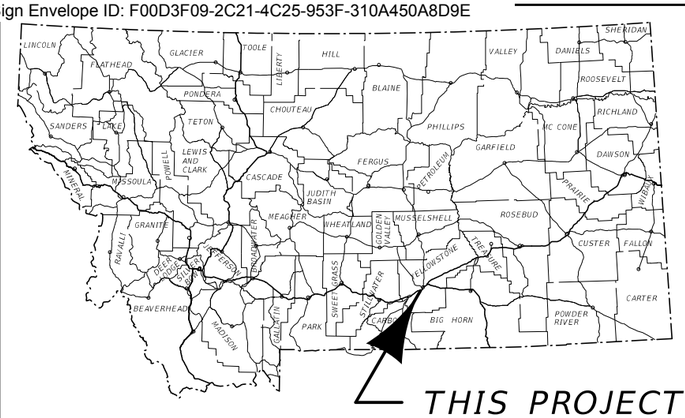
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MONTANA DEPARTMENT OF TRANSPORTATION

FEDERAL AID PROJECT NO. HSIP 1011(17)
SF 169 FRNTG RD WISE LN INTX
INTERSECTION IMPROVEMENTS
YELLOWSTONE COUNTY

LENGTH N/A MILES

PROJECT DESIGN DATA		
PRESENT	2018	A.D.T. = 4,940
LETTING	2020	A.D.T. = 5,040
DESIGN	2040	A.D.T. = 6,150
		D.H.V. = 700
		TRUCKS = 3.8%

THIS CONTRACT

RP 5.093 TO RP 5.231 ON X-56683
(S FRONTAGE RD)

RP 3.441 TO RP 3.698 ON C001011
(S FRONTAGE RD / WISE LN)

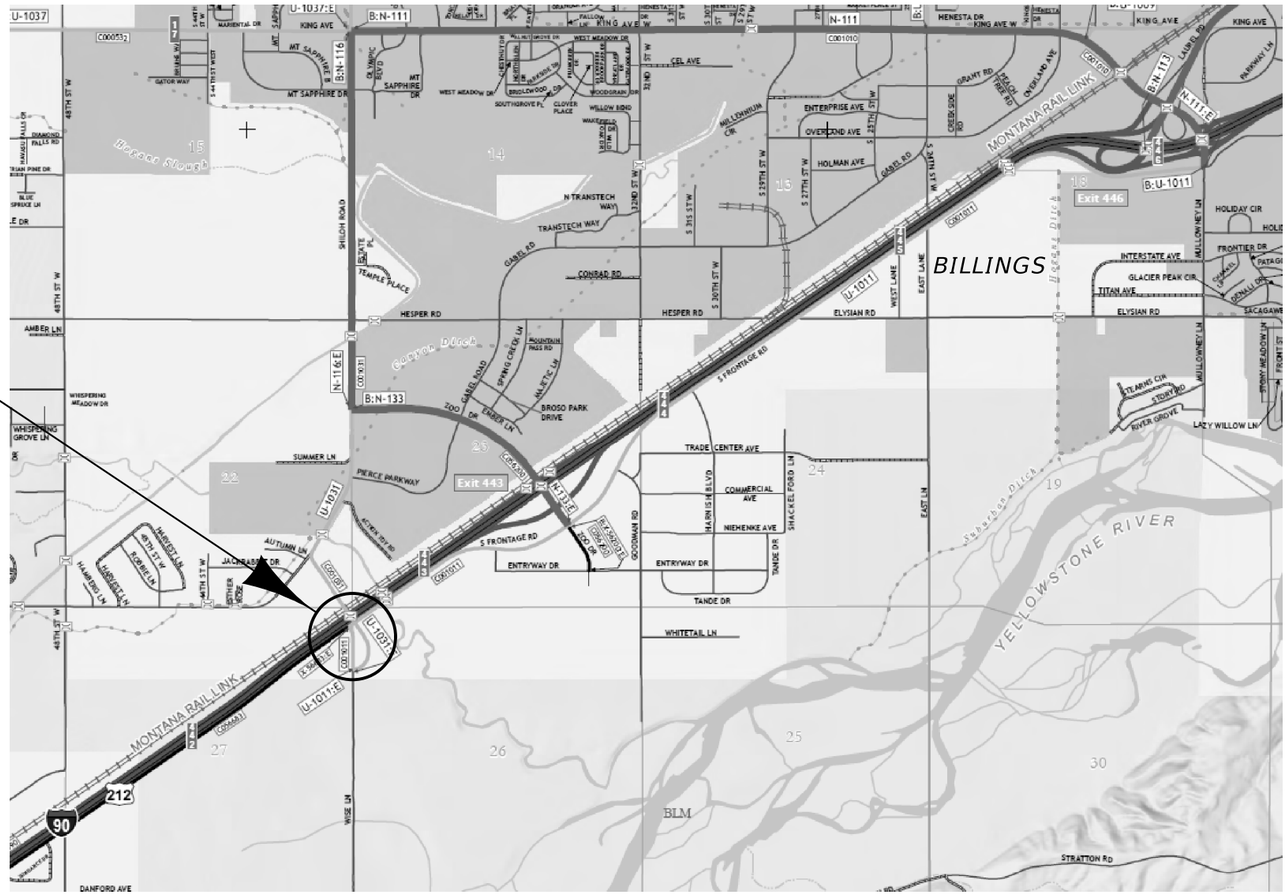


TABLE OF CONTENTS	
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ELECTRICAL QUANTITIES & DETAILS	E1 - E4
ELECTRICAL PLANS	E5

MONTANA
DEPARTMENT OF TRANSPORTATION

MALCOLM "MACK" LONG
DIRECTOR OF TRANSPORTATION

APPROVED BY:

TRAFFIC AND SAFETY
ENGINEER

MONTANA
GABE B. PRIEBE
13957PE
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Gabe Priebe
4895FFA73587466...

5/4/2021
DATE

RELATED PROJECTS

ASSOCIATED PROJECT AGREEMENT NUMBERS	
R / W	
I.C.	
P. E.	HSIP-G 1011(16)

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	C:\dgn\9384000ELTTL001.DGN	DESIGNED BY		
2		1/11/2021	REVIEWED BY		
		7:41:59 AM u7893	CHECKED BY		

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SUMMARY
SIGNING & DELINEATION QUANTITIES

MATERIAL	TOTAL	UNIT
SIGNS-SHEET ALUMINUM-REFLECTIVE SHEETING(IV)		SQ. FOOT
SIGNS-SHEET ALUMINUM-REFLECTIVE SHEETING(XI)	85.3	SQ. FOOT
SIGNS-ALUMINUM SHEET INCREMENT SHEETING (IV)		SQ. FOOT
SIGNS-ALUMINUM SHEET INCREMENT SHEETING (XI)	21.0	SQ. FOOT
OVERLAY-SHEET ALUMINUM		SQ. FOOT
POSTS-STEEL "U"		POUNDS
POLES-TREATED WOOD-4" DIA.		LINEAR FT.
POLES-TREATED WOOD-5" DIA.	28	LINEAR FT.
POLES-TREATED TIMBER-CLASS 4		LINEAR FT.
POLES-TREATED TIMBER-CLASS 3		LINEAR FT.
POSTS-TUBULAR STEEL (ROUND)		POUNDS
POSTS-TUBULAR STEEL (SQUARE PERFORATED)		POUNDS
POSTS-STRUCTURAL STEEL		POUNDS
OVERHEAD STRUCTURE-METAL-CANTILEVER		EACH
OVERHEAD STRUCTURE-METAL-BRIDGE		EACH
HIGHWAY TRAFFIC STRIPING-WHITE		GAL.(S)
HIGHWAY TRAFFIC STRIPING-YELLOW		GAL.(S)
WORDS & SYMBOLS		GAL.(S)
DELINEATOR-DESIGN A	8	EACH
DELINEATOR-DESIGN B		EACH
DELINEATOR-DESIGN C		EACH
DELINEATOR-DESIGN D	2	EACH
DELINEATOR-DESIGN E		EACH
DELINEATOR-DESIGN F		EACH
DELINEATOR-DESIGN G		EACH
DELINEATOR-DESIGN H		EACH
REMOVE SIGNS	3	EACH
REMOVE SIGNS-GUIDE		EACH
RESET SIGNS		EACH
RESET SIGNS-GUIDE		EACH
FRANGIBLE SIGN POST BREAKAWAY DEVICE-		EACH
FRANGIBLE SIGN POST BREAKAWAY DEVICE-		EACH
SQUARE TUBULAR SLIPBASE BREAKAWAY DEVICE-3"		EACH

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SIGN LOCATION AND SPECIFICATIONS

STATION	RAMP NO.	SIGN NO.	PANEL SIZE	REFL SHTG TYPE: BACK-GROUND	REFL SHTG TYPE: LEGEND	FEET: CLEARANCE	FEET: SIGN SUPPORT SPACING	TYPE OF SUPPORT	FEET: CANTILEVER	FEET: SUPPORT LENGTH (ESTIMATED)	FEET: SUPPORT LENGTH (INSTALLED)	FEET: MOUNTING HEIGHT	FEET: FOUNDATION DEPTH	SIGN PANEL (SQ. FT.): SHEET ALUMINUM	SIGN PANEL (SQ. FT.): ALUMINUM SHEET INCREMENT	SIGN PANEL (SQ. FT.): ALUMINUM SHEET OVERLAY	TIMBER POLE (LINEAR FT.): 4" TOP DIA.	TIMBER POLE (LINEAR FT.): 5" TOP DIA.	STEEL POST(LBS.): ROUND TUBULAR	STEEL POST(LBS.): SQUARE TUBULAR	STEEL POST(LBS.): STRUCTURAL STEEL	STEEL POST(LBS.): "U" POST	BREAKAWAY	SIGNS REMOVE	SIGNS RESET	GUIDE REMOVE	GUIDE RESET	REMARKS	
LOC-1		W26-2 W26-3	48 X 24 48 X 48	XI XI		10-0		**				5-0	**	8.0 XI 16.0 XI													BBR	NEW INSTALLATION	** SEE ELECTRICAL PLANS AND DETAILS
LOC-2		W26-2 W26-3	48 X 24 48 X 48	XI XI		10-0		**				5-0	**	8.0 XI 16.0 XI													BBR	NEW INSTALLATION	** SEE ELECTRICAL PLANS AND DETAILS
LOC-3		R1-1 W4-4P	48 X 48 48 X 24	XI XI		6-0		**				9-0	**	13.3 XI 8.0 XI										1			BBR	REPLACE	** SEE ELECTRICAL PLANS AND DETAILS
LOC-4		W3-1	48 X 48	XI		10-0		**				5-0	**	16.0 XI										1			BBR	REPLACE	** SEE ELECTRICAL PLANS AND DETAILS
LOC-5		W1-7A	72 X 42	XI		15-0	3-8	5" DIA POLES		13-2		5-0	3-6		21.0 XI			14 14						1				REPLACE	
LOC-6		W26-1	48 X 48	XI		10-0		**				5-0	**	**														LED EMBEDED SIGNS NEW INSTALLATION	** SEE ELECTRICAL PLANS AND DETAILS
LOC-7		W26-1	48 X 48	XI		10-0		**				5-0	**	**														LED EMBEDED SIGNS NEW INSTALLATION	** SEE ELECTRICAL PLANS AND DETAILS
TOTALS														85.3 XI	21.0 XI			28						3					

DELINEATION TABLE		
	DESIGN "A"	8
	DESIGN "B"	
	DESIGN "C"	
	DESIGN "D"	2
	DESIGN "E"	
	DESIGN "F"	
	DESIGN "G"	
	DESIGN "H"	
	DESIGN "J"	
	DESIGN "BJ"	
	DESIGN "GJ"	
	REMOVE DELINEATORS	

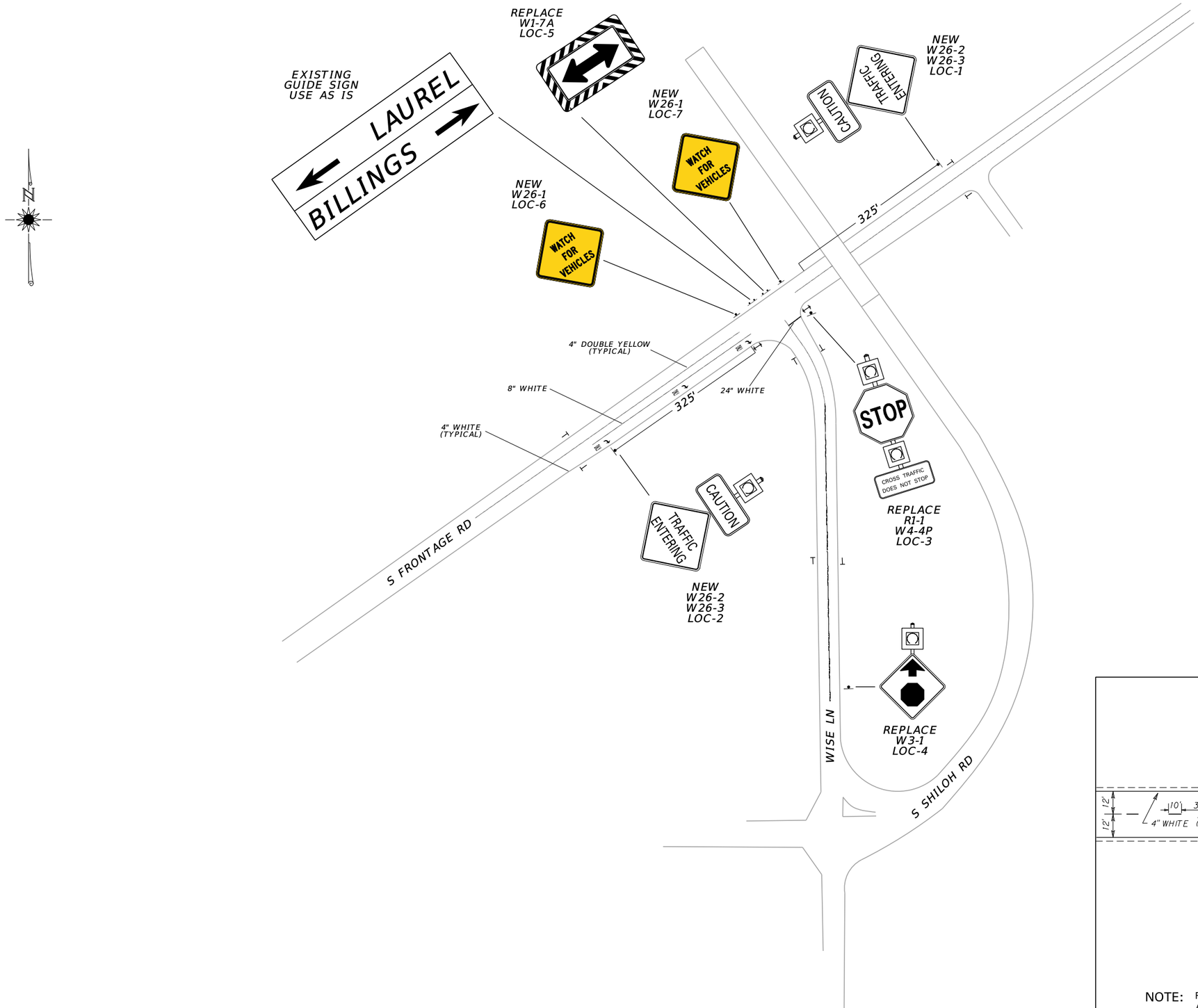
MOUNTING HEIGHT REQUIREMENTS:
MOUNTING HEIGHTS SHOWN REFER TO THE BOTTOM OF THE MAJOR PANEL. SEE DETAILED DRAWINGS 619-00 & 619-08.

BBR = BACKBRACING REQUIRED:
- FOR WOOD POST 2" x 4" REQ'D.
- FOR STRUCTURAL STEEL 2" x 2" x 1/4" ANGLE IRON REQ'D.

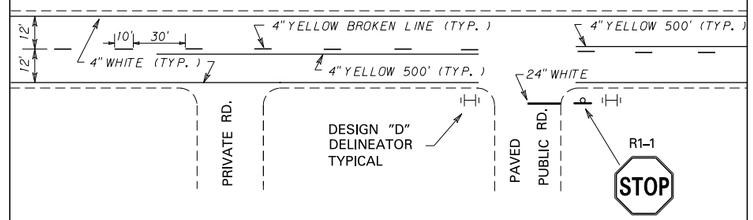
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2		5/19/2020	CHECKED	STEVE ROGNE		YELLOWSTONE COUNTY	UPN #9384000	S2
1		11:13:10 AM CPS - U1376						

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TYPICAL
PAVEMENT MARKINGS
NO SCALE



NOTE: FINAL CENTERLINE CONFIGURATION AND NO PASSING ZONES TO BE DETERMINED BY THE PROJECT MANAGER.

ALL PAVEMENT MARKINGS TO BE EPOXY UNLESS OTHERWISE SPECIFIED.

3	MDT MONTANA DEPARTMENT OF TRANSPORTATION	C:\DGN\9384000sipln001.dgn	DESIGNED	NATHAN STYREN		SIGNING PLANS	SF 169 FRNTG RD WISE LN INTX	HSIP 1011(17)
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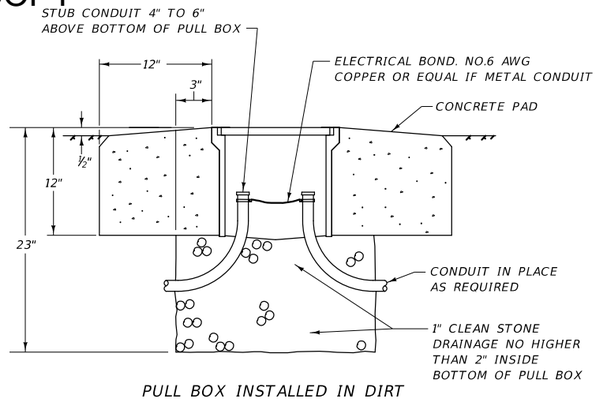
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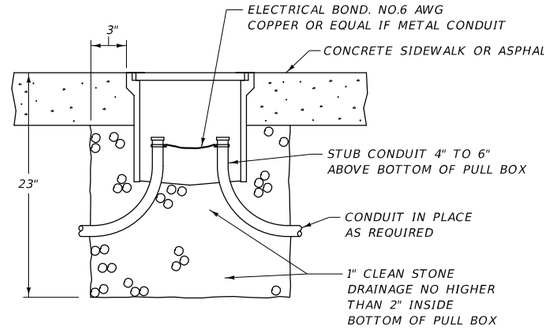
ELECTRICAL QUANTITY SUMMARY

ITEM NO.	MATERIAL	TOTAL	UNIT
616 343 920	CONDUIT - PLASTIC 2 IN	1,800.0	LN FT
616 783 007	PULL BOX - COMPOSITE TYPE 2	7	EACH
617 000 000	FOUNDATION - CONCRETE	3.0	CU YD
617 033 214	CABLE - COPPER 3AWG14-600 V	1,270.0	LN FT
617 123 108	CONDUCTOR - COPPER AWG8-600 V	2,125.0	LN FT
617 123 110	CONDUCTOR - COPPER AWG10-600 V	1,760.0	LN FT
617 333 100	SERV ASSEMBLY	1	EACH
617 483 110	SIG-TRAF 1 COL-1 WAY 12	5	EACH
617 573 080	LED EMBEDDED SIGN	2	EACH
617 673 200	SIG STANDARD TYPE 1-200	6	EACH
617 763 101	DETECTOR LOOP	2	EACH
617 763 500	DETECTOR - RADAR / PRESENCE	1	EACH
617 763 510	DETECTOR - RADAR / ADVANCE	1	EACH
617 763 601	DETECTOR - LOOP SHLD CABLE	950.0	LN FT
617 903 100	CONTROL UNIT	1	EACH

QUANTITY SUMMARY

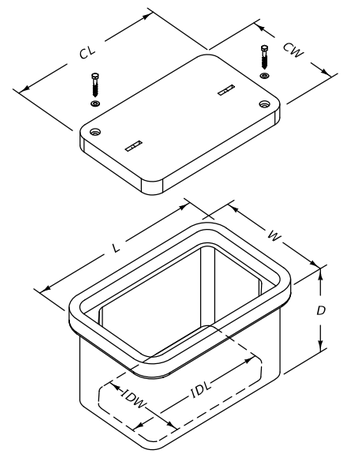


PULL BOX INSTALLED IN DIRT

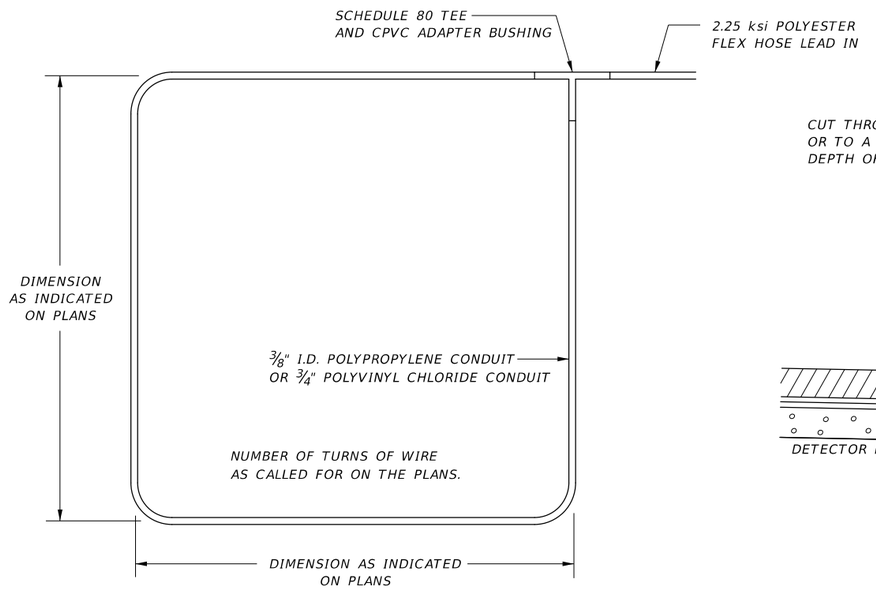


PULL BOX INSTALLED IN A SIDEWALK OR ASPHALT

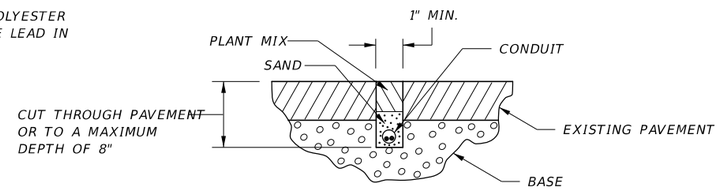
PULL BOX - COMPOSITE MINIMUM DIMENSIONS		
TYPE 1	TYPE 2	TYPE 3
L = 20"	L = 25"	L = 32"
W = 13"	W = 15"	W = 19"
D = 12"	D = 12"	D = 12"
I D L = 17"	I D L = 21"	I D L = 28"
I D W = 10"	I D W = 11"	I D W = 15"
C L = 18"	C L = 23"	C L = 30"
C W = 11"	C W = 13"	C W = 17"



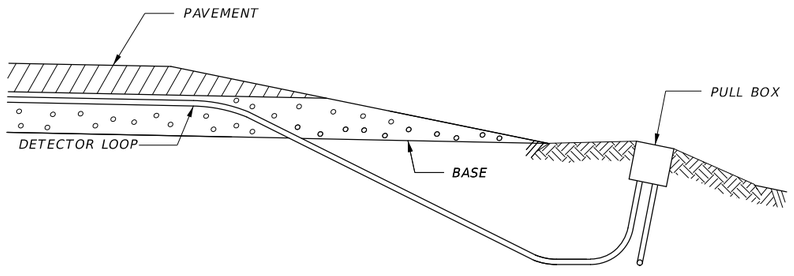
PULL BOX-COMPOSITE TYPE 1,2 & 3
NO SCALE



CONDUIT DETAIL



CROSS SECTION (FOR EXISTING PAVEMENT)



PULL BOX & DETECTOR LOOP LOCATIONS

NOTES

USE STRANDED AWG NO.14 THHN OR TFFN CONDUCTOR IN ⅜" CONDUIT OR STRANDED AWG NO. 12 XHHN CONDUCTOR IN ¾" CONDUIT FOR THE DETECTOR LOOP WIRE. TERMINATE THE LOOP WIRE IN A PULL BOX AT THE SIDE OF THE ROAD WITH A MINIMUM LOOP TAIL LENGTH INSIDE THE PULL BOX OF 4'. ENSURE A MINIMUM OF 1' OF THE LOOP TAIL IS ENCASED IN THE 2250 psi POLYESTER FLEX HOSE, AND A MINIMUM OF 3' OF INSULATED CONDUCTOR IS NEATLY COILED IN THE BOTTOM OF THE PULL BOX FOR EACH LOOP.

EMBED CONDUIT AND LEAD IN HOSE IN SAND. AFTER THE DETECTOR LOOP IS IN PLACE, BACKFILL THE SLOT WITH SAND TO A DEPTH OF 1" ABOVE THE CONDUIT AND LEAD IN HOSE.

MDT PERSONNEL WILL VERIFY THE FOLLOWING LOOP CHARACTERISTICS PRIOR TO ACCEPTANCE:

1. RESISTANCE OF THE LOOP TO GROUND - A RESISTANCE OF LESS THAN 100 MEGOHMS INDICATES A FAULTY LOOP.
2. INDUCTANCE OF THE LOOP - AN INDUCTANCE OF LESS THAN 100 MICROHENRIES INDICATES A FAULTY LOOP.
3. LOOP RESISTANCE - A RESISTANCE OF MORE THAN 5 OHMS INDICATES A FAULTY LOOP.

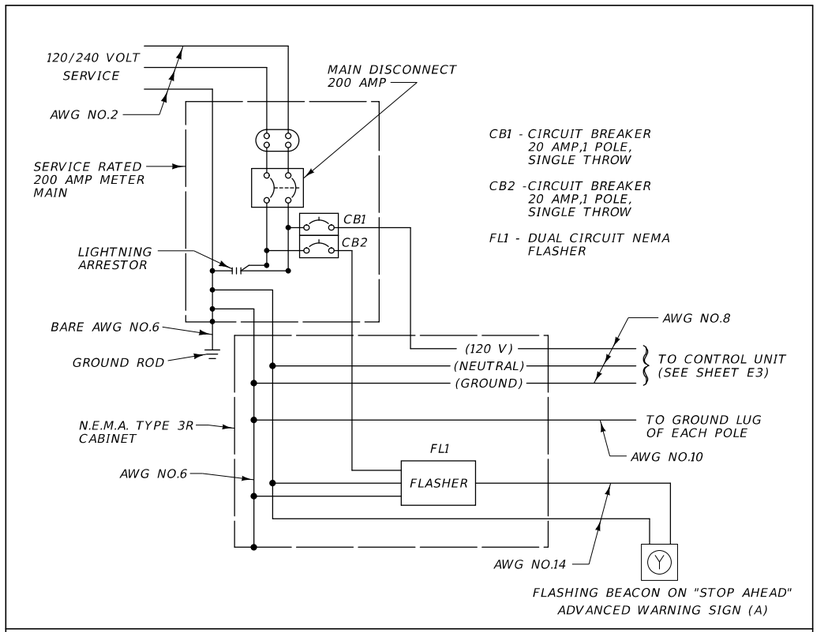
REPAIR FAULTY LOOPS AT NO COST TO THE STATE.

DETECTOR LOOP INSTALLATION
NO SCALE

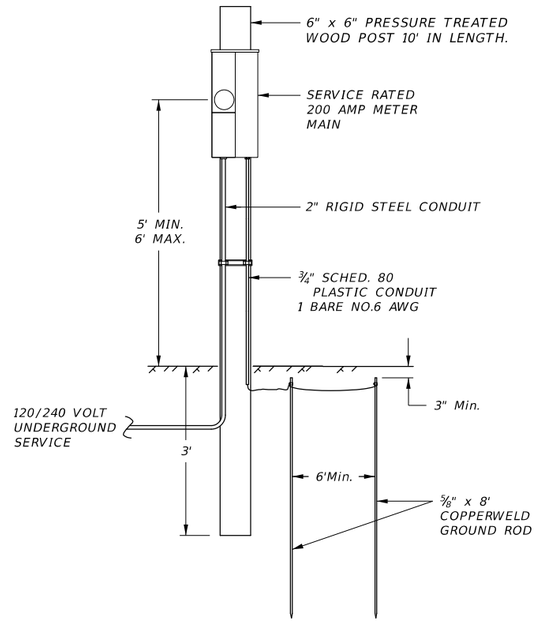
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2		1/26/2021	REVIEWED BY				
		11:03:35 AM u7893	CHECKED BY			YELLOWSTONE COUNTY	UPN 9384000 / SHEET E1

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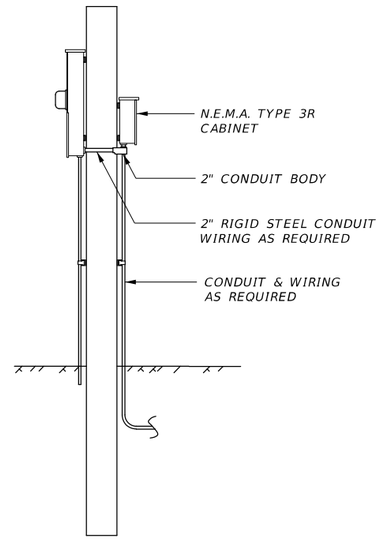
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SERVICE WIRING DIAGRAM



FRONT



SIDE

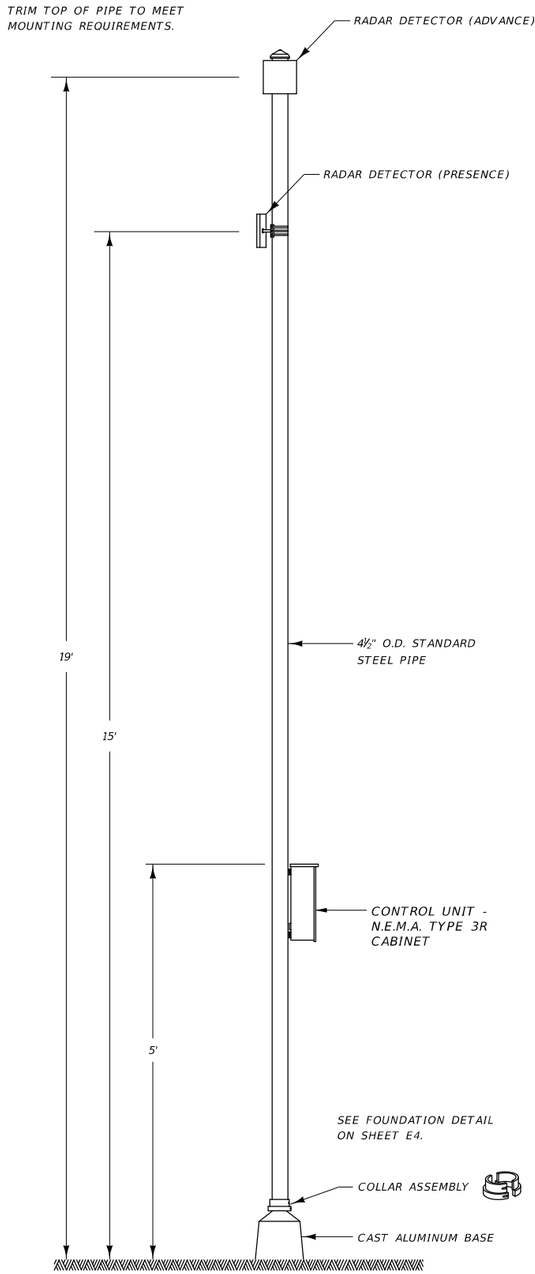
UNDERGROUND SERVICE

ASSEMBLY DETAIL

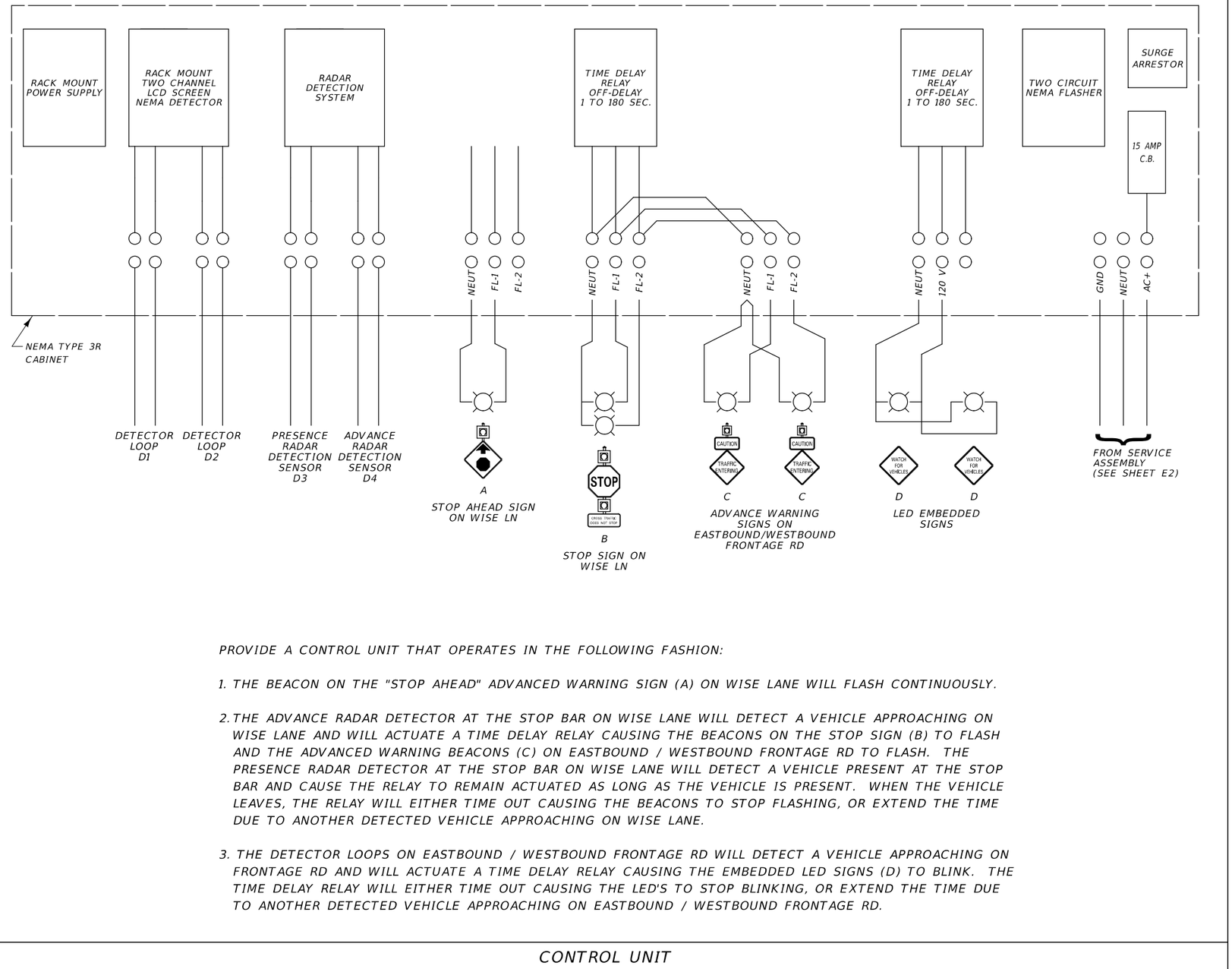
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MOUNT CONTROL CABINET AND RADAR DETECTION SENSORS ON SIGNAL STANDARD TYPE 1-200



PROVIDE A CONTROL UNIT THAT OPERATES IN THE FOLLOWING FASHION:

1. THE BEACON ON THE "STOP AHEAD" ADVANCED WARNING SIGN (A) ON WISE LANE WILL FLASH CONTINUOUSLY.

2. THE ADVANCE RADAR DETECTOR AT THE STOP BAR ON WISE LANE WILL DETECT A VEHICLE APPROACHING ON WISE LANE AND WILL ACTUATE A TIME DELAY RELAY CAUSING THE BEACONS ON THE STOP SIGN (B) TO FLASH AND THE ADVANCED WARNING BEACONS (C) ON EASTBOUND / WESTBOUND FRONTAGE RD TO FLASH. THE PRESENCE RADAR DETECTOR AT THE STOP BAR ON WISE LANE WILL DETECT A VEHICLE PRESENT AT THE STOP BAR AND CAUSE THE RELAY TO REMAIN ACTUATED AS LONG AS THE VEHICLE IS PRESENT. WHEN THE VEHICLE LEAVES, THE RELAY WILL EITHER TIME OUT CAUSING THE BEACONS TO STOP FLASHING, OR EXTEND THE TIME DUE TO ANOTHER DETECTED VEHICLE APPROACHING ON WISE LANE.

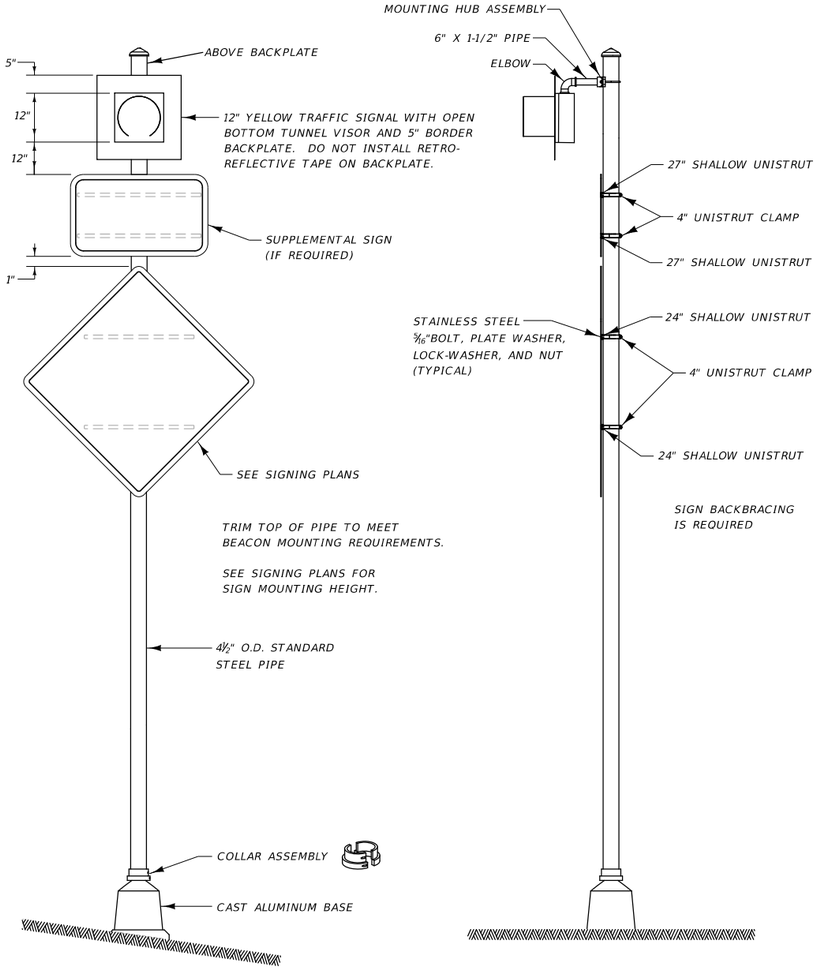
3. THE DETECTOR LOOPS ON EASTBOUND / WESTBOUND FRONTAGE RD WILL DETECT A VEHICLE APPROACHING ON FRONTAGE RD AND WILL ACTUATE A TIME DELAY RELAY CAUSING THE EMBEDDED LED SIGNS (D) TO BLINK. THE TIME DELAY RELAY WILL EITHER TIME OUT CAUSING THE LED'S TO STOP BLINKING, OR EXTEND THE TIME DUE TO ANOTHER DETECTED VEHICLE APPROACHING ON EASTBOUND / WESTBOUND FRONTAGE RD.

CONTROL UNIT

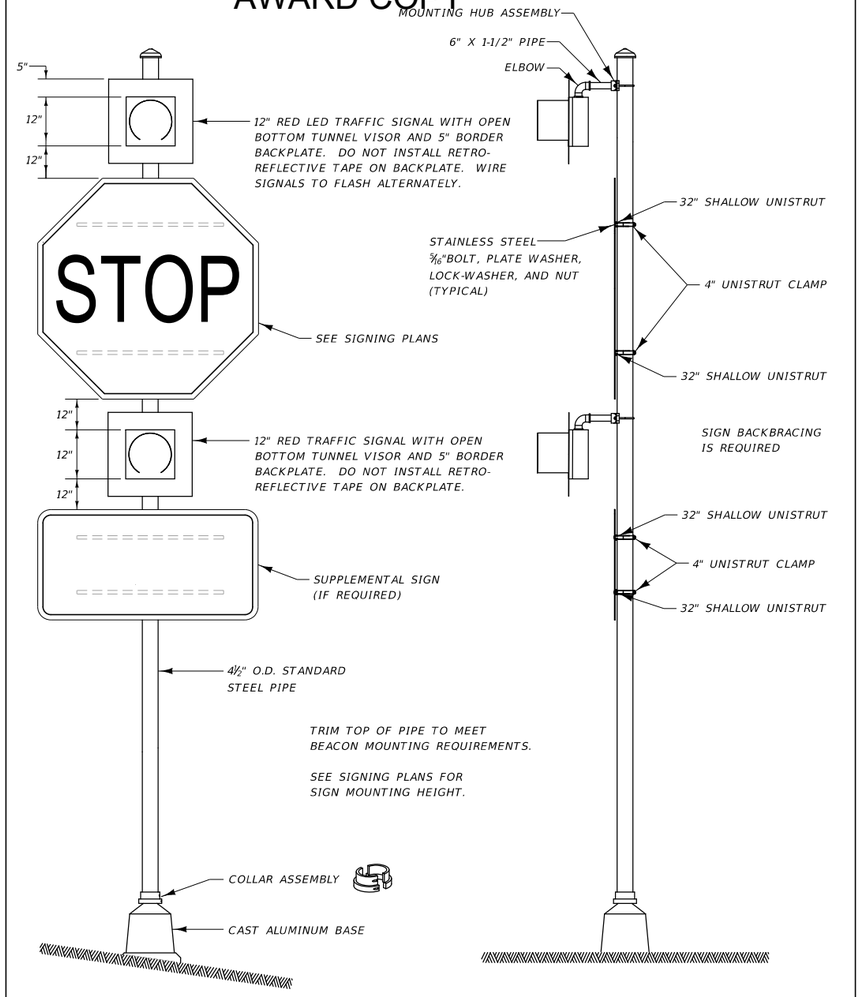
CONTROL UNIT DETAIL
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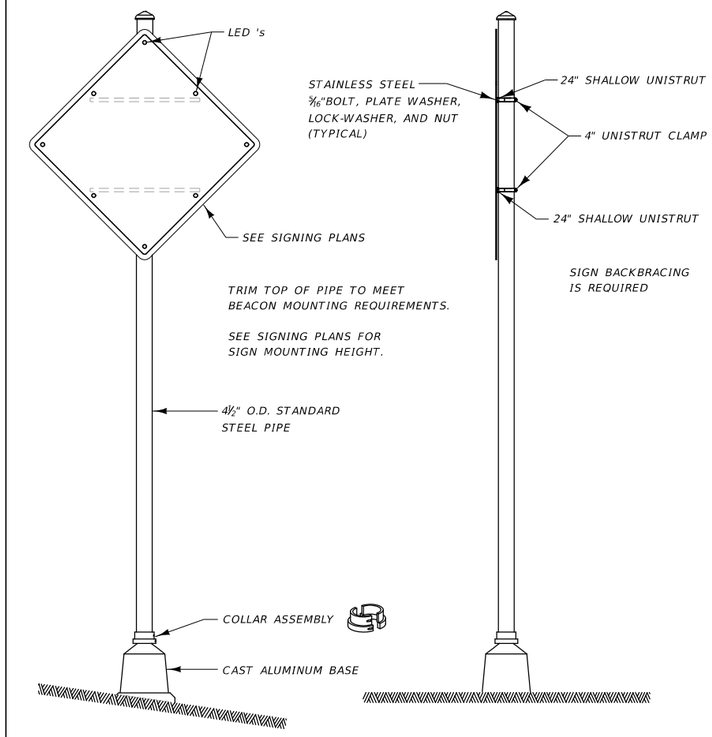
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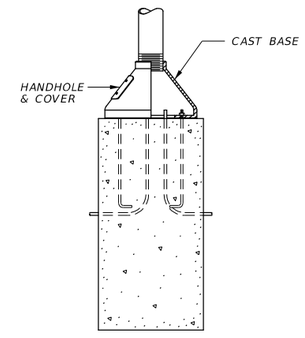
(A) AND (C)



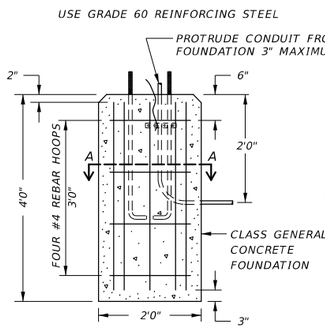
(B)

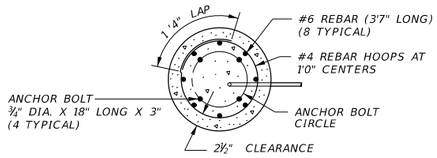


(D)



SLOPE GROUND AROUND FOUNDATION AS REQUIRED. NO PART OF THE FOUNDATION OR ANCHOR BOLTS MAY PROTRUDE MORE THAN 4 INCHES ABOVE GROUND AFTER BREAKAWAY.





SECTION A-A

FOUNDATION (TYPICAL)

SIGNAL STANDARD

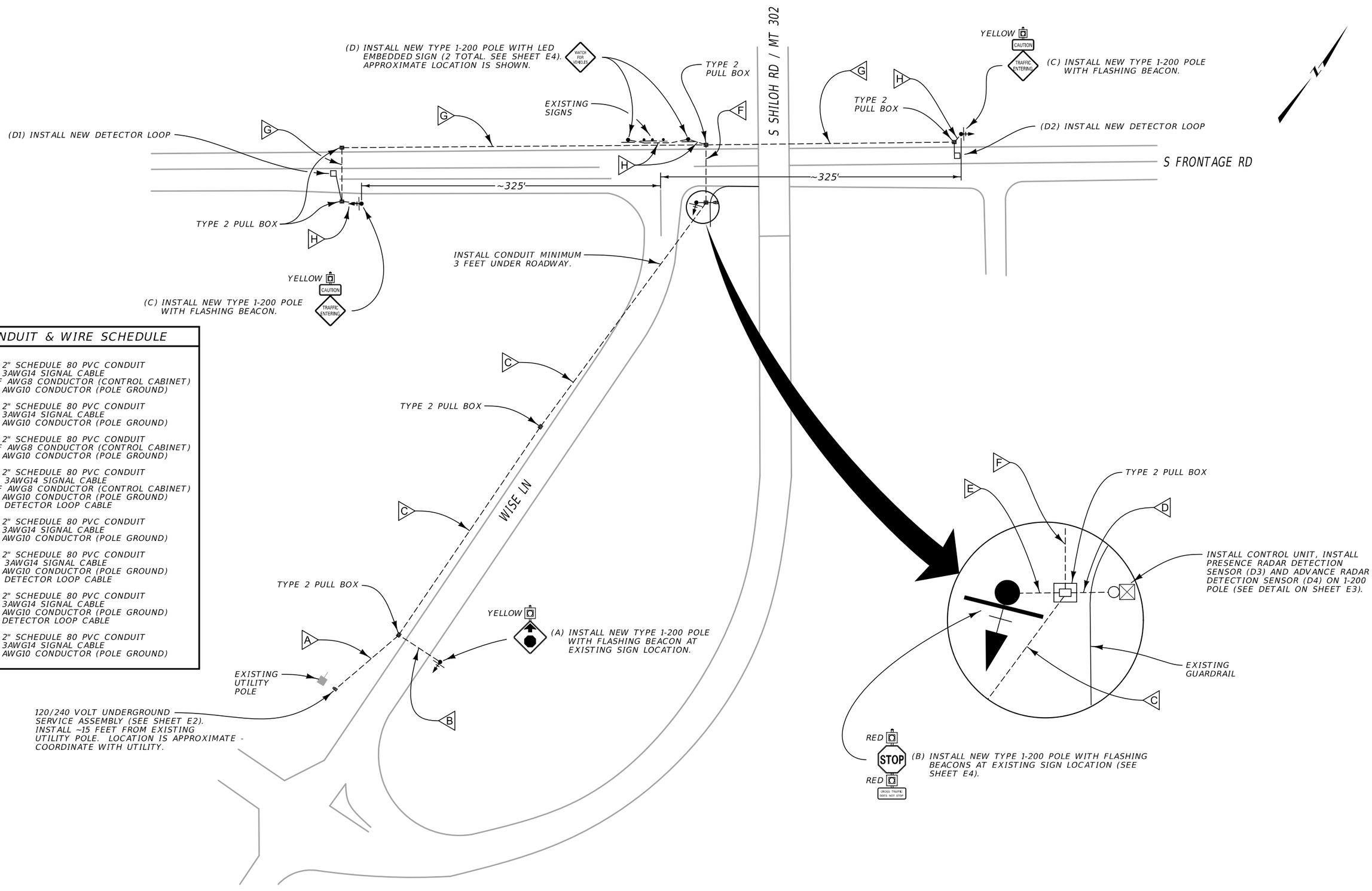
TYPE 1-200

NO SCALE

3 / 1	MDT MONTANA DEPARTMENT OF TRANSPORTATION	C:\dgn\9384000ELDET002.DG 1/12/2021 2:39:38 AM u7893	DESIGNED BY REVIEWED BY CHECKED BY	Dennis E. Schrock	Dec 18, 2019	ELECTRICAL PLANS YELLOWSTONE COUNTY		SF 169 FRNTG RD WISE LN INTX UPN 9384000	HSIP 1011(17) SHEET E4

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CONDUIT & WIRE SCHEDULE

- A: 1 of 2" SCHEDULE 80 PVC CONDUIT
  1 of 3AWG14 SIGNAL CABLE
  3 OF AWG8 CONDUCTOR (CONTROL CABINET)
  1 of AWG10 CONDUCTOR (POLE GROUND)
- B: 1 of 2" SCHEDULE 80 PVC CONDUIT
  1 of 3AWG14 SIGNAL CABLE
  1 of AWG10 CONDUCTOR (POLE GROUND)
- C: 1 of 2" SCHEDULE 80 PVC CONDUIT
  3 OF AWG8 CONDUCTOR (CONTROL CABINET)
  1 of AWG10 CONDUCTOR (POLE GROUND)
- D: 1 of 2" SCHEDULE 80 PVC CONDUIT
  3 of 3AWG14 SIGNAL CABLE
  3 OF AWG8 CONDUCTOR (CONTROL CABINET)
  1 of AWG10 CONDUCTOR (POLE GROUND)
  2 of DETECTOR LOOP CABLE
- E: 1 of 2" SCHEDULE 80 PVC CONDUIT
  1 of 3AWG14 SIGNAL CABLE
  1 of AWG10 CONDUCTOR (POLE GROUND)
- F: 1 of 2" SCHEDULE 80 PVC CONDUIT
  2 of 3AWG14 SIGNAL CABLE
  1 of AWG10 CONDUCTOR (POLE GROUND)
  2 of DETECTOR LOOP CABLE
- G: 1 of 2" SCHEDULE 80 PVC CONDUIT
  1 of 3AWG14 SIGNAL CABLE
  1 of AWG10 CONDUCTOR (POLE GROUND)
  1 of DETECTOR LOOP CABLE
- H: 1 of 2" SCHEDULE 80 PVC CONDUIT
  1 of 3AWG14 SIGNAL CABLE
  1 of AWG10 CONDUCTOR (POLE GROUND)

NO SCALE

3 / 2	MDT MONTANA DEPARTMENT OF TRANSPORTATION	C:\dgn\9384000ELPLN001.DGN	DESIGNED BY	Dennis E. Schrock	Dec 18, 2019	ELECTRICAL PLANS	SF 169 FRNTG RD WISE LN INTX / HSIP 1011(17)
		1/12/2021	REVIEWED BY				UPN 9384000 / SHEET E5
		2:40:33 AM u7893	CHECKED BY			YELLOWSTONE COUNTY	