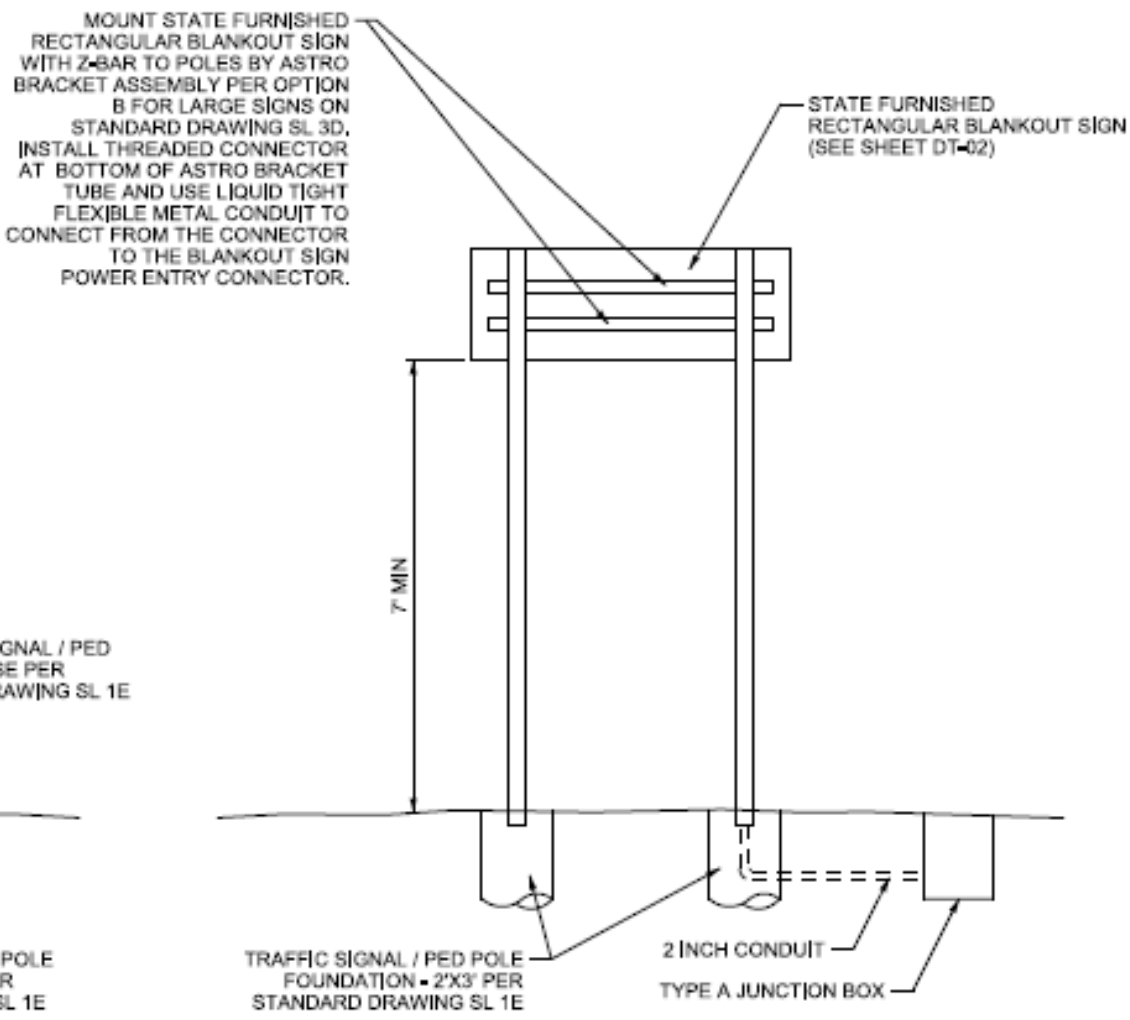


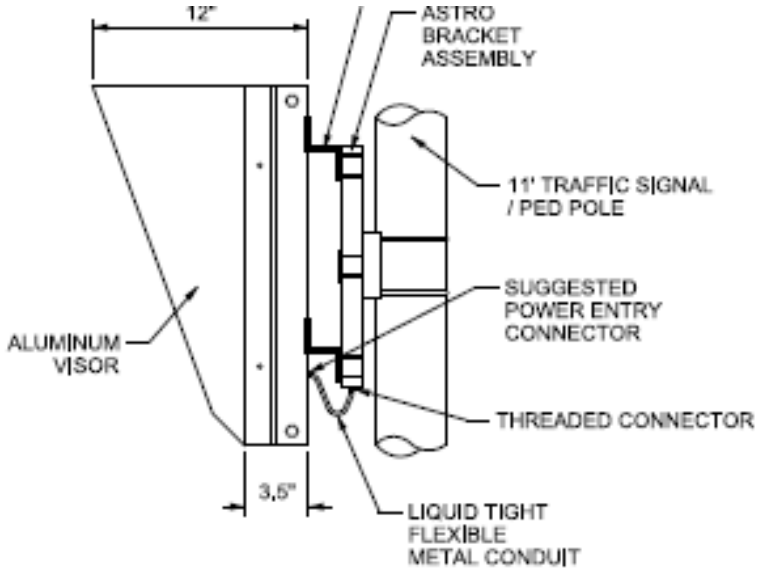
RECTANGULAR BLANKOUT SIGN ASSEMBLY
FRONT ELEVATION



RECTANGULAR BLANKOUT SIGN ASSEMBLY
BACK ELEVATION

STATE FURNISHED RECTANGULAR BLANKOUT SIGN DETAIL

RECTANGULAR BLANKOUT SIGN
FRONT VIEW



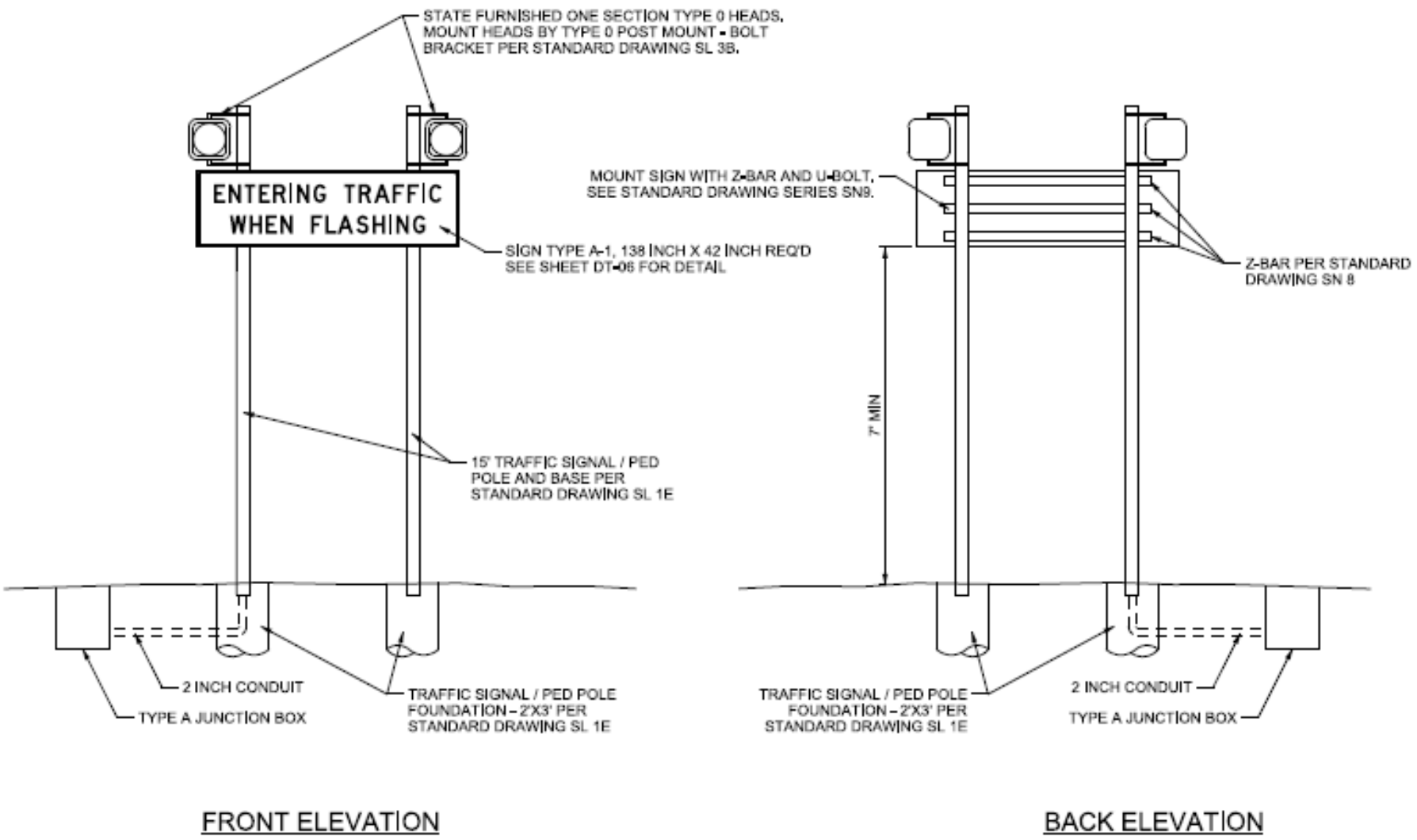
RECTANGULAR BLANKOUT SIGN
SIDE VIEW

NOTES;

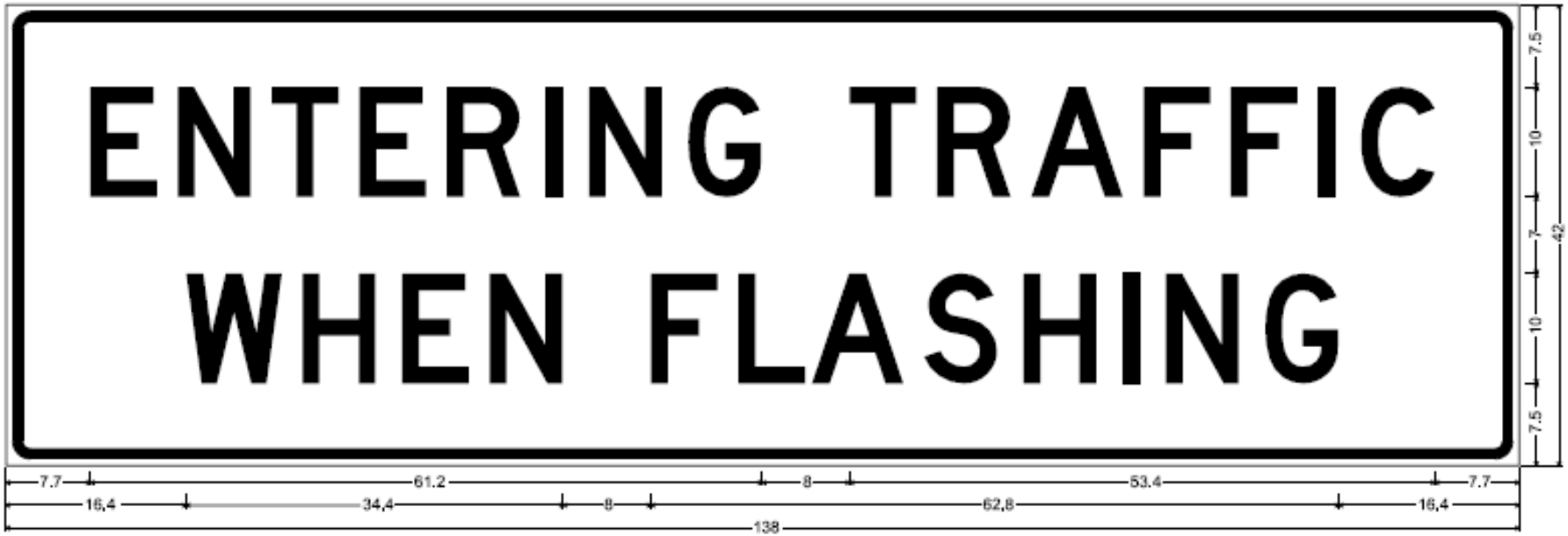
1. PICK UP THE STATE FURNISHED BLANKOUT SIGN AT THE CEDAR DISTRICT OFFICE AT 1470 NORTH AIRPORT ROAD, CEDAR CITY. CONTACT REGION SIGNAL CREW 10 DAYS PRIOR TO THE DESIRED PICK UP DATE, SEE SG-S01 FOR CONTACT INFORMATION.

2. BLANKOUT SIGN WILL COME WITH STATE FURNISHED Z-BAR MOUNTING TO MOUNT THE SIGN TO THE TRAFFIC SIGNAL / PED POLE, ATTACH Z - BAR TO POLE BY ASTRO BRACKET PER OPTION B FOR LARGE SIGNS ON STANDARD DRAWING SL 3D.
INSTALL THREADED CONNECTOR AT BOTTOM OF ASTRO BRACKET TUBE AND USE LIQUID TIGHT FLEXIBLE METAL CONDUIT TO CONNECT FROM THE CONNECTOR TO THE BLANKOUT SIGN POWER ENTRY CONNECTOR.

STATE FURNISHED RECTANGULAR BLANKOUT SIGN DETAIL



FLASHER SIGN DETAIL



WS4-4c Custom; ENTERING TRAFFIC WHEN FLASHING Sign; 2.3" Radius, 0.9" Border, 0.6" Indent, Black on Fluorescent yellow;
[ENTERING TRAFFIC] D; [WHEN FLASHING] D;

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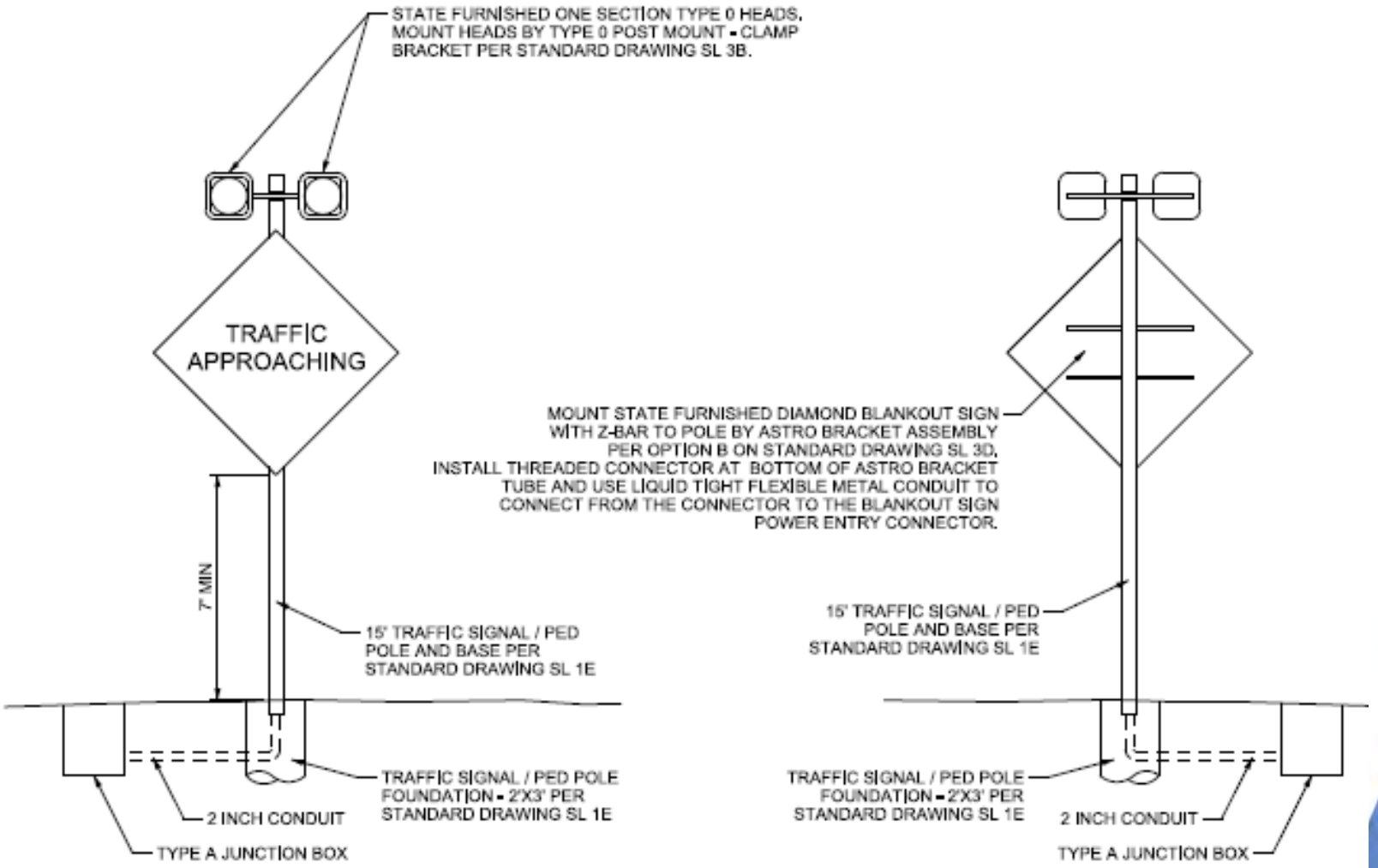
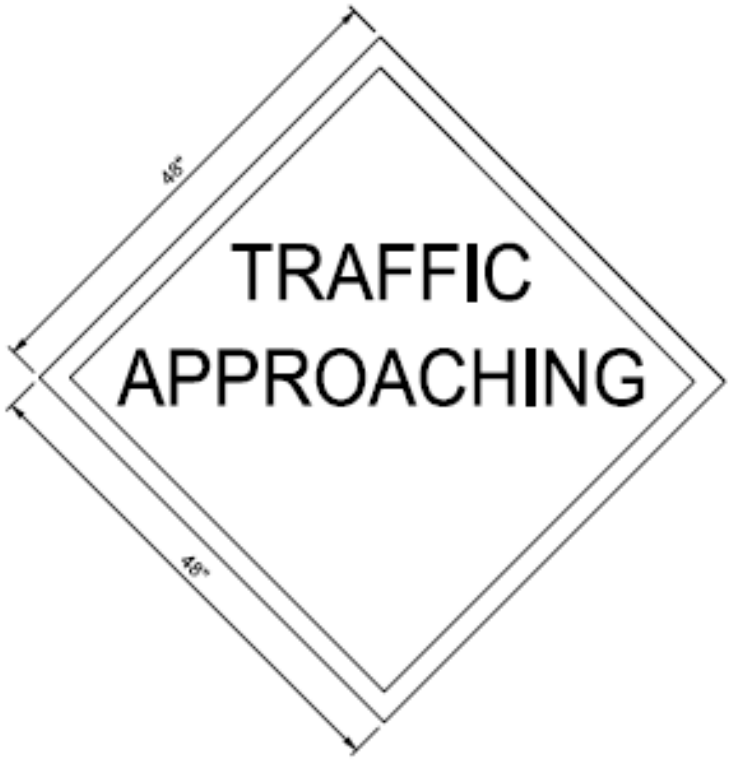
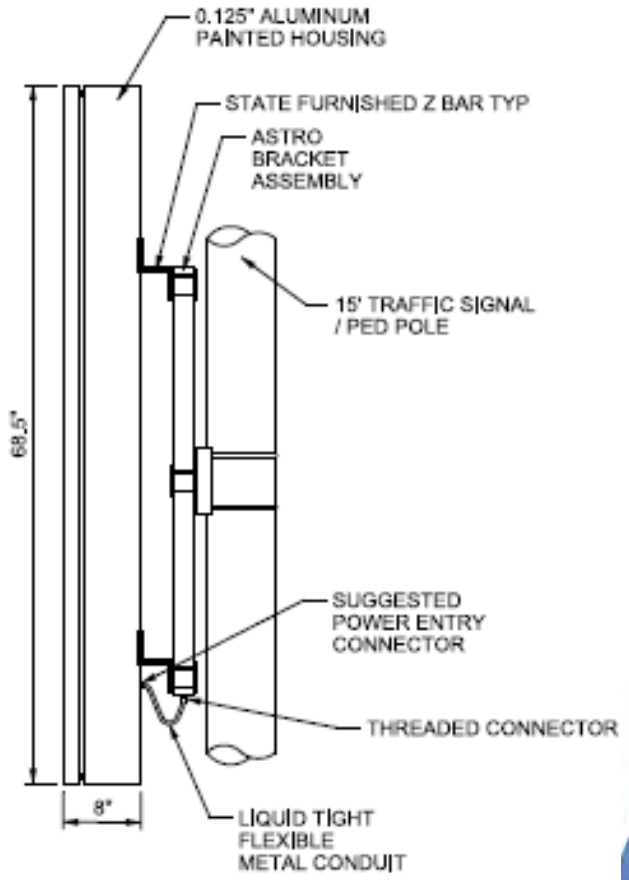


STATE FURNISHED DIAMOND BLANKOUT SIGN DETAIL





NOTES:

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2. BLANKOUT SIGN WILL COME WITH STATE FURNISHED Z-BAR MOUNTING TO MOUNT THE SIGN TO THE TRAFFIC SIGNAL / PED POLE, ATTACH Z - BAR TO POLE BY ASTRO BRACKET PER OPTION B ON STANDARD DRAWING SL 3D.
   INSTALL THREADED CONNECTOR AT BOTTOM OF ASTRO BRACKET TUBE AND USE LIQUID TIGHT FLEXIBLE METAL CONDUIT TO CONNECT FROM THE CONNECTOR TO THE BLANKOUT SIGN POWER ENTRY CONNECTOR.

STATE FURNISHED DIAMOND BLANKOUT SIGN DETAIL

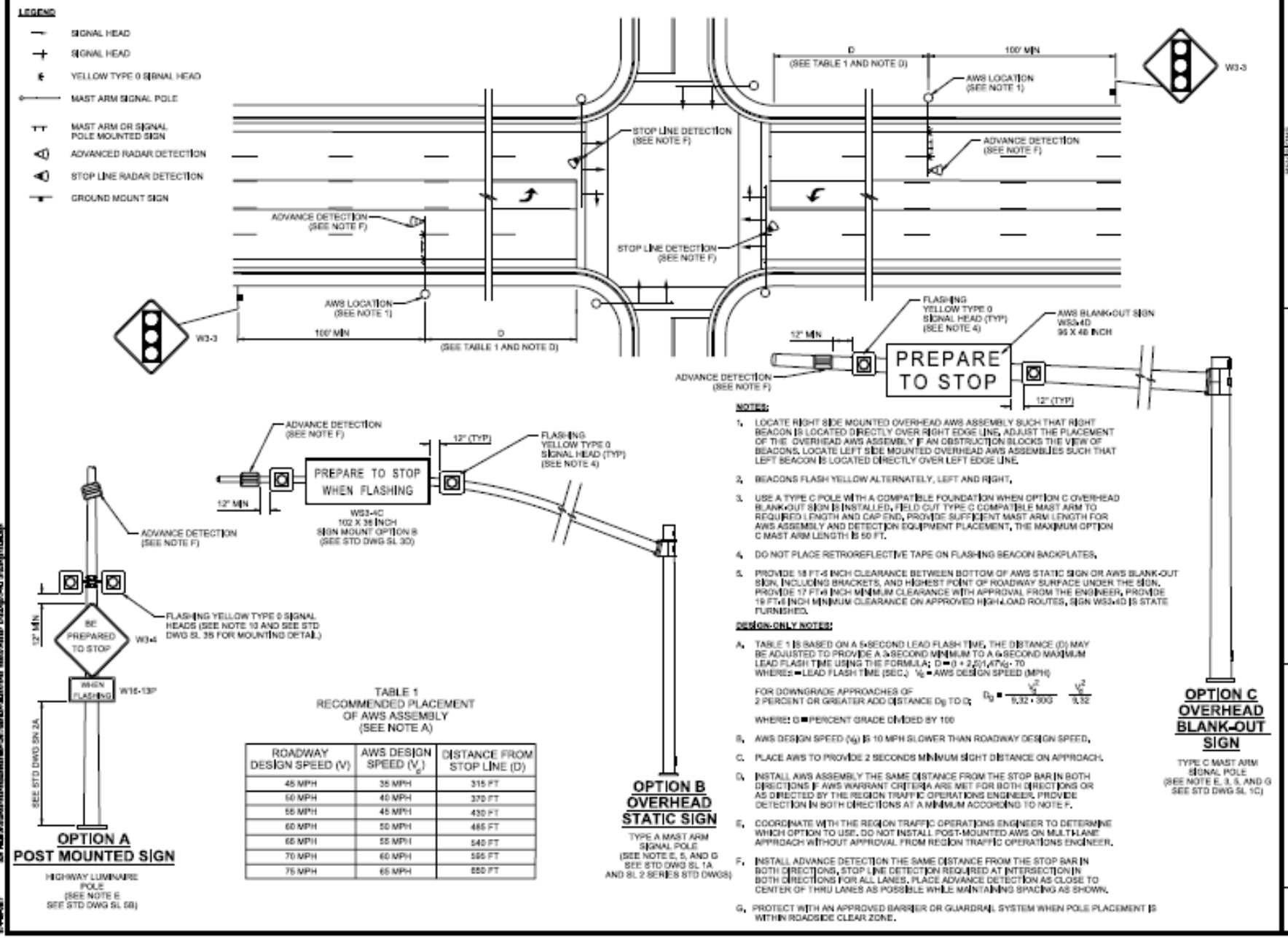


TABLE 1
RECOMMENDED PLACEMENT
OF AWS ASSEMBLY
(SEE NOTE A)

ROADWAY DESIGN SPEED (V)	AWS DESIGN SPEED (V_d)	DISTANCE FROM STOP LINE (D)
45 MPH	35 MPH	315 FT
50 MPH	40 MPH	370 FT
55 MPH	45 MPH	430 FT
60 MPH	50 MPH	485 FT
65 MPH	55 MPH	540 FT
70 MPH	60 MPH	595 FT
75 MPH	65 MPH	650 FT

NOTES:

1. LOCATE RIGHT SIDE MOUNTED OVERHEAD AWS ASSEMBLY SUCH THAT RIGHT BEACON IS LOCATED DIRECTLY OVER RIGHT EDGE LINE. ADJUST THE PLACEMENT OF THE OVERHEAD AWS ASSEMBLY IF AN OBSTRUCTION BLOCKS THE VIEW OF BEACONS. LOCATE LEFT SIDE MOUNTED OVERHEAD AWS ASSEMBLIES SUCH THAT LEFT BEACON IS LOCATED DIRECTLY OVER LEFT EDGE LINE.
2. BEACONS FLASH YELLOW ALTERNATELY, LEFT AND RIGHT.
3. USE A TYPE C POLE WITH A COMPATIBLE FOUNDATION WHEN OPTION C OVERHEAD BLANK-OUT SIGN IS INSTALLED. FIELD CUT TYPE C COMPATIBLE MAST ARM TO REQUIRED LENGTH AND CAP END. PROVIDE SUFFICIENT MAST ARM LENGTH FOR AWS ASSEMBLY AND DETECTION EQUIPMENT PLACEMENT. THE MAXIMUM OPTION C MAST ARM LENGTH IS 50 FT.
4. DO NOT PLACE RETROREFLECTIVE TAPE ON FLASHING BEACON BACKPLATES.
5. PROVIDE 18 FT-6 INCH CLEARANCE BETWEEN BOTTOM OF AWS STATIC SIGN OR AWS BLANK-OUT SIGN, INCLUDING BRACKETS, AND HIGHEST POINT OF ROADWAY SURFACE UNDER THE SIGN. PROVIDE 17 FT-6 INCH MINIMUM CLEARANCE WITH APPROVAL FROM THE ENGINEER. PROVIDE 16 FT-6 INCH MINIMUM CLEARANCE ON APPROVED HIGH-LOAD ROUTES. SIGN W3-4D IS STATE FURNISHED.

DESIGN-ONLY NOTES:

A. TABLE 1 IS BASED ON A 6-SECOND LEAD FLASH TIME. THE DISTANCE (D) MAY BE ADJUSTED TO PROVIDE A 3-SECOND MINIMUM TO A 6-SECOND MAXIMUM LEAD FLASH TIME USING THE FORMULA: $D = (1.2)(1.47)(V_d) \cdot 70$
WHERE: = LEAD FLASH TIME (SEC.) V_d = AWS DESIGN SPEED (MPH)

FOR DOWNGRADE APPROACHES OF 2 PERCENT OR GREATER ADD DISTANCE D_g TO D; $D_g = \frac{V_d^2}{9.32 \cdot 3G} - \frac{V_d^2}{9.32}$

WHERE: G = PERCENT GRADE DIVIDED BY 100

B. AWS DESIGN SPEED (V_d) IS 10 MPH SLOWER THAN ROADWAY DESIGN SPEED.

C. PLACE AWS TO PROVIDE 2 SECONDS MINIMUM SIGHT DISTANCE ON APPROACH.

D. INSTALL AWS ASSEMBLY THE SAME DISTANCE FROM THE STOP BAR IN BOTH DIRECTIONS IF AWS WARRANT CRITERIA ARE MET FOR BOTH DIRECTIONS OR AS DIRECTED BY THE REGION TRAFFIC OPERATIONS ENGINEER. PROVIDE DETECTION IN BOTH DIRECTIONS AT A MINIMUM ACCORDING TO NOTE F.

E. COORDINATE WITH THE REGION TRAFFIC OPERATIONS ENGINEER TO DETERMINE WHICH OPTION TO USE. DO NOT INSTALL POST-MOUNTED AWS ON MULTI-LANE APPROACH WITHOUT APPROVAL FROM REGION TRAFFIC OPERATIONS ENGINEER.

F. INSTALL ADVANCE DETECTION THE SAME DISTANCE FROM THE STOP BAR IN BOTH DIRECTIONS. STOP LINE DETECTION REQUIRED AT INTERSECTION IN BOTH DIRECTIONS FOR ALL LANES. PLACE ADVANCE DETECTION AS CLOSE TO CENTER OF THRU LANES AS POSSIBLE WHILE MAINTAINING SPACING AS SHOWN.

G. PROTECT WITH AN APPROVED BARRIER OR GUARDRAIL SYSTEM WHEN POLE PLACEMENT IS WITHIN ROADSIDE CLEAR ZONE.

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

JAN. 01, 2017
DATE

JAN. 01, 2017
DATE

RECOMMENDED FOR APPROVAL

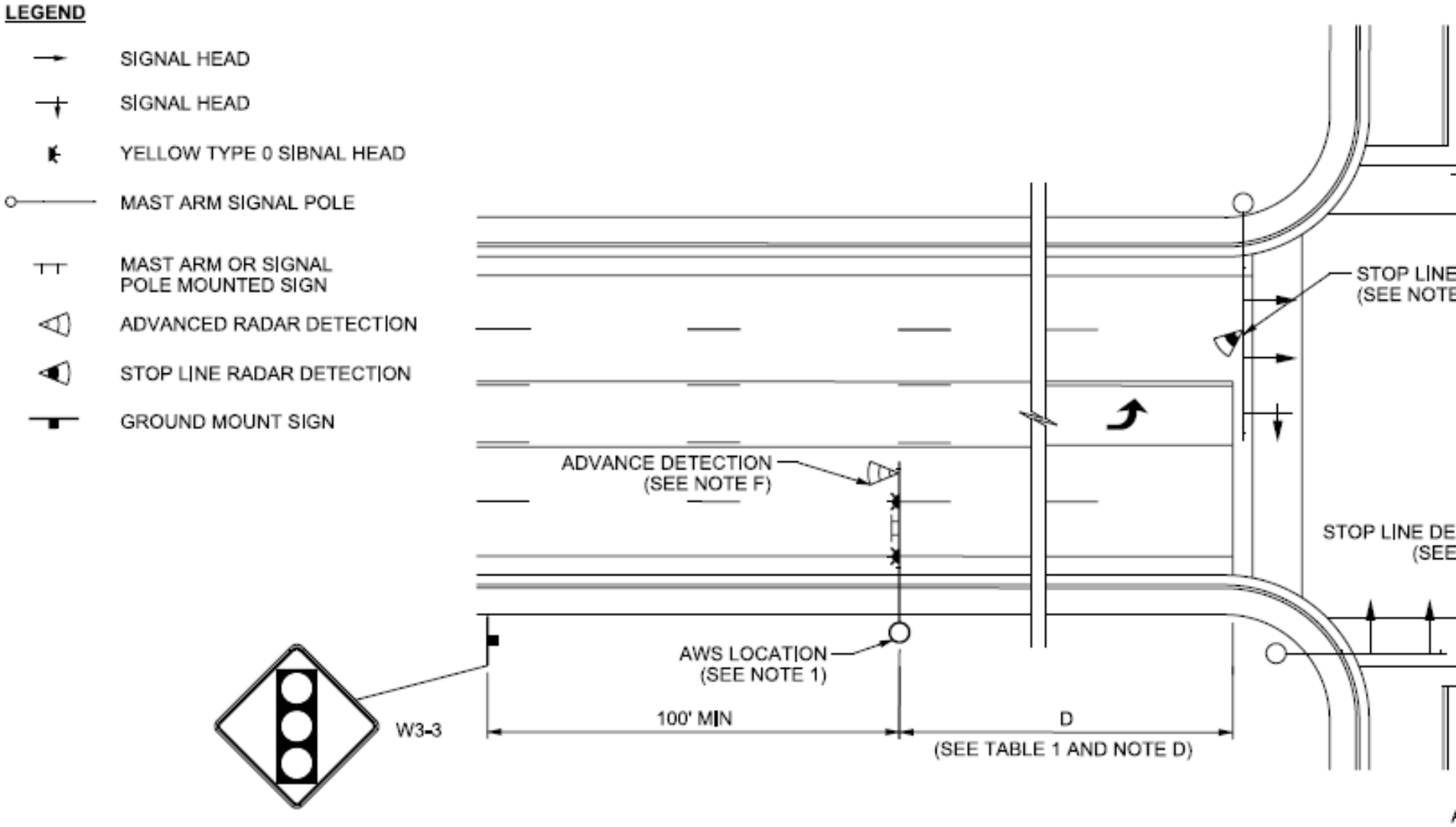
CHAIRMAN, STANDARDS COMMITTEE

APPROVED

ADVANCE WARNING
SIGNAL (AWS) SYSTEM

STANDARD DRAWING

STD. DWG. NO.
SL 8


LEGEND
SIGNAL HEAD
SIGNAL HEAD
YELLOW TYPE 0 SIBNAL HEAD
MAST ARM SIGNAL POLE
MAST ARM OR SIGNAL POLE MOUNTED SIGN
ADVANCED RADAR DETECTION
STOP LINE RADAR DETECTION
GROUND MOUNT SIGN
STOP LINE
(SEE NOTE
ADVANCE DETECTION
(SEE NOTE F)
STOP LINE DE
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AWS LOCATION
(SEE NOTE 1)
W3-3
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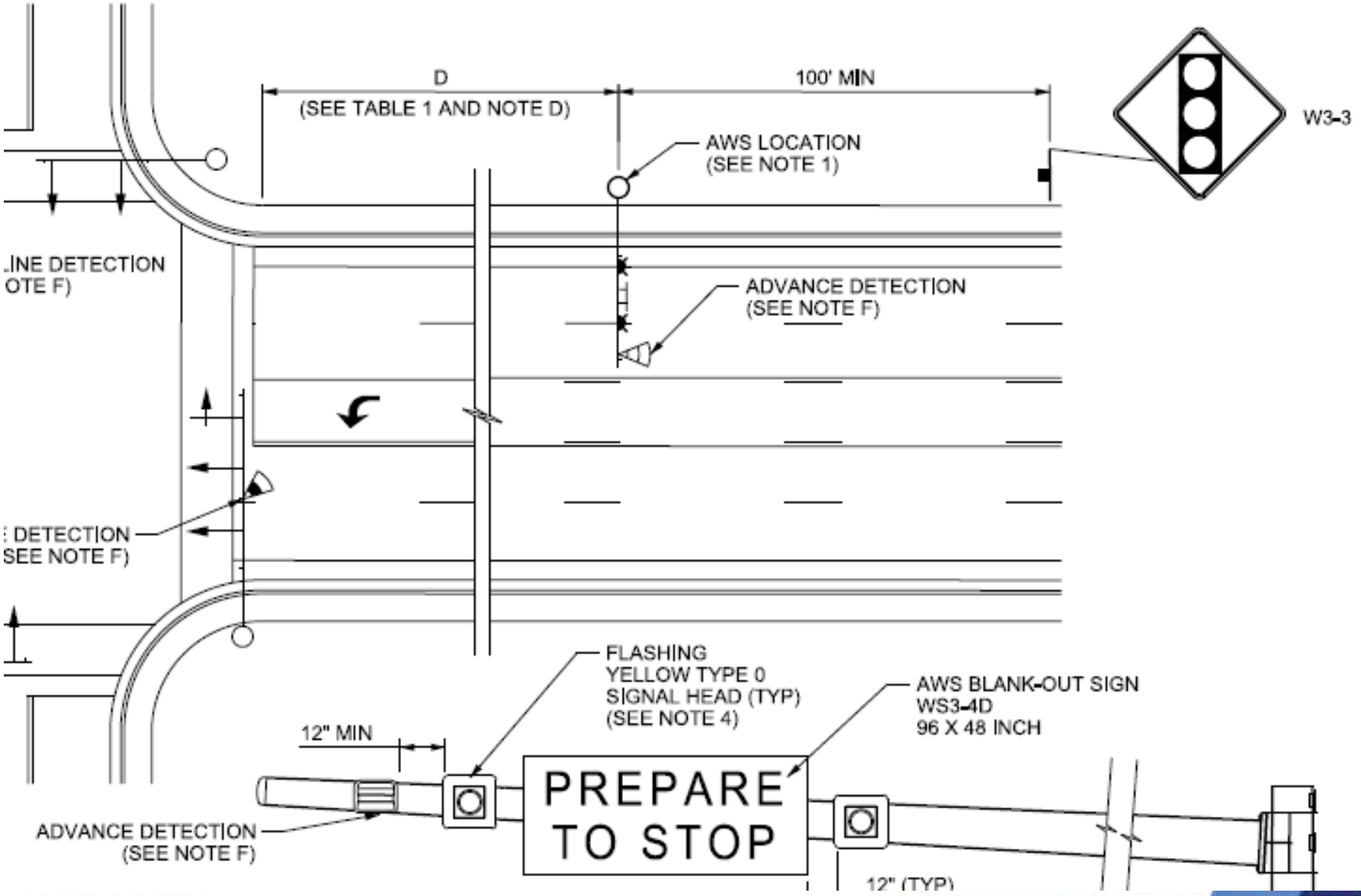
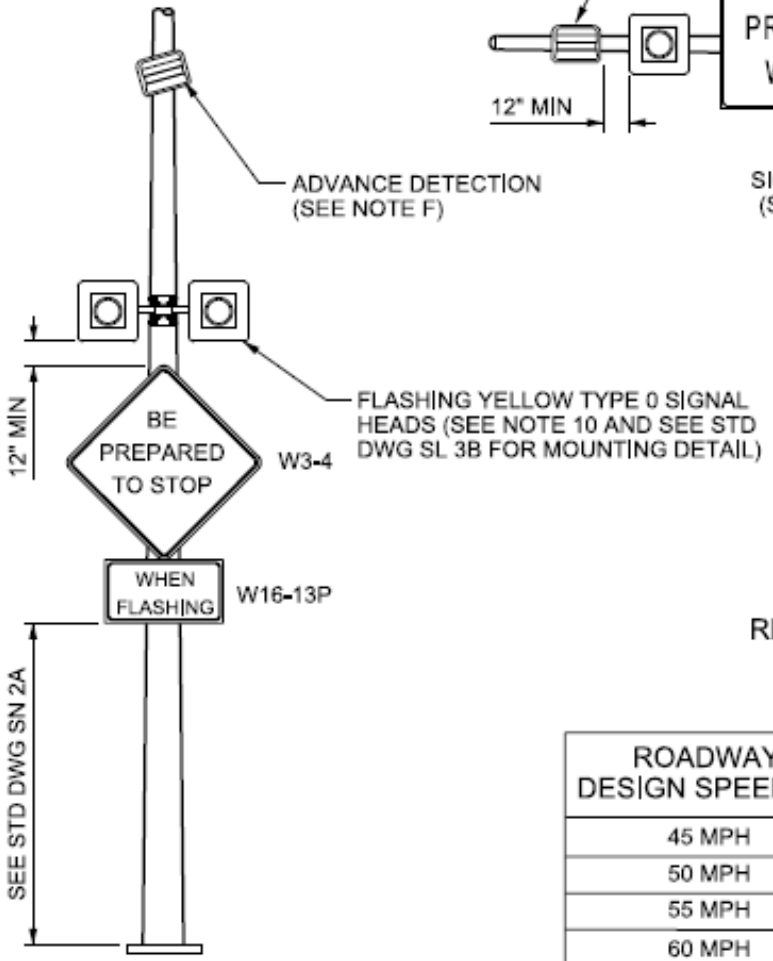
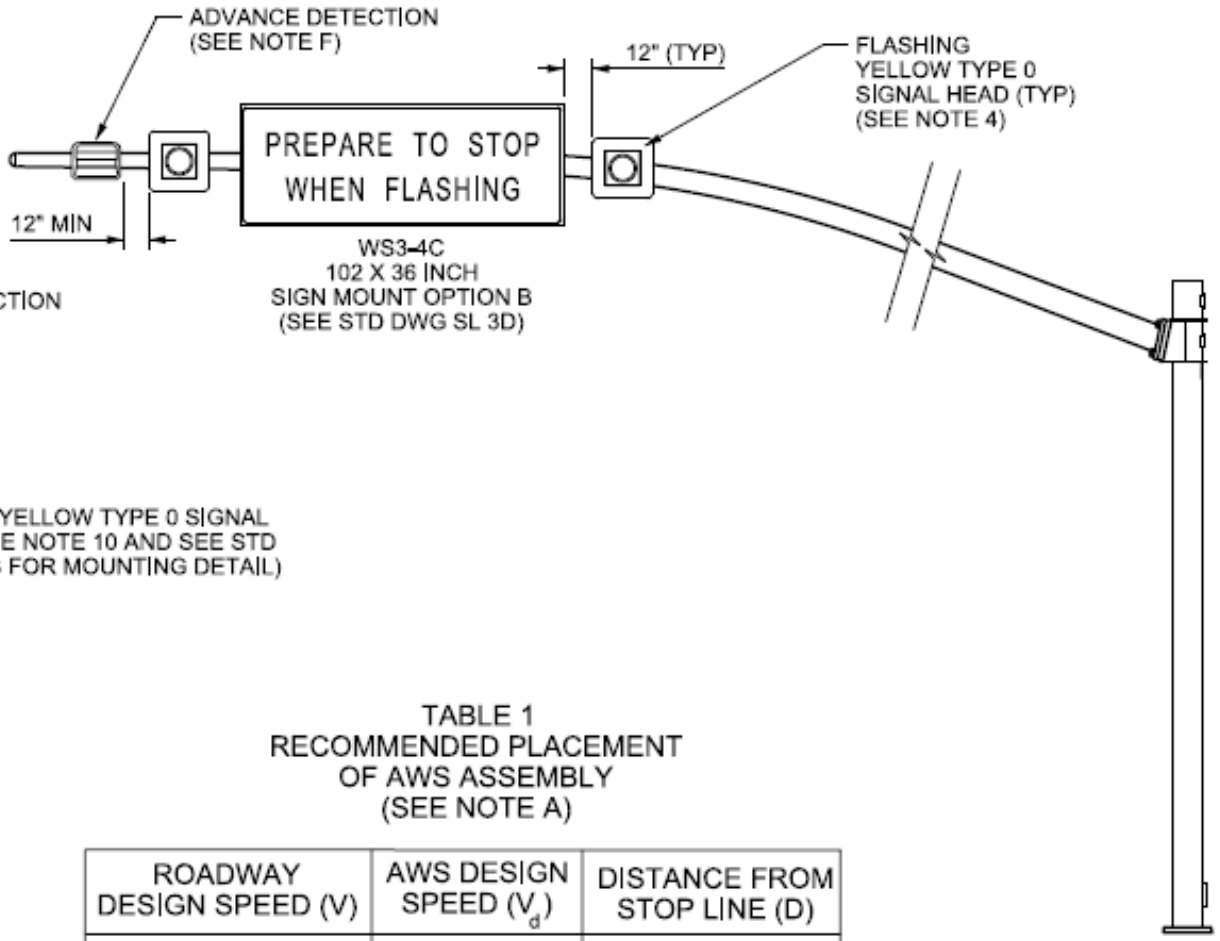
D
(SEE TABLE 1 AND NOTE D)


D
(SEE TABLE 1 AND NOTE D)
100' MIN
W3-3
AWS LOCATION
(SEE NOTE 1)
ADVANCE DETECTION
(SEE NOTE F)
FLASHING
YELLOW TYPE 0
SIGNAL HEAD (TYP)
(SEE NOTE 4)
AWS BLANK-OUT SIGN
WS3-4D
96 X 48 INCH
12" MIN
PREPARE
TO STOP
ADVANCE DETECTION
(SEE NOTE F)
12" (TYP)



OPTION A
POST MOUNTED SIGN

HIGHWAY LUMINAIRE
POLE
(SEE NOTE E
SEE STD DWG SL 5B)

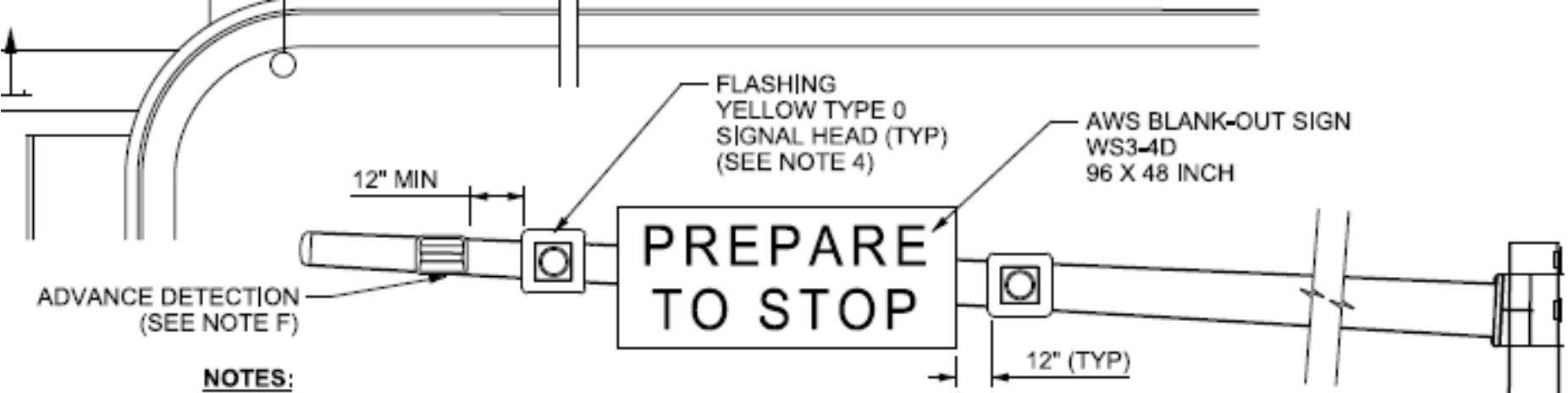


OPTION B
OVERHEAD
STATIC SIGN

TYPE A MAST ARM
SIGNAL POLE
(SEE NOTE E, 5, AND G
SEE STD DWG SL 1A
AND SL 2 SERIES STD DWGS)

TABLE 1
RECOMMENDED PLACEMENT
OF AWS ASSEMBLY
(SEE NOTE A)

ROADWAY DESIGN SPEED (V)	AWS DESIGN SPEED (V_d)	DISTANCE FROM STOP LINE (D)
45 MPH	35 MPH	315 FT
50 MPH	40 MPH	370 FT
55 MPH	45 MPH	430 FT
60 MPH	50 MPH	485 FT
65 MPH	55 MPH	540 FT
70 MPH	60 MPH	595 FT
75 MPH	65 MPH	650 FT



NOTES:

1. LOCATE RIGHT SIDE MOUNTED OVERHEAD AWS ASSEMBLY SUCH THAT RIGHT BEACON IS LOCATED DIRECTLY OVER RIGHT EDGE LINE. ADJUST THE PLACEMENT OF THE OVERHEAD AWS ASSEMBLY IF AN OBSTRUCTION BLOCKS THE VIEW OF BEACONS. LOCATE LEFT SIDE MOUNTED OVERHEAD AWS ASSEMBLIES SUCH THAT LEFT BEACON IS LOCATED DIRECTLY OVER LEFT EDGE LINE.

2. BEACONS FLASH YELLOW ALTERNATELY, LEFT AND RIGHT.

3. USE A TYPE C POLE WITH A COMPATIBLE FOUNDATION WHEN OPTION C OVERHEAD BLANK-OUT SIGN IS INSTALLED. FIELD CUT TYPE C COMPATIBLE MAST ARM TO REQUIRED LENGTH AND CAP END. PROVIDE SUFFICIENT MAST ARM LENGTH FOR AWS ASSEMBLY AND DETECTION EQUIPMENT PLACEMENT. THE MAXIMUM OPTION C MAST ARM LENGTH IS 50 FT.

4. DO NOT PLACE RETROREFLECTIVE TAPE ON FLASHING BEACON BACKPLATES.

5. PROVIDE 18 FT-6 INCH CLEARANCE BETWEEN BOTTOM OF AWS STATIC SIGN OR AWS BLANK-OUT SIGN, INCLUDING BRACKETS, AND HIGHEST POINT OF ROADWAY SURFACE UNDER THE SIGN. PROVIDE 17 FT-6 INCH MINIMUM CLEARANCE WITH APPROVAL FROM THE ENGINEER. PROVIDE 19 FT-6 INCH MINIMUM CLEARANCE ON APPROVED HIGH-LOAD ROUTES. SIGN WS3-4D IS STATE FURNISHED.

DESIGN-ONLY NOTES:

A. TABLE 1 IS BASED ON A 5-SECOND LEAD FLASH TIME. THE DISTANCE (D) MAY BE ADJUSTED TO PROVIDE A 3-SECOND MINIMUM TO A 6-SECOND MAXIMUM LEAD FLASH TIME USING THE FORMULA: $D = (t + 2.5)1.47V_d - 70$
WHERE: t = LEAD FLASH TIME (SEC.) V_d = AWS DESIGN SPEED (MPH)

FOR DOWNGRADE APPROACHES OF 2 PERCENT OR GREATER ADD DISTANCE D_g TO D: $D_g = \frac{V_d^2}{9.32 - 30G} - \frac{V_d^2}{9.32}$

WHERE: G = PERCENT GRADE DIVIDED BY 100

B. AWS DESIGN SPEED (V_d) IS 10 MPH SLOWER THAN ROADWAY DESIGN SPEED.

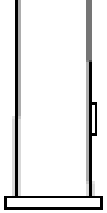
C. PLACE AWS TO PROVIDE 2 SECONDS MINIMUM SIGHT DISTANCE ON APPROACH.

D. INSTALL AWS ASSEMBLY THE SAME DISTANCE FROM THE STOP BAR IN BOTH DIRECTIONS IF AWS WARRANT CRITERIA ARE MET FOR BOTH DIRECTIONS OR AS DIRECTED BY THE REGION TRAFFIC OPERATIONS ENGINEER. PROVIDE DETECTION IN BOTH DIRECTIONS AT A MINIMUM ACCORDING TO NOTE F.

E. COORDINATE WITH THE REGION TRAFFIC OPERATIONS ENGINEER TO DETERMINE WHICH OPTION TO USE. DO NOT INSTALL POST-MOUNTED AWS ON MULTI-LANE APPROACH WITHOUT APPROVAL FROM REGION TRAFFIC OPERATIONS ENGINEER.

F. INSTALL ADVANCE DETECTION THE SAME DISTANCE FROM THE STOP BAR IN BOTH DIRECTIONS. STOP LINE DETECTION REQUIRED AT INTERSECTION IN BOTH DIRECTIONS FOR ALL LANES. PLACE ADVANCE DETECTION AS CLOSE TO CENTER OF THRU LANES AS POSSIBLE WHILE MAINTAINING SPACING AS SHOWN.

G. PROTECT WITH AN APPROVED BARRIER OR GUARDRAIL SYSTEM WHEN POLE PLACEMENT IS WITHIN ROADSIDE CLEAR ZONE.



OPTION C OVERHEAD BLANK-OUT SIGN

TYPE C MAST ARM SIGNAL POLE
(SEE NOTE E, 3, 5, AND G SEE STD DWG SL 1C)

UDOT Keeping Utah Moving

Model
225

v 0.5

SmartSensor Matrix

SmartSensor Matrix

Model 225

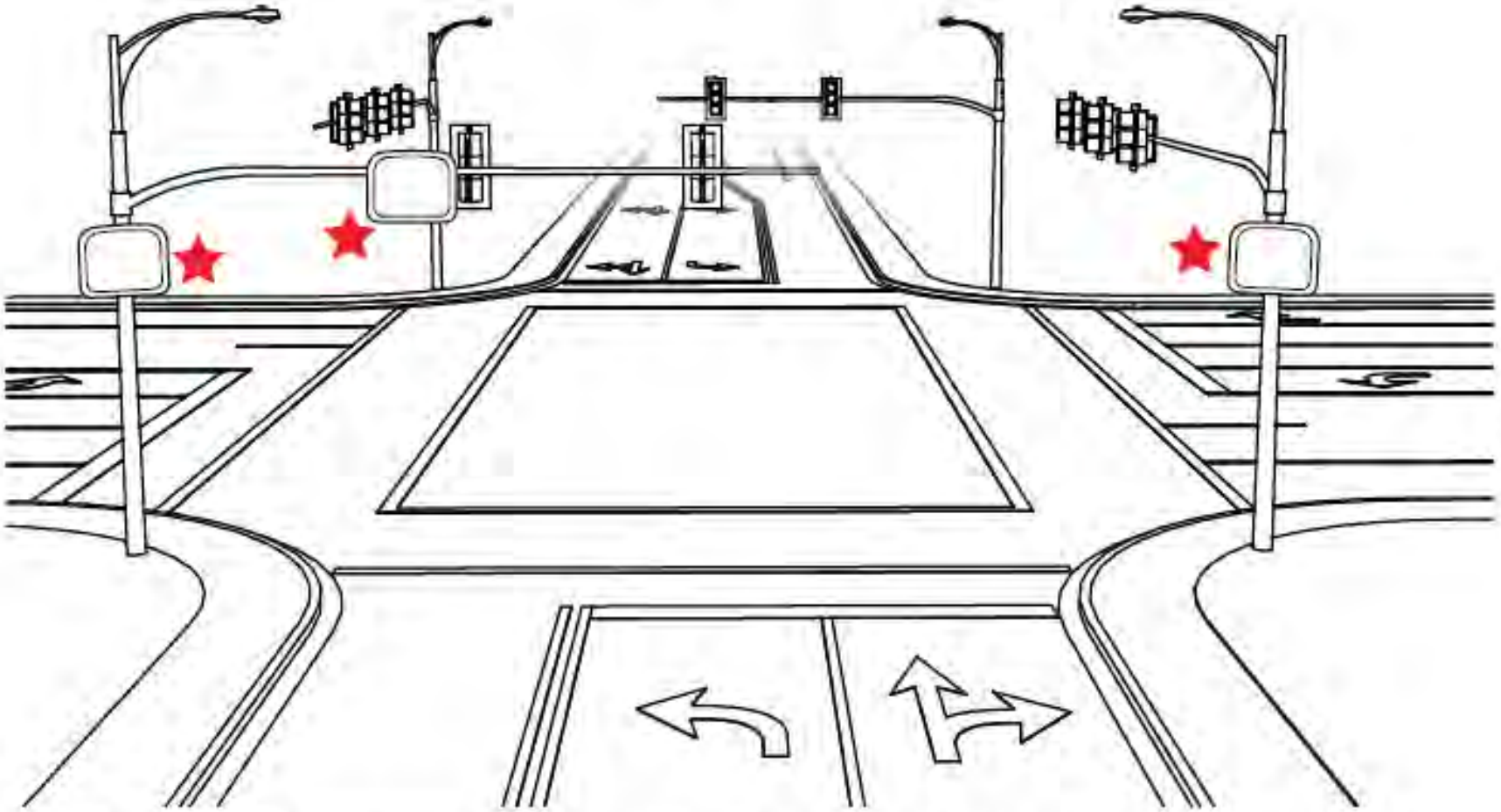


Figure 3. Recommended mounting locations in a mast arm intersection

Mounting location, height and offset

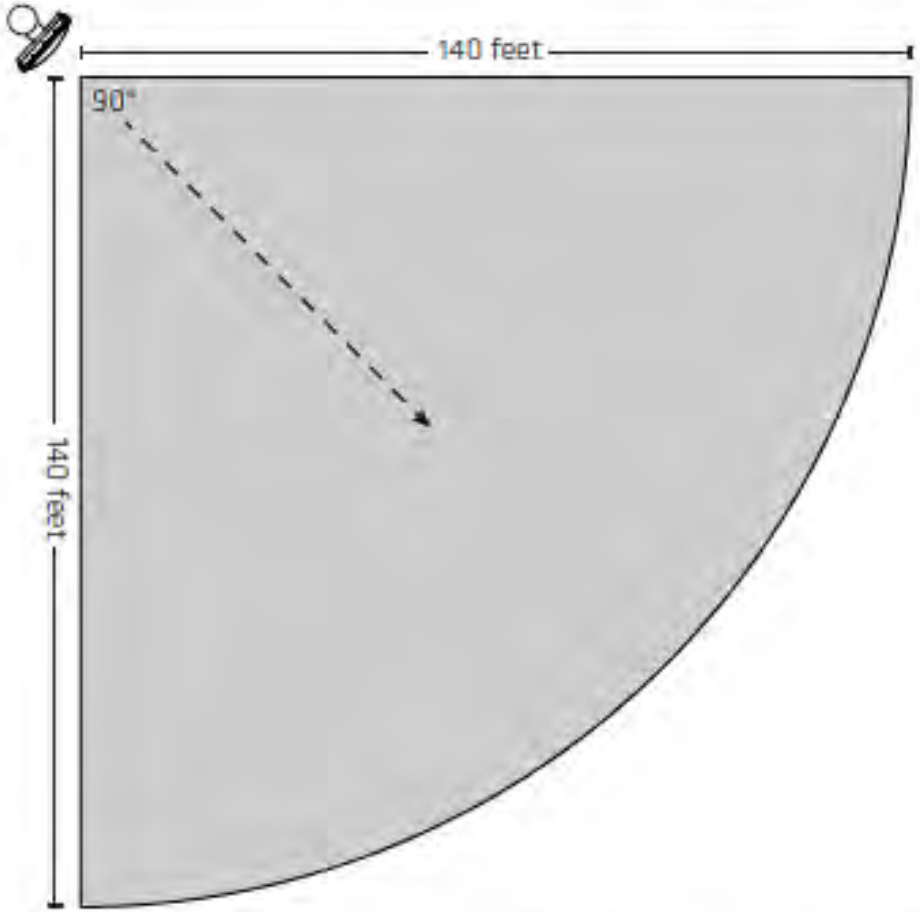


Figure 2. SmartSensor Matrix footprint (quarter circle with a 140 ft range)

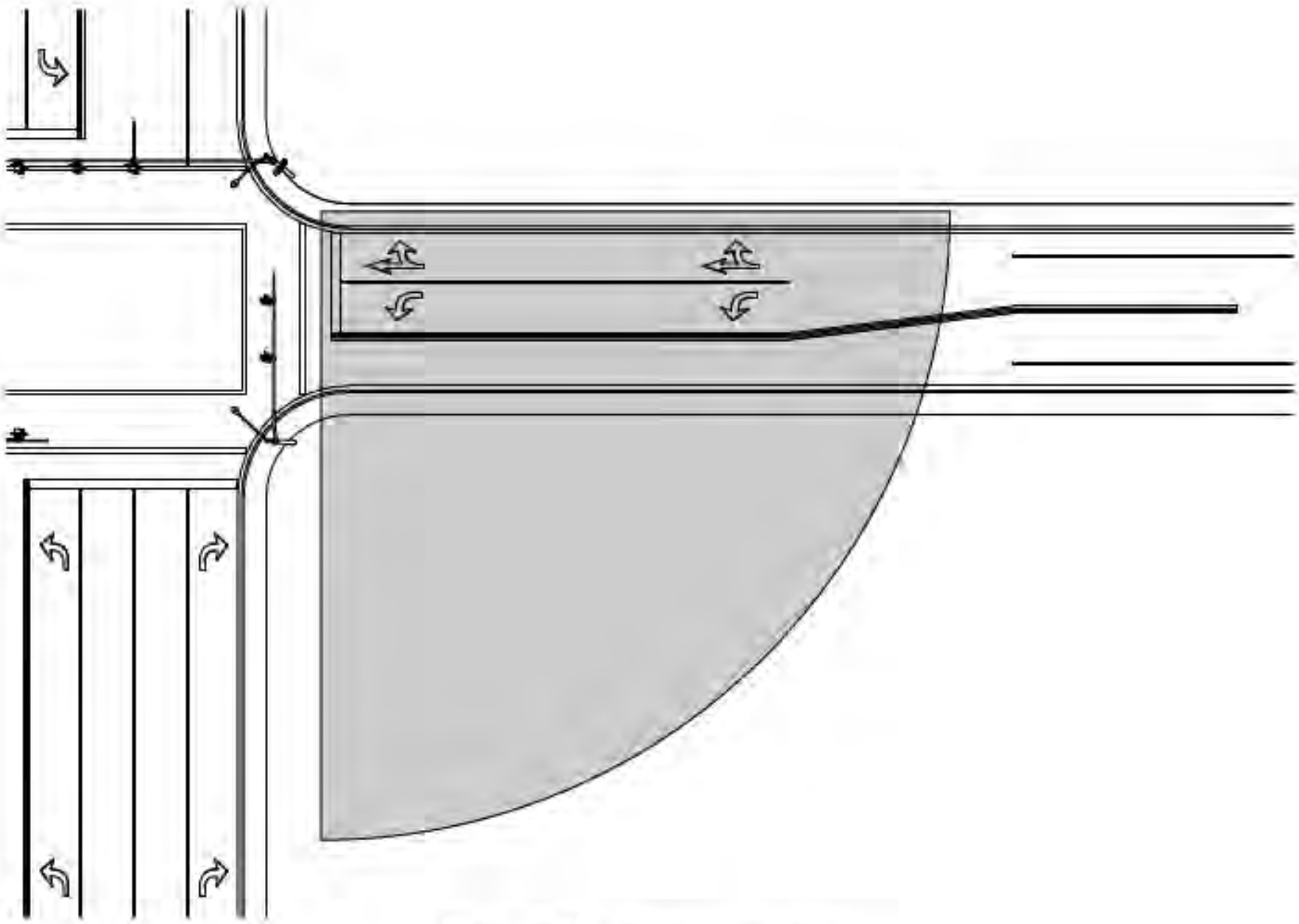


Figure 12. Detection area

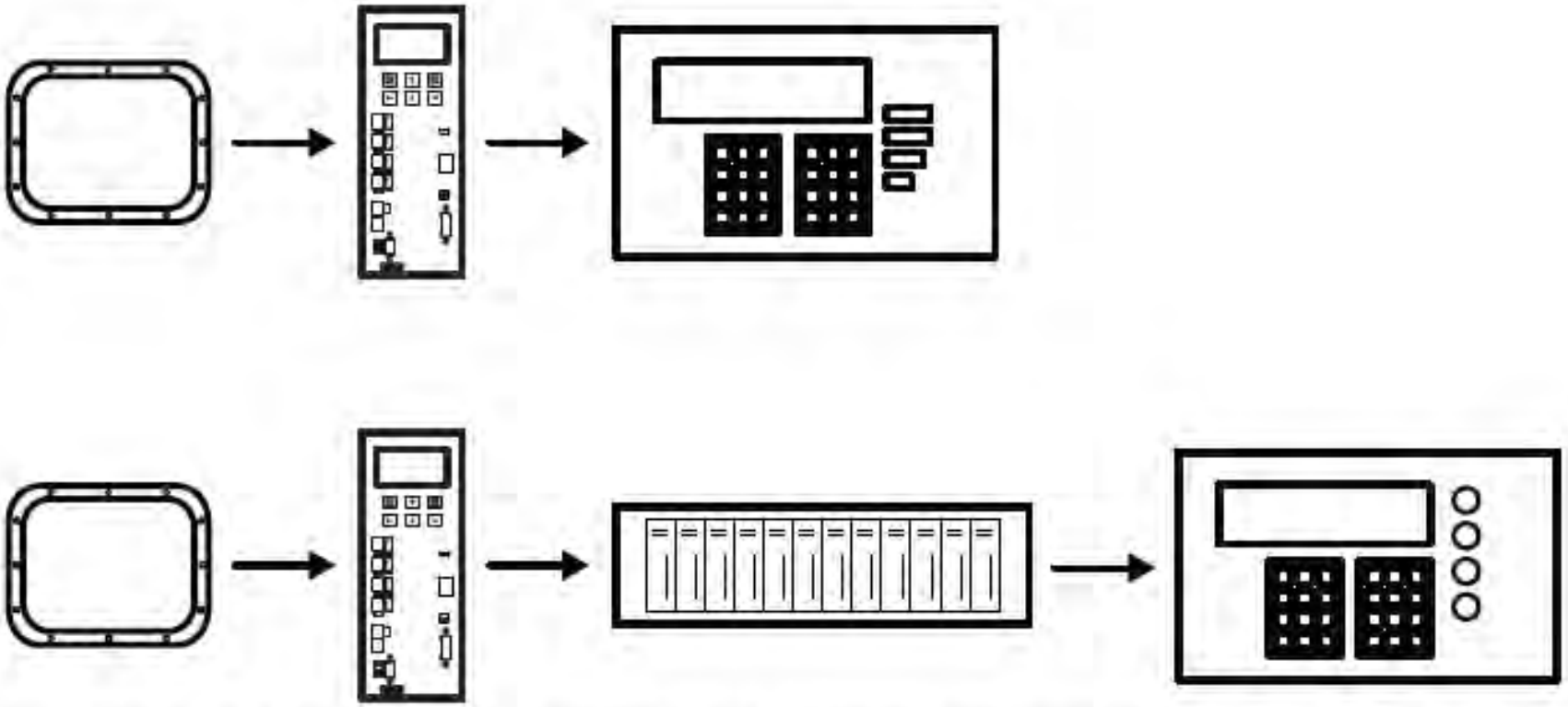
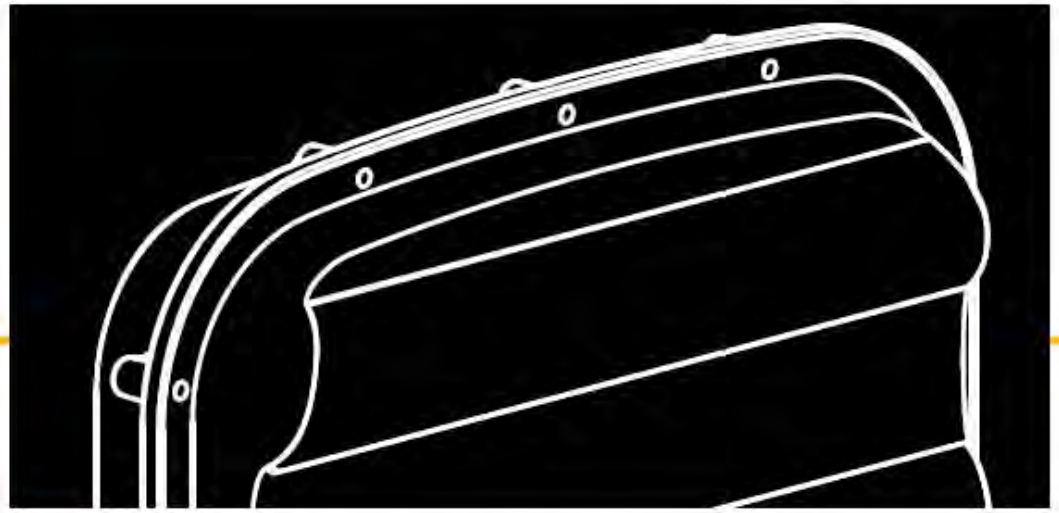


Figure 19. Click 650/656 using SDLC (above) and contact closures (below)



SmartSensor Advance

USER GUIDE

SmartSensor Advance

Intersections

Mounting location, height and offset

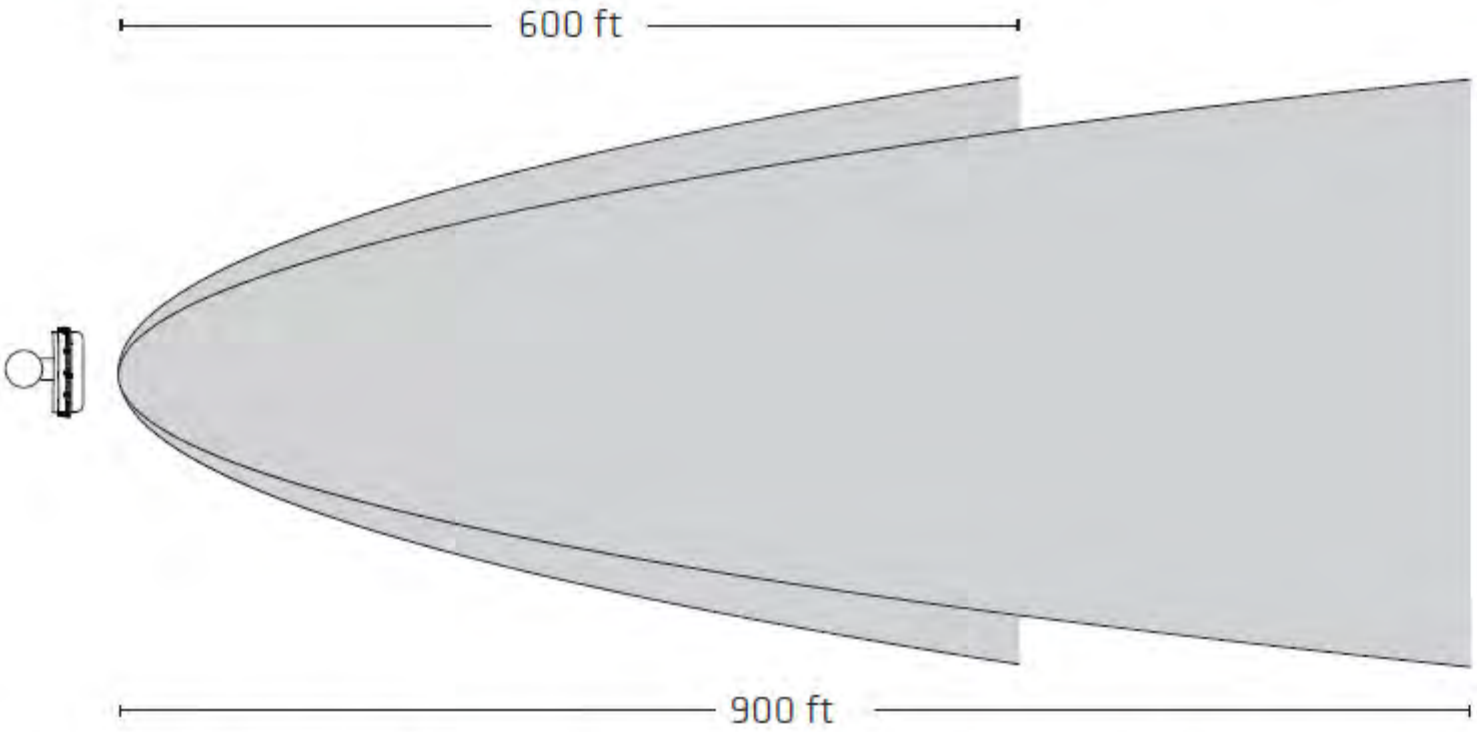


Figure 2. The SmartSensor Advance and Advance Extended Range footprint

- The SmartSensor Advance and SmartSensor Advance Extended Range detect moving traffic out to a maximum range of 600 ft. (182.9 m) and 900 ft. (274.3 m) respectively.
- Make sure the sensor has a clear view of the area you want to detect.

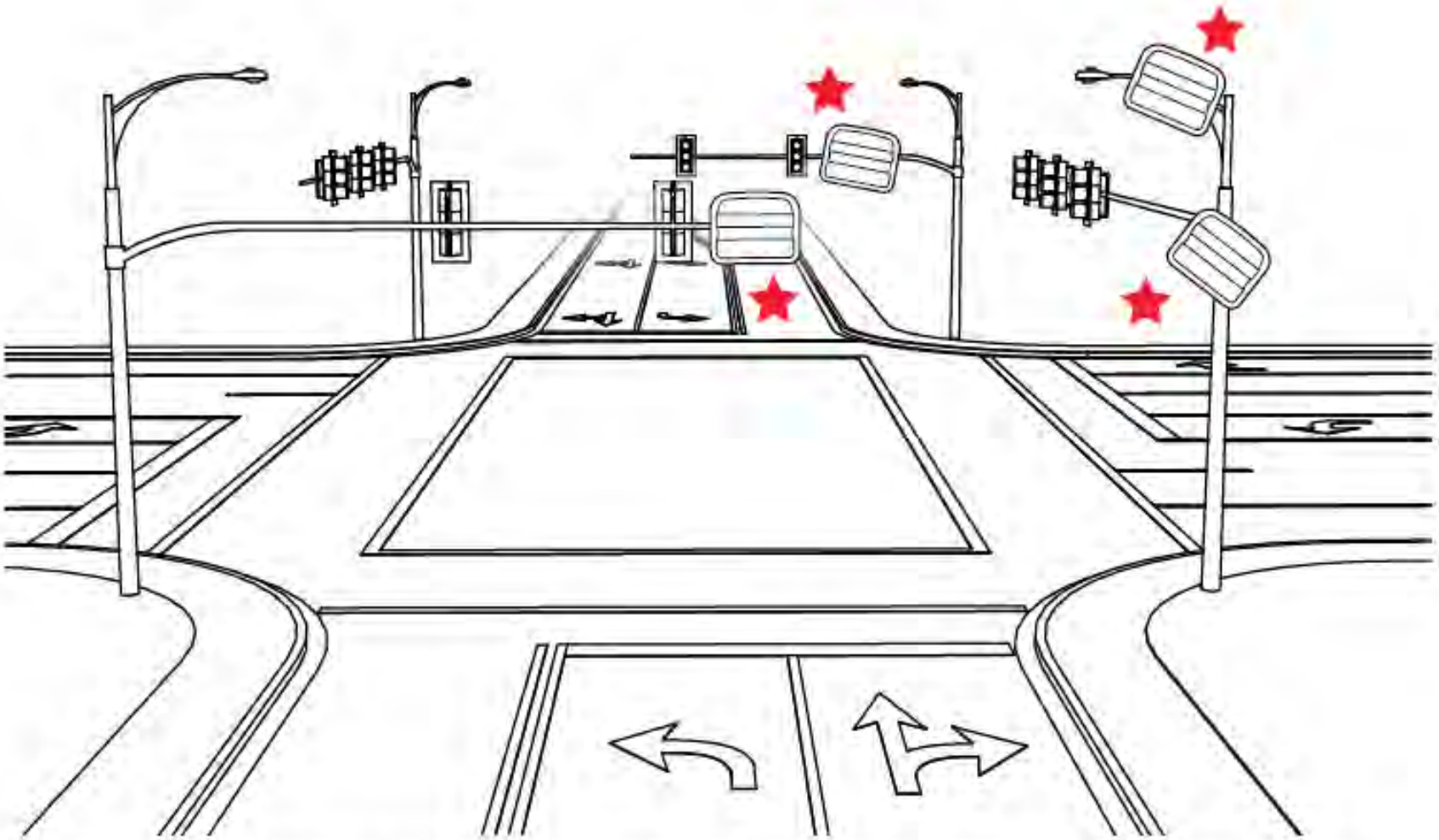


Figure 3. Recommended mounting locations in a mast arm intersection

Mounting on a vertical pole

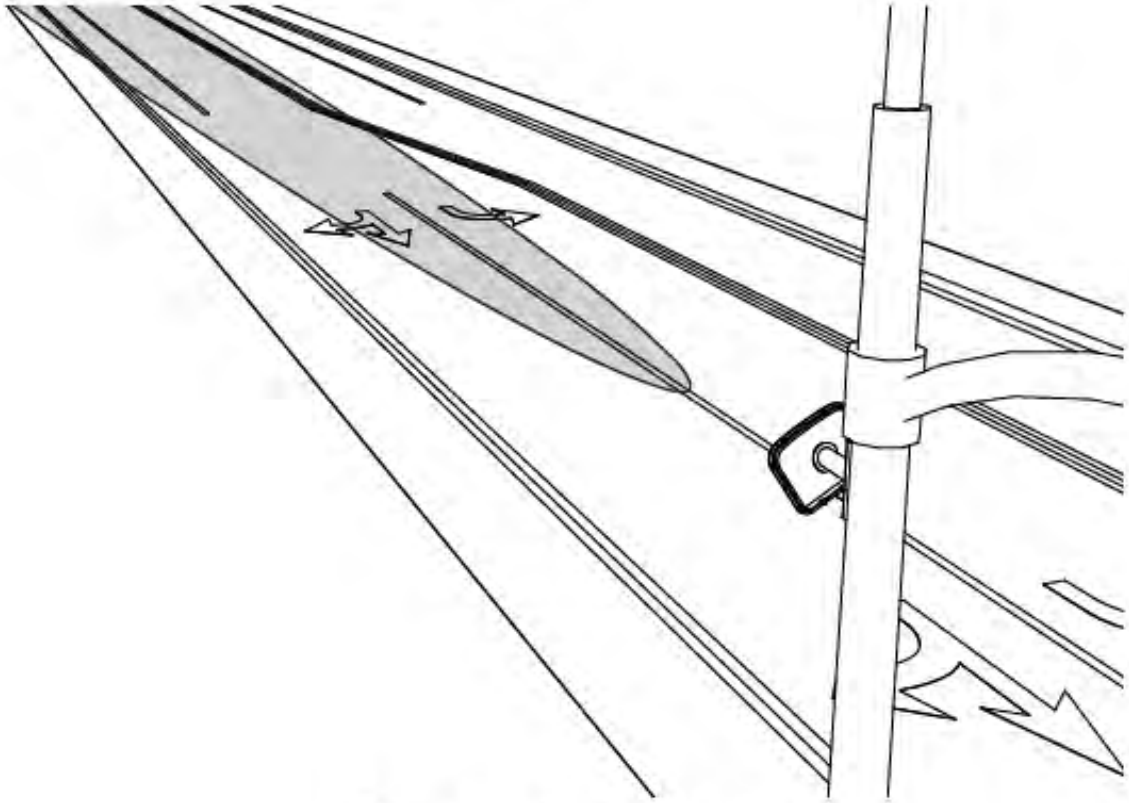


Figure 5. Vertical pole

- Lets you place the sensor near the stop bar.
- Allows the sensor to be mounted high enough to reduce occlusion.
- Mount close to the lanes of interest to prevent departing traffic from occluding approaching vehicles.

Mounting on a luminaire

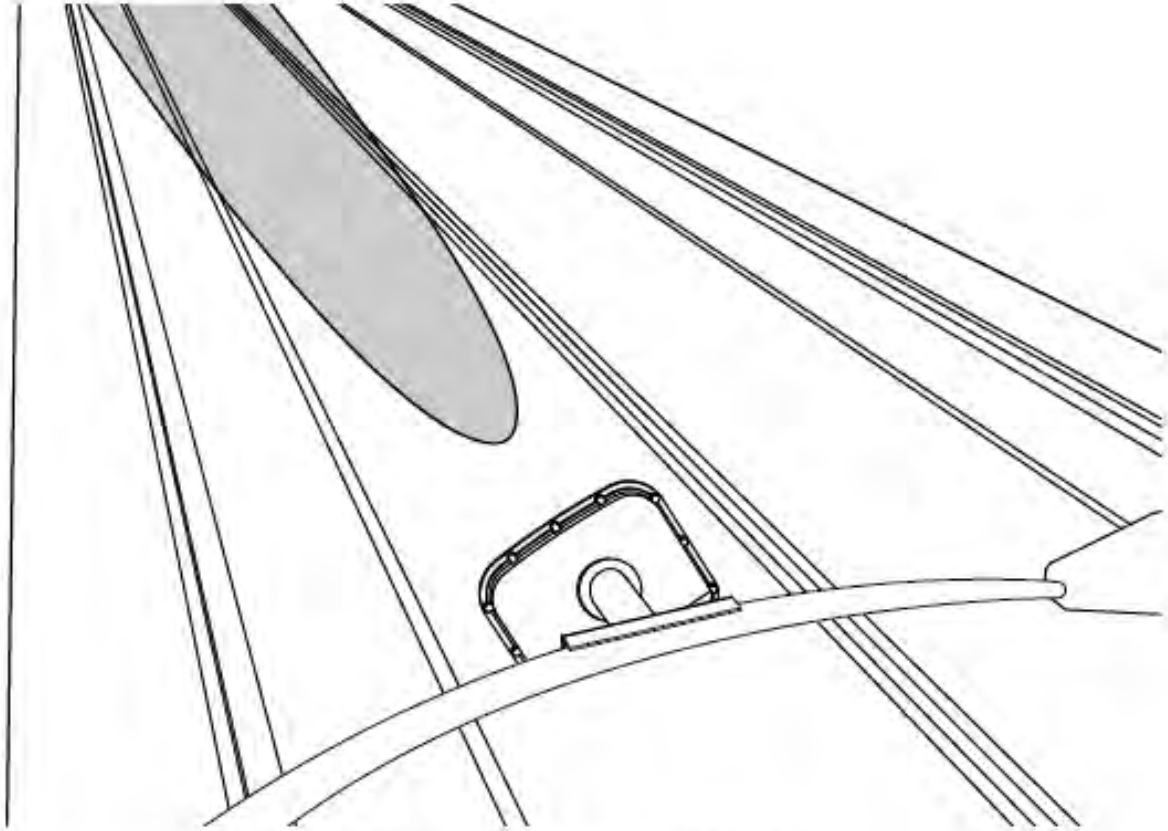


Figure 6. On a luminaire

- Allows you to place the sensor within the maximum offset and increase the mounting height.
- Mount close to the lanes of interest to prevent departing traffic from occluding approaching vehicles.

Using the viewfinder tool

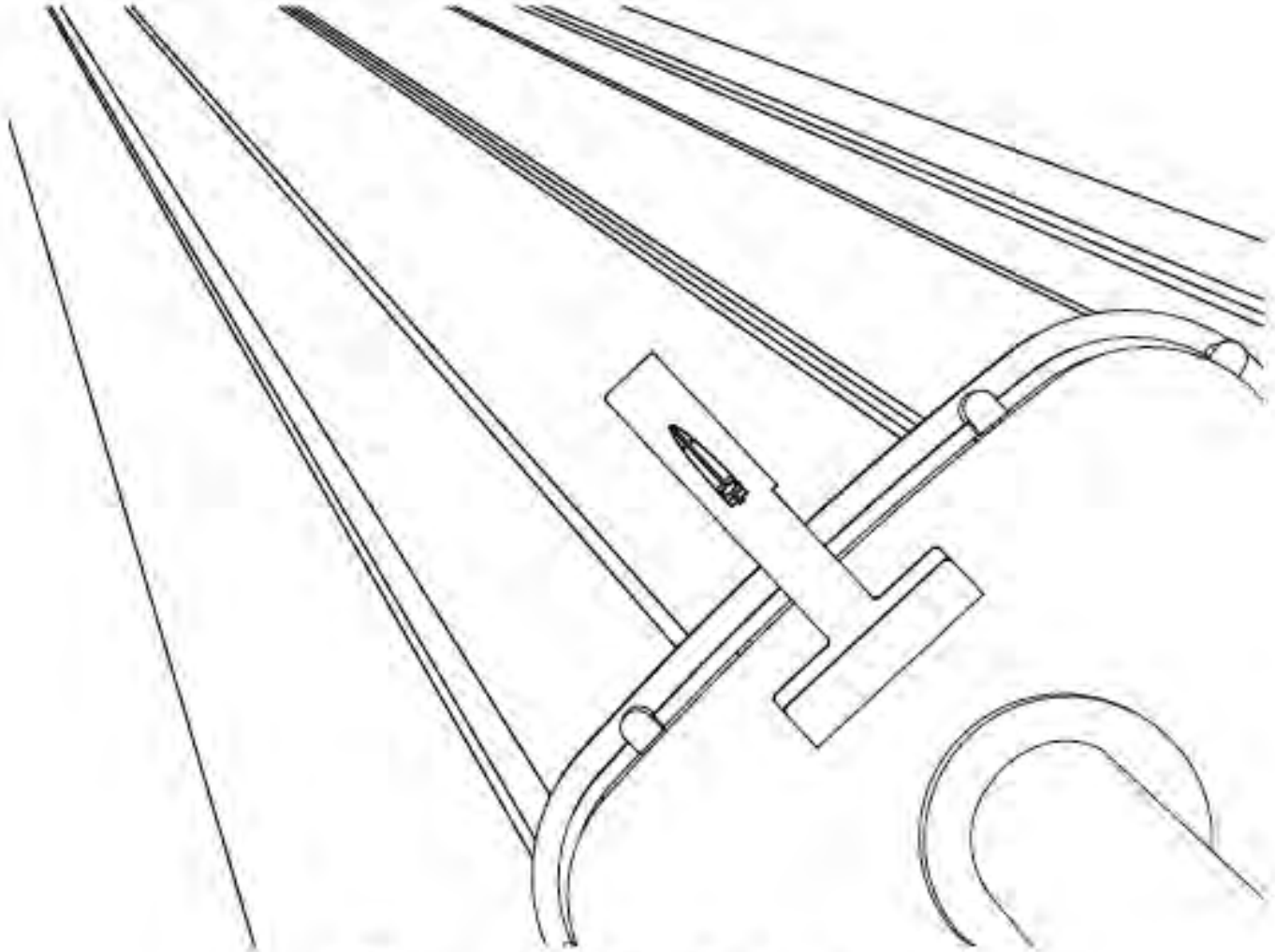
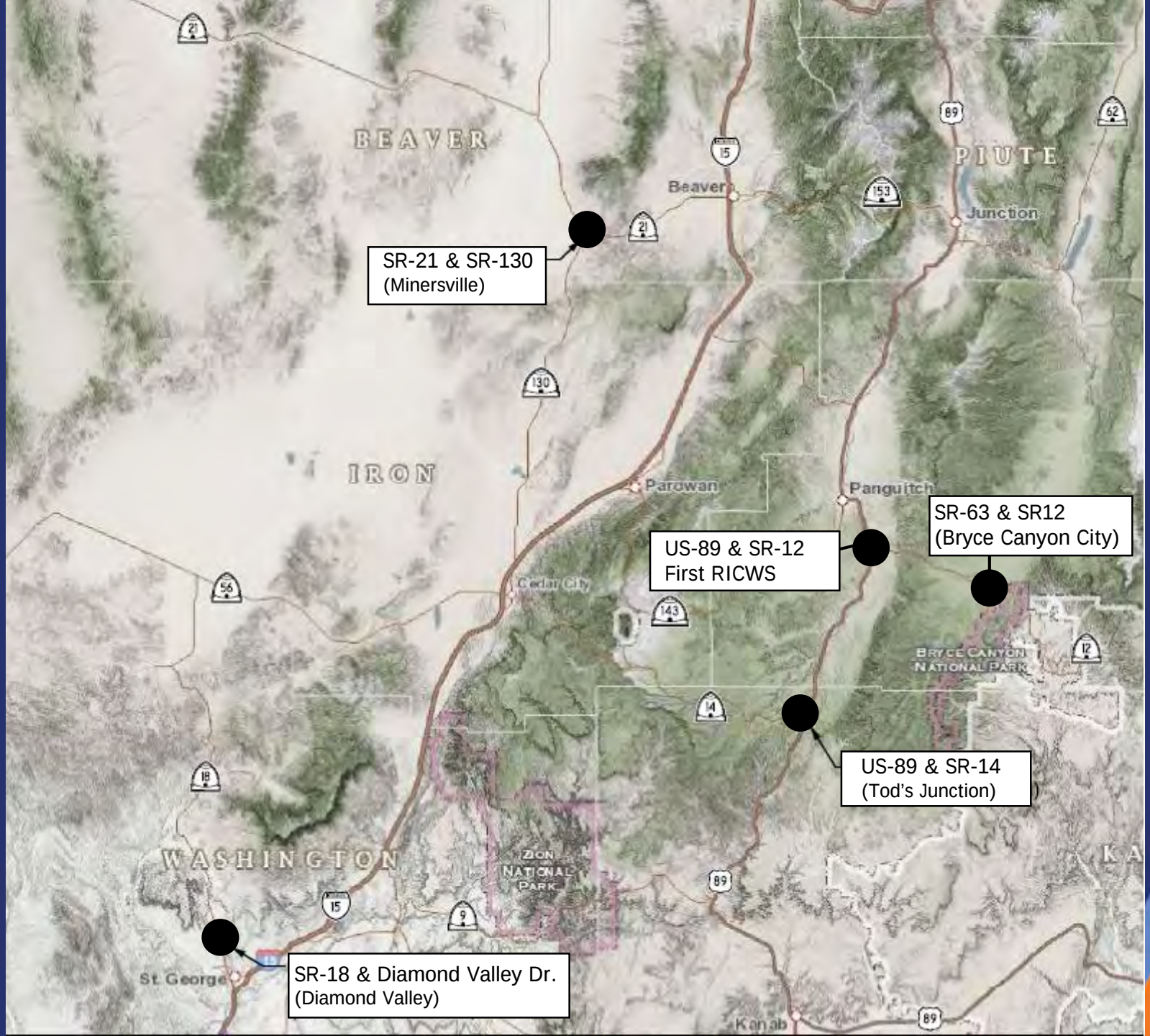


Figure 14. Viewfinder tool


2 AMP
AC to DC
22.5-28.5 VDC
WAVETRONIX
Click! 202
Click! 222
Serial to Ethernet Converter
WX-SS
801-0003


BUS INTERFACE UNIT
POWER ON
TRANSMIT
VALID DATA
ECONOLITE
RACK
1
CH2
CH8
CH6
CH12
CH10
CH16


SR-21 & SR-130
(Minersville)
US-89 & SR-12
First RICWS
SR-63 & SR12
(Bryce Canyon City)
US-89 & SR-14
(Tod's Junction)
SR-18 & Diamond Valley Dr.
(Diamond Valley)
BEAVER
IRON
WASHINGTON
PIUTE
Beaver
Junction
Parowan
Panguitch
Cedar City
St. George
Kanab
Bryce Canyon National Park
Zion National Park

US-89 & SR-12

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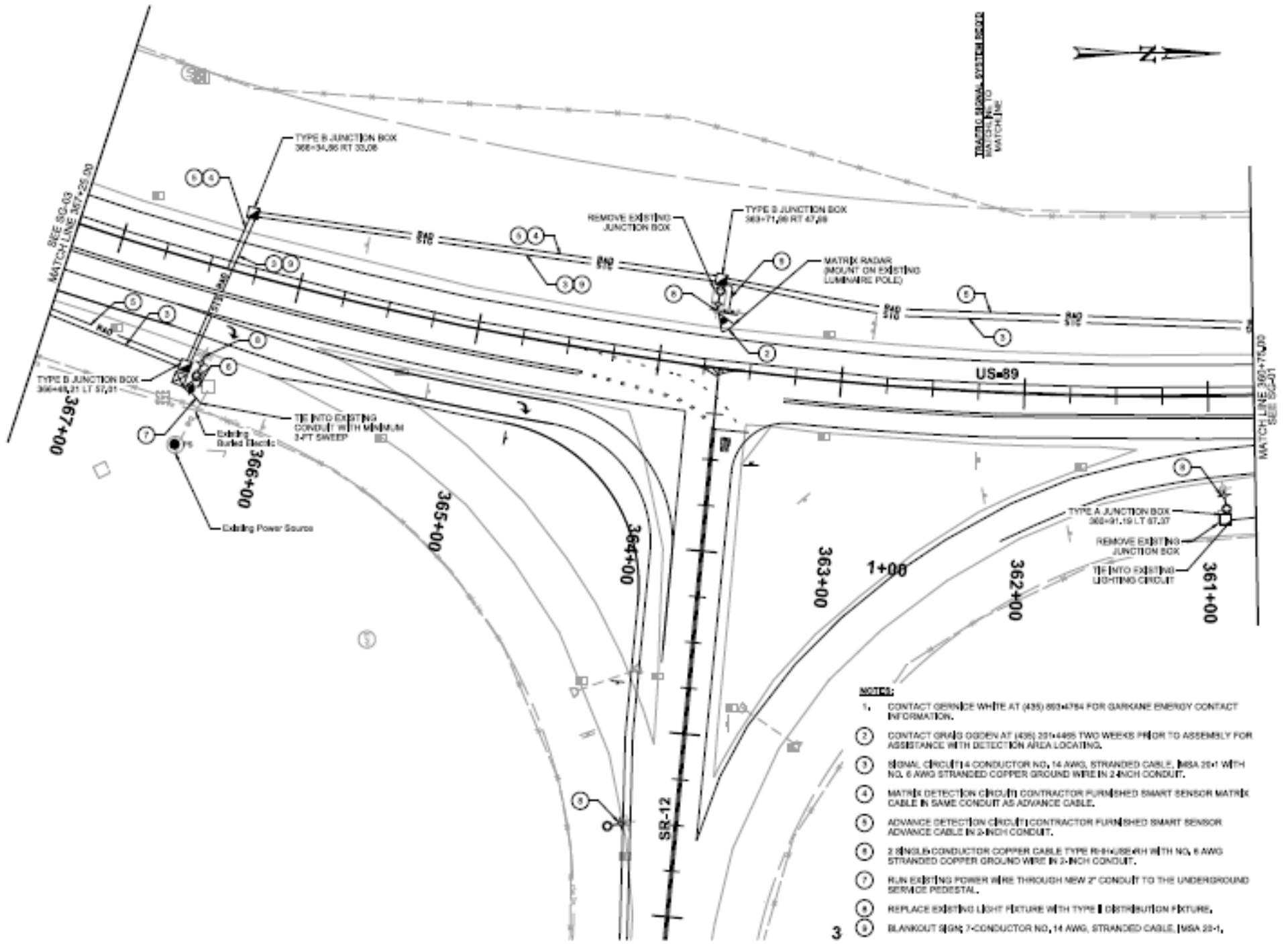
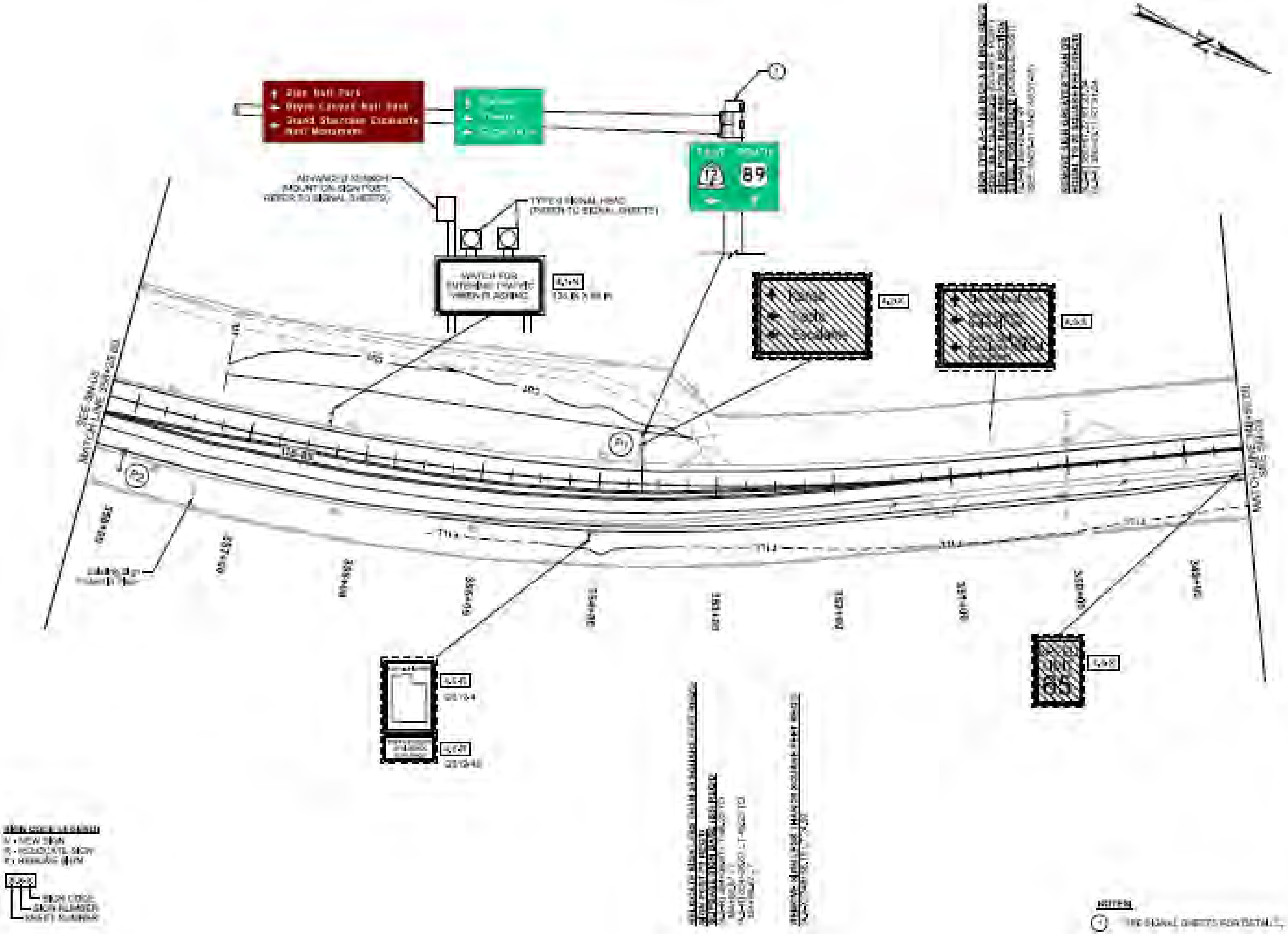


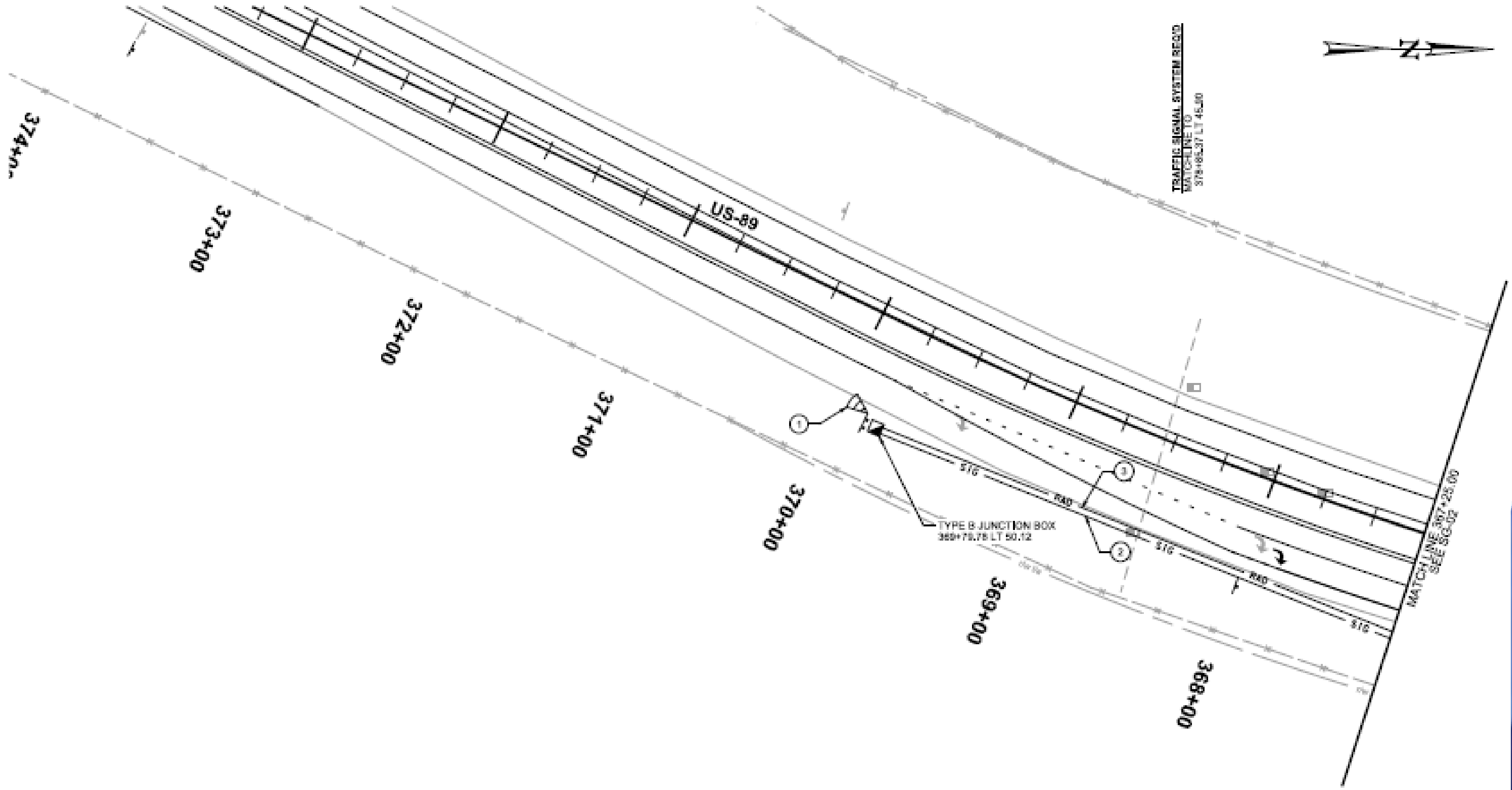
NOTES:

1. CONTACT GERNICE WHITE AT (435) 893-4784 FOR GARKANE ENERGY CONTACT INFORMATION.
2. CONTACT CRAIG OGDEN AT (435) 231-4465 TWO WEEKS PRIOR TO ASSEMBLY FOR ASSISTANCE WITH DETECTION AREA LOCATING.
3. SIGNAL CIRCUIT: 4 CONDUCTOR NO. 14 AWG, STRANDED CABLE, MSA 20-1 WITH NO. 6 AWG STRANDED COPPER GROUND WIRE IN 2-INCH CONDUIT.
4. MATRIX DETECTION CIRCUIT: CONTRACTOR FURNISHED SMART SENSOR MATRIX CABLE IN SAME CONDUIT AS ADVANCE CABLE.
5. ADVANCE DETECTION CIRCUIT: CONTRACTOR FURNISHED SMART SENSOR ADVANCE CABLE IN 2-INCH CONDUIT.
6. 2 SINGLE CONDUCTOR COPPER CABLE TYPE RHH/RHW/USE-2 WITH NO. 6 AWG STRANDED COPPER GROUND WIRE IN 2-INCH CONDUIT.
7. RUN EXISTING POWER WIRE THROUGH NEW 2" CONDUIT TO THE UNDERGROUND SERVICE PEDESTAL.
8. REPLACE EXISTING LIGHT FIXTURE WITH TYPE I DISTRIBUTION FIXTURE.
9. BLANKOUT SIGN; 7-CONDUCTOR NO. 14 AWG, STRANDED CABLE, MSA 20-1.

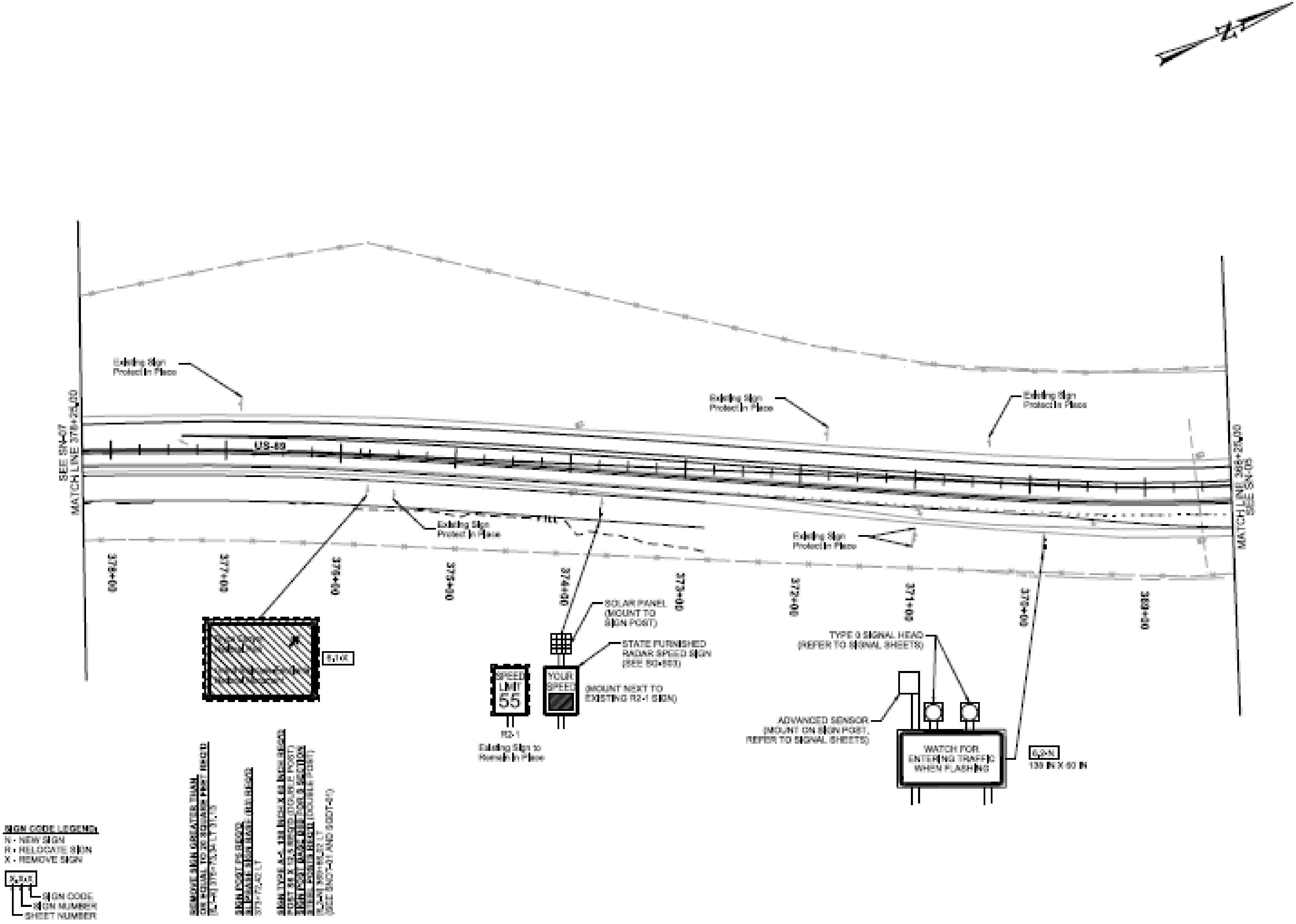
Keeping Utah Moving



Zion Natl Park
Bryce Canyon Natl Park
Grand Staircase Escalante Natl Monument
EAST 12
SOUTH 89
WATCH FOR ENTERING TRAFFIC WHEN FLASHING
TYPE 3 SIGNAL HEAD (REFER TO SIGNAL SHEETS)
SIGN CODE LEGEND
N - NEW SIGN
R - RELOCATE SIGN
NOTES



Keeping Utah Moving



US-89
SEE SN-07
MATCH LINE 378+25.00
MATCH LINE 368+25.00
SEE SN-09
Existing Sign
Protect In Place
378+00
377+00
376+00
375+00
374+00
373+00
372+00
371+00
370+00
369+00
SOLAR PANEL
(MOUNT TO
SIGN POST)
STATE FURNISHED
RADAR SPEED SIGN
(SEE SQ-SS3)
SPEED LIMIT 55
YOUR SPEED
(MOUNT NEXT TO
EXISTING R2-1 SIGN)
R2-1
Existing Sign to
Remain In Place
TYPE 3 SIGNAL HEAD
(REFER TO SIGNAL SHEETS)
ADVANCED SENSOR
(MOUNT ON SIGN POST,
REFER TO SIGNAL SHEETS)
WATCH FOR
ENTERING TRAFFIC
WHEN FLASHING
139 IN X 60 IN
SIGN CODE LEGEND:
N - NEW SIGN
R - RELOCATE SIGN
X - REMOVE SIGN
SIGN CODE
SIGN NUMBER
SHEET NUMBER


STOP
TRAFFIC APPROACHING
SOUTH
89
NORTH
89


SOUTH
89
Scenic Byway
MT. CARMEL
TRAFFIC APPROACHING
NORTH
89
DRIVE AWARE
STOP


Zion Natl Park
Bryce Canyon Natl Park
Grand Staircase Escalante Natl Monument
Kanab
Tropic
Escalante
EAST
SOUTH
12
89
WATCH FOR ENTERING TRAFFIC WHEN FLASHING


WATCH FOR
ENTERING TRAFFIC
WHEN FLASHING
PASSPORT

Keeping Utah Moving


Panguitch
RIGHT LANE MUST TURN RIGHT
NORTH
89
EAST
12


89

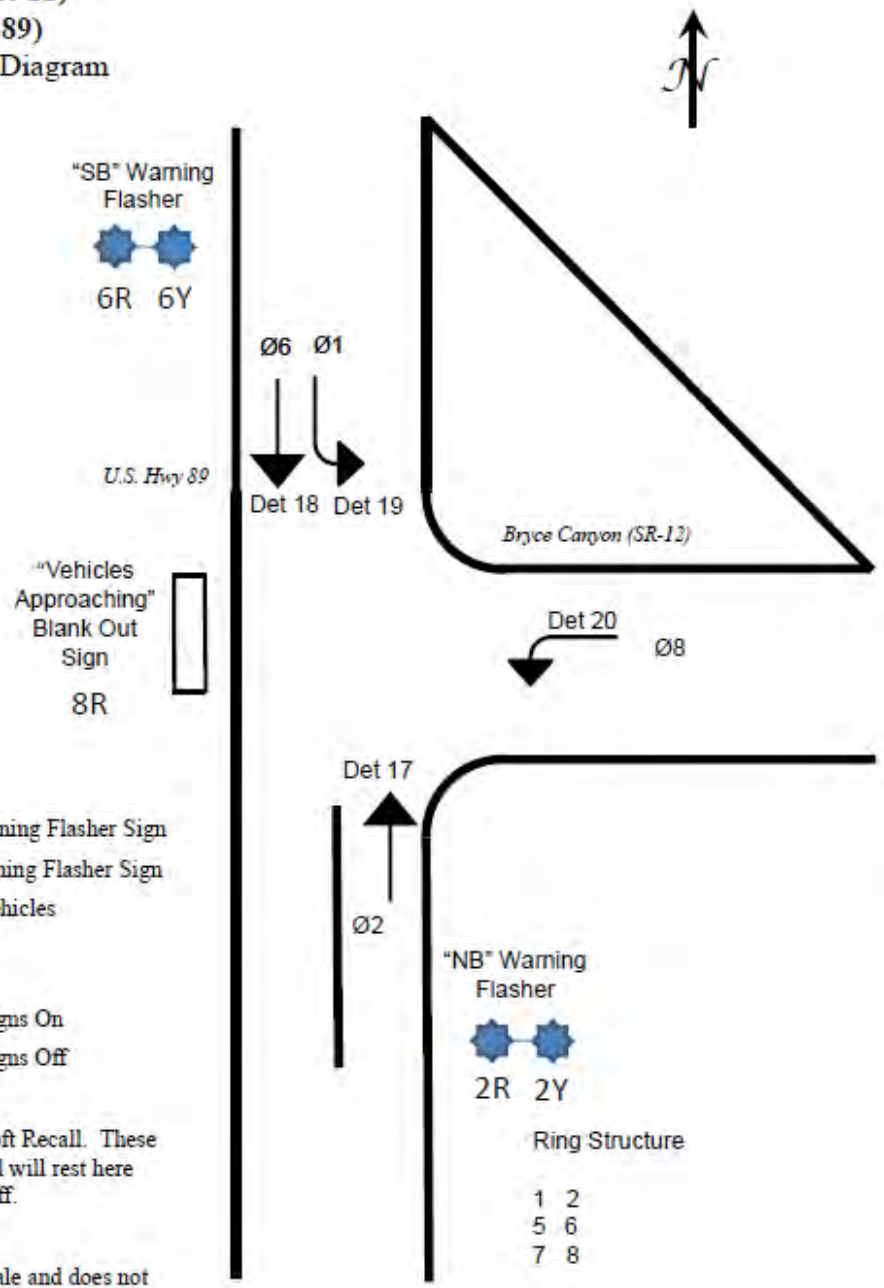
Signal#8277

Bryce Canyon (SR-12)

U.S. Hwy 89 (US-89)

Proposed Phasing Diagram

02/01/18 – T.Noall



Notes:

- Phases 1,2: NB Warning Flasher Sign
- Phases 5,6: SB Warning Flasher Sign
- Phases 7,8: WB "Vehicles Approaching" Sign
- Phases 2, 6 & 8 = Signs On
- Phases 1, 5 & 7 = Signs Off
- Phases 1, 5 & 7 = Soft Recall. These phases are in use and will rest here when the signs are off.
- Diagram is not to scale and does not show number of lanes

UDOT Keeping Utah Moving

US 89 and SR 12 Controller Operation

Detector 17 NB Advance Calls Ø8 EB and has 7 sec extension
Detector 18 SB advance calls Ø8 EB and has 9 sec extension
Detector 19 SBL Matrix calls Ø2 and Ø8 and has 3 sec extension
Detector 20 WB Matrix calls Ø2 and Ø6 and has 1.5 sec extension
Logic 1 flashes one LED through Red 6 output for SB
Logic 2 flashes one LED through Yellow 6 output for SB
Logic 3 flashes one LED through Red 2 output for NB
Logic 4 flashes one LED through Yellow 2 output for NB
Logic 5 controls Ø8 WB LED sign.

NB advance detects from 700 to 1395 ft. and extension time covers the rest of the distance.

SB advance detects from 830 to 1630 ft. and extension time covers the rest of the distance.

Under a MMU or Controller Flash one NB, one SB and one WB sign will flash.

#8277 - US-89 @ SR-12 Bryce Canyon Flasher - 02/01/18

LOAD SWITCH ASSIGNMENT

Write the controller phase assignment in the space provided for each channel. Write the physical connection for each color in the space provided.

LS1	Assign: 0.
R	
Y	Not Used
G	

LS2	Assign: 2 V
R	"NB" Yellow Flasher (1 of 2)
Y	"NB" Yellow Flasher (2 of 2)
G	Not Monitored

LS3	Assign: 0.
R	
Y	Not Used
G	

LS4	Assign: 0.
R	
Y	Not Used
G	

LS5	Assign: 5 V
R	
Y	Not Used
G	

LS6	Assign: 6 V
R	"SB" Yellow Flasher (1 of 2)
Y	"SB" Yellow Flasher (2 of 2)
G	Not Monitored

LS7	Assign: 0.
R	
Y	Not Used
G	

LS8	Assign: 8 V
R	"WB" Message Sign
Y	Not Monitored
G	Not Monitored

LS9	Assign: 0.
R	
Y	Not Used
G	

LS10	Assign: 0.
R	
Y	Not Used
G	

LS11	Assign: 0.
R	
Y	Not Used
G	

LS12	Assign: 0.
R	
Y	Not Used
G	

LS13	Assign: 1 O
R	
Y	Not Used
G	

LS14	Assign: 0.
R	
Y	Not Used
G	

LS15	Assign: 0.
R	
Y	Not Used
G	

LS16	Assign: 0.
R	
Y	Not Used
G	

MMU PROGRAM CARD JUMPERS

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1															
2					X		X								
3															
4															
5															
6							X								
7															
8															
9															
10															
11															
12															
13															
14															
15															

Min Yellow Disable							
1	2	3	4	5	6	7	8
	X				X		X
9	10	11	12	13	14	15	16

MMU TYPE REQUIRED

- [ ] Any Monitor Will Work
- [X] SmartMonitor MMU-16LE (EDI or Econolite)
- [ ] Reno A&E MMU-1600GE

CONTROLLER TYPE

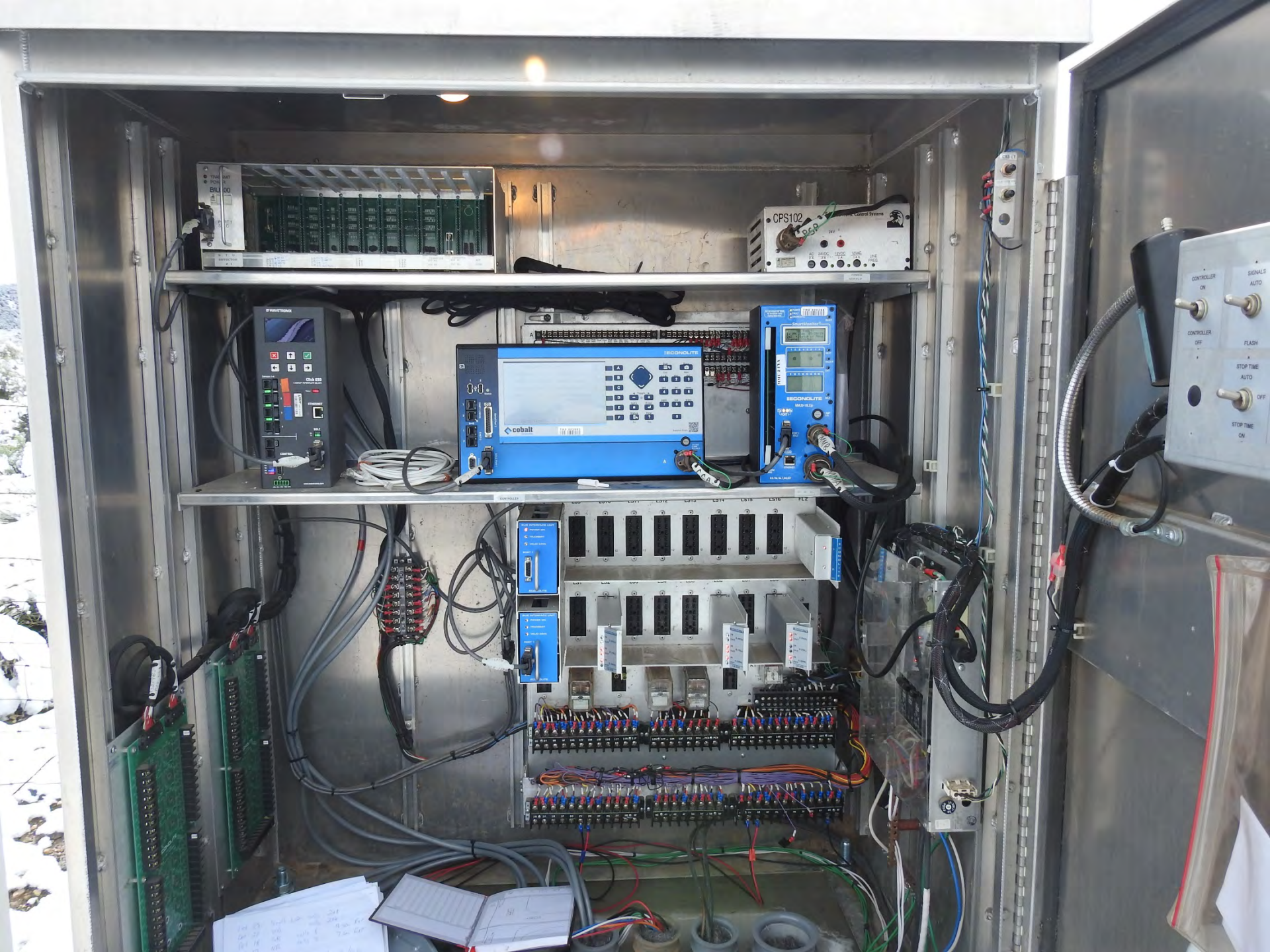
- [ ] Any Controller Will Work
- [ ] Econolite ASC/2
- [ ] Econolite ASC/3
- [ ] Siemens/Eagle m50
- [ ] NextPhase on m50
- [X] Other (see notes)

- [ ] Type 1
- [ ] Type 2
- [ ] Other (see notes)

Location: SIG #8277 US-89 @ SR-12 Warning System

	DESCRIPTION				IF			THEN			ELSE		
1	Enabling one side of the wig wag portion of the SB flasher.	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE RED	6	ON	SIG SET PHASE RED	6	OFF
1		AND	--	F	LP COB CODE ON		546						
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
2	Enabling the other side of the wig wag portion of the SB flasher.	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE YELLOW	6	ON	SIG SET PHASE YELLOW	6	OFF
2		AND	--	F	LP COB CODE OFF		546						
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
3	Enabling one side of the wig wag portion of the NB flasher.	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE RED	2	ON	SIG SET PHASE RED	2	OFF
3		AND	--	F	LP COB CODE ON		546						
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
4	Enabling the other side of the wig wag portion of the NB flasher.	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE YELLOW	2	ON	SIG SET PHASE YELLOW	2	OFF
4		AND	--	F	LP COB CODE OFF		546						
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
5	Enables the "Vehicles Approaching" sign.	IF	--	F	CTR PHASE TIMING	8	ON	SIG SET PHASE RED	8	ON	SIG SET PHASE RED	8	OFF
5		OR	--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									


ADDITIONAL PHASE
DET PH 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 T
13 0 . . . . N
14 0 . . . . N
15 0 . . . . N
16 0 . . . . N
17 8 . . . . N
18 8 . . . . N
19 2 . . . . . X . . . . N
20 2 . . . . . X . . . . N
21 0 . . . . N
22 0 . . . . N
23 0 . . . . N
24 0 . . . . N
25 0 . . . . N
NEXT PAGE
CLEAR
cobalt
by Econolite
TMD 502993
Serial Port 2


CPS102
cobalt
ECONOLITE
CONTROLLER ON
CONTROLLER OFF
SIGNALS AUTO
FLASH
STOP TIME AUTO
OFF
STOP TIME ON

SR-12 & SR-63

Why we didn’t do it.

UDOT
Keeping Utah Moving

Project Description

The project will reduce injuries and improve safety at rural intersections located in Beaver, Garfield, Kane, and Washington Counties by installing Rural Intersection Conflict Warning Systems (RICWS) and other safety improvements. The project includes the following actions at the noted intersections to address the identified needs:

- SR-21 and SR-130 (Beaver)
  - Install RICWS for the SR-21 intersection roadway approach.
  - Modify corridor signing as necessary for the RICWS.
- SR-12 and SR-63 (Garfield)
  - Install RICWS on WB intersection roadway approach on SR-12.
  - Modify corridor signing as necessary for the RICWS.
  - Modify striping as required to improve intersection guidance for turning vehicles.
  - Install flexible delineators to guide NB SR-63 left turning movements into the acceleration lane.
- US-89 and SR-14 (Kane)
  - Install RICWS for both intersection roadway approaches on US-89.
  - Install RICWS for EB intersection approach on SR-14.
  - Modify corridor signing as necessary for the RICWS.
- SR-18 and Diamond Valley Road (Washington)
  - Install RICWS for the Diamond Valley intersection roadway approach.
  - Modify corridor signing as necessary for the RICWS.
  - Install highway luminaire of westside of the T-intersection.
  - Striping improvements for left turning movements from Diamond Valley road.

SR-12 & SR-63 INTERSECTION

PIN: 15523
PROJECT NO. S-R499(310)

R4 RURAL INTERSECTION TRAFFIC DETECTION SIGNAL

SHEET NO. SG-12

SR-12 & SR-63 INTERSECTION

SR-12 & SR-63 INTERSECTION

SR-12 & SR-63 INTERSECTION

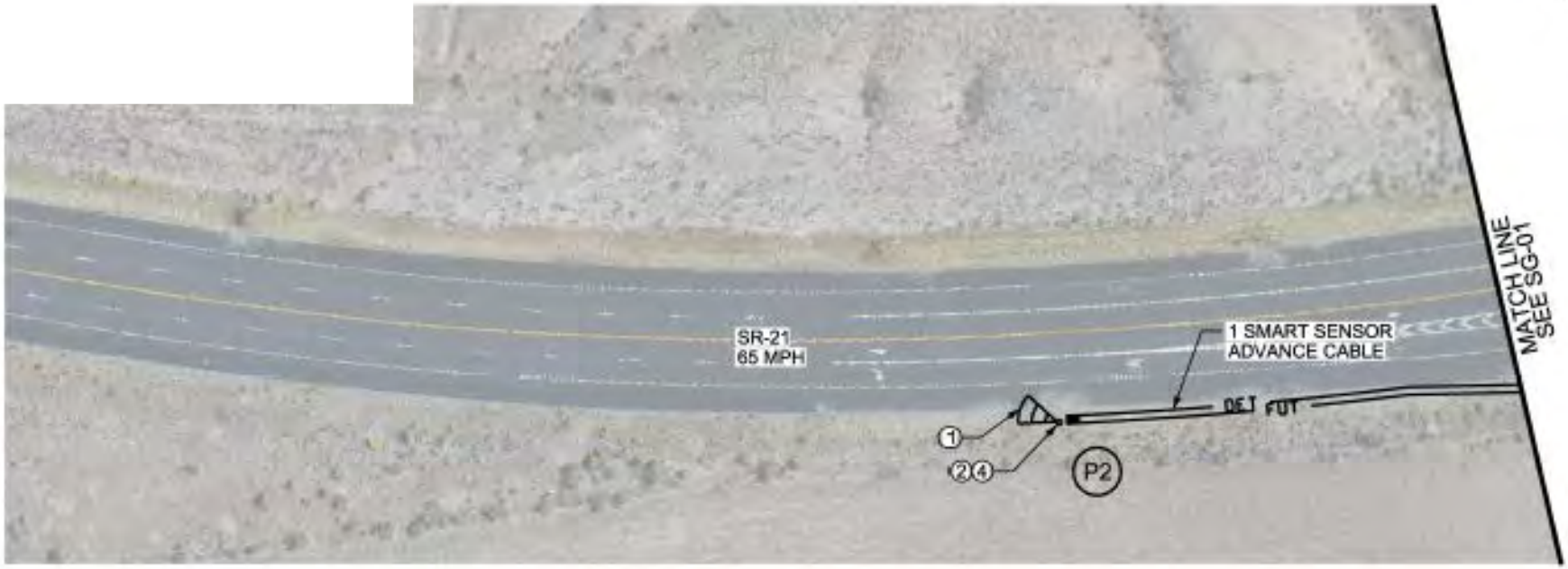

STOP
FedEx


STOP

SR-21 & SR-130 INTERSECTION

MINNERSVILLE

Keeping Utah Moving



UDOT
Keeping Utah Moving

LE SCHEDULE

REMARKS
' HIGHWAY LIGHT POLE

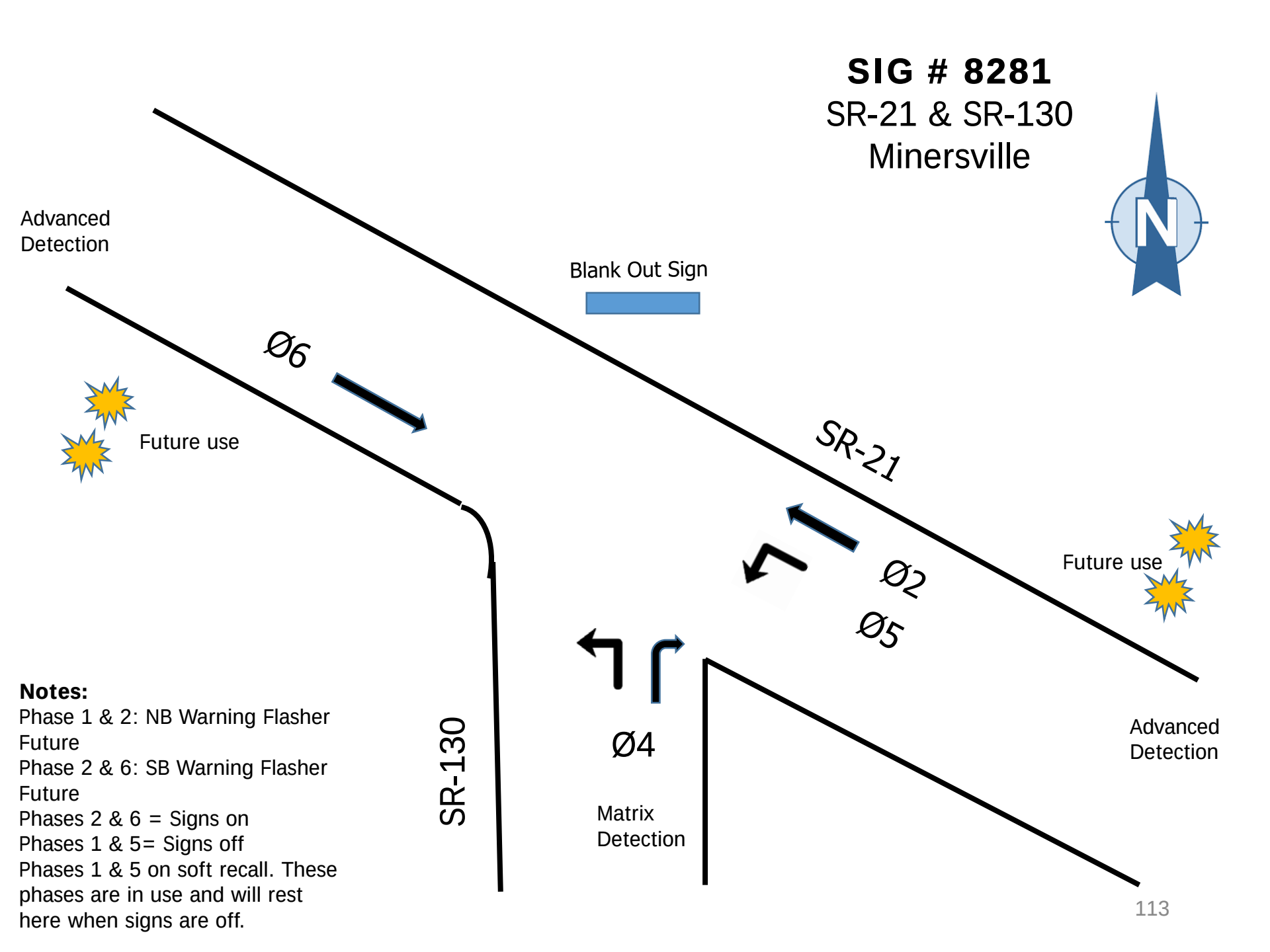
N

UDOT
Keeping Utah Moving

SIG # 8281

SR-21 & SR-130

Minersville



Notes:

Phase 1 & 2: NB Warning Flasher Future

Phase 2 & 6: SB Warning Flasher Future

Phases 2 & 6 = Signs on

Phases 1 & 5= Signs off

Phases 1 & 5 on soft recall. These phases are in use and will rest here when signs are off.

General Install Notes:

Assign Advance detectors to side street phase (4 or 8)

Add **Extend** to Advance detectors. Do this in Detector assignment MM 6-2. Enter enough time so vehicle can travel from end of sensor zone to cross street conflict point

Set up MMU card with no Jumpers except the Min Yellow Disables (Shown on cover sheet)

Program MMU so there are no used channels (-).

RJG 1-10-19

#8281 Minersville Flasher - RJG 1-10-19

LOAD SWITCH ASSIGNMENT

Write the controller phase assignment in the space provided for each channel. Write the physical connection for each color in the space provided.

	LS1	LS2	LS3	LS4	LS5	LS6	LS7	LS8
Assign:	0.	2 V	0.	4V	0	6 V	0.	0
R	Not Used	"NB" Yellow Flasher (1 of 2)	Not Used	"EB" Message Sign	Not Used	"SB" Yellow Flasher (1 of 2)	Not Used	Not Used
Y		"NB" Yellow Flasher (2 of 2)		Not Monitored		"SB" Yellow Flasher (2 of 2)		
G		Not Monitored		Not Monitored		Not Monitored		

	LS9	LS10	LS11	LS12	LS13	LS14	LS15	LS16
Assign:	0.	0.	0.	0.	0	0.	0.	0.
R	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
Y								
G								

MMU PROGRAM CARD JUMPERS

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1																1
2			X		X											2
3																3
4					X											4
5																5
6																6
7																7
8																8
9																9
10																10
11																11
12																12
13																13
14																14
15																15
	9	10	11	12	13	14	15	16								

Min Yellow Disable

1	2	3	4	5	6	7	8
	X		X		X		

MMU TYPE REQUIRED

- [ ] Any Monitor Will Work
- [X] SmartMonitor MMU-16LE (EDI or Econolite)
- [ ] Reno A&E MMU-1600GE

CONTROLLER TYPE

- [ ] Any Controller Will Work
- [ ] Econolite ASC/2
- [ ] Econolite ASC/3
- [ ] Siemens/Eagle m50
- [ ] NextPhase on m50
- [X] Other (see notes)

- [ ] Type 1
- [ ] Type 2
- [ ] Other (see notes)

NOTES

Cobalt Controller. LS2 and LS6 and MMU car jumpers are shown for future use. These are shown but greyed out are for future use.

Location: SIG #8281 Minersville Warning System RJG

	DESCRIPTION					IF			THEN			ELSE		
1	Enabling one side of the wig wag portion of the SB flasher. Disabled at this time for future use	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE RED	6	ON	SIG SET PHASE RED	6	OFF
1		AND	--	F	LP COB CODE ON		546						
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
2	Enabling the other side of the wig wag portion of the SB flasher. Disabled at this time for future use	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE YELLOW	6	ON	SIG SET PHASE YELLOW	6	OFF
2		AND	--	F	LP COB CODE OFF		546						
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
3	Enabling one side of the wig wag portion of the NB flasher. Disabled at this time for future use	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE RED	2	ON	SIG SET PHASE RED	2	OFF
3		AND	--	F	LP COB CODE ON		546						
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
4	Enabling the other side of the wig wag portion of the NB flasher. Disabled at this time for future use	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE YELLOW	2	ON	SIG SET PHASE YELLOW	2	OFF
4		AND	--	F	LP COB CODE OFF		546						
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
5	Enables the "Vehicles Approaching" sign.	IF	--	F	CTR PHASE TIMING	4	ON	SIG SET PHASE RED	4	ON	SIG SET PHASE RED	4	OFF
5		OR	--	F									
5			--	F									
5			--	F									
5			--	F									


2 AMP
AC to DC
22.5-28.5 VDC
WAVETRONIX
Click! 202
Click! 222
Serial to Ethernet Converter
WX-SS
801-0003


BUS INTERFACE UNIT
POWER ON
TRANSMIT
VALID DATA
ECONOLITE
RACK
1
CH2
CH8
CH6
CH12
CH10
CH16

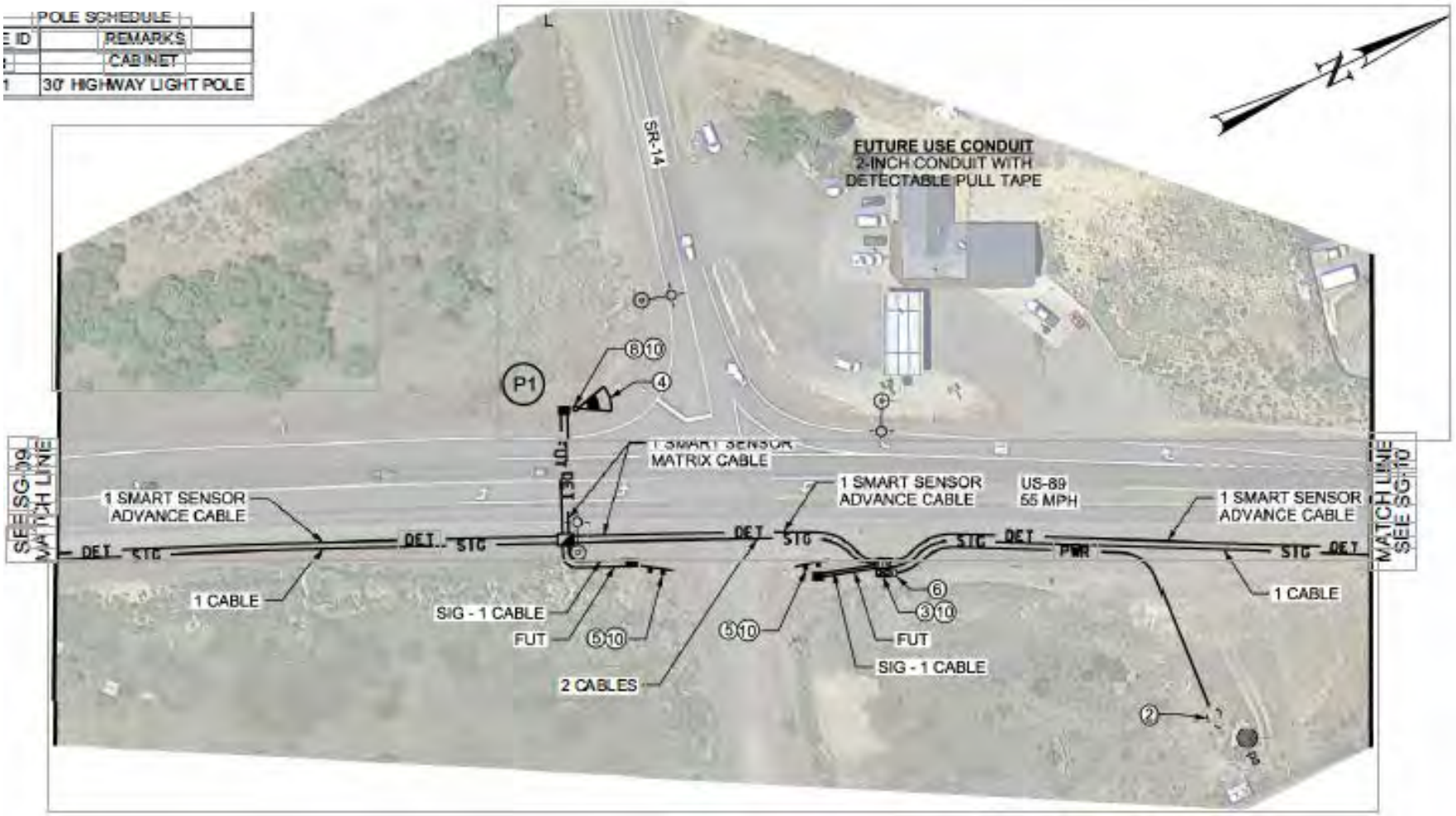

ECONOLITE
cobalt
Status
A
B
C
D
E
F
Toggle
Enter
Status
Help
?
Main
1
2
3
4
5
6
7
8
9
0
A


RESET
SmartMonitor®
-NO FAULT-
Channel Status:
1 2 3 4 5 6 7 8
NEXT
SELECT
EXIT
9 10 11 12 13 14 15 16
HELP
ECONOLITE
MMU2-16LEip
Tx
Rx
PORT 1
1 AMP S.B.
PORT 1 SDLC


TB2
LS1
LS2
LS3
LS5
LS6
LS7
LS8
LS9
LS10
LS11
LS13
LS14
LS15
LS16
FL1
R1
R2
R3
R4
810
#1
#2
EDI
FR4
FR5

US-89 & SR-14 INTERSECTION

Tod's Junction



UDOT
Keeping Utah Moving

POLE SCHEDULE

Keeping Utah Moving


ENTERING TRAFFIC
WHEN FLASHING
yce Canyon
tional Park
dar Breaks
Natl Monument

Keeping Utah Moving


ENTERING TRAFFIC
WHEN FLASHING

Keeping Utah Moving

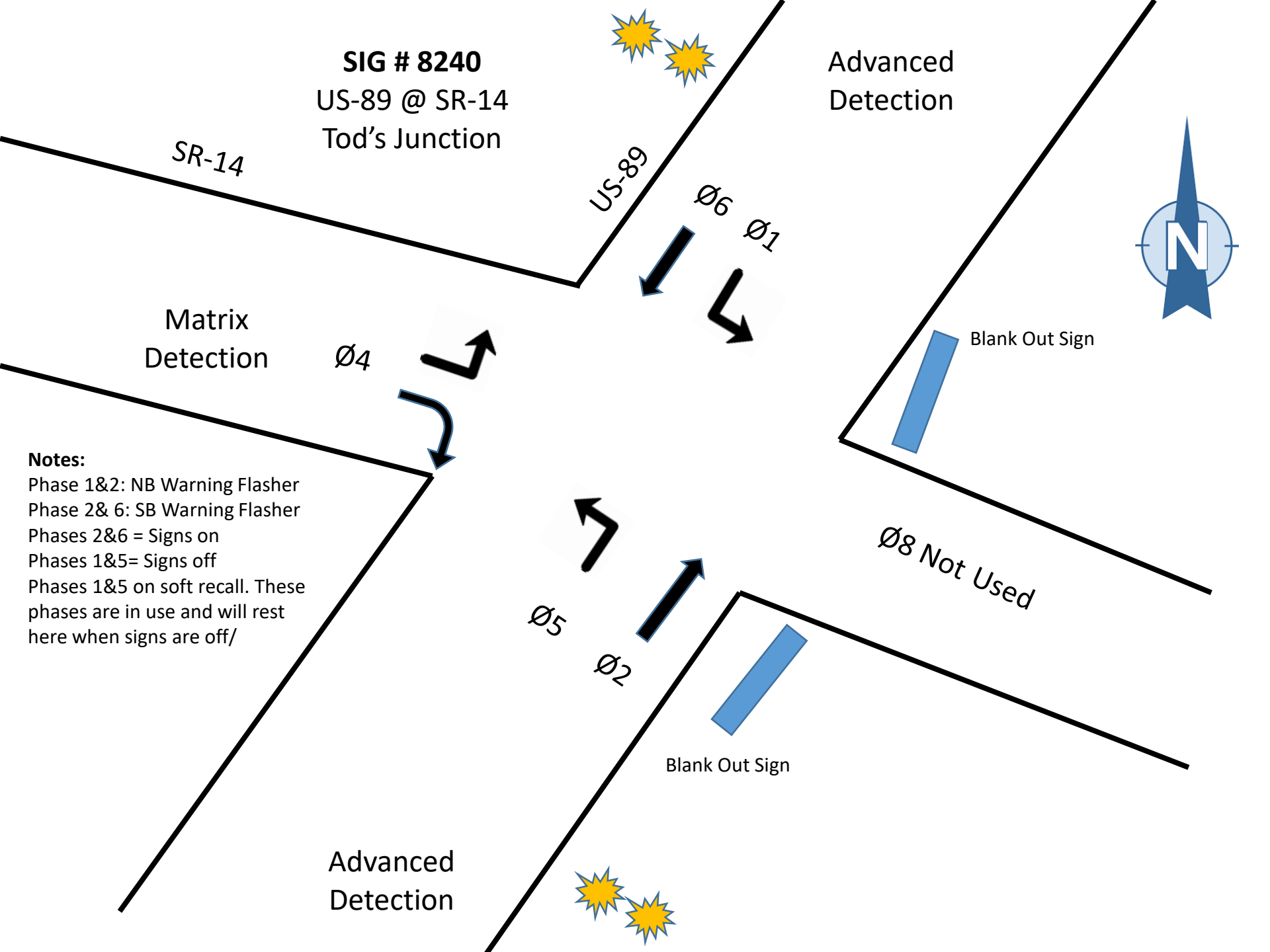

STOP

Keeping Utah Moving


TRAFFIC
APPROACHING

Keeping Utah Moving


STOP


SIG # 8240
US-89 @ SR-14
Tod's Junction
SR-14
US-89
Advanced Detection
Matrix Detection
Ø4
Ø6
Ø1
Blank Out Sign
N
Notes:
Phase 1&2: NB Warning Flasher
Phase 2& 6: SB Warning Flasher
Phases 2&6 = Signs on
Phases 1&5= Signs off
Phases 1&5 on soft recall. These phases are in use and will rest here when signs are off/
Ø8 Not Used
Ø5
Ø2
Blank Out Sign
Advanced Detection

General Install Notes:

Assign Advance detectors (US-89) to cross street phase (Ø4)

Matrix (SR-14) assign to main line phases (Ø2 & Ø6)

Add **Extend** to Advance detectors. Do this in Detector assignment, Main Menu, 6 → 2. Enter enough time so vehicle can travel from end of sensor zone to cross street conflict point

Set up MMU card with no Jumpers except as shown on cover sheet

Program MMU so there are no used channels (-).

RJG 1-10-19

#8240 - US-89 @ SR-14 Long Valley Flasher - RJG 1-10-18

LOAD SWITCH ASSIGNMENT

Write the controller phase assignment in the space provided for each channel. Write the physical connection for each color in the space provided.

LS1	Assign: 0.
R	
Y	Not Used
G	

LS2	Assign: 2 V
R	"NB" Yellow Flasher (1 of 2)
Y	"NB" Yellow Flasher (2 of 2)
G	Not Monitored

LS3	Assign: 0.
R	
Y	Not Used
G	

LS4	Assign: 4V
R	"WB" Message Sign
Y	Not Monitored
G	Not Monitored

LS5	Assign: 5 V
R	
Y	Not Used
G	

LS6	Assign: 6 V
R	"SB" Yellow Flasher (1 of 2)
Y	"SB" Yellow Flasher (2 of 2)
G	Not Monitored

LS7	Assign: 0.
R	
Y	Not Used
G	

LS8	Assign: 0
R	
Y	Not Used
G	

LS9	Assign: 0.
R	
Y	Not Used
G	

LS10	Assign: 0.
R	
Y	Not Used
G	

LS11	Assign: 0.
R	
Y	Not Used
G	

LS12	Assign: 0.
R	
Y	Not Used
G	

LS13	Assign: 1 O
R	
Y	Not Used
G	

LS14	Assign: 0.
R	
Y	Not Used
G	

LS15	Assign: 0.
R	
Y	Not Used
G	

LS16	Assign: 0.
R	
Y	Not Used
G	

MMU PROGRAM CARD JUMPERS

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
															1
		X		X											2
															3
				X											4
															5
															6
															7
															8
															9
															10
															11
															12
															13
															14
															15

Min Yellow Disable

1	2	3	4	5	6	7	8
	X		X		X		
9	10	11	12	13	14	15	16

MMU TYPE REQUIRED

- [ ] Any Monitor Will Work
- [X] SmartMonitor MMU-16LE (EDI or Econolite)
- [ ] Reno A&E MMU-1600GE

CONTROLLER TYPE

- [ ] Any Controller Will Work
- [ ] Econolite ASC/2
- [ ] Econolite ASC/3
- [ ] Siemens/Eagle m50
- [ ] NextPhase on m50
- [X] Other (see notes)

- [ ] Type 1
- [ ] Type 2
- [ ] Other (see notes)

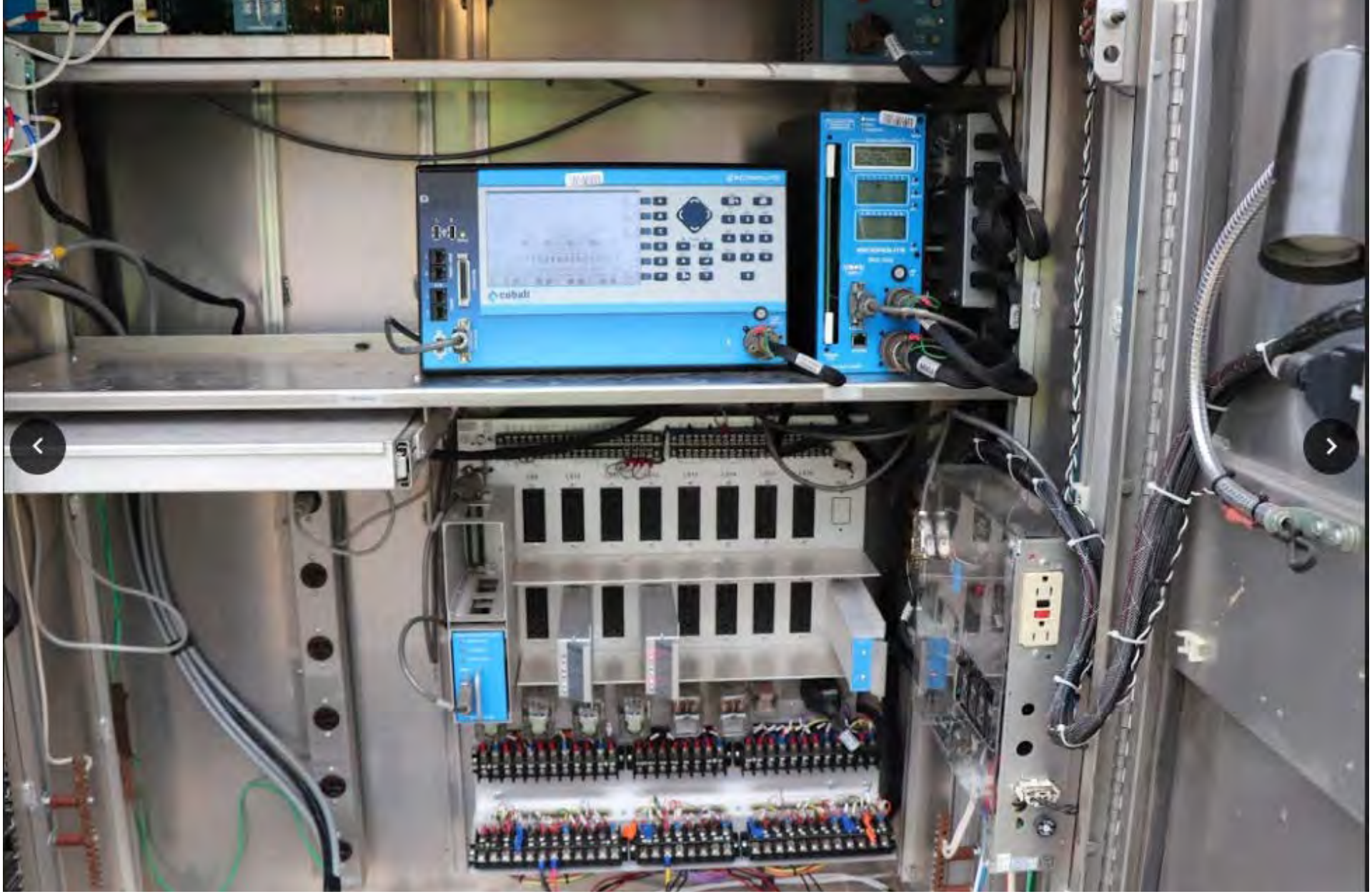
UDOT Keeping Utah Moving

NOTES

Cobalt Controller.

Location: SIG #8240 US-89 @ SR-14 Long Valley Warning System RJG

	DESCRIPTION				IF			THEN			ELSE		
1	Enabling one side of the wig wag portion of the SB flasher.	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE RED	6	ON	SIG SET PHASE RED	6	OFF
1		AND	--	F	LP COB CODE ON		546						
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
2	Enabling the other side of the wig wag portion of the SB flasher.	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE YELLOW	6	ON	SIG SET PHASE YELLOW	6	OFF
2		AND	--	F	LP COB CODE OFF		546						
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
3	Enabling one side of the wig wag portion of the NB flasher.	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE RED	2	ON	SIG SET PHASE RED	2	OFF
3		AND	--	F	LP COB CODE ON		546						
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
4	Enabling the other side of the wig wag portion of the NB flasher.	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE YELLOW	2	ON	SIG SET PHASE YELLOW	2	OFF
4		AND	--	F	LP COB CODE OFF		546						
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
5	Enables the "Vehicles Approaching" sign.	IF	--	F	CTR PHASE TIMING	4	ON	SIG SET PHASE RED	4	ON	SIG SET PHASE RED	4	OFF
5		OR	--	F									
5			--	F									
5			--	F									
5			--	F									




AC to DC
Click 204

SR-18 & DIAMOND VALLEY DRIVE INTERSECTION

DIAMOND VALLEY

Keeping Utah Moving

PIN: 15523
PROJECT NO. S-R499(310)

R4 RURAL INTERSECTION TRAFFIC DETECTION SIGNAL

SHEET NO. SG-04

SR-18 & DIAMOND VALLEY INTERSECTION

07-MAY-2018 PIN 15523 DGN File: IP_PWP\d0317758\15523_SG-05.dgn

PIN: 15523
PROJECT NO. S-R499(310)

R4 RURAL INTERSECTION TRAFFIC DETECTION
SIGNAL

SHEET NO.
SG-05

SR-18 & DIAMOND VALLEY INTERSECTION

07MAY2018 PIN 15523 DGN File IP_PWP\6031775\15523_SG-06.dgn

PIN: 15523
PROJECT NO. S-R499(310)

R4 RURAL INTERSECTION TRAFFIC DETECTION
SIGNAL

SHEET NO.
SG-06

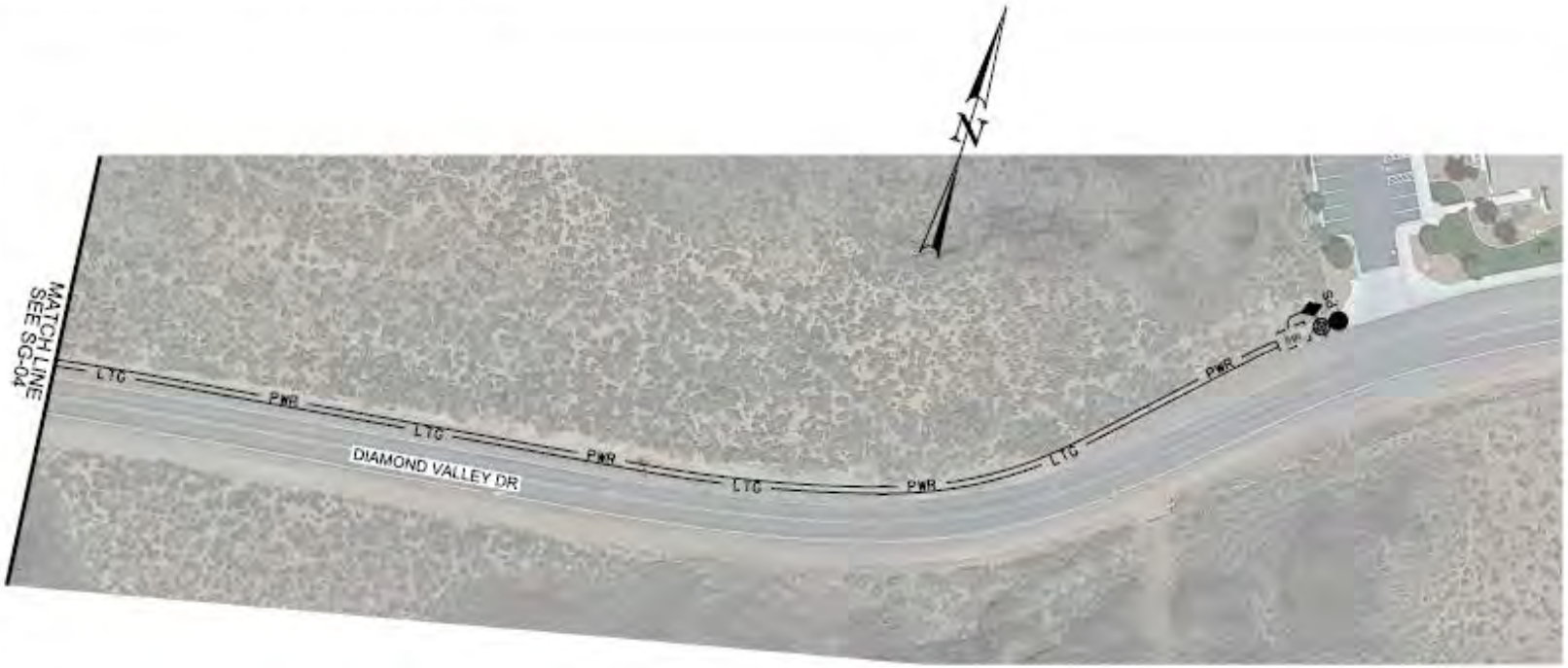
SR-18 & DIAMOND VALLEY INTERSECTION

07-MAY-2018 PIN: 15523 DGN File: IP_PWP\d0317758\15523_SG-07.dgn

PIN: 15523
PROJECT NO. S-R499(310)

R4 RURAL INTERSECTION TRAFFIC DETECTION
SIGNAL

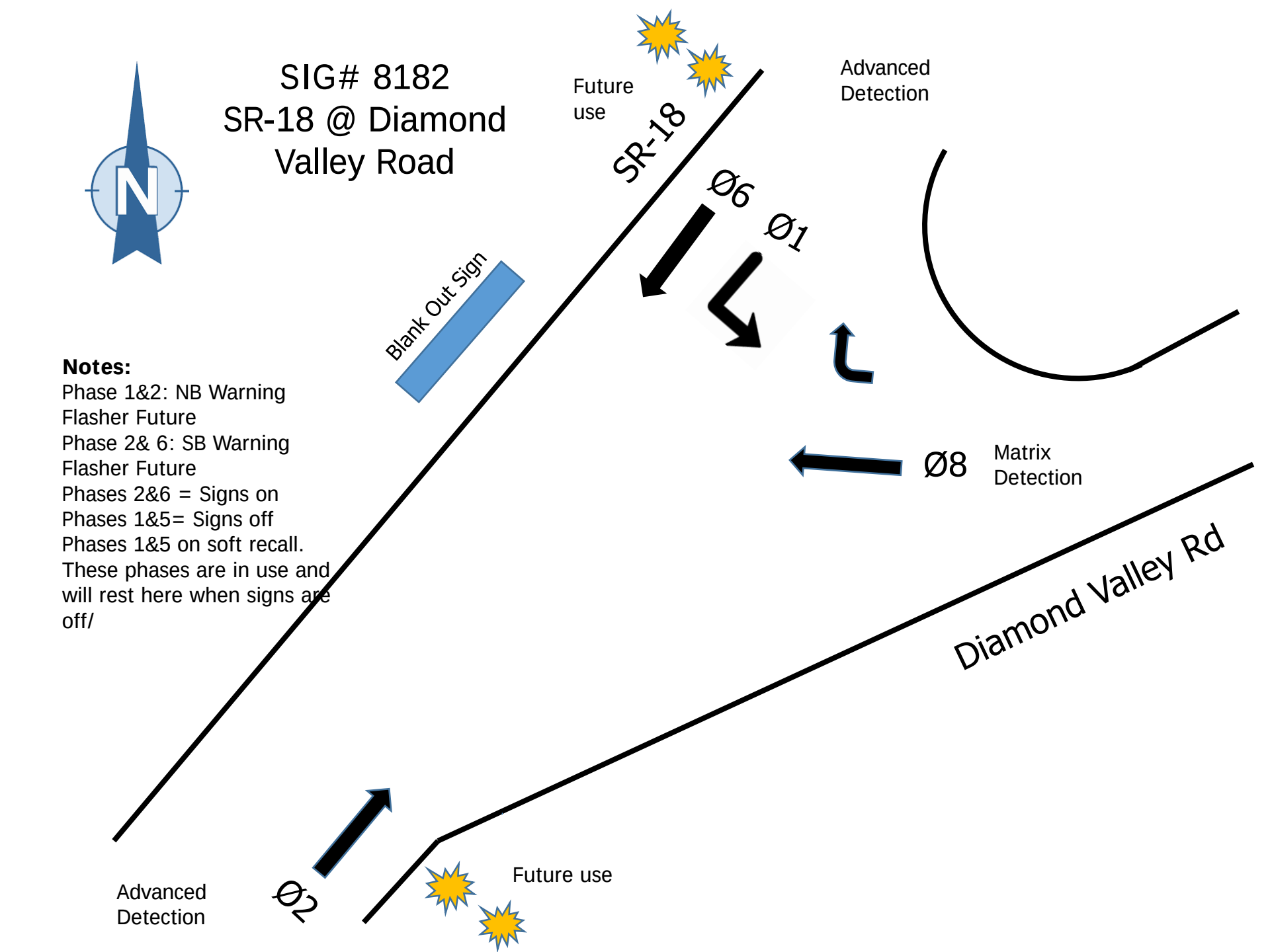
SHEET NO.
SG-07



SR-18 & DIAMOND VALLEY INTERSECTION


TRAFFIC
APPROACHING
05/15/2019 00:39


TRAFFIC
APPROACHING


SIG# 8182
SR-18 @ Diamond Valley Road
N
Future use
Advanced Detection
SR-18
Ø6
Ø1
Blank Out Sign
Notes:
Phase 1&2: NB Warning Flasher Future
Phase 2& 6: SB Warning Flasher Future
Phases 2&6 = Signs on
Phases 1&5= Signs off
Phases 1&5 on soft recall.
These phases are in use and will rest here when signs are off/
Ø8
Matrix Detection
Diamond Valley Rd
Advanced Detection
Ø2
Future use

General Install Notes:

Assign Advance detectors to side street phase (4 or 8)

Add **Extend** to Advance detectors. Do this in Detector assignment MM 6-2. Enter enough time so vehicle can travel from end of sensor zone to cross street conflict point

Set up MMU card with no Jumpers except the Min Yellow Disables (Shown on cover sheet)

Program MMU so there are no used channels (-).

RJG 1-10-19

General Install Notes:

Assign Advance detectors to cross street phase (Ø4 or Ø8)

Add **Extend** to Advance Detectors. Do this in Detector Assignment, Main Menu, 6 → 2. Enter enough time so vehicle can travel from end of sensor zone to cross street conflict point

Set up MMU card with no Jumpers except the Min Yellow Disables (Shown on cover sheet)

Program MMU so there are no used channels (-).

RJG 1-10-19

Location: SIG #8180 SR-18 Diamond Valley Rd Warning System RJG

	DESCRIPTION				IF			THEN			ELSE		
1	Enabling one side of the wig wag portion of the SB flasher. Disabled for future use	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE RED	6	ON	SIG SET PHASE RED	6	OFF
1		AND	--	F	LP COB CODE ON		546						
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
1			--	F									
2	Enabling the other side of the wig wag portion of the SB flasher. Disabled for future use	IF	--	F	CTR PHASE TIMING	6	ON	SIG SET PHASE YELLOW	6	ON	SIG SET PHASE YELLOW	6	OFF
2		AND	--	F	LP COB CODE OFF		546						
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
2			--	F									
3	Enabling one side of the wig wag portion of the NB flasher. Disabled for future use	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE RED	2	ON	SIG SET PHASE RED	2	OFF
3		AND	--	F	LP COB CODE ON		546						
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
3			--	F									
4	Enabling the other side of the wig wag portion of the NB flasher. Disabled for future use	IF	--	F	CTR PHASE TIMING	2	ON	SIG SET PHASE YELLOW	2	ON	SIG SET PHASE YELLOW	2	OFF
4		AND	--	F	LP COB CODE OFF		546						
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
4			--	F									
5	Enables the "Vehicles Approaching" sign.	IF	--	F	CTR PHASE TIMING	8	ON	SIG SET PHASE RED	8	ON	SIG SET PHASE RED	8	OFF
5		OR	--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
5			--	F									
6	Enabling the other side of the wig wag portion of the NB flasher. Disabled for future use	IF	--	F	CTR PHASE TIMING	8	ON	SIG SET PHASE YELLOW	8	ON	SIG SET PHASE YELLOW	8	OFF
6		AND	--	F	LP COB CODE OFF		546						
6			--	F									
6			--	F									
6			--	F									

#8180- SR-18 @ Diamond Valley Rd Flasher RJG 1-10-19

LOAD SWITCH ASSIGNMENT

Write the controller phase assignment in the space provided for each channel. Write the physical connection for each color in the space provided.

LS1	Assign: 0.
R	
Y	Not Used
G	

LS2	Assign: 2 V
R	"NB" Yellow Flasher (1 of 2)
Y	"NB" Yellow Flasher (2 of 2)
G	Not Monitored

LS3	Assign: 0.
R	
Y	Not Used
G	

LS4	Assign: 0.
R	
Y	Not Used
G	

LS5	Assign: 5 V
R	
Y	Not Used
G	

LS6	Assign: 6 V
R	"SB" Yellow Flasher (1 of 2)
Y	"SB" Yellow Flasher (2 of 2)
G	Not Monitored

LS7	Assign: 0.
R	
Y	Not Used
G	

LS8	Assign: 8 V
R	"WB" Message Sign
Y	Not Monitored
G	Not Monitored

LS9	Assign: 0.
R	
Y	Not Used
G	

LS10	Assign: 0.
R	
Y	Not Used
G	

LS11	Assign: 0.
R	
Y	Not Used
G	

LS12	Assign: 0.
R	
Y	Not Used
G	

LS13	Assign: 0
R	
Y	Not Used
G	

LS14	Assign: 0.
R	
Y	Not Used
G	

LS15	Assign: 0.
R	
Y	Not Used
G	

LS16	Assign: 0.
R	
Y	Not Used
G	

MMU PROGRAM CARD JUMPERS

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
															1
				X		X									2
															3
															4
															5
						X									6
															7
															8
															9
															10
															11
															12
															13
															14
															15

Min Yellow Disable

1	2	3	4	5	6	7	8
	X				X		X
9	10	11	12	13	14	15	16

MMU TYPE REQUIRED

- [ ] Any Monitor Will Work
- [X] SmartMonitor MMU-16LE (EDI or Econolite)
- [ ] Reno A&E MMU-1600GE

CONTROLLER TYPE

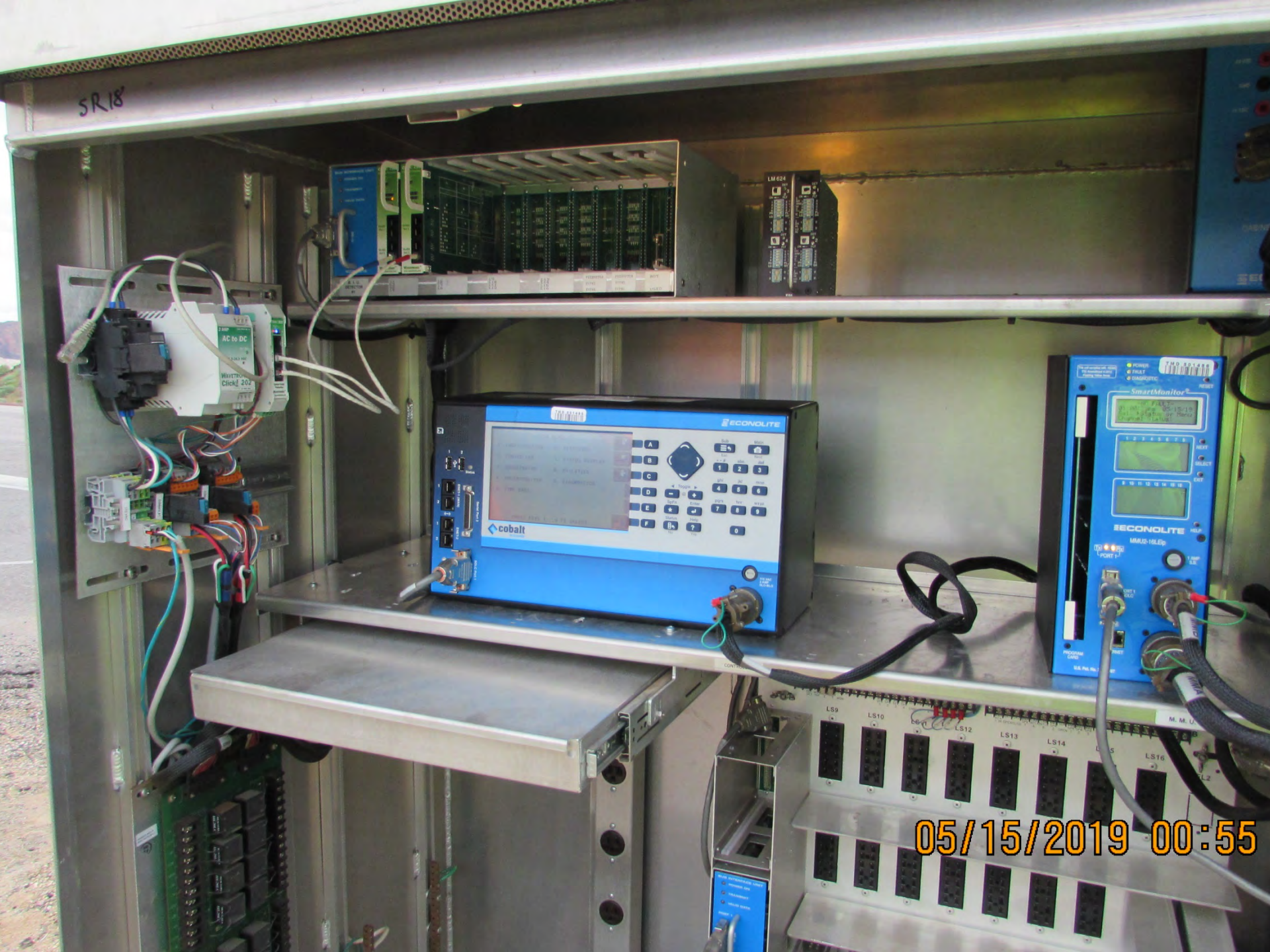
- [ ] Any Controller Will Work
- [ ] Econolite ASC/2
- [ ] Econolite ASC/3
- [ ] Siemens/Eagle m50
- [ ] NextPhase on m50
- [X] Other (see notes)

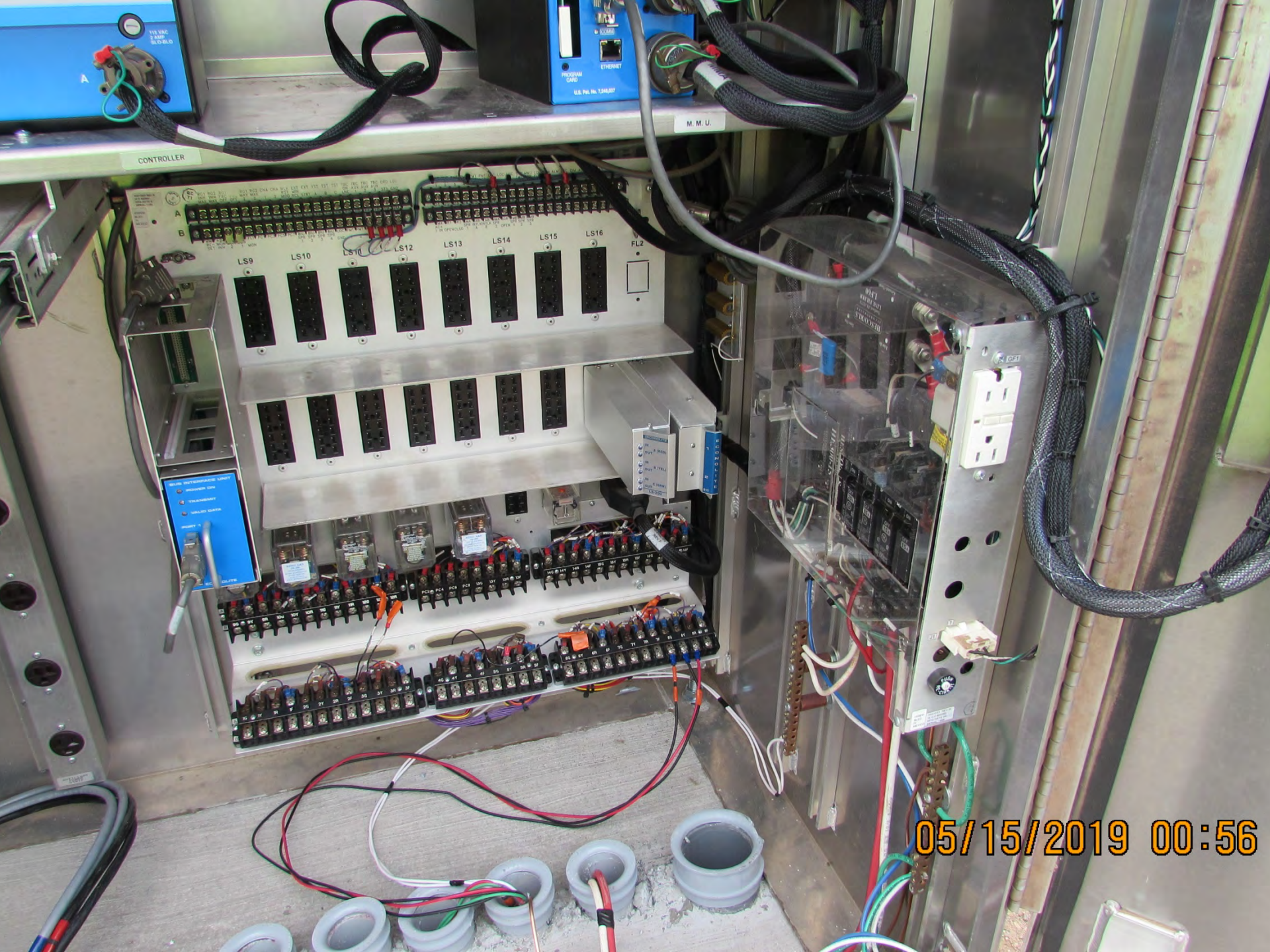
- [ ] Type 1
- [ ] Type 2
- [ ] Other (see notes)

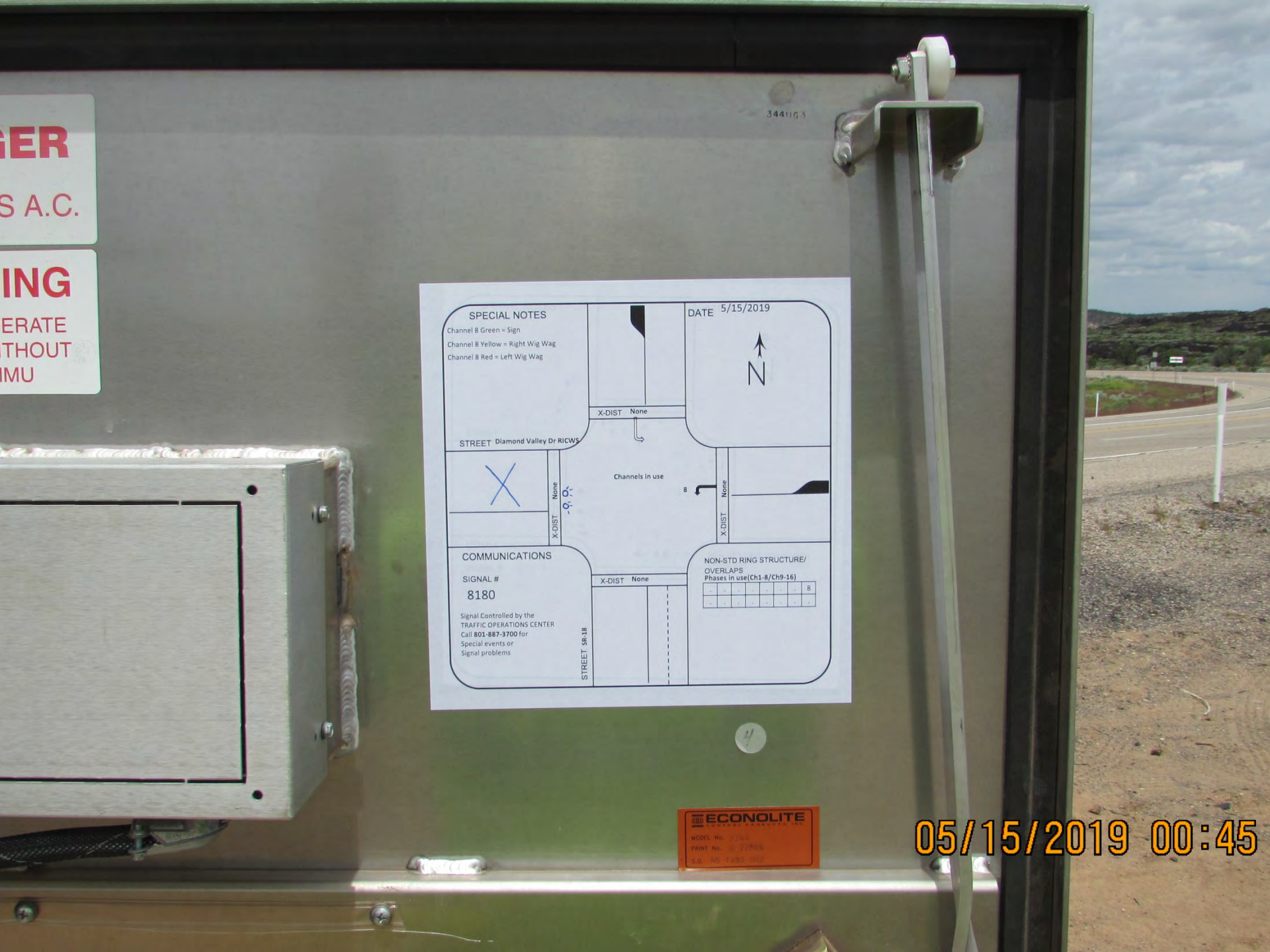
UDOT Keeping Utah Moving

NOTES

Cobalt Controller. LS2 and LS6 shown for future use. MMU jumpers shown but greyed out are for future use.

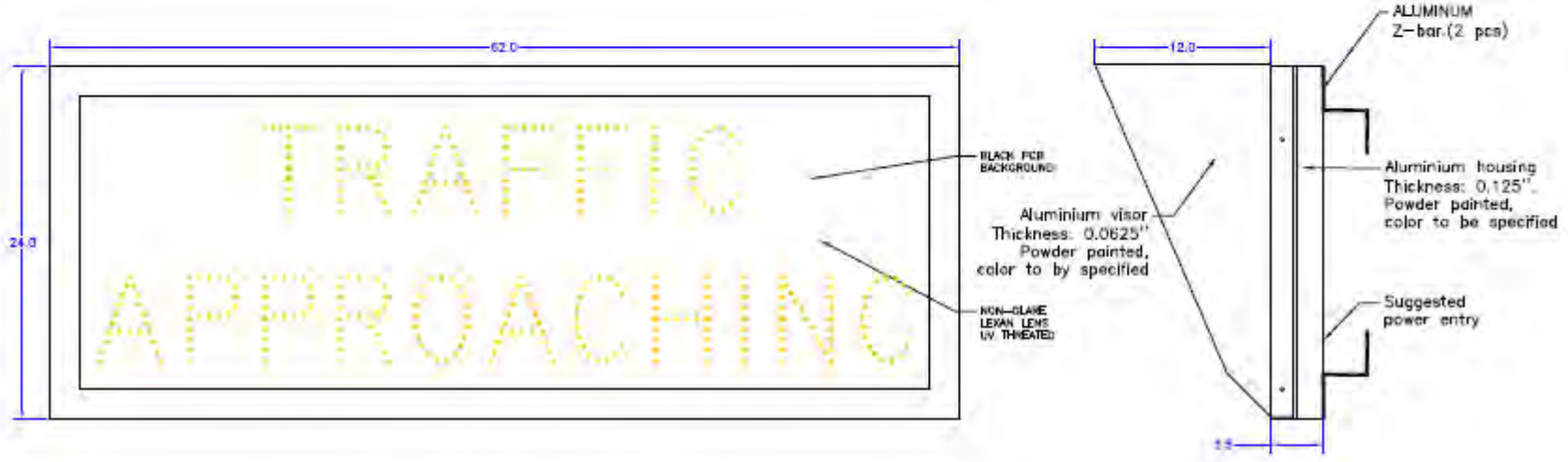

SR18
AC to DC
ECONOLITE
cobalt
SmartMonitor
ECONOLITE
LS9
LS10
LS12
LS13
LS14
LS16
05/15/2019 00:55


CONTROLLER
M. M. U.
LS9
LS10
LS11
LS12
LS13
LS14
LS15
LS16
FL2
05/15/2019 00:56


SPECIAL NOTES
Channel 8 Green = Sign
Channel 8 Yellow = Right Wig Wag
Channel 8 Red = Left Wig Wag
DATE 5/15/2019
N
X-DIST None
STREET Diamond Valley Dr RICWS
Channels in use
8
X-DIST None
X-DIST None
COMMUNICATIONS
SIGNAL #
8180
Signal Controlled by the
TRAFFIC OPERATIONS CENTER
Call 801-887-3700 for
Special events or
Signal problems
X-DIST None
STREET SR-18
NON-STD RING STRUCTURE/
OVERLAPS
Phases in use(Ch1-8/Ch9-16)
8
ECONOLITE
05/15/2019 00:45

Lessons Learned

REVISION	DESCRIPTION	DATE	INI.
0	FOR SUBMITTALS	10 MAR–17	D.L
1	FOR SUBMITTALS	JUNE 6–18	D.L
2	FOR SUBMITTALS	JULY 24–18	D.L



- 350 AMBER HIGH INTENSITY LED'S
- SINGLE STROKE TEXT
- 6" SERIES D CHARACTERS
- PROGRESSIVE DIMMING IN 1000 STEPS
- ALUMINUM Z–BAR INCLUDED

Distributed by:

Gerdes Sales Co. Inc.
TRAFFIC CONTROL SPECIALISTS

ALL DIMENSIONS IN INCHES

Orangetraffic
18195, J.–A. Bombardier
Mirabel, QC, J7J 0E7
T. 800 363–5913
F. 450 477–0047

DWG BY: DL

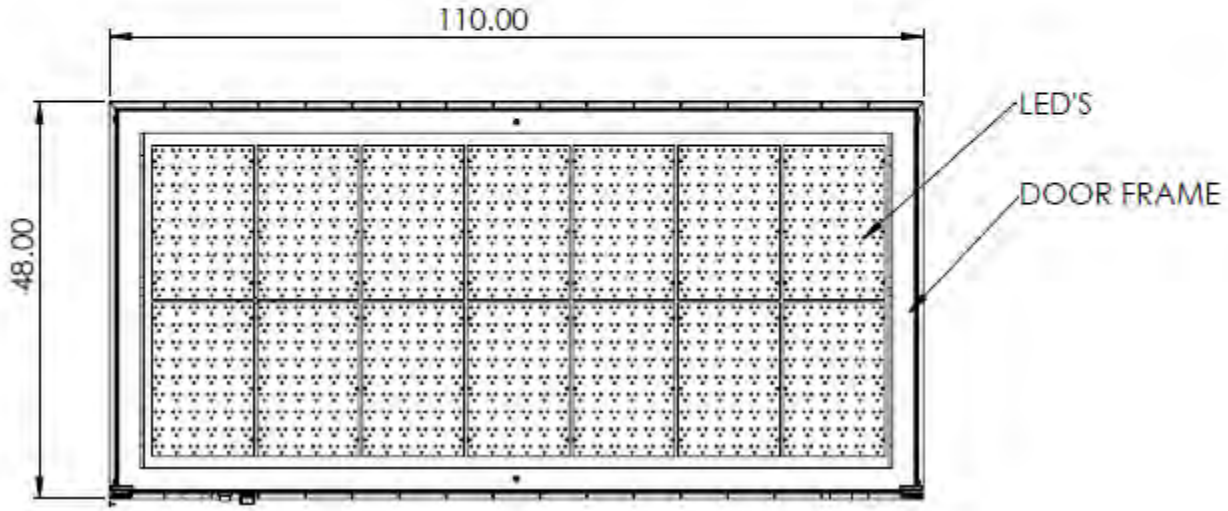
APP. BY: DL

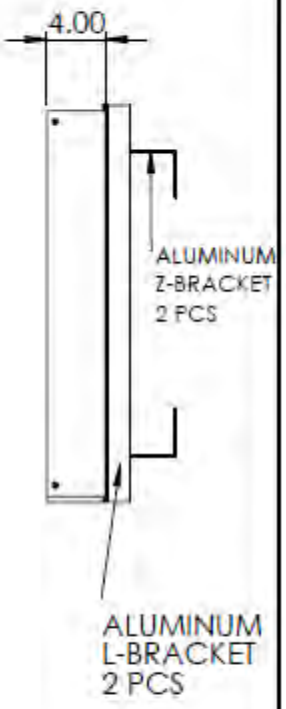
14 / 17

TITLE: LED TRAFFIC APPROACHING BLANK–OUT SIGN, LIGHT VERSION EXTERIOR BODY

P/N: LLS 2462–TA5A

REV:	DRAWING:	DATE:
2	LLS–2052–TA5A	MARCH 2017





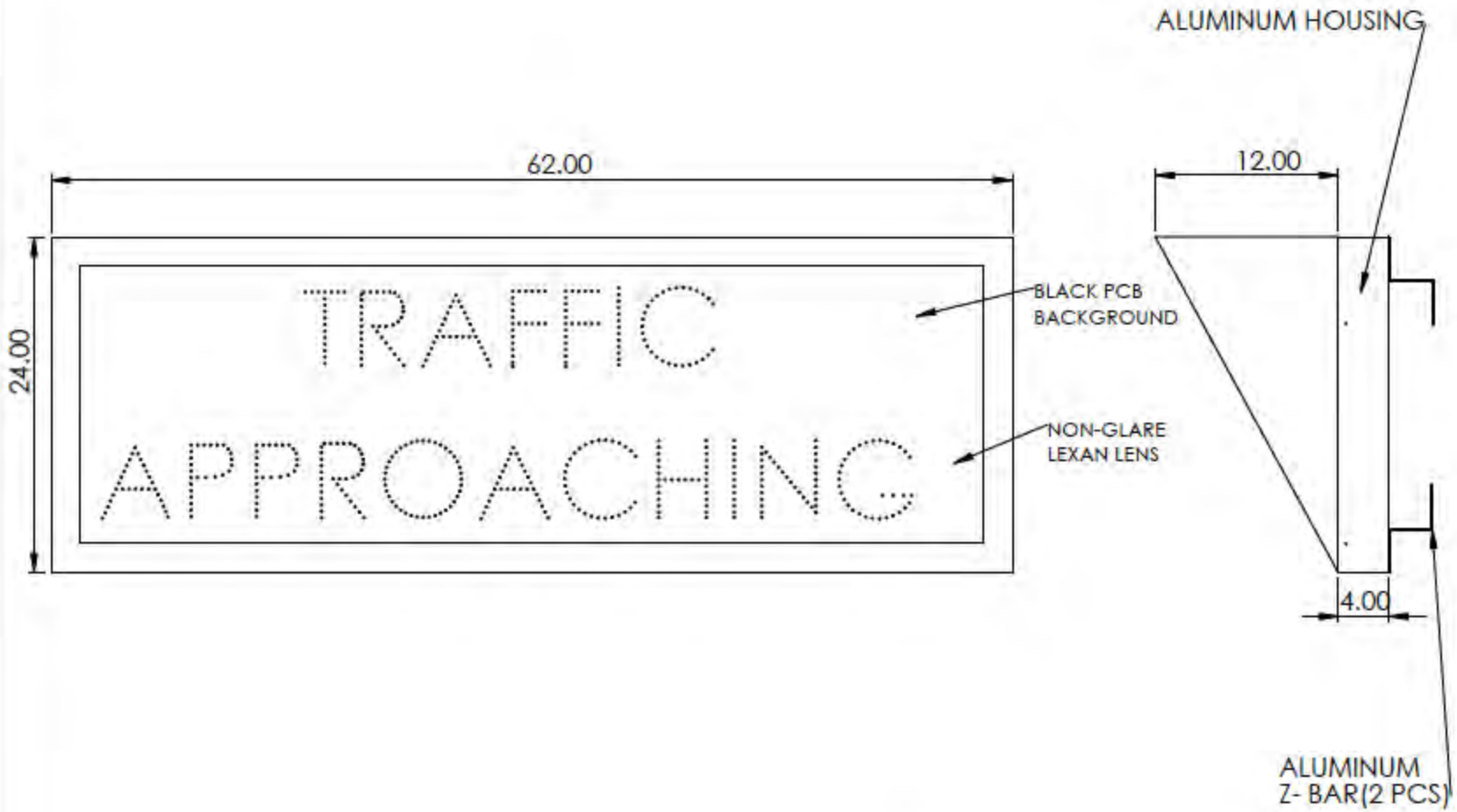
	NAME	DATE
DRAWN	RAGHS	8/10/2018
CHECKED	MIKE	8/10/2018

K & K SYSTEMS
Office: (662) 566-2025
www.k-ksystems.com

TITLE: MESSAGE BOARD

DWG. NO. VMCD 1848110

Scale: 1:1	Size: 8.5 X 11	Sheet: 1 of 1



	NAME	DATE
DRAWN	RAGHS	8/10/2018
CHECKED	MIKE	8/10/2018

K & K SYSTEMS
Office: (662) 566-2025
www.k-ksystems.com

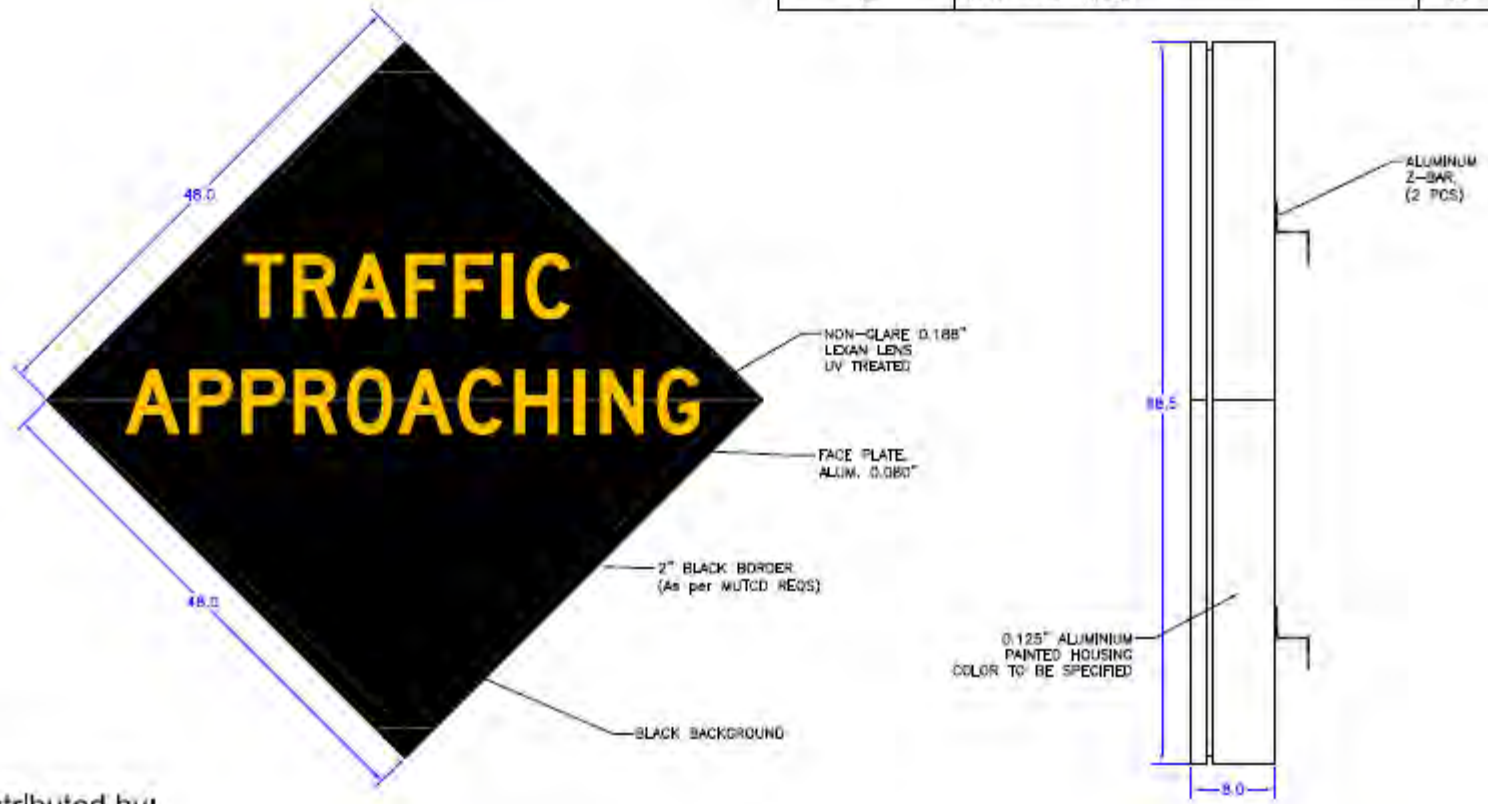
TITLE: Traffic Approaching

DWG. NO. Stamped Traffic Approaching

Scale: 1:1 | Size: 8.5 X 11 | Sheet: 1 of 1


TRAFFIC
APPROACHING

REVISION	DESCRIPTION	DATE	INI.
0	FOR DISCUSSION	APRIL 17-18	D.L
1	FOR SUBMITTALS	JUNE 6-18	D.L
2	FOR SUBMITTALS	JULY 24-18	D.L



Distributed by:

Gates Sales Co Inc
TRAFFIC CONTROL SPECIALISTS

MESSAGE DESCRIPTION
- SINGLE STROKE MESSAGE, 6"-SERIES D CHARACTERS
- HIGH INTESITY AMBER LED'S
- ONE 120Vac INPUT;
- PROGRESSIVE DIMMING IN 1000 STEPS
- TWO INTERNAL STIFFENER CHANNELS RUNNING VERTICALLY FROM TOP TO THE BOTTOM OF THE SIGN.
- Z-BARS INCLUDED

ALL DIMENSIONS IN INCHES

Orangetraffic
18195, J.-A. Bombardier
Mirabel, QC, J7J 0E7
T. 800 363-5913
F. 450 477-0047

DWG BY: DL

APP BY: AM

10 / 17

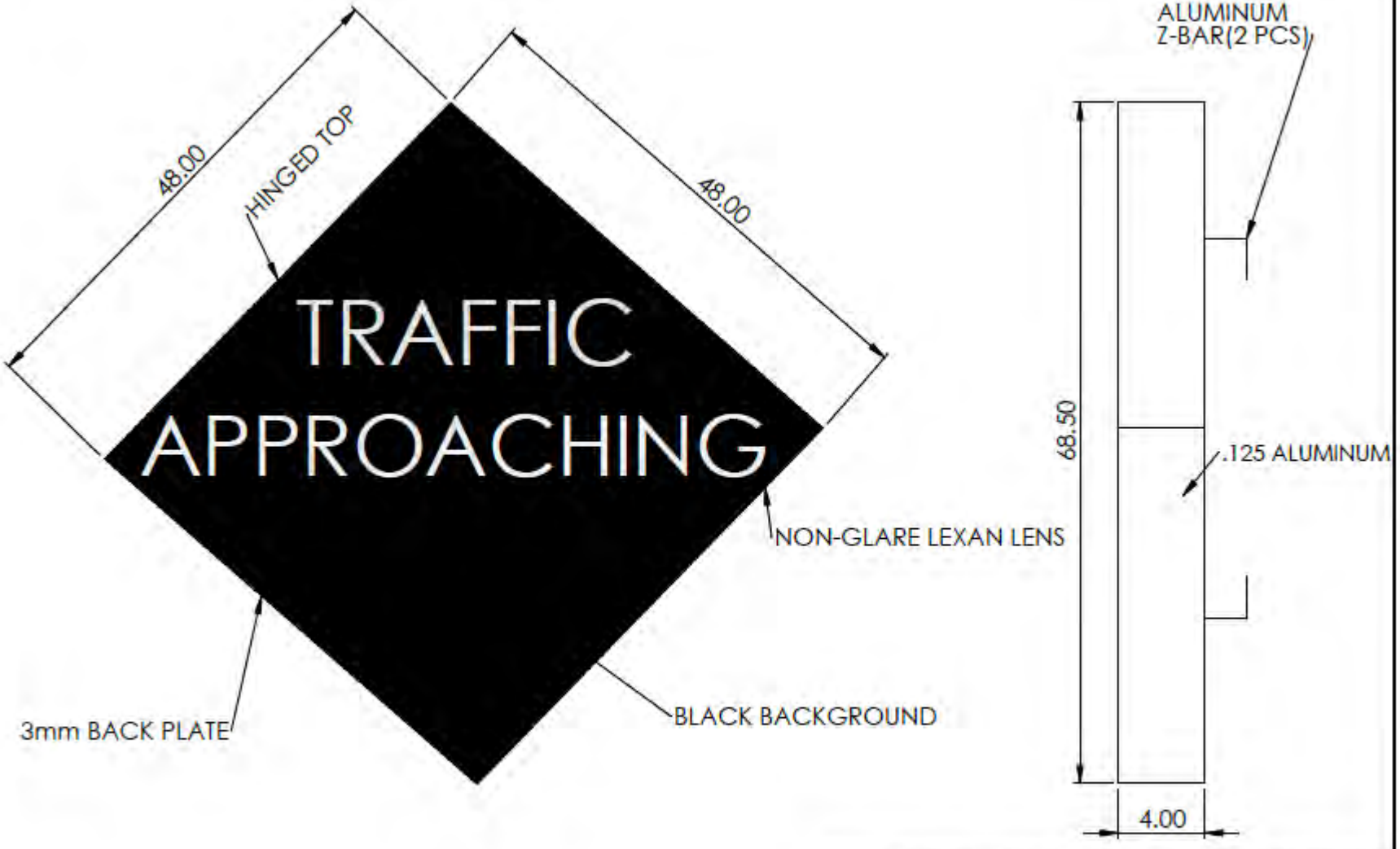
TITLE: LED TRAFFIC APROACHING BLANK-OUT SIGN EXTERIOR BODY AND MESSAGE DESCRIPTION

P/N: LS AWS4848-TA5

REV: 2

DRAWING: L-LSAWS4848-TA5

DATE: APRIL 2018



	NAME	DATE
DRAWN	RAGHS	8/10/2018
CHECKED	MIKE	8/10/2018

K & K SYSTEMS

Office: (662) 566-2025
www.k-ksystems.com

TITLE: Traffic Approaching

DWG. NO. Backlit Traffic Approaching

Scale: 1:1 | Size: 8.5 X 11 | Sheet: 1 of 1

TRAFFIC
APPROACH


TRAFFIC
APPROACHING

SUMMARY / QUESTIONS

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Keeping Utah Moving


UDOT
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