

TRAFFIC CONTROL SIGNAL SYSTEM IN THE CITY OF ELK RIVER, SHERBURNE COUNTY, MINNESOTA

GOVERNING SPECIFICATIONS
THE 1988 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL GOVERN."
ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO THE MN MUTCD INCLUDING THE FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS, DATED JANUARY 1998

INDEX

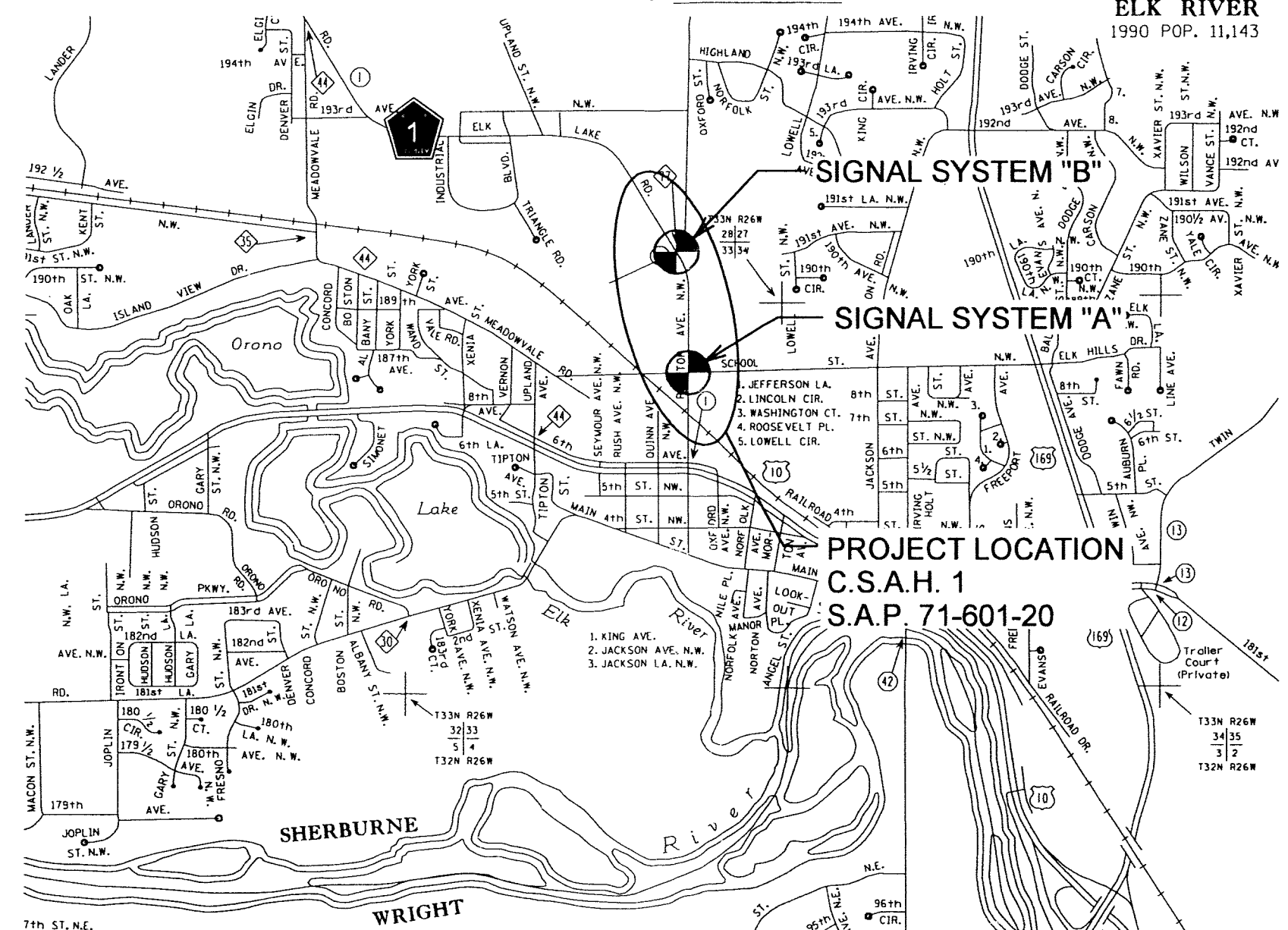
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SIGNAL SYSTEM "A" INTERSECTION LAYOUT
3	SIGNAL SYSTEM "A" WIRING DIAGRAM
4	SIGNAL SYSTEM "B" INTERSECTION LAYOUT
5	SIGNAL SYSTEM "B" WIRING DIAGRAM
6-9	DETAIL SHEETS, STANDARD PLATE TABULATION

- PLAN SYMBOLS**
- STATE LINE
 - COUNTY LINE
 - TOWNSHIP OR RANGE LINE
 - SECTION LINE
 - QUARTER LINE
 - SIXTEENTH LINE
 - RIGHT-OF-WAY LINE
 - SLOPE EASEMENT
 - PRESENT RIGHT-OF-WAY
 - CONTROL OF ACCESS LINE
 - PROPERTY LINES (EXCEPT LAND LINES)
 - VACATED PLATTED PROPERTY
 - CORPORATE OR CITY LIMITS
 - TRUNK HIGHWAY CENTER LINE
 - RETAINING WALL
 - RAILROAD
 - RAILROAD RIGHT-OF-WAY
 - RIVER OR CREEK
 - DRY RUN
 - DRAINAGE DITCH
 - DRAIN TILE
 - CULVERT
 - DROP INLET
 - GUARD RAIL
 - BARBED WIRE FENCE
 - WOVEN WIRE FENCE
 - CHAIN LINK FENCE
 - RAILROAD SNOW FENCE
 - STONE WALL OR FENCE
 - HEDGE
 - RAILROAD CROSSING SIGN
 - RAILROAD CROSSING BELL
 - ELECTRIC WARNING SIGN
 - CROSSING GATE
 - MEANDER CORNER
 - SPRINGS
 - MARSH
 - TIMBER
 - ORCHARD
 - BRUSH
 - NURSERY
 - CATCH BASIN
 - FIRE HYDRANT
 - CATTLE GUARD
 - OVERPASS (HIGHWAY OVER)
 - UNDERPASS (HIGHWAY UNDER)
 - BRIDGE
 - BUILDING (ONE STORY FRAME)
 - F - FRAME C - CONCRETE
 - S - STONE T - TILE
 - B - BRICK ST - STUCCO
 - IRON ROD OR PIPE
 - MONUMENT (STONE, CONCRETE, OR METAL)
 - WOODEN HUB
 - GRAVEL PIT
 - SAND PIT
 - BORROW PIT
 - ROCK QUARRY

- UTILITY SYMBOLS**
- POWER POLE LINE
 - TELEPHONE OR TELEGRAPH POLE LINE
 - JOINT TELEPHONE AND POWER ON POWER POLE
 - ON TELEPHONE POLES
 - ANCHOR
 - STREET LIGHT
 - PEDESTAL (TELEPHONE CABLE TERMINAL)
 - GAS MAIN
 - WATER MAIN
 - CONDUIT
 - TELEPHONE CABLE IN CONDUIT
 - ELECTRIC CABLE IN CONDUIT
 - TELEPHONE MANHOLE
 - ELECTRIC MANHOLE
 - BURIED TELEPHONE CABLE
 - BURIED ELECTRIC CABLE
 - AERIAL TELEPHONE CABLE
 - SEWER (SANITARY OR STORM)
 - SEWER MANHOLE

DESIGN DESIGNATION - CSAH 1

R VALUE	=	EN18
ADT (Current Year) 1999	=	10,700
ADT (Future Year) 2019	=	19,260
dhv (Design Hr. Vol.)	=	
D (Directional Distr.)	=	
T (Heavy Commercial)	=	
SOIL FACTOR	=	
HCA DT (Future Year) 2019	=	
DESIGN SPEED	=	30 mph
BASED ON STOPPING SIGHT DISTANCE		
HEIGHT OF EYE	=	in. HEIGHT OF OBJECT
DESIGN SPEED NOT ACHIEVED AT:		
FUNCTIONAL CLASSIFICATION		
NO. OF TRAFFIC LANES	=	4 LANES
NO. OF PARKING LANES	=	N/A
TON DESIGN		



ELK RIVER
1990 POP. 11,143

EXCAVATION NOTICE SYSTEM

A CALL TO GOPHER STATE ONE (651-454-0002) IS REQUIRED A MINIMUM OF 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION.

ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.



350 Westwood Lake Office
8441 Wayzata Boulevard
Minneapolis, MN 55426

612-541-4800
FAX 541-1700

INFRASTRUCTURE - ENGINEERS - PLANNERS

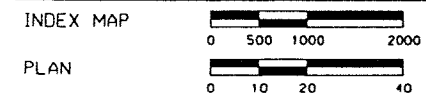
Charles T. Rickart
CHARLES T. RICKART, P.E.

SIGNAL DESIGN ENGINEER: I HEREBY CERTIFY THAT THESE SIGNAL PLANS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, THAT THIS PLAN CONFORMS TO THE MUTCD (EXCEPT WHERE A VARIANCE HAS BEEN GRANTED), AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 8/03/00 REGISTRATION NUMBER 26082

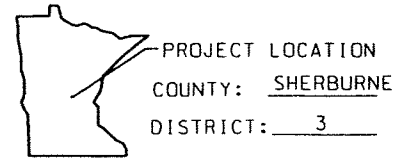
PROJECT LOCATION
C.S.A.H. 1
S.A.P. 71-601-20

1. KING AVE.
2. JACKSON AVE. N.W.
3. JACKSON L.A. N.W.

SCALES



ESTIMATED QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	TOTAL
2565.511	FULL T ACT T CONTROL SIGNAL SYSTEM "A"	SYSTEM	1
2565.511	FULL T ACT T CONTROL SIGNAL SYSTEM "B"	SYSTEM	1



S.A.P. 71-601-20
(C.S.A.H. 1)

TITLE SHEET

SHEET NO. 1 OF 9 SHEETS

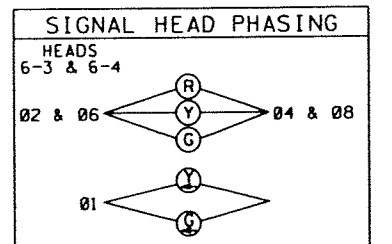
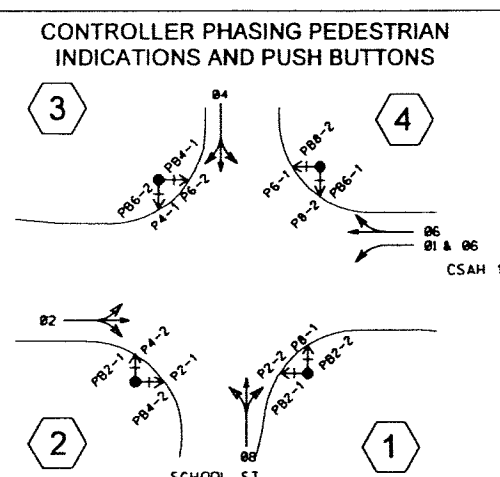
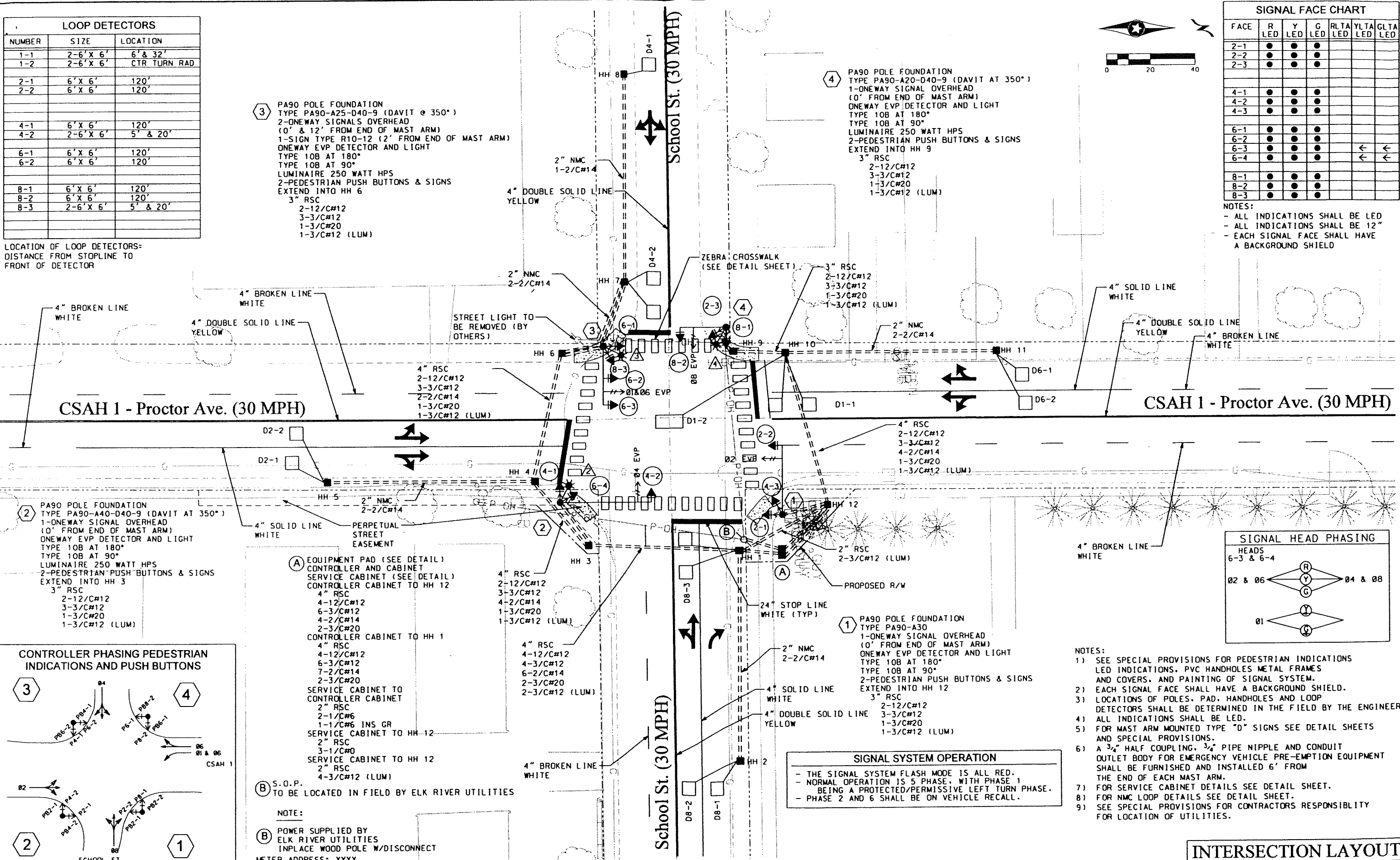
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LOOP DETECTORS		
NUMBER	SIZE	LOCATION
1-1	2-6' X 6'	6' & 32'
1-2	2-6' X 6'	CTR TURN RAD
2-1	6' X 6'	120'
2-2	6' X 6'	120'
4-1	6' X 6'	120'
4-2	2-6' X 6'	5' & 20'
6-1	6' X 6'	120'
6-2	6' X 6'	120'
8-1	6' X 6'	120'
8-2	6' X 6'	120'
8-3	2-6' X 6'	5' & 20'

LOCATION OF LOOP DETECTORS=
DISTANCE FROM STOPLINE TO
FRONT OF DETECTOR

SIGNAL FACE CHART						
FACE	R LED	Y LED	G LED	RLTA LED	YLTA LED	GLTA LED
2-1	●	●	●			
2-2	●	●	●			
2-3	●	●	●			
4-1	●	●	●			
4-2	●	●	●			
4-3	●	●	●			
6-1	●	●	●			
6-2	●	●	●			
6-3	●	●	●	←	←	
6-4	●	●	●	←	←	
8-1	●	●	●			
8-2	●	●	●			
8-3	●	●	●			

NOTES:
- ALL INDICATIONS SHALL BE LED
- ALL INDICATIONS SHALL BE 12"
- EACH SIGNAL FACE SHALL HAVE
A BACKGROUND SHIELD



SIGNAL SYSTEM OPERATION
- THE SIGNAL SYSTEM FLASH MODE IS ALL RED.
- NORMAL OPERATION IS 5 PHASE, WITH PHASE 1
BEING A PROTECTED/PERMISSIVE LEFT TURN PHASE.
- PHASE 2 AND 6 SHALL BE ON VEHICLE RECALL.

- NOTES:
- 1) SEE SPECIAL PROVISIONS FOR PEDESTRIAN INDICATIONS LED INDICATIONS, PVC HANDHOLES METAL FRAMES AND COVERS, AND PAINTING OF SIGNAL SYSTEM.
 - 2) EACH SIGNAL FACE SHALL HAVE A BACKGROUND SHIELD.
 - 3) LOCATIONS OF POLES, PAD, HANDHOLES AND LOOP DETECTORS SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
 - 4) ALL INDICATIONS SHALL BE LED.
 - 5) FOR MAST ARM MOUNTED TYPE "D" SIGNS SEE DETAIL SHEETS AND SPECIAL PROVISIONS.
 - 6) A 3/4" HALF COUPLING, 3/4" PIPE NIPPLE AND CONDUIT OUTLET BODY FOR EMERGENCY VEHICLE PRE-EMPTION EQUIPMENT SHALL BE FURNISHED AND INSTALLED 6' FROM THE END OF EACH MAST ARM.
 - 7) FOR SERVICE CABINET DETAILS SEE DETAIL SHEET.
 - 8) FOR NMC LOOP DETAILS SEE DETAIL SHEET.
 - 9) SEE SPECIAL PROVISIONS FOR CONTRACTORS RESPONSIBILITY FOR LOCATION OF UTILITIES.

INTERSECTION LAYOUT

PLAN FOR SUBMITTAL
15:12:00-000\1228p-1.dgn

NO.	DATE	BY	CHK	REVISIONS

Design By: _____
Plan By: _____
Checked By: _____
Approved By: _____
DATE: 5/04/00 REG. NO.: 26082

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY OR UNDER THE DIRECT SUPERVISION AND THAT I AM A DAILY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

WSB
& Associates, Inc.
INFRASTRUCTURE - ENGINEERS - PLANNERS

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Minneapolis, MN 55426
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FAX 541-1700

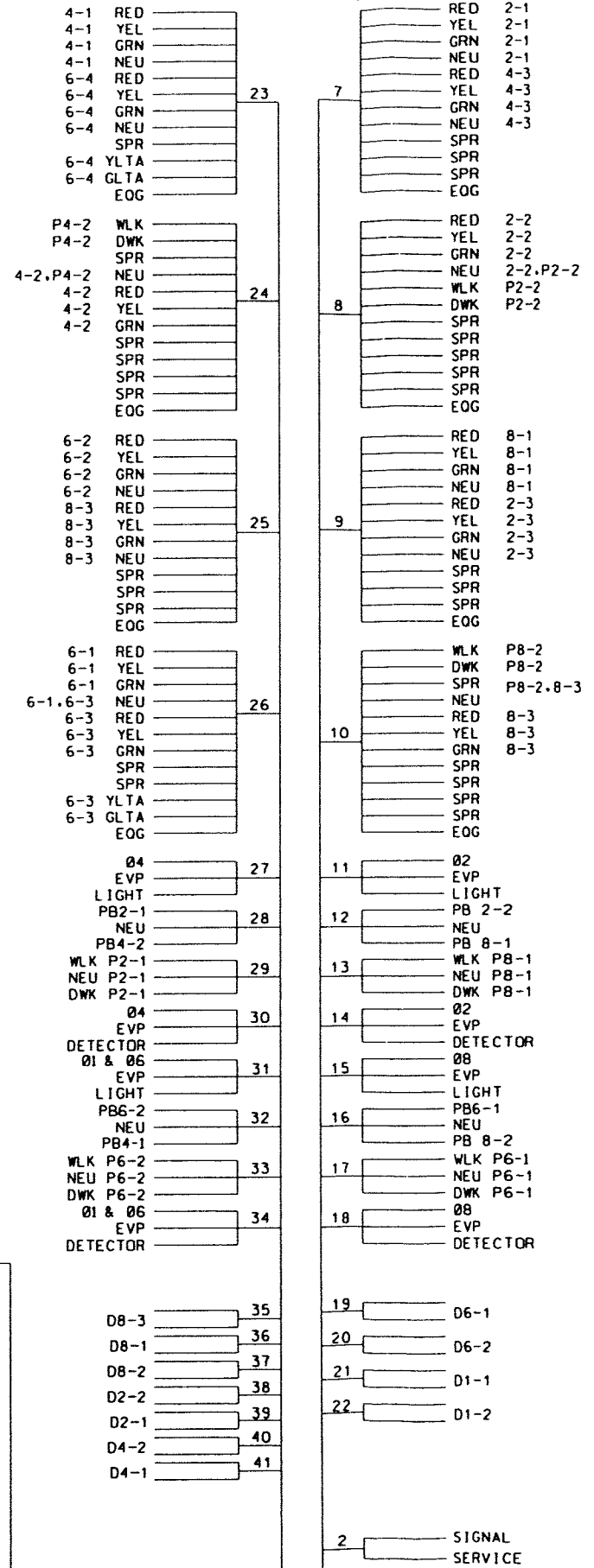
School Street and CR 77 at CSAH 1
City of Elk River, Sherburne County, Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION

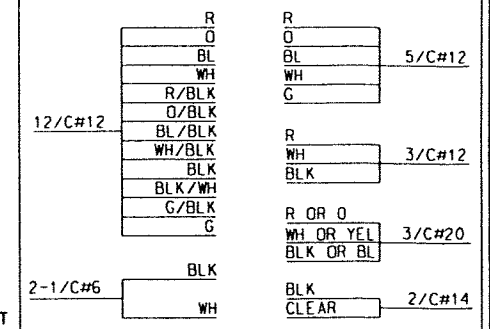
SIGNAL PLAN
SIGNAL SYSTEM "A"
S.A.P. 71-601-20

SHEET
2
OF
9
SHEETS

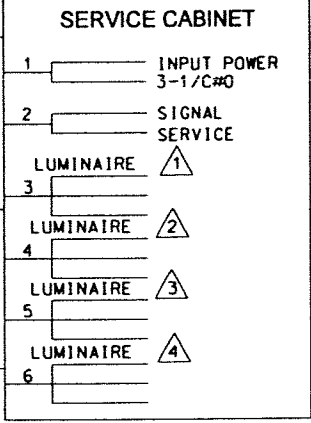
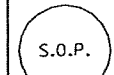
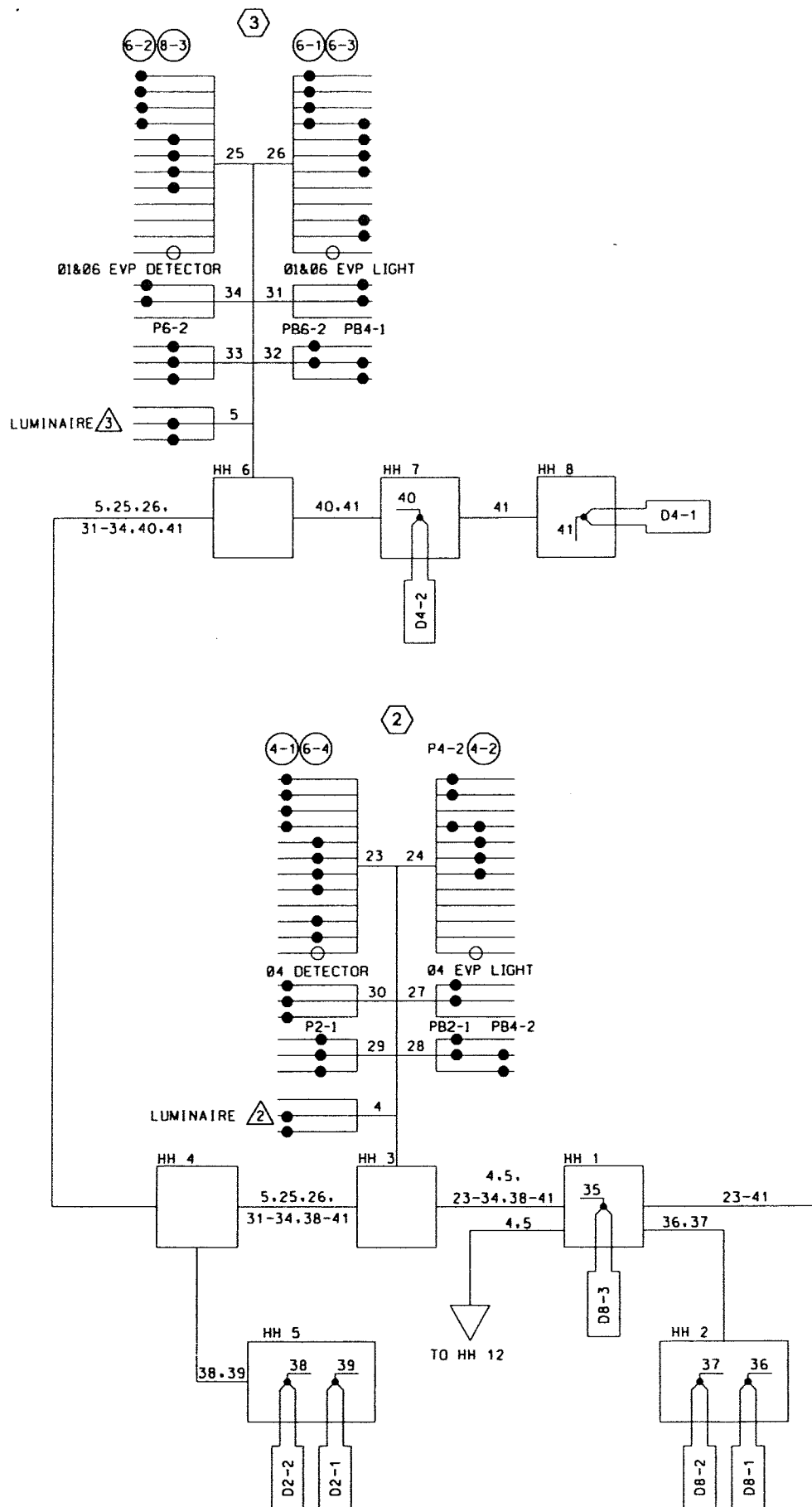
CONTROLLER CABINET



CONDUCTOR COLOR CODING



NOTE: ALL TERMINAL BLOCK CONNECTIONS SHALL BE ARRANGED AS SPECIFIED ABOVE



WIRING DIAGRAM

PLAN FOR SUBMITTAL

NO.	DATE	BY	CHK	REVISIONS

Design By:
 Plan By:
 Checked By:
 Approved By:

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Charles T. Rickart
 CHARLES T. RICKART, P.E.
 DATE: 5/04/00 REG. NO: 26082

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 Minneapolis, MN 55426

612-641-4800
 FAX 541-1700

School Street and CR 77 at CSAH 1
 City of Elk River, Sherburne County, Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
 WRING DIAGRAM
 SIGNAL SYSTEM "A"
 S.A.P. 71-601-20

SHEET
 3
 OF
 9
 SHEETS

LOOP DETECTORS		
NUMBER	SIZE	LOCATION
2-1	6' X 6'	120'
2-2	6' X 6'	120'
4-1	6' X 6'	120'
4-2	6' X 6'	5'
6-1	6' X 6'	250'
6-2	6' X 6'	250'
8-1	6' X 6'	120'
8-2	2-6' X 6'	5' & 20'

LOCATION OF LOOP DETECTORS-
DISTANCE FROM STOPLINE TO
FRONT OF DETECTOR

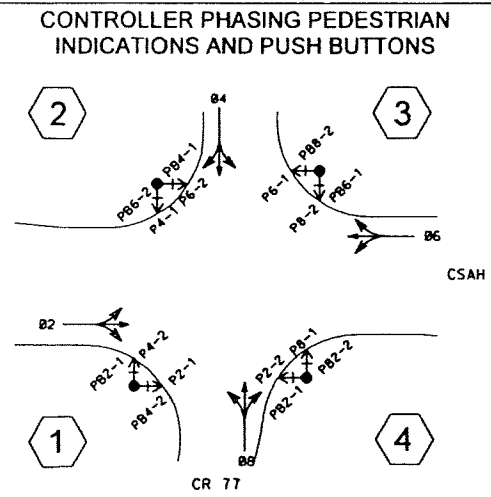
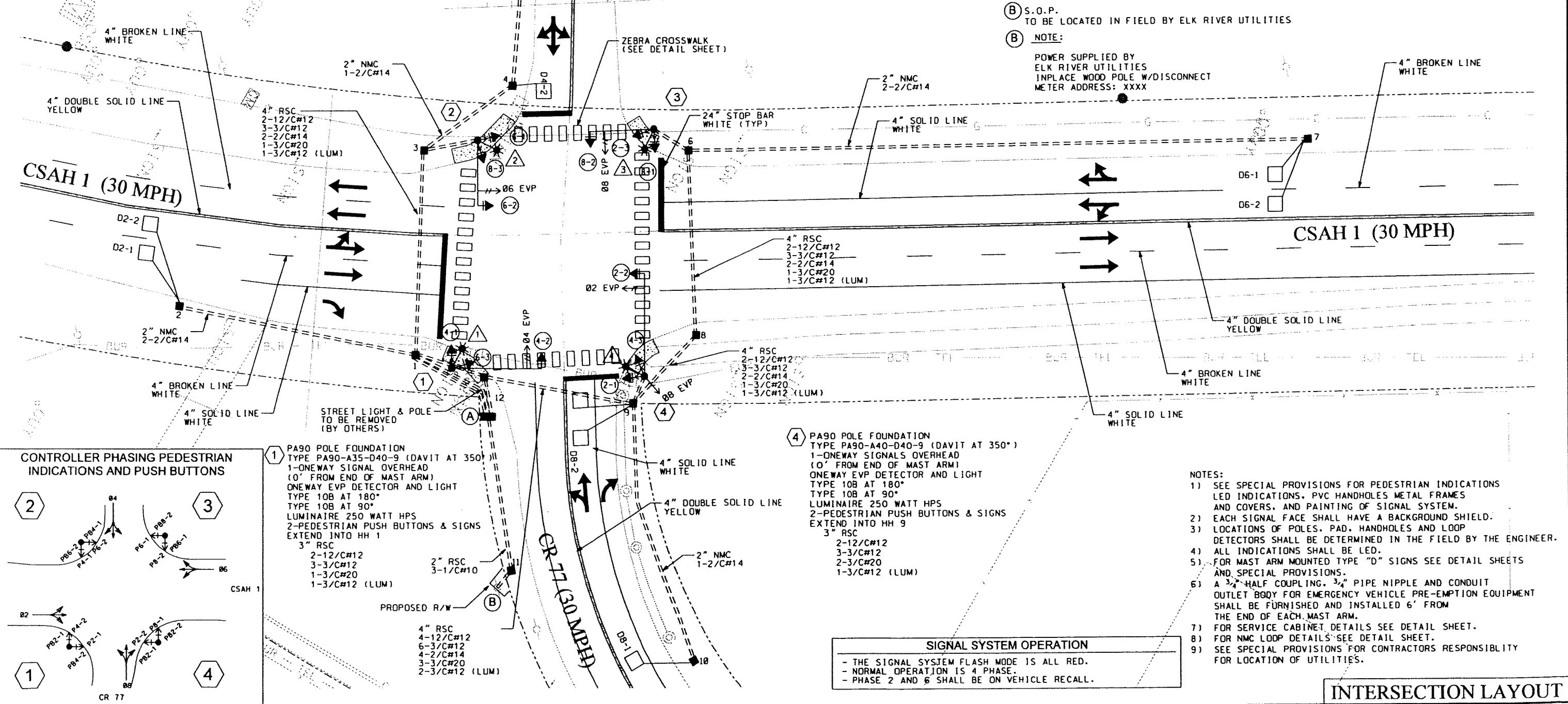
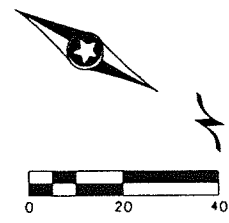
2 PA90 POLE FOUNDATION
TYPE PA90-A25-D40-9 (DAVIT AT 350°)
1-ONEWAY SIGNALS OVERHEAD
(0' FROM END OF MAST ARM)
ONEWAY EVP DETECTOR AND LIGHT
TYPE 10B AT 180°
TYPE 10B AT 90°
LUMINAIRE 250 WATT HPS
2-PEDESTRIAN PUSH BUTTONS & SIGNS
EXTEND INTO HH 3
3" RSC
2-12/C#12
3-3/C#12
1-3/C#20
1-3/C#12 (LUM)

3 PA90 POLE FOUNDATION
TYPE PA90-A25-D40-9 (DAVIT AT 350°)
1-ONEWAY SIGNALS OVERHEAD
(0' FROM END OF MAST ARM)
ONEWAY EVP DETECTOR AND LIGHT
TYPE 10B AT 180°
TYPE 10B AT 90°
LUMINAIRE 250 WATT HPS
2-PEDESTRIAN PUSH BUTTONS & SIGNS
EXTEND INTO HH 6
3" RSC
2-12/C#12
3-3/C#12
1-3/C#20
1-3/C#12 (LUM)

A EQUIPMENT PAD (SEE DETAIL)
CONTROLLER AND CABINET
SERVICE CABINET (SEE DETAIL)
CONTROLLER CABINET TO HH 1
4" RSC
4-12/C#12
6-3/C#12
4-2/C#14
2-3/C#20
CONTROLLER CABINET TO HH 12
4" RSC
4-12/C#12
6-3/C#12
4-2/C#14
3-3/C#20
SERVICE CABINET TO
CONTROLLER CABINET
2" RSC
2-1/C#6
SERVICE CABINET TO HH 1
2" RSC
3-1/C#0
SERVICE CABINET TO HH 1
2" RSC
4-3/C#12 (LUM)

SIGNAL FACE CHART						
FACE	R LED	Y LED	G LED	RLTA LED	YLTA LED	GLTA LED
2-1	●	●	●			
2-2	●	●	●			
2-3	●	●	●			
4-1	●	●	●			
4-2	●	●	●			
4-3	●	●	●			
6-1	●	●	●			
6-2	●	●	●			
6-3	●	●	●			
8-1	●	●	●			
8-2	●	●	●			
8-3	●	●	●			

NOTES:
- ALL INDICATIONS SHALL BE LED
- ALL INDICATIONS SHALL BE 12"
- EACH SIGNAL FACE SHALL HAVE
A BACKGROUND SHIELD



1 PA90 POLE FOUNDATION
TYPE PA90-A35-D40-9 (DAVIT AT 350°)
1-ONEWAY SIGNALS OVERHEAD
(0' FROM END OF MAST ARM)
ONEWAY EVP DETECTOR AND LIGHT
TYPE 10B AT 180°
TYPE 10B AT 90°
LUMINAIRE 250 WATT HPS
2-PEDESTRIAN PUSH BUTTONS & SIGNS
EXTEND INTO HH 1
3" RSC
2-12/C#12
3-3/C#12
1-3/C#20
1-3/C#12 (LUM)

4 PA90 POLE FOUNDATION
TYPE PA90-A40-D40-9 (DAVIT AT 350°)
1-ONEWAY SIGNALS OVERHEAD
(0' FROM END OF MAST ARM)
ONEWAY EVP DETECTOR AND LIGHT
TYPE 10B AT 180°
TYPE 10B AT 90°
LUMINAIRE 250 WATT HPS
2-PEDESTRIAN PUSH BUTTONS & SIGNS
EXTEND INTO HH 9
3" RSC
2-12/C#12
3-3/C#12
2-3/C#20
1-3/C#12 (LUM)

B S.O.P.
TO BE LOCATED IN FIELD BY ELK RIVER UTILITIES
B NOTE:
POWER SUPPLIED BY
ELK RIVER UTILITIES
INPLACE WOOD POLE W/DISCONNECT
METER ADDRESS: XXXX

SIGNAL SYSTEM OPERATION
- THE SIGNAL SYSTEM FLASH MODE IS ALL RED.
- NORMAL OPERATION IS 4 PHASE.
- PHASE 2 AND 6 SHALL BE ON VEHICLE RECALL.

NOTES:
1) SEE SPECIAL PROVISIONS FOR PEDESTRIAN INDICATIONS
LED INDICATIONS, PVC HANDHOLES METAL FRAMES
AND COVERS, AND PAINTING OF SIGNAL SYSTEM.
2) EACH SIGNAL FACE SHALL HAVE A BACKGROUND SHIELD.
3) LOCATIONS OF POLES, PAD, HANDHOLES AND LOOP
DETECTORS SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
4) ALL INDICATIONS SHALL BE LED.
5) FOR MAST ARM MOUNTED TYPE "D" SIGNS SEE DETAIL SHEETS
AND SPECIAL PROVISIONS.
6) A 3/4" HALF COUPLING, 3/4" PIPE NIPPLE AND CONDUIT
OUTLET BODY FOR EMERGENCY VEHICLE PRE-EMPTION EQUIPMENT
SHALL BE FURNISHED AND INSTALLED 6' FROM
THE END OF EACH MAST ARM.
7) FOR SERVICE CABINET DETAILS SEE DETAIL SHEET.
8) FOR NMC LOOP DETAILS SEE DETAIL SHEET.
9) SEE SPECIAL PROVISIONS FOR CONTRACTORS RESPONSIBILITY
FOR LOCATION OF UTILITIES.

INTERSECTION LAYOUT

PLAN FOR SUBMITTAL
1:1212-000\scad\1212sp-3.dgn

NO.	DATE	BY	CHK	REVISIONS

Design By:
Plan By:
Checked By:
Approved By:
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY OR UNDER
MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER
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Charles T. Rickart
CHARLES T. RICKART, P.E.
DATE: 5/04/00 REG. NO: 26082

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WSB
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INFRASTRUCTURE - ENGINEERS - PLANNERS

School Street and CR 77 at CSAH 1
City of Elk River, Sherburne County, Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
SIGNAL PLAN
SIGNAL SYSTEM "B"
S.A.P. 71-601-20

SHEET
4
OF
9
SHEETS

PLAN FOR SUBMITTAL
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NO.	DATE	BY	CHK	REVISIONS

Design By:
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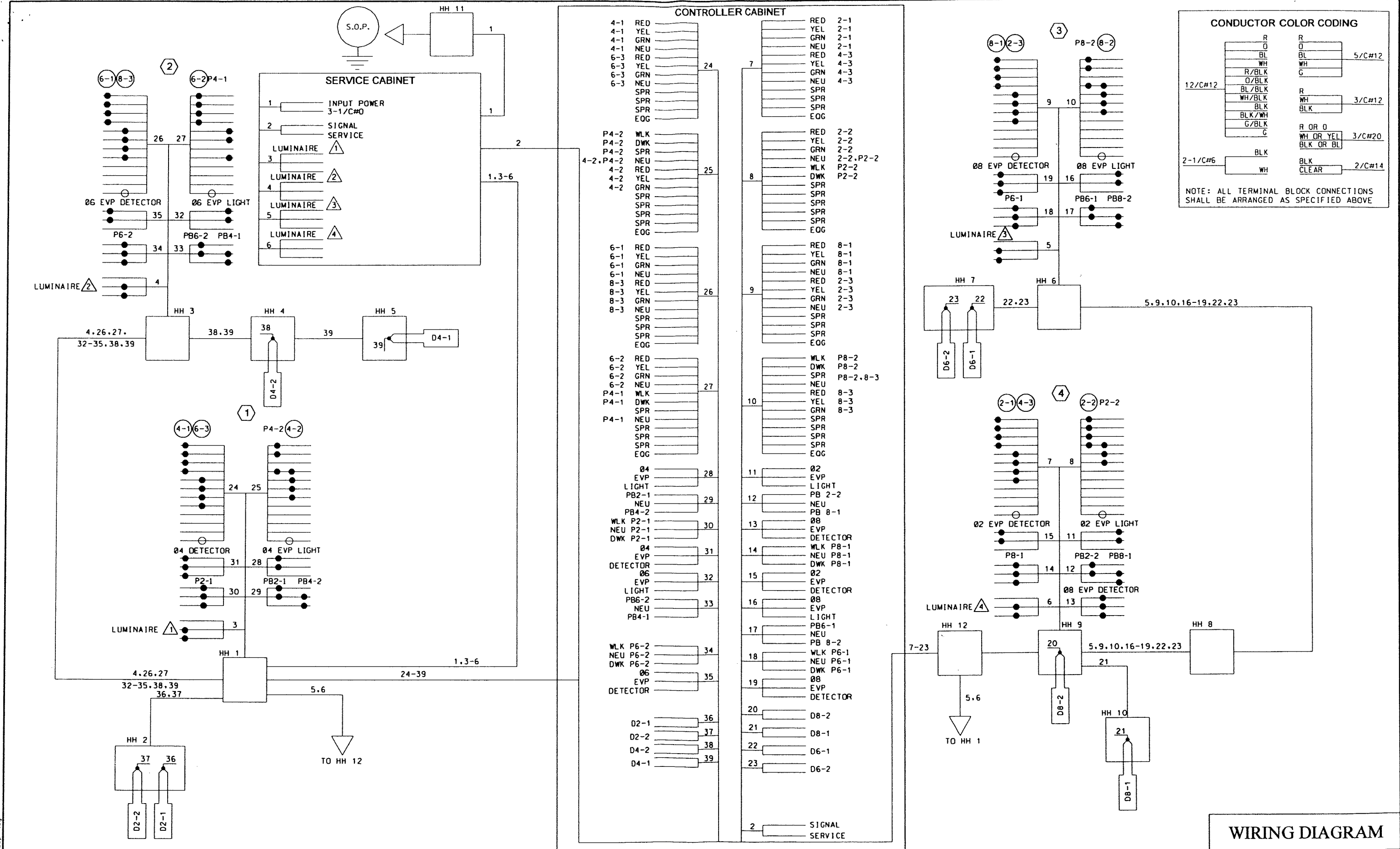
350 Westwood Lake Office
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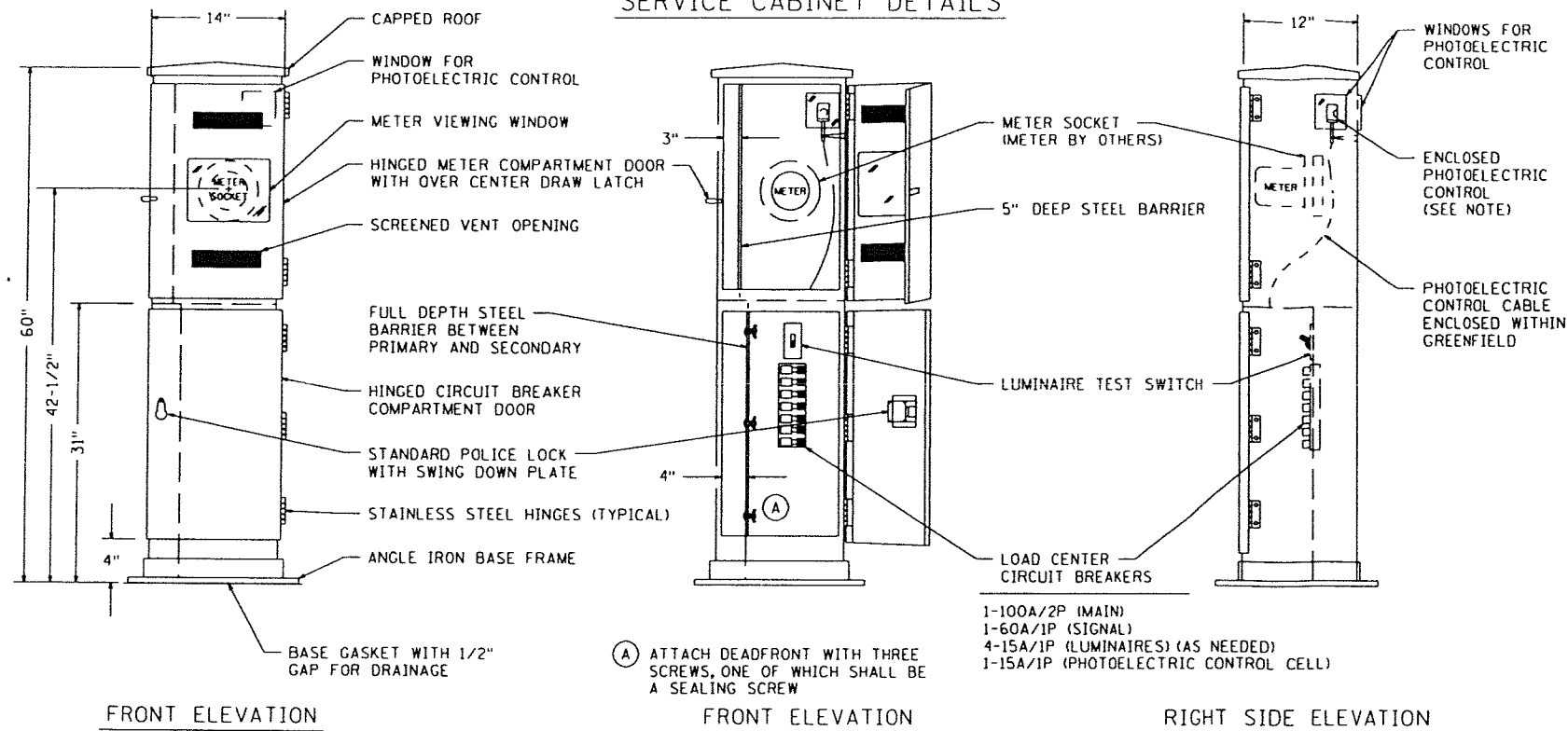
School Street and CR 77 at CSAH 1
 City of Elk River, Sherburne County, Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
 WIRING DIAGRAM
 SIGNAL SYSTEM "B"
 S.A.P. 71-601-20

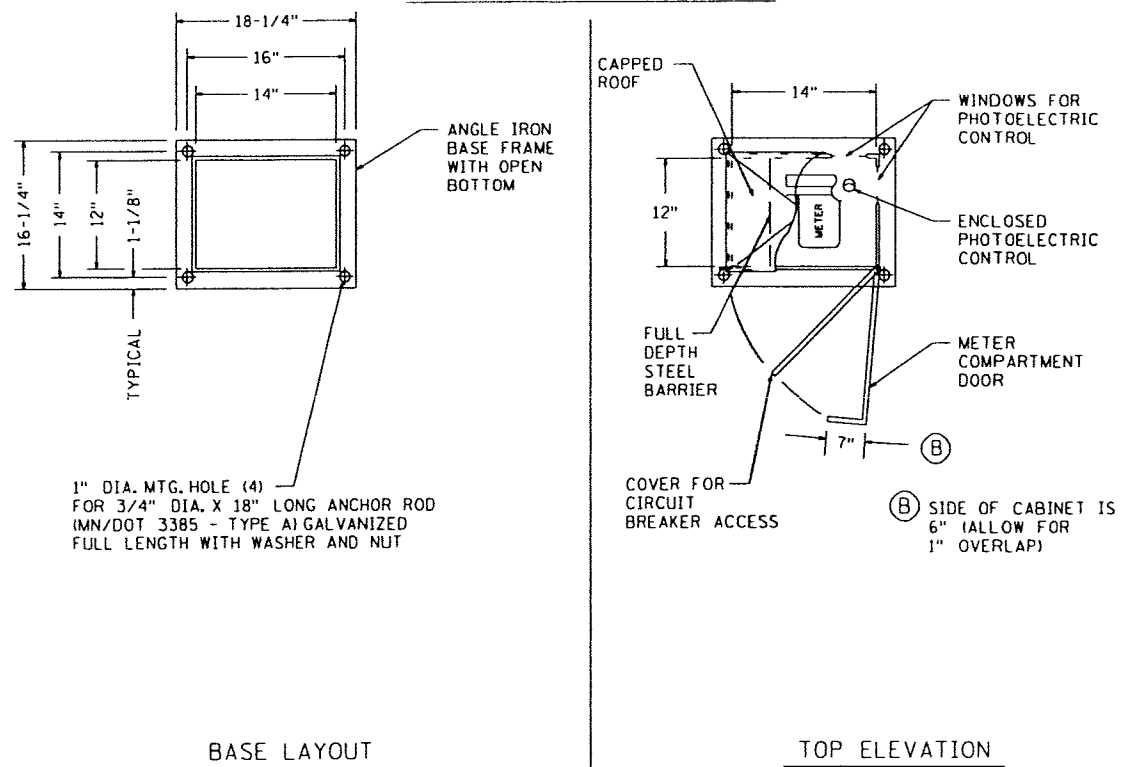
SHEET
 5
 OF
 9
 SHEETS



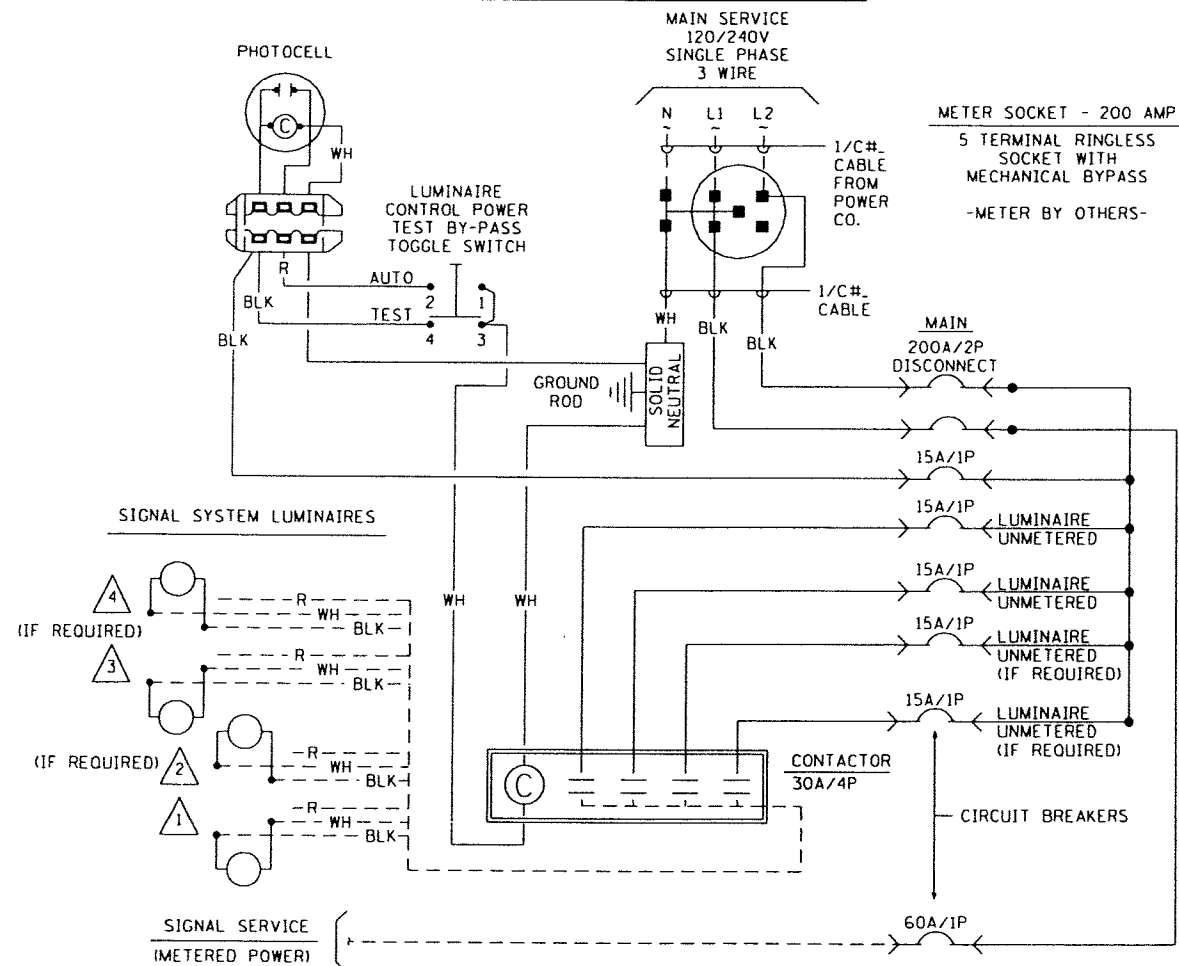
SERVICE CABINET DETAILS



CABINET BASE DETAILS



FEED POINT WIRING DIAGRAM



FIELD WIRING DIAGRAM CABLE NUMBERS

CABLE NO.	CABLE	USE
1	3-1/C#2	INPUT POWER
2	2-1/C#6	SIGNAL SERVICE
3	3/C#12	LUMINAIRE - 1
4	3/C#12	LUMINAIRE - 2
5	3/C#12	LUMINAIRE - 3
6	3/C#12	LUMINAIRE - 4

DETAILS

PLAN FOR SUBMITTAL
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NO.	DATE	BY	CHK	REVISIONS

Design By:
Plan By:
Checked By:
Approved By:

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DAY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

Charles T. Rickart
CHARLES T. RICKART, P.E.
DATE: 5/04/00 REG. NO. 26082

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School Street and CR 77 at CSAH 1

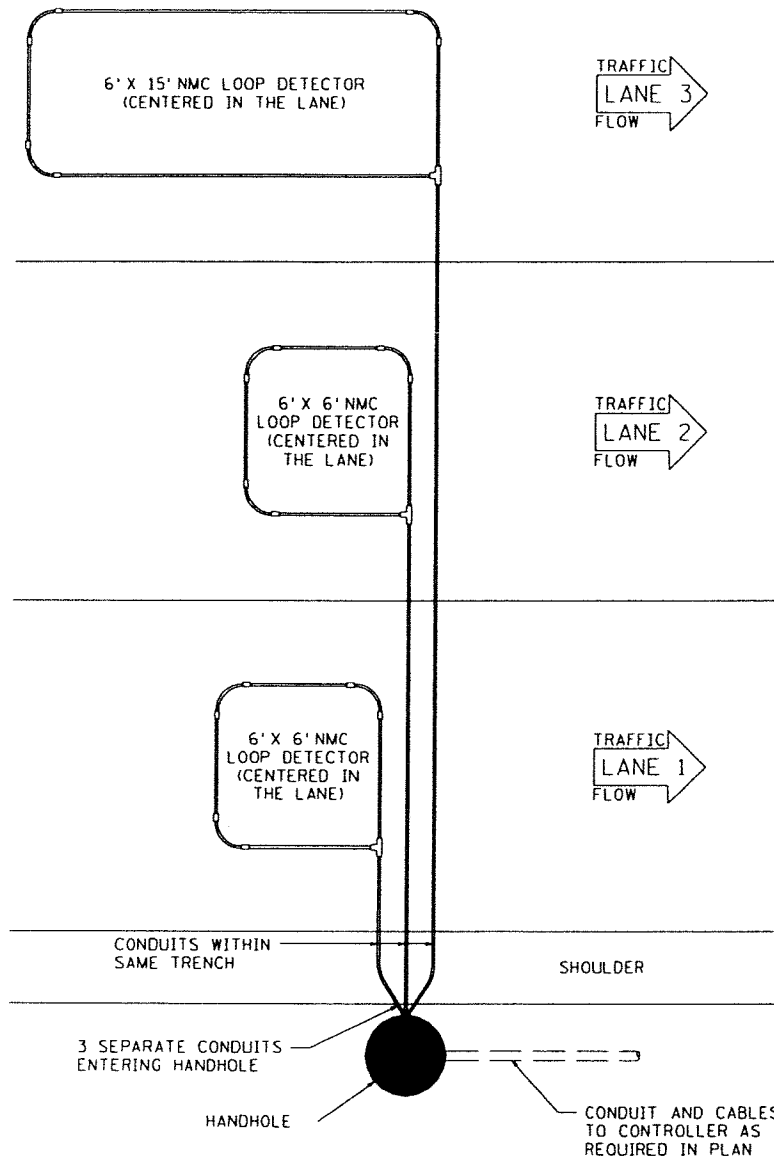
City of Elk River, Sherburne County, Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION

SERVICE CABINET DETAILS
SIGNAL PLAN
S.A.P. 71-601-20

SHEET
6
OF
9
SHEETS

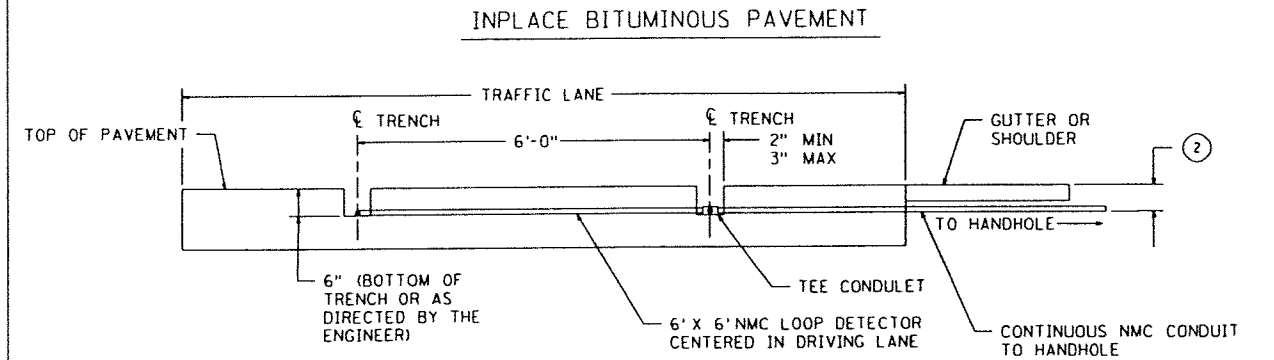
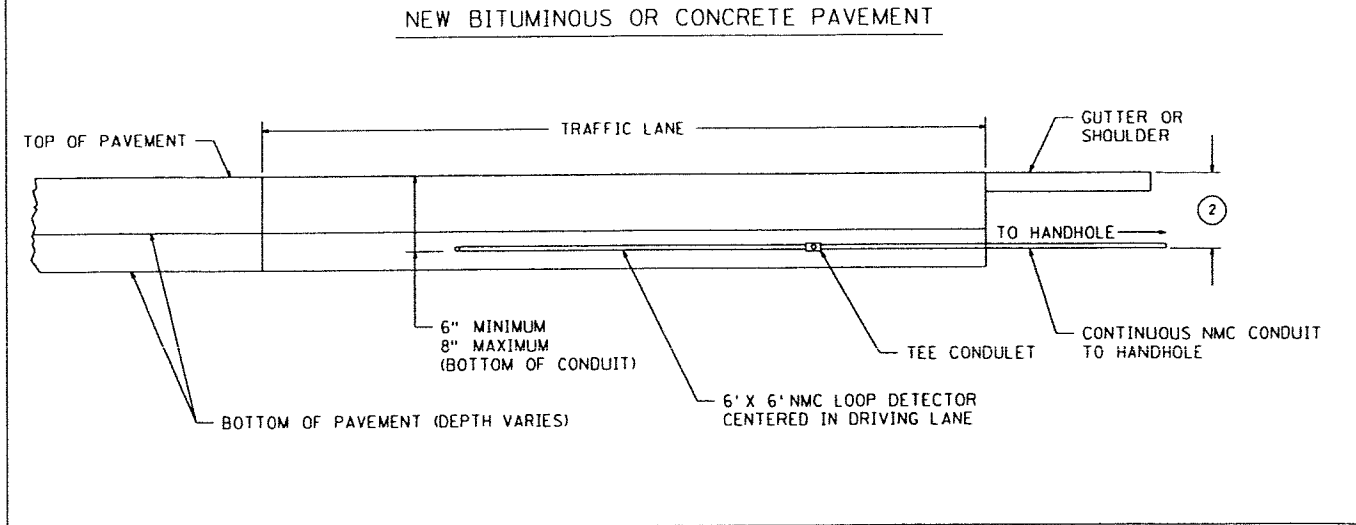
TYPICAL NMC LOOP DETECTOR LAYOUT



GENERAL NOTES:

- SEE SPECIAL PROVISIONS FOR REQUIRED LOOP DETECTORS AND SPLICE KITS.
- THE 3/4" NON-METALLIC CONDUIT (NMC) AND FITTINGS SHALL BE SCHEDULE 40 HEAVY WALL RIGID POLYVINYL CHLORIDE (PVC). SEE SPEC. 3803.
- THREE CORNERS OF EACH LOOP DETECTOR SHALL BE A 90° FACTORY ELBOW (6" RADIUS). THE FOURTH SHALL BE A NMC TEE CONDULET.
- APPROVED PVC PRIMER AND CEMENT SHALL BE USED FOR THE PVC JOINTS.
- ALL SLACK MUST BE REMOVED FROM LOOP DETECTOR CONDUCTORS WITHIN THE NMC.
- THE LOOP DETECTOR ROADWAY CONDUCTORS (1/C#14) SHALL BE TWISTED THREE TURNS PER FOOT FROM THE NMC TEE CONDULET TO THE HANDHOLE.
- ATTACH A FERROUS METAL ITEM TO THE EXTERIOR OF THE TEE CONDULET COVER.
- EACH LOOP DETECTOR CONDUIT TO THE HANDHOLE SHALL BE SLOPED TOWARDS THE HANDHOLE.
- LOOP DETECTOR CONDUITS TO THE HANDHOLE MAY BE PLACED WITHIN THE SAME TRENCH.
- THE LOOP DETECTOR ROADWAY CONDUCTORS SHALL END IN THE HANDHOLE.
- NO SPLICES ALLOWED IN CONDUIT OR TEE CONDULET.
- THE LOOP DETECTOR ROADWAY CONDUCTORS AND THE LOOP DETECTOR LEAD-IN CABLE CONDUCTORS SHALL BE PROPERLY PREPARED AND CLEANED BEFORE SPLICING.
- SPLICE KITS SHALL BE INSTALLED IN HANDHOLES IN SUCH A MANNER AS TO ENSURE THAT EACH SPLICE KIT IS SUSPENDED AND/OR SECURED NEAR THE TOP OF THE HANDHOLE TO THE SATISFACTION OF THE ENGINEER. (PLACING SPLICE KITS ON TOP OF THE ELECTRICAL CABLES AND CONDUCTORS IS NOT ACCEPTABLE.)
- TYPICAL LOOP DETECTOR SIZES ARE 6' X 6', 6' X 10', 6' X 15' AND 6' X 20'. REFER TO INTERSECTION LAYOUT FOR SPECIFIC LOOP DETECTORS TO BE PLACED.
- ALL LOOP DETECTORS SHALL HAVE FOUR TURNS OF CONDUCTORS.

TYPICAL NMC LOOP DETECTOR INSTALLATION

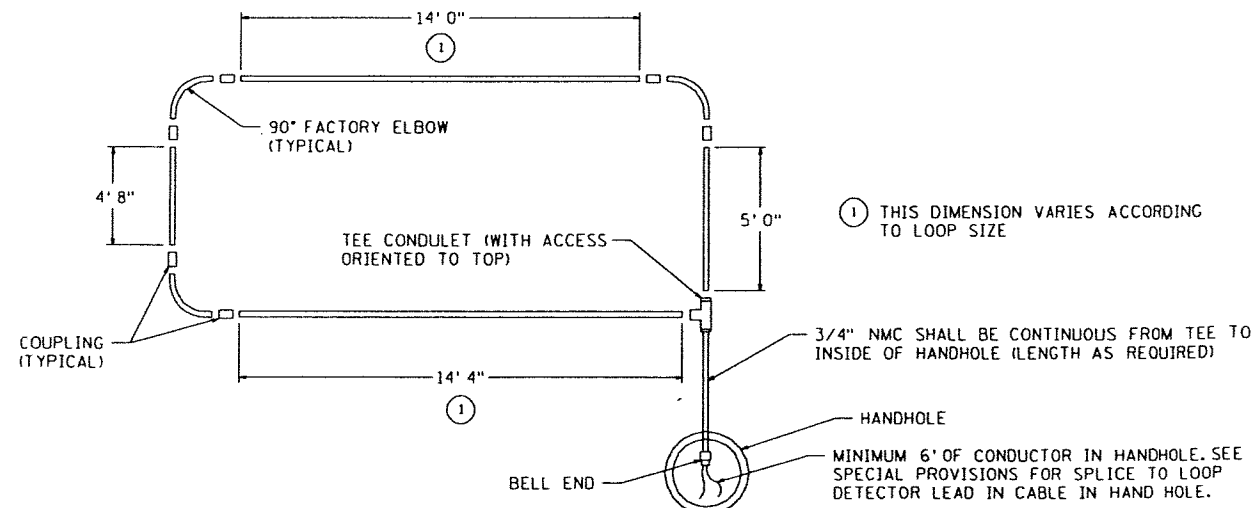


NOTES:

- USE THE ACTUAL LOOP DETECTOR TO BE PLACED FOR MARKING THE PAVEMENT FOR MILLING LOCATION.
- MILL PAST THE CENTER OF THE CONDUIT TO BE PLACED.
- ACHIEVE A MINIMUM TWO INCH VERTICAL EDGE ON ALL CUTS.
- AN AIR COMPRESSOR UNIT (50 HP) IS REQUIRED FOR REMOVING ALL LOOSE MATERIAL FROM TRENCH PRIOR TO TACK COAT APPLICATION.
- APPLY A TACK COAT AT A UNIFORM RATE TO THE BOTTOM AND EDGES OF THE MILLED AREA. USE AN EMULSIFIED ASPHALT PER SPEC. 2357.2A.
- USE MIXTURE 41 WEARING COURSE (TYPE 41WEA50055) TO BACKFILL THE TRENCH. OTHER WEARING COURSE TYPE MIXTURES ARE ALLOWED WHEN APPROVED BY THE ENGINEER. (AGGREGATE SIZE "A" IS REQUIRED.)
- THE USE OF PETROLEUM DISTILLATES AS AN ANTI-ADHESIVE AGENT IS NOT ALLOWED. REFER TO MN/DOT TECH MEMO NO. 94-16-MRE-05 DATED 3/10/94 FOR ADDITIONAL INFORMATION.
- COMPACTION SHALL BE OBTAINED BY THE ORDINARY COMPACTION METHOD. BACKFILL THE TRENCH WITH A MINIMUM OF TWO LIFTS AND COMPACT EACH LIFT. BEFORE COMPACTION THE FIRST LIFT, ENSURE THAT THERE IS ADEQUATE MIXTURE ON EACH SIDE AND ABOVE THE CONDUIT SO THAT THE CONDUIT IS NOT DAMAGED DURING COMPACTION OPERATIONS.
- THE COMPACTED MIXTURE IN THE TRENCH SHOULD BE LEFT 1/4" TO 1/2" ABOVE THE ADJACENT PAVEMENT SURFACE TO PROVIDE FOR ADDITIONAL COMPACTION BY TRAFFIC.
- APPLY A BITUMINOUS FOG SEAL ON THE NEWLY COMPACTED MIXTURE TO PROVIDE AN ADDITIONAL SURFACE SEAL (EMULSIFIED ASPHALT 2355.2A). DRY SAND SHALL BE SPREAD ON THE FOG SEAL TO PREVENT MATERIAL PICKUP AND TRACKING.

② VARIABLE DEPTH-MAINTAIN DRAINAGE TO HANDHOLE

TYPICAL NMC LOOP DETECTOR DETAIL- (6' X 15' LOOP)



DETAILS

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Approved By:

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

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MINNESOTA DEPARTMENT OF TRANSPORTATION
NMC LOOP DETECTOR DETAILS
SIGNAL PLAN
S.A.P. 71-601-20

SHEET
7
OF
9
SHEETS

STANDARD PLATES

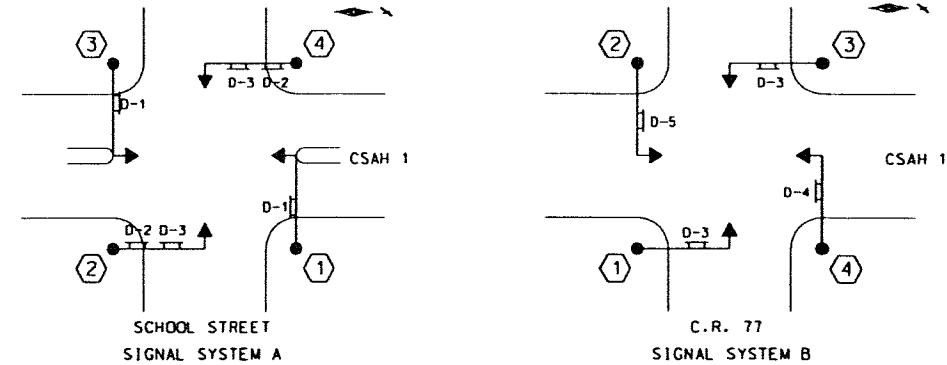
THESE STANDARD PLATES AS APPROVED BY FHWA SHALL APPLY:

PLATE NO.	DESCRIPTION
* 8110 D	TRAFFIC SIGNAL BRACKETING - POLE MOUNTED
8111 C	TRAFFIC SIGNAL BRACKETING - PEDESTAL MOUNTED
8112 C	PEDESTAL FOUNDATION
8113 C	MAGNETIC VEHICLE DETECTOR INSTALLATION
* 8114 A	PVC HANDHOLE / PULL BOX
* 8115 D	PEDESTRIAN PUSH BUTTON INSTALLATION
* 8118 C	SERVICE EQUIPMENT AND POLE
* 8119 C	GROUND MOUNTED CABINET FOUNDATION
8120 K	POLE FOUNDATION (PA85)
* 8121 D	TRANSFORMER BASE WITH POLE BASE
8122 C	PEDESTAL AND PEDESTAL BASE
* 8123 D	POLE AND MAST ARM
* 8124 E	SIGNAL HEAD MOUNTS
* 8126 F	POLE FOUNDATION (PA100 & PA90)
3124 B	METAL APRON CONNECTION
3221 C	CORRUGATED STEEL PIPE COUPLING BAND

* - APPLIES TO THIS PROJECT

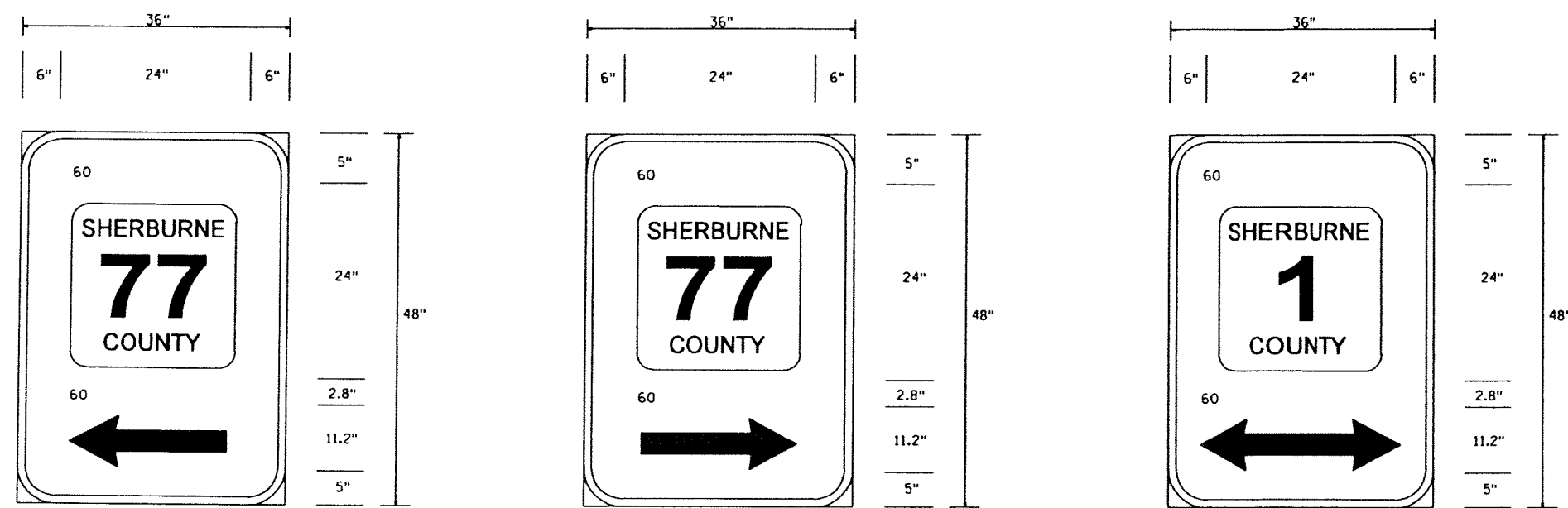
ABBREVIATIONS

3-1(EG)	SIGNAL HEAD PHASE "3" - NO. "1"	P1-(EG)	PEDESTRIAN INDICATION PHASE "2"-NO. "1"
BR. GR.	BARE GROUND	PB	PUSH BUTTON
CH. SW.	CHECK SWITCH	PB-2(EG)	PUSH BUTTON PHASE "2"-NO. "1"
CLR	CLEAR	PEC	PHOTOELECTRIC CELL
D2-1(EG)	DETECTOR PHASE "2" - NO. "1"	PED	PEDESTRIAN
DWK	DON'T WALK	R	RED
EOG	EQUIPMENT GROUND	R&S	REMOVE AND SALVAGE
EVP	EMERGENCY VEHICLE PRE-EMPTION	RLTA	RED LEFT TURN ARROW
F&I	FURNISH AND INSTALL	RRTA	RED RIGHT TURN ARROW
FL	FLASH/FLASHING	RSC	RIGID STEEL CONDUIT
G	GREEN	SOP	SOURCE OF POWER
GLTA	GREEN LEFT TURN ARROW	SPR	SPARE
GRN	GREEN	ST. LHT.	STREET LIGHT
GR. R.	GROUND ROD	STA	STATION
GRTA	GREEN RIGHT TURN ARROW	SW	SWITCH
GTHA	GREEN THRU ARROW	SWD	SWITCHED
HH	HANDHOLE	TDW	TELEPHONE DROP WIRE
HPS	HIGH PRESSURE SODIUM	WLK	WALK
JB	JUNCTION BOX	YEL	YELLOW
LUM	LUMINAIRE	YLTA	YELLOW LEFT TURN ARROW
NEU	NEUTRAL	YRTA	YELLOW RIGHT TURN ARROW
NMC	NONMETALLIC CONDUIT	YTHA	YELLOW THRU ARROW



TYPE "D" SIGNS

SIGN PANEL	SIGNAL SYSTEM	POLE NO.	α (FT.)	SIZE (IN.)	NO. POSTS PER SIGN	POST SPACING (IN.)	AREA/SIGN (SQ. FT.)	NO. REQ.
D-1	A	1,3	13.0	70 X 18	2	24	8.75	2
D-2	A	2,4	9.0	86 X 18	2	24	10.75	2
D-3	A	2,4	2.0	36 X 48	2	24	12.0	2
D-3	B	1,3	2.0	36 X 48	2	24	12.0	2
D-4	B	4	2.0	36 X 48	2	24	12.0	1
D-5	B	2	2.0	36 X 48	2	24	12.0	1

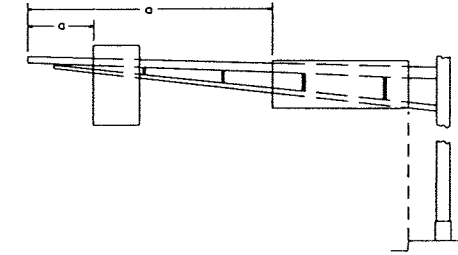


D-5
36" X 48" .6" R, 1.2B
LINE 1 : 24.0 : 24" X 24" -- 10" NUM
LINE 2 : 24.0 : 5-24 ARROW LT

D-4
36" X 48" .6" R, 1.2B
LINE 1 : 24.0 : 24" X 24" -- 10" NUM
LINE 2 : 24.0 : 5-24 ARROW RT

D-3
36" X 48" .6" R, 1.2B
LINE 1 : 24.0 : 24" X 24" -- 10" NUM
LINE 2 : 24.0 : 5-24 DBL ARROW

MAST ARM SIGN LOCATION



- NOTES:**
- ALL SIGN COLORS, WHITE LEGEND AND BORDER ON GREEN BACKGROUND, SHALL BE FULLY REFLECTORIZED.
 - CORNERS EXTENDING BEYOND THE BORDER SHALL NOT BE TRIMMED.
 - SEE STANDARD SIGNS MANUAL FOR ARROW AND OVERLAY DETAILS.
 - FOR STRUCTURAL DETAILS, TYPE "D" SIGNS, SEE STANDARD SIGNS MANUAL, PAGES 105A AND 105B.
 - FOR TYPE "D" STRINGER AND PANEL JOINT DETAIL, SEE STANDARD SIGNS MANUAL.
 - FURNISHING AND INSTALLING TYPE "D" AND TYPE "R" SIGNS SHALL BE INCIDENTAL TO THE INDIVIDUAL SIGNAL SYSTEM.



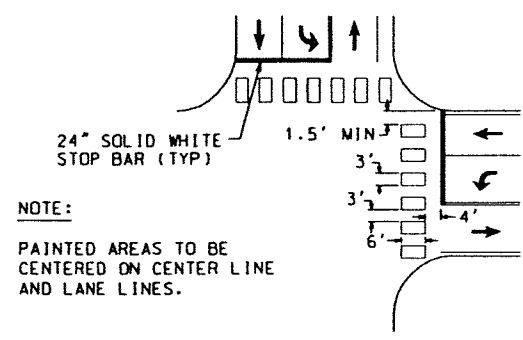
D-1
70" X 18" .3" R, 1.0B
LINE 1 : 60.02" : 8" - 6" E MOD



D-2
86" X 18" .3" R, 1.0B
LINE 1 : 75.21" : 8" - 6" E MOD

OVERLAYS

CODE NO.	QUANTITY	SIZE	LEGEND	SQ. FT. PER OVERLAY
M1-X4A	4	24" X 24"	1	4.0
M1-X4A	2	24" X 24"	77	4.0



NOTE:
PAINTED AREAS TO BE CENTERED ON CENTER LINE AND LANE LINES.

CROSSWALK DETAIL

DETAILS

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MINNESOTA DEPARTMENT OF TRANSPORTATION

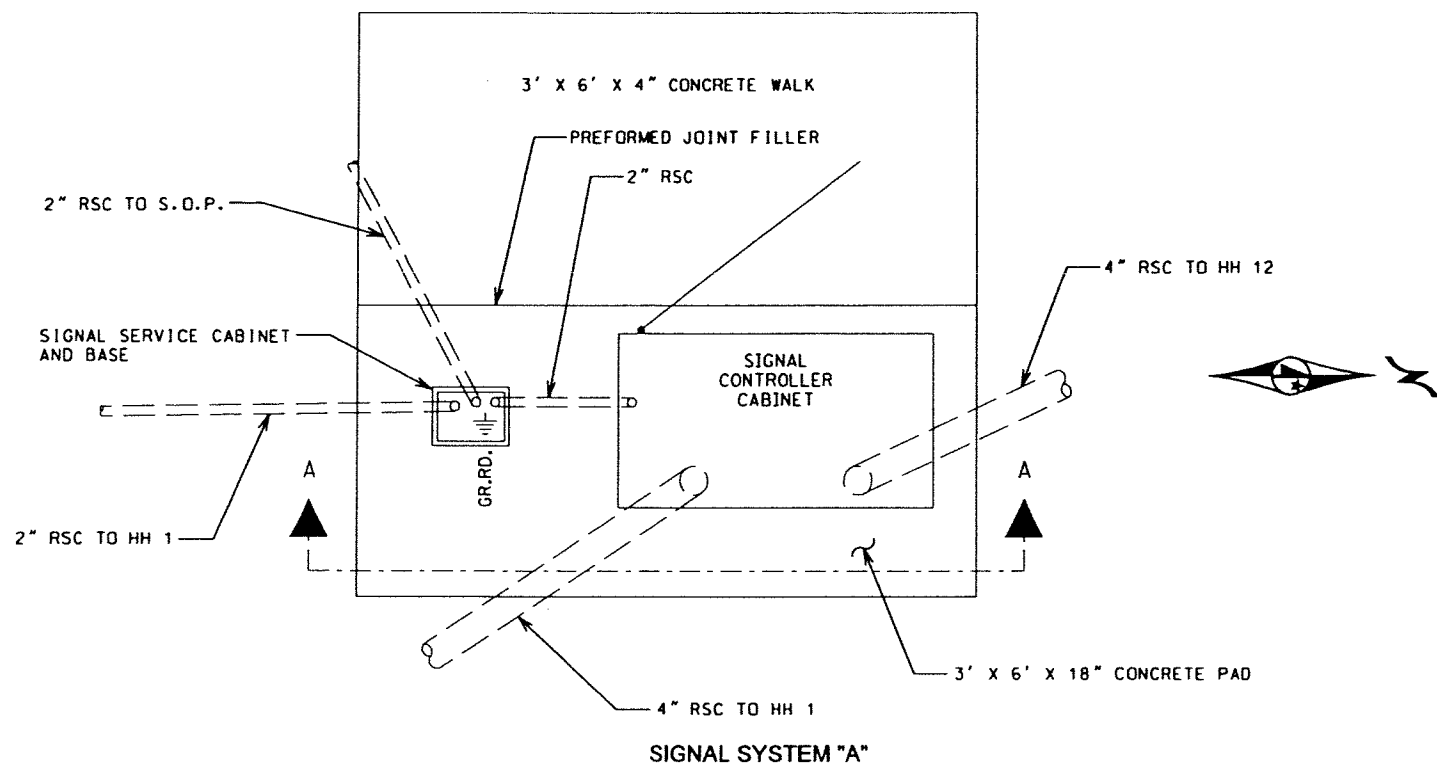
TYPE D SIGNS
SIGNAL PLAN
S.A.P. 71-601-20

SHEET
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SHEETS

TYPICAL PAD WITH CONTROLLER CABINET AND SERVICE CABINET

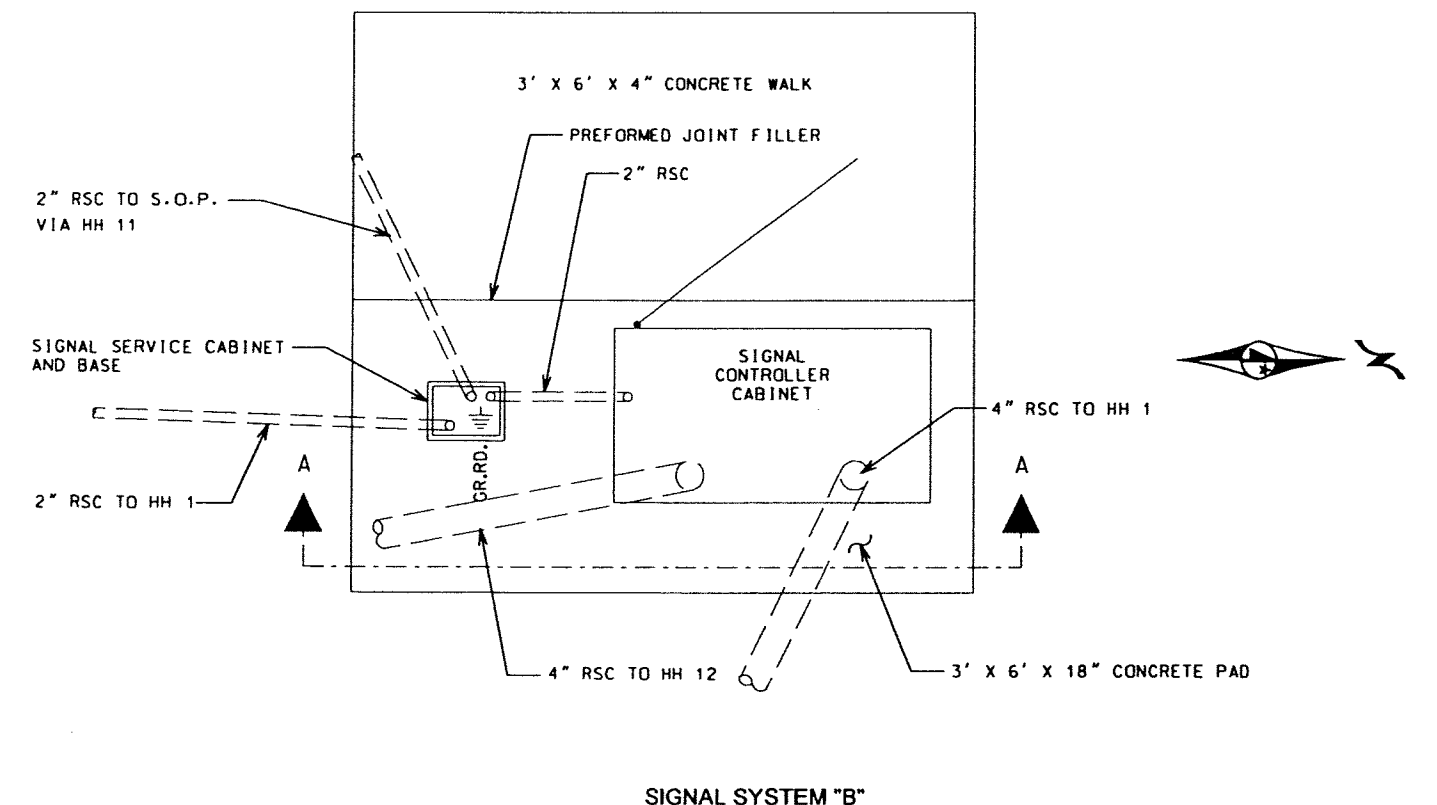
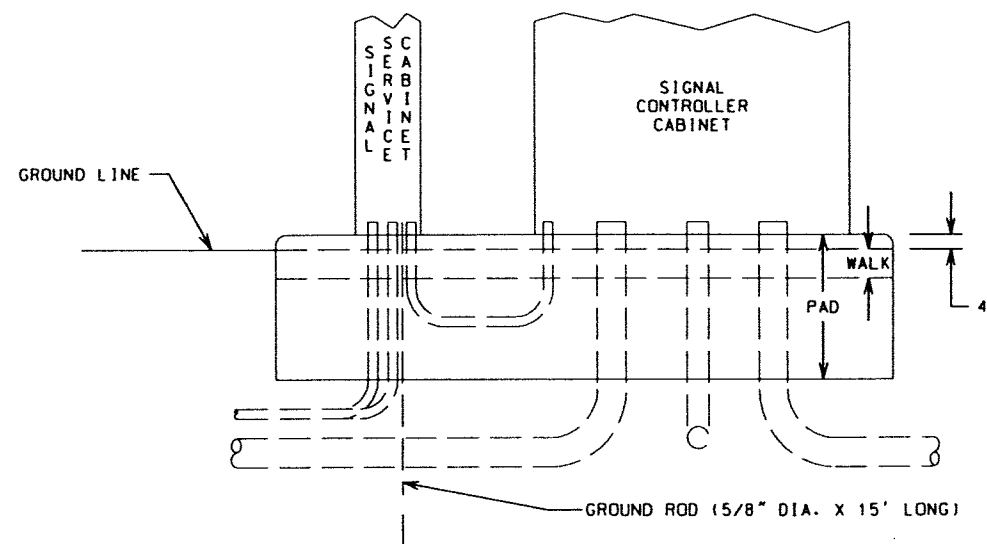
SEE INTERSECTION LAYOUT FOR CABLE INFORMATION (NOT TO SCALE)

PLAN VIEW



- NOTES:
1. ANCHOR RODS, NUTS AND WASHERS FOR CONTROLLER CABINET TO BE FURNISHED BY MNDOT.
 2. THE UPPER PART OF THE EQUIPMENT PAD SHALL BE BEVELLED OR CHAMFERED IN A NEAT MANNER AS DIRECTED BY THE ENGINEER.
 3. THE TOP OF THE CONDUITS SHALL BE THREADED AND CAPPED AFTER INSTALLATION (UNTIL CABLES ARE INSTALLED).
 4. CONDUIT SHALL PROJECT A MINIMUM OF 2 INCHES ABOVE THE CONCRETE AND SHALL BE LOCATED INSIDE THE CABINET WHERE DIRECTED BY THE ENGINEER, BUT SHALL NOT INTERFERE WITH THE CABINET FUNCTIONS (SUPPORTING MEMBERS, ETC.).
 5. CONCRETE MIX 3A32 OR EQUAL SHALL BE USED FOR THE EQUIPMENT PAD AND SIDEWALK.
 6. CONDUITS WITH BOTH ENDS TERMINATING WITHIN THE PAD SHALL NOT BE INSTALLED BELOW THE CONCRETE.
 7. THE EXACT LOCATION OF CONDUITS WITHIN THE PAD SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.

SECTION A - A



DETAILS

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MINNESOTA DEPARTMENT OF TRANSPORTATION
EQUIPMENT PAD DETAILS
SIGNAL PLAN
S.A.P. 71-601-20

SHEET 9 OF