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### ABBREVIATIONS

<table>
<thead>
<tr>
<th>AFS</th>
<th>ACCESSIBLE PEDESTRIAN SIGNAL</th>
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<tbody>
<tr>
<td>CAF</td>
<td>ADVANCE WARNING FLASHER</td>
</tr>
<tr>
<td>C1-2</td>
<td>(e.g.) CLOTH DRAIN</td>
</tr>
<tr>
<td>D4-1</td>
<td>(e.g.) PEDESTRIAN HEAD (PHASE 2, NO. 1)</td>
</tr>
<tr>
<td>DGS</td>
<td>DECRETE</td>
</tr>
<tr>
<td>DKS</td>
<td>DON'T WALK INDICATION</td>
</tr>
<tr>
<td>EGO</td>
<td>EQUIPMENT GROUND</td>
</tr>
<tr>
<td>EVP</td>
<td>EMERGENCY VEHICLE PRE-EMPTION</td>
</tr>
<tr>
<td>FW</td>
<td>FURNISH AND INSTALL</td>
</tr>
<tr>
<td>FL</td>
<td>FLASH/FLASHING</td>
</tr>
<tr>
<td>FTA</td>
<td>FLASHING YELLOW ARROW</td>
</tr>
<tr>
<td>FLA</td>
<td>FLASHING YELLOW LEFT ARROW</td>
</tr>
<tr>
<td>GRN</td>
<td>GREEN INDICATION</td>
</tr>
<tr>
<td>GRD</td>
<td>ROAD SIGN</td>
</tr>
<tr>
<td>GSA</td>
<td>GREEN SIGNARROW</td>
</tr>
<tr>
<td>GTA</td>
<td>GREEN THRU ARROW</td>
</tr>
<tr>
<td>HP</td>
<td>HANDHELD</td>
</tr>
<tr>
<td>HPS</td>
<td>HIGH PRESSURE SODIUM</td>
</tr>
<tr>
<td>IND</td>
<td>INDICATOR</td>
</tr>
<tr>
<td>IMC</td>
<td>INTERMEDIATE METAL CONDUIT</td>
</tr>
<tr>
<td>IMP</td>
<td>INFILATE</td>
</tr>
<tr>
<td>INS</td>
<td>INSULATED GROUND</td>
</tr>
<tr>
<td>JPT</td>
<td>JUNCTION BOX</td>
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<td>LED</td>
<td>LIGHT EATING DIODE</td>
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<td>LUM</td>
<td>LUMINANCE</td>
</tr>
<tr>
<td>NCU</td>
<td>NEUTRAL</td>
</tr>
<tr>
<td>NMC</td>
<td>NOMINAL CONDUIT</td>
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<td>P-1-1</td>
<td>(e.g.) PEDESTRIAN HEAD (PHASE 1, NO. 1)</td>
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<tr>
<td>PB</td>
<td>PUSH BUTTON</td>
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<tr>
<td>PBD-1-1</td>
<td>(e.g.) PUSH BUTTON (PHASE 2, NO. 1)</td>
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<tr>
<td>PP</td>
<td>PNEUMATIC ELECTRIC</td>
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<tr>
<td>PVC</td>
<td>POLYVINYL CHLORIDE</td>
</tr>
<tr>
<td>PCY</td>
<td>POLYVINYL CHLORIDE (CONDUIT)</td>
</tr>
<tr>
<td>RED</td>
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</tr>
<tr>
<td>RJS</td>
<td>REMOVE AND SALVAGE</td>
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<tr>
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</tr>
<tr>
<td>RSC</td>
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<tr>
<td>SIM</td>
<td>INSTALL AND MOUNT</td>
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<tr>
<td>SOP</td>
<td>SOURCE OF POWER</td>
</tr>
<tr>
<td>SPH</td>
<td>SPHERE</td>
</tr>
<tr>
<td>STA</td>
<td>STATION</td>
</tr>
<tr>
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<td>YEL</td>
<td>YELLOW INDICATION</td>
</tr>
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<td>YLA</td>
<td>YELLOW LEFT ARROW</td>
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<tr>
<td>YRA</td>
<td>YELLOW RIGHT ARROW</td>
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</tbody>
</table>

### SYMBOLS

- **H** = HANDHELD
- **CL** = ELEC/CABLE CONNECTION
- **1** = EXP CONFINMENTARY LIGHT
- **2** = SILENCE DETECTOR
- **F** = FIBER OPTIC VOLTAGE
- **U** = UNLUMINARLY NO.
- **B** = SIGNAL BASE NO.
- **N** = SIGNAL HEAD NO./FLASHER HEAD NO.
- **W** = BARREL MOUNT BASE NO.
- **P** = WOOD POLE NO.
- **V** = SPELCE
- **V** = VIDEO DETECTION
- **M** = MICROPHONE DETECTION
- **S** = SONIC DETECTION

### STANDARD PLATES - FLASHER SYSTEMS

<table>
<thead>
<tr>
<th>PLATE NO.</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>50000</td>
<td>STANDARD BARREDCROSSBAR</td>
</tr>
<tr>
<td>611</td>
<td>TRAFFIC SIGNAL BRACKETING (PEDESTAL MOUNTED) (3 SHEETS)</td>
</tr>
<tr>
<td>617</td>
<td>PRECAST CONCRETE HANDHELD WITH WOOD BASE</td>
</tr>
<tr>
<td>619</td>
<td>GROUND MOUNTED CUPBOARD FOUNDATION</td>
</tr>
<tr>
<td>627</td>
<td>LIGHT FOUNDATION - DESIGN E 40&quot; POLE OR LESS (2 SHEETS)</td>
</tr>
<tr>
<td>632</td>
<td>PRECAST ROD PVC CONDUC DETECTORS (3 SHEETS)</td>
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### STATEMENT OF ESTIMATED QUANTITIES

<table>
<thead>
<tr>
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<td>(A3b)</td>
<td>(A3c)</td>
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<tr>
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<td>SALVAGE PANEL TYPE D</td>
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</tr>
</tbody>
</table>

### FUNDING NOTES

- (A) = RD 50 FEDERAL/10% STATE
- (B) = SEE LUMP SUM AGREEMENT NO. 1000027 WITH CROW MING COUNTY
- (C) = 100% STATE

**GENERAL NOTES**:  
1. NO UTILITIES ARE ANTICIPATED TO BE AFFECTED BY THIS PROJECT.  
2. THE SUBSURFACE UTILITIES INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL "C," THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF MINN. STAT. 408.02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEFERRAL OF SUBSURFACE UTILITY DATA."  
3. THE FOLLOWING LIST SHOWS THE UTILITIES COMPANIES WITHIN THE PROJECT LIMITS OF THE ENTIRE PROJECT.  
4. TURF ESTABLISHMENT SHALL BE APPLIED TO ALL DISTURBED AREAS IN ACCORDANCE WITH MDOT 2575 AND MDOT 3878 AND AS FOLLOWS:  
   - A: EXISTING VEGETATION SHALL BE REPLACED IN AND USING MDOT SEED MIX 25-121, 25-131 OR 35-241 IF SEEDED PRIOR TO SEPTEMBER 20TH.  
   - B: NO SEED WILL BE APPLIED IN WOOD MOWED OR WOOD LAWN AREAS.  
   - C: SEED MIX 25-131 SHALL BE USED AS WOODS MOWED OR LAWN LANDSCAPING.  
   - D: SEED MIXES SHALL BE APPLIED AT THE RATES NOTED IN MDOT 2575 AND MDOT 3878.  
5. THE CONTRACTOR SHALL USE ENVIRONMENTALLY FRIENDLY CONSTRUCTION TECHNIQUES WHILE PERFORMING THESE WORKS. THESE TECHNIQUES CAN BE ALTERED TO NOT DISTURB EXISTING AREAS, PROPEL CONSTRUCTION, INSECT PROTECTION, DUST CONTROL, AND PERMANENT SOIL STABILIZATION.  
6. THE CONTRACTOR SHALL MOW/WOOD ALL DISTURBED AREAS WITHIN 14 DAYS OF MOWING. ALL AREAS THAT HAVE A POTENTIAL TO DISCHARGE TO AN ENVIRONMENTALLY SENSITIVE AREA MUST BE MOWED/SPRIGGED WITHIN 24 HOURS AS DIRECTED BY THE DIRECTOR OF ENGINEERING WITH CHANGE FIELD CONDITIONS.  
8. THE CONTRACTOR IS REQUIRED TO PROVIDE TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO COMMENCING ANY FIELD WORK A WRITTEN PLAN ON HOW THE CONTRACTOR INTENDS TO COMPLY WITH THE ABOVE REQUIREMENTS.  
9. THE CONTRACTOR IS REQUIRED TO PROVIDE TO THE ENGINEER A COMPLETE SET OF THE CONTRACTOR'S FIELD MANUALS TO INCLUDE THE CONTENTS OF THE MDOT FIELD MANUALS.  
10. THE CONTRACTOR IS REQUIRED TO USE THE SHORT AND MOWED TRAFFIC CONTROL LAYOUTS FROM THE MDOT "FIELD MANUAL" (WORK ON THIS PROJECT IS RESTRICTED TO USE SHORT TERM TRAFFIC CONTROL LAYOUTS, UNTIL OTHERWISE APPROVED BY THE ENGINEER).  
11. THE CONTRACTOR MUST HAVE ALL REQUIRED TRAFFIC CONTROL SIGNS AND DEVICES ON SITE AND INSTALLED IN ACCORDANCE WITH THE APPROVED TRAFFIC CONTROL PLAN AND THE MDOT "FIELD MANUAL."  

### FLASHING BEACON SYSTEMS - PHASE 2

**STATEMENT OF ESTIMATED QUANTITIES**

<table>
<thead>
<tr>
<th>PLATE NO.</th>
<th>DESCRIPTION</th>
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<tr>
<td>621-1</td>
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<td>621-1</td>
<td>MOBILIZATION</td>
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<tr>
<td>27</td>
<td>REMOVE SIGN TYPE C</td>
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<td>27</td>
<td>SALVAGE SIGN TYPE C</td>
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<td>SALVAGE SIGN TYPE D</td>
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<tr>
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<td>LUMP SUM</td>
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<tr>
<td>27</td>
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<tr>
<td>27</td>
<td>INSTALL SIGN PANEL TYPE C</td>
</tr>
<tr>
<td>27</td>
<td>INSTALL SIGN PANEL TYPE D</td>
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<td>27</td>
<td>SALVAGE PANEL TYPE C</td>
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<tr>
<td>27</td>
<td>SALVAGE PANEL TYPE D</td>
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**STATEMENT OF ESTIMATED QUANTITIES**

<table>
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<th>SHEET ID</th>
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<th>ITEM</th>
<th>TOTAL ESTIMATED QUANTITY</th>
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<td>LUMP SUM</td>
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</tbody>
</table>
TYPICAL CABINET INTERSECTION LAYOUT

1. 3' x 3' x 4' SIDEWALK (SEE DETAIL)
2. 3342 STYLE RIGS CABINET LOCATION
3. RURAL LIGHTING/FLASHER SERVICE CABINET
4. GROUND ROD
5. 4" CONDUIT TO HANDHOLE 1 (WITH RIGS FLASHER/DETECTOR CABLES)
6. 2" CONDUIT BETWEEN SERVICE CABINET AND RIGS CABINET (WITH SERVICE CABLES)
7. 2" CONDUIT FROM SERVICE CABINET TO SOURCE OF POWER (WITH 3/4" ELECTRICAL CABLE)
8. 2" CONDUIT FROM SERVICE CABINET TO HANDHOLE 1 (WITH STREET LIGHTING CABLES)

NOTES:

1. THE ANCHOR RODS, NUTS AND WASHERS FOR THE STATE FURNISHED RIGS CABINET AND CONTROLLER SHALL BE FURNISHED BY THE STATE AND INSTALLED BY THE CONTRACTOR.
2. THE ANCHOR RODS, NUTS AND WASHERS FOR THE CONTRACTOR FURNISHED SERVICE CABSINET SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
3. THE OUTER EDGE OF THE ENTIRE EQUIPMENT PAD AND CONCRETE WALK SHALL BE BEVELLED OR CHAMFERED IN A NEAT MANNER AS DIRECTED BY THE ENGINEER.
4. THE TOP OF THE CONDUITS SHALL BE THREADED AND CAPPED AFTER INSTALLATION (UNTIL CABLES ARE PULLED IN).
5. CONDUIT SHALL PROJECT A MINIMUM OF 2" ABOVE THE CONCRETE AND SHALL BE LOCATED IN THE CABINET WHERE DIRECTED BY THE ENGINEER, BUT SHALL NOT INTERFERE WITH THE CABINET FUNCTION (INCLUDING MEMBERS, ETC.).
6. CONCRETE MIX 3432 OR EQUAL SHALL BE USED FOR EQUIPMENT PAD AND SIDEWALK.
7. CONDUITS WITH BOTH ENDS TERMINATING WITHIN THE PAD SHALL NOT BE PLACED BELOW THE CONCRETE.
8. THE EXACT LOCATION OF CONDUITS WITHIN THE PAD SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.
9. ANCHOR RODS SHALL PROJECT A MINIMUM OF 3" ABOVE THE CONCRETE BUT SHALL NOT INTERFERE WITH THE CABINET FUNCTION (INCLUDING MEMBERS, ETC.).
10. CABINETS TO BE CENTERED (LEFT & RIGHT) ON THE PAD.
11. BRUSH ON ANTI-SEIZE LUBRICANT MUST BE APPLIED TO ALL ANCHOR ROD THREADS PROTRUSING ABOVE THE CONCRETE PAD BEFORE THE CABINETS ARE SET.

TYPICAL 334 SERIES + DM5 FOUNDATION WITH SERVICE CABINET

FLASHING BEACON SYSTEMS "A-E"
NOTES:

1. WITHOUT PAVED SHOULDER, EDGE OF SIGN SHALL BE 12" - 6" FROM EDGE OF DRIVING LANE.
2. CONTRACTOR SHALL MEET BOTH MINIMUM REQUIRED MOUNTING HEIGHTS WITH THE SHORTEST U-CHANNEL POSTS POSSIBLE OR AS DIRECTED BY THE ENGINEER.
NOTES:

1. WITHOUT PAVEMENT SHOULDERS, 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.
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 HANDBORES, FLASHERS/SIGNS, LOOP/CANADA DETECTORS, AND CABINET PAD SHALL BE FIELD VERIFIED BY THE ENGINEER AND WOOD DISTRICT TRAFFIC PERSONNEL.
2. SEE SPECIAL PROVISIONS FOR STATE FURNISHED MATERIALS.
3. COORDINATE SERVICE CONNECTION WITH XCEL 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 CONCRETE SIZES, TYPES, AND GENERAL LOCATION. THE EXACT LOCATIONS WILL BE DEEMED IN THE FIELD. CONCRETE UNDER EXISTING ROADWAYS AND CULVERTS WILL REQUIRE BORING.
6. CONTRACTOR SHALL MAINTAIN 200 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 WOOD TRAFFIC ENGINEERING MANUAL FOR MOUNTING AND SIGN PLACEMENT.
9. NEW HANDBORES TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR SHALL BE IN ACCORDANCE WITH WOOD APPROVED/QUALIFIED PRODUCTS LIST, MAXIMUM SPACING OF HANDBORES 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 SIDING NO.  
FLASHER AND SIGN POST  
SINGLE BEACON (ADVANCE INSTALLATION)  
DOUBLE BEACON INTERSECTION INSTALLATION)  
HANDBORE  
FLASHER  
1-2-3 CONDUIT X 2-5/8"
CAUTION: REMOVE FROM PLANS AFTER INSTALLATION
CAUTION: REMOVE FROM PLANS AFTER INSTALLATION

ABBREVIATIONS

02-1 GQ-1 DETECTOR (PHASE 2, NO. 1)  
F & 1 FURNISH AND INSTALL  
GRID GROUND  
HDL HANDBORE  
LED LIGHT EMITTING DIODE  
LUM LUMINARE  
PVC POLYVINYL CHLORIDE CONDUIT  
SFP SOURCE OF POWER

SCALE IN FEET

100

DESIGN TEAM

DESIGNER: D.E.
CHECKED BY: J.S.

NO. 81  DATE: 4/27/2005

REVISIONS

MINNESOTA DEPARTMENT OF TRANSPORTATION
RURAL INTERSECTION CONFLICT WARNING SYSTEM - PHASE II
INTERSECTION LAYOUT
TRUNK HIGHWAY 67 AT CR 213
MINNESOTA - BEAUFORT COUNTY

FLAShING BEACON SYSTEM "A"  
FILE NO. 10-10300-001

41
NOTE: THIS PLAN SHEET IS THE SAME AS SHEET 12, EXCEPT THAT PLAN HAS BEEN ENLARGED TO SHOW INTERSECTION IN GREATER DETAIL.
NOTE: THIS PLAN SHEET IS THE SAME AS SHEET 19, EXCEPT THAT PLAN HAS BEEN ENLARGED TO SHOW INTERSECTION IN GREATER DETAIL.
NOTES:

1. FLASHER SYSTEM AND LUMINARIES SHALL BE METERED POWER.

CONDUCTOR COLOR CODE (4A GAUGED)

TO RICWS CABINET/DEVICE

1/4" CARGO

3/16" CARGO

1/8" CARGO

3/16" CARGO

NOTE:
ALL POLE CONNECTIONS SHALL BE ARRANGED AS SPECIFIED ABOVE.
### Salvage Sign Type C

**General Salvage & Install Sign Type C Notes:**
1. Post lengths are approximate and include embeedment, but do not include additional length required for splice.
2. See sheets 36-40 for structural details.

**Specific Salvage & Install Sign Type C Notes:**
1. Mounting height is minimum (with a 1/2 inch tolerance), see sheet no. 41, for typical mounting.

<table>
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<th>Code No.</th>
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<td>17C-202</td>
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<td>16 x 7</td>
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<td>W2-12</td>
<td>SYSTEM A</td>
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<td>17C-203</td>
<td>1</td>
<td>16 x 7</td>
<td>24 x 24</td>
<td>W1-8</td>
<td>SYSTEM B</td>
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<tr>
<td>17C-204</td>
<td>1</td>
<td>16 x 7</td>
<td>24 x 24</td>
<td>W3-12</td>
<td>SYSTEM B</td>
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<td>17C-205</td>
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<td>24 x 24</td>
<td>W1-12</td>
<td>SYSTEM B</td>
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<td>17C-207</td>
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<td>16 x 7</td>
<td>24 x 24</td>
<td>W1-12</td>
<td>SYSTEM C</td>
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<tr>
<td>17C-208</td>
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<td>W1-12</td>
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<td>17C-211</td>
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<td>16 x 7</td>
<td>24 x 24</td>
<td>W1-12</td>
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</table>

### Salvage Sign Type D

**General Salvage & Install Sign Type D Notes:**
1. Post lengths are approximate and include embeedment, but do not include additional length required for splice.
2. See sheets 36-40 for structural details.
4. For all salvage and installed sign panels, provide new posts and mounting hardware, remove and dispose of old posts and mounting hardware.

**Specific Salvage & Install Sign Type D Notes:**
1. Mounting height is minimum (with a 1/2 inch tolerance), see sheet no. 41, for typical mounting.
2. Sizes and spacing are approximate.
3. Mount on same sign post as sign C-206.

<table>
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### Remove Sign Type C

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<td>W1-12</td>
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</tbody>
</table>

---

**Specific Notes for All Signs:**
- Quantity included under S.P. 6406-24 (System A).
**LEGEND**

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

**U-CHANNEL POST-POSTS** (See WNGC03 for Mounting Standards)

**LOCATION OF FLASHING BEACON SYSTEM**

**NOTES**

Maintain minimum 500' spacing between installation of new signs and location of existing signs on major roadway.
LEGEND

1. FURNISH AND INSTALL
2. INPLACE
3. SALVAGE
4. REMOVE SIGN TYPE C
5. INSTALL SIGN

U-CHANNEL POST/POSTS (SEE MIN AUTO FOR MOUNTING STANDARDS)

LOCATION OF FLASHING BEACON SYSTEM

NOTE: MAINTAIN MINIMUM 100' SPACING BETWEEN INSTALLATION OF NEW SIGNS AND LOCATION OF EXISTING SIGNS ON MAJOR ROADWAY.

RELOCATE "PEBBLE CREEK GOLF CLUB" AND "BECKER COMMUNITY CENTER" SIGN

600-2000\( N \) NORTHWEST, APPROXIMATELY 1000 NORTHWEST OF HAGEDOSS STREET.
LEGEND

1 FURNISH AND INSTALL
2 INPLACE
3 SALVAGE
4 REMOVE SIGN TYPE C
5 INSTALL SIGN
6 U-CHANNEL POST/POSTS (SEE WHAUTO 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

- FURNISH AND INSTALL
- INPLACE
- SALVAGE
- REMOVE SIGN TYPE C
- INSTALL SIGN
- U-CHANNEL POST/POSTS (SEE MINNCDT FOR MOUNTING STANDARDS)
- LOCATION OF FLASHING BEACON SYSTEM

NOTE: MAINTAIN MINIMUM 700' SPACING BETWEEN INSTALLATION OF NEW SIGNS AND LOCATION OF EXISTING SIGNS ON MAJOR ROADWAY.

SEE FLASHING BEACON SYSTEM "C" LAYOUT

ENTERING TRAFFIC MEN FLASHING

T.H. 23

MATCHLINE "A" - SEE SHEET 32

MATCHLINE "B" - SEE SHEET 33

SCALE IN FEET

100

MINNESOTA DEPARTMENT OF TRANSPORTATION
RURAL INTERSECTION CONFLICT WARNING SYSTEM - PHASE II
TRUNK HIGHWAY 23 AT CR 158
COLD SPRING, MINNESOTA - STEarnes COUNTY
SIGNING AND STRIPING PLAN
FILE NO. M1060501

FILE NO. M1060501
**Type C & D Post**

Riser post (no splice permitted)

- 2-3/8" Stainless Steel bolts with nylon insert lock nuts placed in top and bottom holes.

**Typical Type C Installation**

- Post
- Panel
- Lateral brace

**Typical Type D Installation**

- Post
- Panel
- Stringer
- Lateral brace

**U Post Breakaway Splice**

- Stainless steel washer and nylon washer (1/2" min, 1" max, D.D.+1/8" max)
- Sign panel
- Post
- 3/4" Stainless Steel bolt with nylon insert lock nut.

**Modified Type C Installation**

- Post section
- Lateral brace
- Panel

**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 spliced. Driven stub posts shall be at least 7' long.
8. Use stainless steel 3/8" 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 3352, 246.
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
**GORE PLACEMENT**

- Thru roadway
- Exit sign
- Ramp

**ROADSIDE PLACEMENT**

- 12' from edge of shoulder or curb face
- Exit sign
- Ramp

**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 9° 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 friction 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.
8. When a type A sign is installed directly behind traffic barrier, the left edge of the sign panel shall be located a minimum of 8 feet behind the face of the traffic barrier.

**SIGN PLACEMENT**

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.
MINNESOTA DEPARTMENT OF TRANSPORTATION
SAINT LOUIS COUNTY

CONSTRUCTION PLAN FOR: MAINLINE DYNAMIC WARNING SYSTEMS
LOCATED ON SEVEN RURAL INTERSECTIONS IN ST. LOUIS COUNTY

ST. LOUIS COUNTY
SP 8821-270
HISP
DISTRICT 1 (DULUTH)

This plan contains 16 sheets.

Design Signs: VL, CL, RP

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.

Name: Victor K. Lund

Date: 

Sheet No.: 48160

Approved St. Louis County Highway Engineer: Date:

Recommended for approval, District 1 Traffic Engineer: Date:

Approved: District 1 Traffic Engineer: Date:

District State Aid Engineer: Reviewed for compliance with State Aid Rules/Policies: Date:

Approved for State Aid Funding and Federal Aid Funding: State Aid Engineer: Date:

Recommended for approval: State Pre-Letting Engineer: Date:

Office of Land Management Approval: District, Land Management: Date:

Approved: State Design Engineer: Date:

S.P. 069-070-017

S.P. 8821-270

Sheet No. 1 of 16 sheets
## Statement of Estimated Quantities

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<th>Item No.</th>
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### Standard Plates

The following standard plates, approved by federal highway administration, shall apply on this project:

- **ROU1** Standard Barnacles
- **8112H** Pedestal Foundation (traffic control signals)
- **8112F** Pedestal Equipment & Pole Traffic Control Signals
- **8127F** Pedestal & Pedestal Base (for traffic control signals support)
- **8127D** Light Foundation - Design E Cast In-Place 42 Pole or Less
- **8126A** Shims and Raisers (traffic control signals and roadway lighting)

### Intersection Description Chart

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### 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 all work in this project with the Engineer.

---

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

[Signature]

Date: [Date]

Revisions

S.P. 069-070-017

S.P. 8821-270

Sheet 2 of 16 sheets
1-1/2" ANODIZED ALUMINUM BRACKETING

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

12' FROM EDGE OF SHOULDER

"ENTERING TRAFFIC" WARNING SIGN
W3-8b9a
BLACK ON YELLOW
48"x48"

"WHEN FLASHING" PLAQUE
W3-8b9p
BLACK ON YELLOW
42"x24"

15' TRAFFIC SIGNAL PEDESTAL POLE
(4" DIAMETER)

5' MINIMUM ABOVE ROADWAY

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 FUTURE USE.
5. THE DISTANCE BETWEEN THE EDGE OF THE "ENTERING TRAFFIC" SIGN AND EDGE OF THE "WHEN FLASHING" PLAQUE SHALL BE ≤ 3".
6. THE PEDESTAL AND PEDESTAL BASE, SHOWN IN 8122, SHALL BE MADE OF ALUMINUM.
VEHICLE DETECTOR POLE

NOTE: DRAWING NOT TO SCALE

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.
8. The vehicle detection area in advance of the stop sign will be determined by the placement of the warning signs on the major road, and not less than 1' downstream of the stop sign. The engineer will coordinate with the contractor on the advance detection distance.
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 bands.
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.
SIGN MOUNTING BRACKET

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 DEGREES 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 MNDOT 3396 AND GALVANIZED IN ACCORDANCE WITH MNDOT 3394. FASTENERS SHALL BE IN ACCORDANCE WITH MNDOT 3391 2B AND SHALL BE GALVANIZED EITHER BY THE HOT-DIP PROCESS IN ACCORDANCE WITH ASTM A123, OR BY THE MECHANICAL PROCESS IN ACCORDANCE WITH ASTM B695, CLASS 5D OR GREATER.

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

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 INFLUENCE UTILITIES PRIOR TO COMMENCING WORK.

3. THE EXACT LOCATION OF THE TRAFFIC SIGNAL PEDISTRIANS, GALLUATED STEEL POLES, AND MARKABLE SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR.

4. MUSTO AND ST. LOUIS COUNTY SHALL LOCATE EXISTING TRAFFIC SIGNS AS NECESSARY. THE CONTRACTOR SHALL COORDINATE WITH AVAILABILITY OF THE SIGN CREWS.

5. THE CONTRACTOR SHALL DIRECTIONAL DRILL THE CONDUIT UNDER THE ROADSIDE.

6. ALL CONDUIT SHALL BE MAC - SCHEDULE 80 OR NOMINAL SCHEDULE 80. SEE THE SPECIAL PROVISIONS.

7. SEE SHEET 3 FOR THE DETAIL OF THE WIRING SKIN ASSEMBLY.

8. SEE SHEET 4 FOR A DETAIL OF THE VEHICLE DETECTOR POLE.

9. THE CONTROL LOGIC OF THE MARINE DYNAMIC WARNING SYSTEM SHALL MEET THE FOLLOWING REQUIREMENTS:


9.2. NO VEHICLE IS DETECTED ON A MINOR APPROACH - DEACTIVATE THE BEACONS ON BOTH MARINE DYNAMIC WARNING SIGNAL 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 LEGALLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SHEET 6 OF 16 SHEETS

S.P. 069-070-017
S.P. 8821-270
FLAShING BEACON SYSTEM C
INTERSECTION OF US-53 AND CSAH 115 (ASHAWA ROAD)

1. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE AND COMPLETE THE POWER CONNECTIONS WITH LAKE COUNTRY POWER. THE SERVICE ADDRESS IS 1900 HWY 53, COOK, MN 55723.
2. THE CONTRACTOR SHALL LOCATE AND VERIFY INFRASTRUCTURE UTILITIES PRIOR TO COMMENCING WORK.
3. THE EXACT LOCATION OF THE TRAFFIC SIGNALS, CALIBRATED STEEL POLES, AND WIRING HUB SHALL BE TRANSMITTED TO THE CONTRACTOR IN THE FIELD BY THE ENGINEER.
4. WIRING AND ST. LOUIS COUNTY SHALL RELOCATE EXISTING TRAFFIC SIGNS AS NECESSARY. THE CONTRACTOR SHALL COORDINATE WITH AVAILABILITY OF THE SIGN CREWS.
5. THE CONTRACTOR SHALL DIRECTIONAL DRILL THE CONDUIT UNDER THE ROADWAY.
6. ALL CONDUIT SHALL BE PVC - SCHEDULE 80 OR PIPE SCHEDULE 80. SEE THE SPECIAL PROVISIONS.
7. SEE SHEET 3 FOR THE DETAIL OF THE WIRING HUB ASSEMBLY.
8. SEE SHEET 4 FOR A DETAIL OF THE VEHICLE DETECTOR POLE.
9. THE CONTROL LOGIC OF THE MARINELINE DYNAMIC 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 MARINELINE DYNAMIC WARNING SIGN 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 MARINELINE DYNAMIC WARNING SIGN ASSEMBLIES. THE BEACONS SHALL NOT FLASH AS LONG AS NO VEHICLE IS DETECTED ON A MINOR APPROACH.
FLASHER BEACON SYSTEM E
INTERSECTION OF MNTH-37 AND CSAH 25 (HIGHWAY 25 WEST)

1. Furnish and Install
   - 120/240VAC-50HZ 3 PHASE 120-240VAC-50HZ 3 PHASE
   - 1 - FLASHING BEACON MOUNTED ABOVE THE WARNING SIGN ASSEMBLY
   - 1 - FLASHING BEACON MOUNTED ABOVE THE WARNING SIGN ASSEMBLY

WIRING DIAGRAM

NOTES:
1. The contractor is responsible to coordinate and complete the power connections with Lake Country Power.
2. The contractor shall locate and verify phase utilization prior to commencing work.
3. The exact location of the traffic signal pedestals, galvanized steel poles, and manholes shall be determined in the field by the engineer.
4. MoDOT 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 directional drill the conduit under the roadway.
6. All conduit shall be NAC - Schedule 80 or NACE 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 vehicle dynamic 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, or beginning to enter the intersection) - simultaneously and immediately activate the warning sign.
   9.2. No vehicle is detected on a minor approach - deactivate the warning sign.

LEGEND

PLAN SHEETS

S.P. 069-070-017  S.P. 8821-270  SHEET 10 OF 16 SHEETS

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 J. Lund
Engineer

048160
MINNESOTA DEPARTMENT OF TRANSPORTATION
MCLEOD COUNTY
CONSTRUCTION PLAN FOR: INTERSECTION LIGHTING, AND ITS ACTIVE WARNING SYSTEMS

PROJECT LOCATION: VARIOUS COUNTY INTERSECTIONS

CSAH 1 & CSAH 3 A
CSAH 1 & CSAH 10 B
CSAH 2 & CSAH 10 C
CSAH 2 & CSAH 3 (W'S 1) D
CSAH 4 & CR 79 E
CSAH 6 & CSAH 11 F
CSAH 4 & CR 62 G
CSAH 5 & CSAH 31 H
CSAH 5 & CSAH 2 I
CSAH 7 & CR 79 J
CSAH 7 & CSAH 115 (W'S 2) K

PLAN SYMBOLS

= 2" NON-METALLIC CONDUIT (DIRECTIONAL BORE)
= 2" NON-METALLIC CONDUIT
= OVER HEAD POWER
= RIGHT OF WAY
= BURIED TV CABLE
= 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

INDEX OF SHEETS

SHEET DESCRIPTION
1 TITLE SHEET
2 ESTIMATED QUANTITIES
3-4 LIGHTING DETAILS
5-7 ITS DETAILS
8-11 SIGN DETAILS
12-34 LOCATION DETAILS

THIS PLAN SET CONTAINS 34 SHEETS

MIDWEST COUNTY HIGHWAY DEPARTMENT
1000 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

ACCOUNTING AND ENGINEERING: FOR COMPLIANCE WITH STATE AID RULES POLICY

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: 5/26/2011
LICENSE NO: 26890

PROJECT LOCATION: COUNTY: MCLEOD
DISTRICT: 8

T117N

T116N

T115N

T114N

R30W R29W R28W R27W

R30W R29W

R28W R27W

T114N

MCLEOD COUNTY, MINNESOTA S.P. 043-070-004 SHEET 1 OF 34 SHEETS
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

SP 043-070-004

TOTAL

2545.501 ELECTRIC LIGHT SYSTEM "A" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "B" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "C" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "D" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "E" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "F" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "G" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "H" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "I" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "J" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "K" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "L" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "M" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "N" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "O" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "P" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "Q" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "R" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "S" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "T" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "U" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "V" LS 1
2545.501 ELECTRIC LIGHT SYSTEM "W" LS 1

A,B 2565.616 INTERSECTION WARNING SYSTEM "1" SYS 1
A,B 2565.616 INTERSECTION WARNING SYSTEM "2" SYS 1
A,B 2565.616 INTERSECTION WARNING SYSTEM "3" SYS 1

UTILITY CONTACTS

CENTER POINT ENERGY  608-223-2014/800-722-9326
CITY OF HUTCHINSON/HUC  320-587-4745
CITY OF WINSTED  763-559-5185
EMBAH  800-162-0592
FRONTIER COMMUNICATION  763-682-3514
GLENCOE UTILITIES  320-864-5184
KCH PIPELINE CO, LP  800-688-7594
MCLEOD COOP POWER  763-682-3514
MEDICOM  320-583-3824
NORTHERN NATURAL GAS  320-894-5800
NU TELECOM  763-682-3514
WINSTED 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."

SPECIFIC 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:


2 TURF ESTABLISHMENT IS INCIDENTAL. ALL AREAS DISTURBED BY THE CONTRACTORS OPERATIONS SHALL BE LEVELD SUITABLE TO THE ENGINEER IN THE FIELD AND COVERED WITH MNDOT SEED MIX 250 AT A NOMINAL RATE OF 130 LBS/ACRE. EXPOSED AREAS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL A MINIMUM OF 70% VEGETATIVE COVER HAS BEEN ESTABLISHED. THE CONTRACTOR MAY, AT THEIR OWN COST, USE EROSION CONTROL BLANKET CONFORMING TO MNDOT SPEC. 8865 OR OTHER APPROVED BY THE ENGINEER FOR SITE STABILIZATION.

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

McLeod County
HIGHWAY DEPARTMENT

S.P.  043-070-004
C.P.,
S.A.P.

INTERSECTION LIGHTING

ESTIMATED QUANTITIES

SHEET  2
OF  34
**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 DGS OR APPROVED EQUAL.

4. CONTRACTOR SHALL ENSURE THAT ALL L.E.D. SIGN PANELS AND RADAR UNITS ARE ALIGNED PROPERLY TO FUNCTION IN ACCCORDANCE WITH THE APPROACHING TRAFFIC. ANY MISALIGENMENT 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.

**TYPICAL MASTER CONTROLLER INSTALLATION**

**CSAH 3 APPROACH**

**TYPICAL RADAR DETECTION INSTALLATION**

**CSAH 2 APPROACH**
(APPROX.) LIGHT STANDARD LOCATIONS

<table>
<thead>
<tr>
<th>NO.</th>
<th>TYPE</th>
<th>NORTHING</th>
<th>EASTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF</td>
<td>12-40</td>
<td>220050</td>
<td>621305</td>
</tr>
</tbody>
</table>

(APPROX.) SYSTEM "F" QUANTITY TAB

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIGHT UNIT TYPE 12-40</td>
<td>EA</td>
<td>1</td>
</tr>
<tr>
<td>30' STUB POLE</td>
<td>EA</td>
<td>0</td>
</tr>
<tr>
<td>2&quot; NON-METALLIC CONDUIT</td>
<td>LF</td>
<td>40</td>
</tr>
<tr>
<td>2&quot; NON-METALLIC CONDUIT (DIRECTIONAL BORE)</td>
<td>LF</td>
<td>0</td>
</tr>
<tr>
<td>SERVICE CABINET SECONDARY TYPE B</td>
<td>EA</td>
<td>1</td>
</tr>
<tr>
<td>CONDUCTOR NO. 8 WIRE</td>
<td>LF</td>
<td>150</td>
</tr>
</tbody>
</table>

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.
POWERS 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 1-800-252-4666
FROM YOUR SMARTPHONE
HTTP://MNTICKETENTRY.KORTEMWEB.COM
OR ON THE WEB GOPHERSTATEONECALL.ORG

McLEOD COUNTY
HIGHWAY DEPARTMENT

INTERSECTION LIGHTING
SYSTEM F
S.P. 043-070-004
CSAH 2 & CSAH 3

SHEET 17 OF 34

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and from I am a duly Registered Professional Engineer under the law of the State of Minnesota.

DATE 6/24/2011
REG. NO. 40990
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
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**

![Photo provided is for information only and does not depict exact structure details]

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**

![Photo provided is for information only and does not depict exact structure details]

- 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**

- 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.
- 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**

(Property 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.