This report represents the results of research conducted by the authors and does not necessarily represent the views or policies of the Minnesota Local Road Research Board, the Minnesota Department of Transportation, or the SRF Consulting Group, Inc. This report does not contain a standard or specified technique. The authors, the Minnesota Local Road Research Board, the Minnesota Department of Transportation, and the SRF Consulting Group, Inc. do not endorse products or manufacturers. Any trade or manufacturers’ names that may appear herein do so solely because they are considered essential to this report.
NOTES:

1. WITHOUT PAVED SHOULDER, EDGE OF SIGN SHALL BE 12" - 0" FROM EDGE OF DRIVING LANE.

2. CONTRACTOR SHALL MEET BOTH MINIMUM REQUIRED MOUNTING HEIGHTS WITH THE SHORTEST U-COMPONENTS POSSIBLE OR AS DIRECTED BY THE ENGINEER.
NOTES:

1. WITHOUT PAVED SHOULDER, EDGE OF SIGN SHALL BE 12'-0" FROM EDGE OF DRIVING LANE.
2. CONTRACTOR SHALL MEET BOTH MINIMUM REQUIRED MOUNTING HEIGHTS WITH THE SHORTEST SQUARE TUBE POSTS POSSIBLE OR AS DIRECTED BY THE ENGINEER.
NOTES:
1) THE EXACT LOCATION OF HANDBOLES, Flashers/Signs, Loop/Corner Detectors, and Cabinet Pad shall be verified by the Engineer and MnDOT District Traffic Personnel.
2) See special provisions for State Furnished Materials.
3) Coordinate Service Connection with JCEL Energy and with Engineer, Contractor is responsible for coordinating the connection of the power for the new Flasher System.
4) See details for further information regarding Flasher Installations.
5) This plan specifies conduit sizes, types, and general locations. The exact locations will be determined in the field. Conduits under existing roadways and culverts will require boring.
6) Contractor shall maintain 300 foot spacing between new signs and existing signs on major roadway, unless otherwise directed by Engineer.
7) Devices shall be furnished and installed at distances listed from the intersection.
8) Signs shall be furnished and installed at a minimum 10'-0" mounting height. See MnDOT Traffic Engineering Manual for typical mounting and sign placement.
9) All handholes to be furnished and installed by the Contractor shall be in accordance with MnDOT approved/furnished products. Maximum spacing of handholes allowed is 400 feet.
10) All new conduit shall be PVC-Schedule 80 or higher Schedule 80 as shown in the Plans.
11) All items are furnished and install unless otherwise noted.

ABBREVIATIONS
DETECTOR (PHASE 2, NO. 1)
F & 1 FURNISH AND INSTALL
GRID GRID
HANDBOLES
LED LIGHT EMITTING DIODE
LUMinaire
PVC POLYVINYL CHLORIDE (CONDUIT)
SOP SOURCE OF POWER
SOURCE OF POWER
FLASHER SIGN NO.
SINGLE BEACON ADVANCE INSTALLATION
DOUBLE BEACON INTERSECTION INSTALLATION
HANDBOLES
F & I CONDUIT (SIZE AS NOTED)
PVC LOOP DETECTOR (SIZE AS NOTED)
CNDGA 702-13-CANDGA DETECTORS
CABINET, CONTROLLER, AND SERVICE CABLE
SOURCE OF POWER-PLACEMENT
STREET LIGHT AND POLE
FLASHER FACE NO.

LEGEND OF SYMBOLS

1) LOCATION OF UTILITIES SHOWN ARE APPROXIMATE.
2) CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO BEGINNING ANY CONSTRUCTION.
3) DAMAGE TO EXISTING UTILITIES DUE TO FLASHER SYSTEM CONSTRUCTION SHALL BE REPAIRED BY CONTRACTOR AT NO EXPENSE TO THE CITY OR COUNTY.

PUBLIC UTILITIES
AT-MEAT INTERSECTION
UTILITY COMPANY
ARCO COMMUNICATIONS SYSTEMS
REDROO ELECTRIC COOPERATIVE
JCEL ENERGY

FILE NO. BY DATE
DESIGNER: NO. 0414
CHECKED BY NO. 0414
REVISIONS: 41

MINNESOTA DEPARTMENT OF TRANSPORTATION
RURAL INTERSECTION CONFLICT WARNING SYSTEM - PHASE II
TRUNK HIGHWAY 67 AT CSAH 13
Waconia, Minnesota - Reorganized County
NOTE: THIS PLAN SHEET IS THE SAME AS SHEET B, EXCEPT THAT PLAN HAS BEEN ENLARGED TO SHOW INTERSECTION IN GREATER DETAIL.
NOTES:
1. THE EXACT LOCATION OF HANDBOLES, FLASHERS/SIGNS, LOOP/CANADA DETECTORS, AND CABINET PAD SHALL BE FIELD VERIFIED BY THE ENGINEER AND HIGHWAY DISTRICT TRAFFIC PERSONNEL.
2. SEE SPECIAL PROVISIONS FOR STATE FURNISHED MATERIALS.
3. COORDINATE SERVICE CONNECTION WITH ON-LEVEL ENERGY HAND. WITH ENGINEER, CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE CONNECTION OF THE POWER FOR THE NEW FLASHER SYSTEM.
4. SEE DETAILS FOR FURTHER INFORMATION REGARDING FLASHER INSTALLATIONS.
5. THIS PLAN SPECIFIES CONCRETE SIZES, TYPES, AND GENERAL LOCATIONS. THE EXACT LOCATIONS WILL BE DETERMINED IN THE FIELD. CONCRETE UNDER EXISTING ROADWAYS AND CULVERTS WILL REQUIRE BORING.
6. CONTRACTOR SHALL MOUNT 1500 FOOT SPACING BETWEEN NEW SIGNS AND EXISTING SIGNS ON MAJOR ROADWAY, UNLESS OTHERWISE DIRECTED BY ENGINEER.
7. DEVICES SHALL BE FURNISHED AND INSTALLED AT DISTANCES LISTED FROM THE INTERSECTION.
8. SIGNS SHALL BE FURNISHED AND INSTALLED AT A MINIMUM 1-FOOT MOUNTING HEIGHT. SEE HIGHWAY ENGINEERING MANUAL FOR MOUNTING AND SIGN PLACEMENT.
9. NEW HANDBOLES TO BE FURNISHED AND PLACED BY THE CONTRACTOR SHALL BE IN ACCORDANCE WITH HIGHWAY APPROVED/QUALIFIED PRODUCTS LIST. MAXIMUM SPACING OF HANDBOLES ALLOWED IS 400 FEET.
10. ALL NEW CONDUIT SHALL BE PVC-SCHEDULE 80 OR HOPE SCHEDULE 80 AS SHOWN ON THE PLANS.
11. ALL ITEMS ARE FURNISH AND INSTALL UNLESS OTHERWISE NOTED.

LEGEND OF SYMBOLS

- FLASHER SIGN NO.
- FLASHER AND SIGN POST
- SINGLE BEACON (ADVANCE INSTALLATION)
- DOUBLE BEACON (INTERSECTION INSTALLATION)
- HANDBOLE
- F & I CONDUIT SIZE AS NOTED
- PVC LOOP DETECTOR SIZE AS NOTED
- CANADA LOOP (CANADA DETECTORS)
- CABSNET, CONTROLLER, AND SERVICE CABINET
- SOURCE OF POWER-IMPLAC
- FLASHER FACE NO.

ABBREVIATIONS
0-2-1 111 100 DETECTOR PHASE 2, NO. 2
F & I FURNISH AND INSTALL
GRID GROUND
HNL HANDBOLE
LED LIGHT EMITTING DIODE
LMU LUMINARIE
PVC POLYVINYL CHLORIDE CONDUIT
SOP SOURCE OF POWER

DESIGN TEAM
DESIGNER:
CHECKED BY:
REVISIONS:
4/28/2010

MINNESOTA DEPARTMENT OF TRANSPORTATION
RURAL INTERSECTION CONFLICT WARNING SYSTEM - PHASE II
INTERSECTION LAYOUT
TRUNK HIGHWAY 67 AT CSAH 13
CLEARANCE:

FLASHER SYSTEM "A"
FILE No. 10-23047

MINNESOTA, WINNEDELAGUE"
NOTE: THIS PLAN SHEET IS THE SAME AS SHEET 15, EXCEPT THAT PLAN HAS BEEN ENLARGED TO SHOW INTERSECTION IN GREATER DETAIL.
MATCHLINE "A"-SYSTEM "E"  
(SEE SHEET 23)
### SIGN PANELS TYPE C

**GENERAL FURNISH & INSTALL SIGN TYPE C NOTES:**
1. POST LENGTHS ARE APPROXIMATE AND INCLUDE EMBEDMENT, BUT DO NOT INCLUDE ADDITIONAL LENGTH REQUIRED FOR SPLICE.
2. SEE SHEETS 36-40 FOR STRUCTURAL DETAILS.
3. SEE STANDARD SIGN MANUAL FOR PUNCHING CODE AND DETAILED DRAWINGS OF TYPE C SIGN PANELS.

**SPECIFIC FURNISH & INSTALL SIGN TYPE C NOTES:**
1. MOUNTING HEIGHT IS MINIMUM WITH A +6 INCH TOLERANCE; SEE SHEET NO. 41 FOR TYPICAL MOUNTING.

### SALVAGE SIGN TYPE C

**GENERAL SALVAGE & INSTALL SIGN TYPE C NOTES:**
4. FOR ALL SALVAGE AND INSTALLED SIGN PANELS, PROVIDE NEW POSTS AND MOUNTING HARDWARE (REMOVAL AND DISPOSE OF OLD POSTS AND MOUNTING HARDWARE).
4. SPECIFIC SALVAGE & INSTALL SIGN TYPE C NOTES:
1. MOUNTING HEIGHT IS MINIMUM WITH A +6 INCH TOLERANCE; SEE SHEET NO. 41 FOR TYPICAL MOUNTING.
2. MOUNT UNDER D-205, SEE SIGNING PLANS.
3. MOUNT ABOVE D-205, SEE SIGNING PLANS.
4. MOUNT UNDER IMPLAC "LEFT LANE MUST TURN LEFT" SIGN, SEE SIGNING PLANS.

### REMOVE SIGN TYPE C

**SPECIFIC NOTES FOR ALL CASTING:**
1. QUANTITY INCLUDED UNDER S.P. 4.006.24 (SYSTEM "A").
2. QUANTITY INCLUDED UNDER S.P. 7.002.132 "SYSTEM B").
3. QUANTITY INCLUDED UNDER S.P. 7.005.127 "SYSTEM C").
4. QUANTITY INCLUDED UNDER S.P. 6.007.070-000 (SYSTEM "D").
5. QUANTITY INCLUDED UNDER S.P. 6.006.77-070-000 (SYSTEM "E").
6. QUANTITY INCLUDED UNDER S.P. 6.006.77-070-000 (SYSTEM "E").
LEGEND

1. FURNISH AND INSTALL
2. INPLACE
3. SALVAGE
4. REMOVE SIGN TYPE C
5. INSTALL SIGN
6. U-CHANNEL POSTS/POSTS (SEE MOUNTED FOR MOUNTING STANDARDS)
7. LOCATION OF FLASHING BEACON SYSTEM

NOTE: MAINTAIN MINIMUM 300' SPACING BETWEEN INSTALLATION OF NEW SIGNS AND LOCATION OF EXISTING SIGNS ON MAJOR ROADWAY.
LEGEND

1. Furnish and Install
2. Implant
3. Salvage
4. Remove Sign Type C
5. Install Sign

U-channel post/posts (see MnDOT for mounting standards)

Location of Flashing Beacon System

Note: Maintain minimum 300'-spacing between installation of new signs and location of existing signs on major roadway.

SEE FLASHING BEACON SYSTEM "C" LAYOUT

ENTERING TRAFFIC MEN FLUSHING

SEE FLASHING BEACON SYSTEM "C" LAYOUT

ENTERING TRAFFIC MEN FLUSHING

T.H. 23

MATCHLINE "A" - SEE SHEET 32

MATCHLINE "B" - SEE SHEET 33

SCALE IN FEET

100
NOTES:
1. USE 3 LB/FT STUB POSTS, SHALL CONFORM TO MNDOT 3401.
2. USE 2.5 LB/FT RISER POSTS, STRINGERS, KNEE BRACES AND LATERAL BRACES, ALL SHALL CONFORM TO MNDOT 3401.
3. SEE SIGN DATA SHEETS FOR NUMBER OF POSTS, KNEE BRACES, POST LENGTHS AND SPACINGS, AS DETERMINED FROM TEM CHARTS 6.3 AND 6.4.
4. IF MORE THAN TWO POSTS ARE NEEDED, THE MINIMUM SPACING SHALL BE 45° BETWEEN POSTS.
5. TYPE D SIGN PANELS SHALL BE BOLTED TO STRINGERS AT 24° MAXIMUM INTERVALS IN ACCORDANCE WITH THE TYPE D STRINGER AND PANEL-JOINT DETAIL (SEE STANDARD SIGNS MANUAL).
6. MOUNTING (PUNCH CODE) FOR TYPE C SIGN PANELS SHALL BE AS INDICATED IN THE STANDARD SIGNS MANUAL UNLESS OTHERWISE SPECIFIED.
7. ALL RISER (VERTICAL) U POSTS SHALL BE SPACED. DRIVEN STUB POSTS SHALL BE AT LEAST 7’ LONG.
8. USE STAINLESS STEEL 1/4" BOLTS, WASHERS AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD MOUNTED SIGNS.
9. STAINLESS STEEL WASHER WITH SAME DIMENSIONS SHALL BE PROVIDED BETWEEN ALL NYLON WASHERS AND BOLT HEADS.
10. BRACING STUBS SHALL BE NO MORE THAN 4" ABOVE GROUND AND EMBEDDED AT LEAST 42".
11. A-FRAME BRACKET SHALL BE STEEL CONFORMING TO MNDOT 3306 AND GALVANIZED IN ACCORDANCE WITH MNDOT 3394.
12. COLLARS SHALL BE USED TO SHIM OVERLAYS AND LEGEND COMPONENTS AWAY FROM PANEL WHERE INTERFERENCE WITH BOLT HEADS IS ENCOUNTERED, MNDOT 33522A4.
13. 2 POST TYPE C SIGNS SHALL BE REINFORCED WITH AT LEAST ONE LATERAL BRACE, INSTALLATIONS WHERE THE TOTAL PANEL HEIGHT IS 60° OR MORE SHALL HAVE TWO LATERAL BRACES LOCATED APPROXIMATELY AT THE QUARTER POINTS.
14. WHERE 2 SINGLE POST TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND LOCATED APPROXIMATELY AT THE QUARTER POINTS.
15. WHERE 3 OR MORE TYPE C SIGNS ARE INSTALLED SIDE BY SIDE, THEY SHALL BE REINFORCED LATERALLY BY AT LEAST 2 BRACES, BOLTED AT EACH POST AND POST SECTION AND LOCATED APPROXIMATELY AT THE QUARTER POINTS AS SHOWN IN MODIFIED TYPE C INSTALLATION.

TYPE C & D SIGN

STRUCTURAL DETAILS

Sheet 1 of 3

STATE PROJ. NO. 8816-2274, 1806-74, 6406-24, 7102-132, 7305-117, 01B-070-010 SHEET NO. 38 OF 41 SHEETS
GORE PLACEMENT

THRU ROADWAY

100' MAX.

BACK OF
PAVED GORE
OR
CONCRETE
NOSE

CURB FACE
OR
EDGE OF SHOULDER

EXIT SIGN

RAMP

8' MIN. (1)

SPECIFIC NOTES:

1. EXIT SIGNS.
   If these offsets cannot be attained within 100 feet of the paved gore, a 4 foot offset is acceptable. If the 4 foot offsets cannot be attained within 100 feet of the paved gore, contact the project engineer who will consult with the state signing engineer.

2. MERGE SIGNS.
   If these offsets cannot be attained within 200 feet of the paved gore, a 4 foot offset is acceptable. If the 4 foot offsets cannot be attained within 200 feet of the paved gore, contact the project engineer who will consult with the state signing engineer.

ROADSIDE PLACEMENT

12' FROM EDGE OF SHOULDER OR CURB FACE

9' MIN.

ROUTE MARKER, REGULATORY & WARNING SIGNS - TYPE C

GUIDE SIGNS - TYPE D

GUIDE SIGN - TYPE A

NOTES:

1. ALL ROUTE MARKERS, WARNING & REGULATORY SIGNS SHALL BE AT LEAST 7' ABOVE EDGE OF THRU LANE.

2. SIGN FACES SHALL BE VERTICAL.

3. OVERHEAD SIGNS SHALL BE POSITIONED AT RIGHT ANGLES TO THE THRU ROADWAY UNLESS OTHERWISE NOTED.

4. TO AVOID SPECULAR GLARE, $\angle A$ SHALL BE APPROXIMATELY 93° FOR SIGNS LOCATED LESS THAN 30' FROM THE EDGE OF THRU LANE AND APPROXIMATELY 30° FOR SIGNS LOCATED 30' OR MORE FROM EDGE OF THRU LANE. THIS APPLIES TO SIGNS TYPE A, C, & D AND INCLUDES SIGNS IN THE GORE.

5. $X$ IS THE PERPENDICULAR DISTANCE FROM THE GROUND LINE TO THE FRICITION FUSE ON THE POST. THIS DISTANCE SHALL BE AT LEAST 7'.

6. WHERE $X$ IS LESS THAN 30', $H$ SHALL BE 7' & 6", WHERE $X$ IS 30' OR GREATER, MINIMUM AND PREFERRED $H$ IS 5'.

7. LATERAL CLEARANCES GIVEN APPLY TO RIGHT AND OR LEFT SIDE INSTALLATION.


SIGN PLACEMENT

STATE PROJ. NO. 8816-2274, 1806-74, 6406-24, 7102-132, 7305-117, 018-070-010 SHEET NO. 41 OF 41 SHEETS

REVISED: 3-7-14
### Statement of Estimated Quantities

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<th>Item Description</th>
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### Standard Plates

The following standard plates approved by Federal Highway Administration shall apply on this project:

- **Route Standard Barriercues**
- **8123H Pedestal Foundation (Traffic Control Signals)**
- **8123J Service Equipment & Pole Traffic Control Signals**
- **8127F Pedestal & Pedestal Base (For Traffic Control Signals Support)**
- **8127D Light Foundation - Design E Cast In-Place 40' Pole or Less**
- **8129A Chim and Riser (Traffic Control Signals and Roadway Lighting)**

### Intersection Description Chart

<table>
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<tr>
<th>Flashing Beacon System</th>
<th>Major Road No.</th>
<th>Major Road Name</th>
<th>Minor Road No.</th>
<th>Minor Road Name</th>
<th>Quantity (Sys)</th>
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<td>CR-223</td>
<td>Munger Shaw Road</td>
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<td>US-33</td>
<td>Highway 33</td>
<td>CSAH-115</td>
<td>Ashawa Road</td>
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<td>MNTH-37</td>
<td>Highway 37</td>
<td>CSAH-7</td>
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<td>MNTH-37</td>
<td>Highway 37</td>
<td>CSAH-25 (West)</td>
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<td>Jean Duluth Road</td>
<td>CSAH-2</td>
<td>West Tischer Road</td>
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</tbody>
</table>

### Construction Notes:

1. The contractor shall coordinate the staging of all work in this project with the engineer.
2. This project does not meet the criteria for the NPDSS construction general permit including the SWPPP development. However, the contractor will use environmentally friendly construction techniques while performing work. These techniques can include but are not limited to: do not disturb areas, perimeter control, inlet protection, dust control, proper dewatering techniques, temporary soil stabilization and permanent soil stabilization. These techniques shall be incidental to 2565.616.
WARNING SIGN ASSEMBLY

1-1/2" ANODIZED ALUMINUM BRACKETING

SOLAR POWERED, WIRELESS ACTIVATION
12" LED YELLOW BEACON
WITH BLACK POLYCARBONATE BACKGROUND SHIELD

"ENTERING TRAFFIC" WARNING SIGN
W3-2B8a
BLACK ON YELLOW
48"x48"

"WHEN FLASHING" PLACARD
W3-2B8bP
BLACK ON YELLOW
42"x24"

15' TRAFFIC SIGNAL PEDESTAL POLE
(4" DIAMETER)

12" TRAFFIC SIGNAL BREAKAWAY PEDESTAL BASE
SEE STANDARD PLATE 8112, 8122, AND 8129.

6' CONCRETE FOUNDATION

NOTES:
1. MOUNTING BOLTS SHALL BE STAINLESS STEEL.
   APPLY BRUSH-ON ANTI-SEIZE COMPOUND
   PRIOR TO ASSEMBLY.
2. ANTI-SEIZE COMPOUND MUST BE USED ON THE
   MOUNTING BOLTS ON ALL SIGNS.
3. THE CONTRACTOR SHALL INCLUDE RIGID PVC
   CONDUIT IN PEDESTAL FOUNDATION PER
   STANDARD PLATE 8112, AND SHALL
   APPROPRIATELY CAP THE CONDUIT FOR
   POTENTIAL FUTURE USE.
4. THE DISTANCE BETWEEN THE EDGE OF THE
   BEACON BACKGROUND SHIELD AND THE EDGE
   OF THE "ENTERING TRAFFIC" SIGN SHALL BE
   12'.
5. THE DISTANCE BETWEEN THE EDGE OF THE
   "ENTERING TRAFFIC" SIGN AND EDGE OF THE
   "WHEN FLASHING" PLACARD SHALL BE ≤ 3'.
6. THE PEDESTAL AND PEDESTAL BASE, SHOWN IN
   8122, SHALL BE MADE OF ALUMINUM.
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND SECURE ELECTRIC SERVICE WITH THE POWER COMPANY.

2. THE STEEL POLE SHALL BE GALVANIZED BY THE MANUFACTURER.

3. THE ANCHOR BASE SHALL BE A BREAKAWAY DESIGN.

4. THE MINIMUM MOUNTING HEIGHT OF THE RADAR DETECTOR SHALL BE 15' ABOVE THE DETECTION AREA.

5. THE WIRELESS TRANSMITTER AND RADAR DETECTOR SHOULD BE MOUNTED WITHIN 3'-6" OF THE TOP OF THE POLE.

6. ELECTRICAL WIRING SHALL BE RUN INSIDE OF THE POLE.

7. THE RADAR DETECTOR SHALL WIRELESSLY COMMUNICATE WITH THE 12" LED BEACONS MOUNTED ON THE WARNING SIGN ASSEMBLIES.


9. THERE ARE TWO VEHICLE DETECTOR POLES PER SYSTEM. ONLY ONE POLE PER SYSTEM HAS AN ELECTRICAL SERVICE CABINET. SEE EACH SYSTEM PLAN SHEET FOR WHICH POLE HAS THE ELECTRICAL SERVICE CABINET.

10. THE BEACONS SHALL FLASH CONTINUOUSLY IF THE COMMUNICATION FAILS BETWEEN THE WIRELESS TRANSMITTER AND BEACONS. IF COMMUNICATIONS ARE RESTORED FOLLOWING AN INTERRUPTION, THE BEACONS SHALL RESUME NORMAL FUNCTION.

11. A DATA LOGGER SHALL BE INSTALLED IN A WATERPROOF ENCLOSURE TO ELECTRONICALLY RECORD OPERATIONS OF THE RADAR DETECTOR AND WIRELESS TRANSMITTER. IF A USB INTERFACE CABLE IS USED TO TRANSFER DOWNLOADABLE DATA, THE CABLE(S) SHALL BE RUN INSIDE THE POLE AND TERMINATED INSIDE THE ELECTRICAL SERVICE CABINET. IF MULTIPLE USB INTERFACE CABLES ARE USED, THE TERMINATIONS SHALL BE LABELED INSIDE THE ELECTRICAL SERVICE CABINET TO IDENTIFY WHICH DATA LOGGER AND DEVICE THE CABLES ARE CONNECTED TO.

12. SECURE WIRES BETWEEN SERVICE ENTRANCE CAP AND EXTERNAL DEVICES TO THE POLE AS DIRECTED BY THE ENGINEER.

13. WIRES SHALL BE TERMINATED AT THE ELECTRIC SERVICE CABINET AND DEVICES ONLY.

14. THE ELECTRIC SERVICE CABINET SHALL HAVE ONE (1) 30 AMP, 2-POLE MAIN CIRCUIT BREAKER, AND FOUR (4) 15 AMP BRANCH BREAKERS. EACH DEVICE ON THE VEHICLE DETECTOR POLES WILL BE SERVICED BY ITS OWN BRANCH BREAKER.

15. TWO (2) 1.5" DIAMETER HUBS, WITH A RUBBER GROMMET TO PROTECT THE WIRES, SHALL BE DRILLED AND WELDED ONTO THE POLE BEHIND THE ELECTRIC SERVICE CABINET. THE CONNECTION OF THE ELECTRIC SERVICE CABINET TO THE HUBS SHALL BE MADE BY A THREADED NIPPLE AND BE SEALED TO PROTECT FROM WATER PENETRATION.

16. THE ELECTRIC SERVICE CABINET SHALL BE FASTENED TO THE POLE WITH THREE (3) STAINLESS STEEL BOLTS.

17. THE WIRES FROM THE SOURCE OF POWER SHALL BE RUN INSIDE A CONDUIT WHICH IS RUN BETWEEN THE POLE FOUNDATION AND ONE OF THE HUBS. THE INTENT IS TO PROTECT THE CONDUCTORS FROM CONTACTING THE POLE.

NOTE: DRAWING NOT TO SCALE
SIGN MOUNTING BRACKET

SINGLE POST PUNCHING

ELEVATION

STRAP MOUNTING DETAIL FOR
OVERHEAD IDENTIFICATION AND
LIGHTING SYSTEM IDENTIFICATION PLATES

ELEVATION

2-POST PUNCHING

VIEW A-A

NOTES:
1. FOR DETAILS AND NOTES NOT SHOWN SEE "C" & "D" SIGN DETAILS.
2. FOR BACK TO BACK MOUNTINGS, ROTATE STRINGERS FOR ONE PANEL 180° FROM WHAT IS SHOWN SUCH THAT PANELS CAN BE MOUNTED AT SAME ELEVATION.
3. DETAIL A STRINGER MAy BE ONE OF THE THREE DESIGNS DETAILED OR AN APPROVED EQUAL. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH MDOT 3396 AND GALVANIZED IN ACCORDANCE WITH MDOT 3394. FASTENERS SHALL BE IN ACCORDANCE WITH MDOT 3391.2B AND SHALL BE GALVANIZED EITHER BY THE HOT-DIP PROCESS IN ACCORDANCE WITH ASTM A153, OR BY THE MECHANICAL PROCESS IN ACCORDANCE WITH ASTM B895, CLASS 5O OR GREATER.

SIGN TYPE C AND D STRUCTURAL STEEL MOUNTING SYSTEM FOR ROUND SUPPORTS

I HEREBY CERTIFY THAT THE PLAN SHEET WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND I AM A duly LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

S.P. 069-070-017 S.P. 8821-270 SHEET 5 OF 16 SHEETS
FLASHING BEACON SYSTEM A
INTERSECTION OF US-2 AND CSAH 46 (SAGINAW ROAD)

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND COMPLETE THE POWER CONNECTIONS WITH LAKE COUNTRY POWER. THE SERVICE ADDRESS IS 7000 SAGINAW ROAD, SAGINAW, MN 55779.
2. THE CONTRACTOR SHALL LOCATE AND VERIFY INFRASTRUCTURE UTILITIES PRIOR TO COMMENCING WORK.
3. THE EXACT LOCATION OF THE TRAFFIC SIGNAL PEDISTRIAN, GALLUMED STEEL POLES, AND Debadge SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. MOCD AND ST LOUIS COUNTY SHALL RETAIN EXISTING TRAFFIC SIGNS AS NECESSARY. THE CONTRACTOR SHALL COORDINATE WITH AVAILABILITIY OF THE SIGN CREWS.
5. THE CONTRACTOR SHALL DIRECTIONAL STAKES THE CONSTRUCTION UNDER THE ROADWAY.
6. ALL CONSTRUCTION SHEETS SHALL BE MAC - SCHEDULE 80 OR HEAVY SCHEDULE 80. SEE THE SPECIAL PROVISIONS.
7. SEE SHEET 3 FOR THE DETAIL OF THE WARNING SIGN ASSEMBLY.
8. SEE SHEET 4 FOR A DETAIL OF THE VEHICLE DETECTOR POLE.
9. THE CONTROL LOGIC OF THE MARINE VEHICLE WARNING SYSTEM SHALL MEET THE FOLLOWING REQUIREMENTS:
9.1. A VEHICLE IS DETECTED ON A MINOR APPROACH (THE DETECTED VEHICLE MAY BE APPROACHING A STOP LINE, STOPPED AT A STOP LINE, OR BEGINNING TO ENTER THE INTERSECTION) - SIMULTANEOUSLY AND IMMEDIATELY ACTIVATE THE BEACONS ON BOTH MARINE VEHICLE WARNING SYSTEM ASSEMBLIES (THE BEACONS SHALL FLASH CONTINUOUSLY AS LONG AS A VEHICLE IS DETECTED ON A MINOR APPROACH).
9.2. NO VEHICLE IS DETECTED ON A MINOR APPROACH - DEACTIVATE THE BEACONS ON BOTH MARINE VEHICLE WARNING SYSTEM ASSEMBLIES (THE BEACONS SHALL NOT FLASH AS LONG AS NO VEHICLE IS DETECTED ON A MINOR APPROACH).

I HEREBY CERTIFY THAT THIS PLAN SHEET WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THIS IS A TRUE AND COMPLETE PROFESSIONAL ENGINEER UNDER THE LAW OF THE STATE OF MINNESOTA.

Vicky J. Kall
Senior Engineer
FLASHING BEACON SYSTEM E
INTERSECTION OF MTH-37 AND CSAH 25 (HIGHWAY 25 WEST)

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND COMPLETE THE POWER CONNECTIONS WITH LAKE COUNTRY POWER. THE SERVICE ADDRESS IS 9700 MTH 37, IRON, MN 55751.
2. THE CONTRACTOR SHALL LOCATE AND VERIFY INFRASTRUCTURE AS NECESSARY BEFORE COMMENCING WORK.
3. THE EXACT LOCATION OF THE TRAFFIC SIGNAL PEDESTALS, GROUNDWIRE STEEL POLES, AND HANDHELD SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. MNDOT AND ST. LOUIS COUNTY WILL DETERMINE THE VEHICLE DETECTOR POLE NECESSARY. RESPONSIBLE CONTRACTOR SHALL COORDINATE WITH AVAILABILITY OF THE VEHICLE DETECTOR POLES.
5. THE CONTRACTOR SHALL DIRECTORIAL DRILL THE CONDUIT UNDER THE ROADWAY.
6. ALL CONDUIT SHALL BE PVC - SCHEDULE 80 OR SCHEDULE 80. SEE THE SPECIAL PROVISIONS.
7. SEE SHEET 3 FOR THE DETAIL OF THE WARNING SIGN ASSEMBLY.
8. SEE SHEET 4 FOR THE DETAIL OF THE VEHICLE DETECTOR POLE.
9. THE CONTROL LOGIC OF THE MANUAL DYNAMIC WARNING SYSTEM SHALL MEET THE FOLLOWING REQUIREMENTS:
   9.2. NO VEHICLE IS DETECTED ON A MINOR APPROACH (THE BEACONS SHALL NOT FLASH AS LONG AS NO VEHICLE IS DETECTED ON A MINOR APPROACH).
FLAShING BEACON SYSTEM F
INTERSECTION OF CSAH 4 (RICE LAKE ROAD) AND CSAH 43 (EMERSON ROAD)

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND COMPLETE THE POWER CONNECTIONS WITH MINNESOTA POWER. THE SERVICE ADDRESS IS 8100 RICE LAKE ROAD, DULUTH, MN 55813.
2. THE CONTRACTOR SHALL LOCATE AND VERIFY INFILL UTILITIES PRIOR TO COMMENCING WORK.
3. THE EXACT LOCATION OF THE TRAFFIC SIGNAL PEDESTRIANS, GALVANIZED STEEL POLES, AND CROSSBAR SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. MINAX AND ST. LOUIS COUNTY WILL RELOCATE EXISTING TRAFFIC SIGNS AS NECESSARY. THE CONTRACTOR SHALL COORDINATE WITH AVAILABILITY OF THE SIGN CREWS.
5. THE CONTRACTOR SHALL OBTAIN PERMITS TO CONDUCT UNDER THE HIGHWAY.
6. ALL UTILITIES SHALL BE NATURAL - SCHEDULE LTD OR NO SCHEDULE LTD. SEE THE SPECIAL PROVISIONS.
7. SEE SHEET 3 FOR THE DETAIL OF THE WARNING SIGN ASSEMBLY.
8. SEE SHEET 4 FOR A DETAIL OF THE VEHICLE DETECTOR POLE.
9. THE CONTROL LOGIC OF THE MARLINA DISPLAY WARNING SYSTEM SHALL MEET THE FOLLOWING REQUIREMENTS:
  9.1. A VEHICLE IS DETECTED ON A MINOR APPROACH (THE DETECTED VEHICLE MAY BE APPROACHING A STOP LINE, STOPPED AT A STOP LINE, OR BEGINNING TO ENTER THE INTERSECTION) - SIMULTANEOUSLY AND IMMEDIATELY ACTIVATE THE BEACONS ON BOTH MARLINA DISPLAY WARNING SIGN ASSEMBLIES (THE BEACONS SHALL FLASH CONTINUOUSLY AS LONG AS A BEACON IS DETECTED ON A MINOR APPROACH).
  9.2. NO VEHICLE IS DETECTED ON A MINOR APPROACH - DEACTIVATE THE BEACONS ON BOTH MARLINA DISPLAY WARNING SIGN ASSEMBLIES (THE BEACONS SHALL NOT FLASH AS LONG AS NO VEHICLE IS DETECTED ON A MINOR APPROACH).

I HEREBY CERTIFY THAT THIS PLAN SHEET WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND I AM A FULLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNED: Victor K. Lund
REVISIONS: S.P. 069-070-017
S.P. 8821-270 SHEET 11 OF 16 SHEETS

PLAN SHEETS
SHEET 11 OF 16 SHEETS
FLASHER SYSTEM G
INTERSECTION OF CSAH 37 (JEAN DULUTH ROAD) AND CSAH 2 (WEST TISCHER ROAD)

NOTES:
1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND COMPLETE THE POWER CONNECTIONS WITH MINNESOTA POWER. THE SERVICE ADDRESS IS 5100 JEAN DULUTH ROAD, DULUTH, MN 55813.
2. THE CONTRACTOR SHALL LOCATE AND VERIFY INFRASTRUCTURE UTILITIES PRIOR TO COMMENCING WORK.
3. THE EXACT LOCATION OF THE TRAFFIC SIGNAL PFEDESTALS, GROUND-PLANTED STEEL POLES, AND MANHOLE SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
4. WOOD AND ST. LOUIS COUNTY WILL RELOCATE EXISTING TRAFFIC SIGNS AS NECESSARY. THE CONTRACTOR SHALL COORDINATE WITH AVAILABILITY OF THE SIGN CREWS.
5. THE CONTRACTOR SHALL photoelectrically DIRECTIONAL SIGNALS UNDER THE ROADWAY.
6. ALL CONDUIT SHALL BE PVC - SCHEDULE 40 OR RISER SCHEDULE 80. SEE THE SPECIAL PROVISIONS.
7. SEE SHEET 3 FOR THE DETAIL OF THE WARNING SIGN ASSEMBLY.
8. SEE SHEET 4 FOR A DETAIL OF THE VEHICLE DETECTOR POLE.
9. THE CONTROL LOGIC OF THE MANUAL DYNAMIC WARNING SYSTEM SHALL MEET THE FOLLOWING REQUIREMENTS:
   a. IF A VEHICLE IS DETECTED AT A MINOR APPROACH THE BEACONS SHALL NOT FLASH CONTINUOUSLY AS LONG AS A VEHICLE IS DETECTED ON A MINOR APPROACH.

LEGEND
- WARNING SIGN ASSEMBLY
- POLE MOUNTED DETECTOR AND RADIO TRANSMITTER (FER)
- MANHOLE (PAS)
- INFLATE WIRE MOUNTED POLE
- INFLATE LIGHTING UNIT
- INFLATE TRAFFIC SIGN

REVISIONS
S.P. 069-070-017
S.P. 8821-270
SHEET 12 OF 16 SHEETS
INTERSECTION OF US-2 AND CSAH 46

INTERSECTION OF US-2 AND CR 223

NOTE: ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING "FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS".

I hereby certify that this plan sheet was prepared by me or under my direct supervision and I am a duly licensed professional engineer under the laws of the state of Minnesota.

Signature: Victor K. Lund
Date: 4/16/20

REVISIONS

TRAFFIC CONTROL

S.P. 069-070-017
S.P. 8821-270

SHEET 13 OF 16 SHEETS
INTERSECTION OF MNTH-37 AND CSAH 25 (WEST)

INTERSECTION OF CSAH 37 AND CSAH 2

NOTE: ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING "FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS".

I hereby certify that this plan sheet was prepared by me or under my direct supervision and I am a duly licensed professional engineer under the laws of the State of Minnesota.

Victor K. Lund

REVISIONS
S.P. 069-070-017
S.P. 8821-270

TRAFFIC CONTROL
SHEET 15 OF 16 SHEETS
INTERSECTION OF CSAH 4 AND CSAH 43

LEGEND:
- FLASHER
- SIGN
- BARRICADE
- WORK ZONE

TRAFFIC CONTROL DEVICES

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<th>ITEM</th>
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<th>REMARKS</th>
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<td>ROAD WORK AHEAD</td>
<td>W23-1</td>
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<tr>
<td>END ROAD WORK</td>
<td>W20-2</td>
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<td>FLASHER, TYPE A</td>
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REVISIONS

S.P. 069-070-017
S.P. 8821-270
SHEET 16 OF 16 SHEETS

NOTE: ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES INCLUDING "FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS".

I HEREBY CERTIFY THAT THIS PLAN SHEET WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND I AM A RULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Victor K. Lind

DATE 4/16/20

TRAFFIC CONTROL

POSTED SPEED LIMIT PRIOR TO STARTING (mph) | SPACING OF ADVANCE WARNING SIGNS (feet)
--- | ---
0 - 30 | 250
35 - 40 | 325
45 - 50 | 600
55 | 750
60 - 55 | 1,000
MINNESOTA DEPARTMENT OF TRANSPORTATION
MCLEOD COUNTY
CONSTRUCTION PLAN FOR: INTERSECTION LIGHTING, AND ITS ACTIVE WARNING SYSTEMS

PROJECT LOCATION: VARIOUS COUNTY INTERSECTIONS

CSAH 1 & CS 106
CSAH 1 & CS 56
CSAH 1 & CSAH 3
CSAH 1 & CSAH 10
CSAH 2 & CSAH 22
CSAH 2 & CSAH 10
CSAH 2 & CSAH 3 (W 1)
CSAH 4 & CR 79
CSAH 4 & CSAH 11
CSAH 4 & CR 62
CSAH 5 & CSAH 31
CSAH 5 & CSAH 2
CSAH 7 & CR 79
CSAH 7 & CSAH 115 (W 2)  

PLAN SYMBOLS

2" NON-METALLIC CONDUIT  (DIRECTIONAL BORE)  
2" NON-METALLIC CONDUIT

R/W

OVERRIDE HEAD POWER

TV-BUR

BURIED TV CABLE

F/G-BUR

BURIED FIBER OPTIC

EXISTING POWER POLE

F & I 12-4D LIGHTING UNIT, 250 WATT HPS WITH DESIGN E (CONCRETE) LIGHT BASE

F & I 30' STUB POST WITH CABINET AND METER

GOVERNING SPECIFICATIONS

THE 2005 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

INDEX OF SHEETS

SHEET DESCRIPTION
1-4 LIGHTING DETAILS
5-7 ITS DETAILS
8-11 SIGN DETAILS
12-34 LOCATION DETAILS

THIS PLAN SET CONTAINS 34 SHEETS

MCLEOD COUNTY HIGHWAY DEPARTMENT
1400 ADAMS STREET HUTCHINSON, MN 55350
320-484-4321

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

CHAD HAUSMANN, MCLEOD COUNTY ASSISTANT ENGINEER
DATE: 5/26/2011
LICENSE NO: 40890

STATE AID ENGINEER:
APPROVED FOR STATE AID AND FEDERAL AID FUNDING

I HEREBY CERTIFY THAT THE FINAL FIELD REVISIONS, IF ANY, OF THE PLAN WERE MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

JOHN T. BRUNKHORST, MCLEOD COUNTY ENGINEER
DATE: LICENSE NO: 26890

MINNESOTA DEPARTMENT OF TRANSPORTATION
MCLEOD COUNTY, MINNESOTA S.P. 043-070-004 SHEET 1 OF 34 SHEETS
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>CONTRACT ITEM</th>
<th>UNIT</th>
<th>COUNTY-WIDE SP 043-070-004 TOTAL</th>
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**STANDARD PLATES**

The following standard plates, approved by FHWA shall apply to this project.

- **8000**I STANDARD BARRICADES
- **8114**A P.V.C. HANDHOLE/PULLBOX
- **8127**B LIGHT BASE - DESIGN E
- **COUNTY-WIDE**

**ITEM NOTES**

A. All items necessary to accomplish the intended function of the intersection warning system including, but not limited to: signs, posts, solar panels, batteries, cabinets, radar detectors, wiring, and miscellaneous hardware shall be included in the unit price bid for “system”.

B. See “location details” for individual system quantities.

**GENERAL CONSTRUCTION NOTES:**

1. Traffic control is incidental. All construction zone signing shall be the responsibility of the contractor. All traffic control layouts and devices shall conform to the latest edition of the Minnesota Manual on Uniform Traffic Control Devices (MMUTC), including the latest edition of the field manual for temporary traffic control zone layouts. The contractor will furnish, install, and maintain all required traffic control signs and devices to the satisfaction of the engineer.

2. Turf establishment is incidental. All areas disturbed by the contractor’s operations shall be leveled to the engineer in the field and covered with MnDOT seed mix 250 at a nominal rate of 150 lbs/acre. Exposed areas shall be the responsibility of the contractor, to a minimum of 70% vegetative cover is established. The contractor may, at their own cost, use erosion control blanket conforming to MnDOT spec. 2805 or other approved by the engineer for site stabilization.

**UTILITY CONTACTS**

- CENTER POINT ENERGY: 608-223-2014/800-722-9326
- CITY OF HUTCHINSON: 320-587-4745
- CITY OF WINSTED: 763-559-5185
- EMBARG: 800-626-0599
- FRONTIER COMMUNICATION: 763-682-3514
- GLONOCE UTILITIES: 320-864-5184
- KOCHE PIPELINE CO., LP: 800-688-7594
- MCLEOD COOP POWER: 763-682-3514
- MEDITCOM: 320-553-3624
- NORTHERN NATURAL GAS: 320-894-5800
- NU TELECOM: 763-682-3514
- WINSLE TELEPHONE: 763-682-3514
- WRIGHT HENNEPIN COOP: 763-682-3514
- XCEL ENERGY: 612-630-4366

The subsurface utility information in this plan is utility quality level D. This quality level was determined according to the guidelines of CI/ASCE 38-2, entitled "Standard Guidelines for the Collection and Depiction of Existing Utility Data."

**STANDARD PLATES**

The following standard plates, approved by FHWA shall apply to this project.

8000 I STANDARD BARRICADES
8114A P.V.C. HANDHOLE/PULLBOX
8127B LIGHT BASE - DESIGN E

*PRECAST OR Poured CONCRETE BASE REQUIRED (STD. PLT. 8127B)*

**McLeod County Highway Department**

Intersect Lighting: 043-070-004
C.P.: 043-070-004
S.P.: 043-070-004
NOTES:

1. ALTERNATIVE INSTALLATION CONFIGURATIONS MAY BE APPROVED BY THE ENGINEER PROVIDED THEY PERFORM THE FUNCTIONS INTENDED OF THE INTERSECTION WARNING SYSTEM.

2. SHOP DRAWINGS MUST BE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

3. ALL SIGNS SHALL BE 36" IN SIZE AND SHEETING SHALL BE QQ3 OR APPROVED EQUAL.

4. CONTRACTOR SHALL ENSURE THAT ALL L.E.D. SIGN PANELS AND RADAR UNITS ARE ALIGNED PROPERLY TO FUNCTION IN ACCORDANCE WITH THE APPROACHING TRAFFIC. ANY MISALIGNMENT SHALL BE CORRECTED TO THE ENGINEER’S SATISFACTION.

5. ALL SIGN STRUCTURES SHALL BE TYPE 2U-1A WITH KNEE BRACE.

6. EXACT SIGN LOCATIONS TO BE STAKED BY THE ENGINEER IN THE FIELD.
(APPROX.) SYSTEM "F" QUANTITY TAB

<table>
<thead>
<tr>
<th>ITEM</th>
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<th>QTY.</th>
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<tbody>
<tr>
<td>LIGHT UNIT TYPE 12-40</td>
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<tr>
<td>30' STUB POLE</td>
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<tr>
<td>2&quot; NON-METALLIC CONDUIT</td>
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<td>40</td>
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<td>2&quot; NON-METALLIC CONDUIT (DIRECTIONAL BORE)</td>
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<td>SERVICE CABINET SECONDARY TYPE B</td>
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<tr>
<td>CONDUCTOR NO.8 WIRE</td>
<td>LF</td>
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NOTES
- POLES, UNDERGROUND WIRE AND INSIGNIA SIGN LOCATIONS SHALL BE STAKED BY THE ENGINEER IN THE FIELD.
- FOR INFORMATIONAL PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY. POWER SHALL BE PROVIDED BY MCLEOD COOP AT THIS LOCATION

METER SOCKET ADDRESS FOR LOCATION "F"
8723 120TH ST, GLENCOE MN, 55336

-----------------------------
2" NON METALLIC CONDUIT

F & I 12-40 LIGHTING UNIT, 250 WATT HPS WITH DESIGN E (CONCRETE) LIGHT BASE

EXISTING POWER POLE

PUBLIC UTILITIES PRESENT
GLENCOE UTILITIES, MCLEOD COOP POWER, CENTER POINT ENERGY, EMARQ

GOPHER STATE ONE CALL
CALL 1-800-252-1666
FROM YOUR SMARTPHONE
HTTP://VNTICKETENTRY.KORTERRAWEB.COM
OR ON THE WEB GOPHERSTATEONECALL.ORG

McLEOD COUNTY
HIGHWAY DEPARTMENT

S.P. 043-070-004
SP.
CSAH 2 & CSAH 3

INTERSECTION LIGHTING SYSTEM F

SHEET 17 OF 34
S-1 INTERSECTION WARNING SYSTEM (IWS)
The contractor shall be responsible for providing all time and materials necessary for proper installation and function of each IWS as stated in the plan. All components of the IWS system shall be installed to conform to the recommendations of the manufacturer unless otherwise approved by the engineer. The proposed IWS shall be installed using guidance from the plan as well as what is stated below:

S-1.1 With Approval of the Engineer, the Contractor may submit alternate design configurations provided they perform the functions intended of the intersection warning systems.

S-1.2 Sign/Radar Placement
All sign locations shall be approved by the Engineer prior to installation.

The Major and Minor roadway radars need to be placed at the detection distance recommended by the manufacturer and approved by the Engineer.

The contractor shall ensure proper alignment of radar units to allow for proper function of the IWS system.

S-1.3 Solar Panel and Battery Backup
The contractor shall be responsible for determining the size of solar panel required based on sunlight intensity in the area of the IWS and daily power consumption of the IWS electrical loads. The battery backup shall have enough storage to power the IWS node for at least 10 consecutive days without any solar panel draw.

S-1.4 Sign Posts
Posts must be of breakaway type with breakaway bases that meet the crashworthy requirements of NCHRP 350, Category II, Test Level 3. Flanged Channel Type Sign Posts shall be used in sign structure type 2U-1A. Post weight must be sufficient for support of IWS elements. Structure installations must be approved by the Engineer prior to installation of IWS elements.

S-1.5 Solar Panels
DIVISION S - SPECIAL PROVISIONS

The contractor shall follow the following guidelines when installing solar panels, unless recommended otherwise by manufacturer:

- Solar panels are installed facing south in order to optimize sunlight exposure.
- Panels shall be installed at a 45-degree angle to the sign post.
- Per FHWA guidance, the panel shall be securely mounted and shall not compromise the crashworthiness of the structure.
- The post that the solar panel is mounted to should extend 1.5-feet above the top of the sign to ensure that the solar panel clears the top of the sign.

S-1.6  Major and Minor Roadway Radar

The contractor shall follow the following guidelines when installing the Major and Minor Roadway Radar:

- Radar is screwed into a fiberglass enclosure that has a front fastening cover and conduit fitting attached.
- Radar enclosure shall be bolted to the sign post, with the radar positioned to detect vehicles approaching the radar.
- The radar should be aimed at an angle towards the roadway and away from the sign post towards the adjacent lane of traffic, in order to detect traffic at a point approximately 100-feet downstream of the radar.
- Radar cable should be run from the radar enclosure to the controller cabinet. Enclose the cables in a ½ inch N.M.C. flex conduit and tie/wrap the conduit to the sign post.

S-1.7  Intersection Ahead Sign with edge lit LED Lights

- Intersection Ahead signs with edge lit LED Lights shall be installed on CSAH 115 in conjunction with the radar sensors located on the stop ahead signs on CSAH 7.

S-1.8  Stop Sign with edge lit LED Lights

(Photo provided is for information only and does not depict exact structure details)
- Stop signs with edge lit LED Lights shall be installed on CSAH 3 in conjunction with the radar sensors located on the Intersection Ahead signs on CSAH 15 and CSAH 2.

S-1.9  **Controller Cabinet**

![Controller Cabinet Image](image)

(Photograph provided is for information only and does not depict exact structure details)

- Install a water tight fiberglass Controller Cabinet on two lateral braces.
- Install weather tight conduit/cable fittings to receive flex conduit and cables from the different IWS components and run the necessary wires/cables into the controller cabinet.
- The controller cabinet should be installed approximately 5 feet above the ground so the cabinet is at eye-level.

S-1.10  **Fault Notification System**

The contractor shall furnish and install a fault notification and failsafe system which will notify personnel of a system malfunction. The parameters and configuration of the fault notification system must be approved by the Engineer prior to installation.

S-1.11  **Miscellaneous Items**

In addition to the previously listed items, all other items necessary to complete the IWS to the satisfaction of the contract; including, but not limited to wireless radios and solar charge controllers shall be supplied/installed by the Contractor. Specific details for these miscellaneous items shall be obtained from manufacturers or other knowledgeable individuals. The completed IWS will only be accepted per the approval of the Engineer.

Shop drawings of the IWS for each intersection indicated shall be required from the contractor prior to IWS installation. Shop drawings must be approved by the Engineer prior to construction of the IWS.
S-1.12 **Warranty and Users Manual**

The Contractor shall provide an Intersection Warning System warranty for a period of two (2) years from the date of acceptance. The system warranty shall guarantee that the installed IWS is free of defects in materials and workmanship for the above specified time period. Warranty details must be reviewed and approved by the Engineer prior to the final acceptance of the IWS.

The Contractor shall provide McLeod County with a user manual for the IWS. The user manual must define maintenance, troubleshooting, and repair procedures for the care of the IWS. The user manual shall include manufacturer information (website, names and contact numbers), all pertinent information required for proper care and replacement of parts and materials associated with the IWS. The contractor shall submit a DRAFT of their proposed user manual for review and comment by the Engineer prior to final IWS acceptance. The final user manual shall meet the satisfaction of the Engineer prior to final IWS acceptance and subsequent payment.