

CDOT ITS DETAIL SHEET INDEX

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45	NODE GROUNDING RINGS		

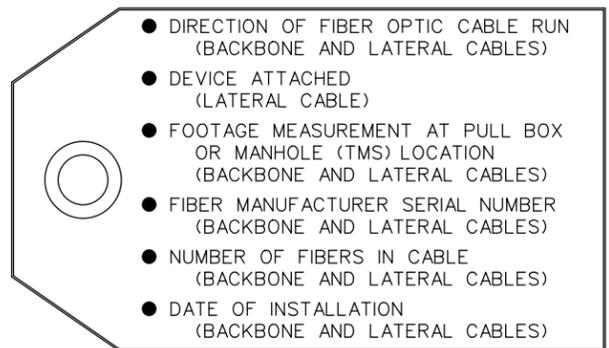
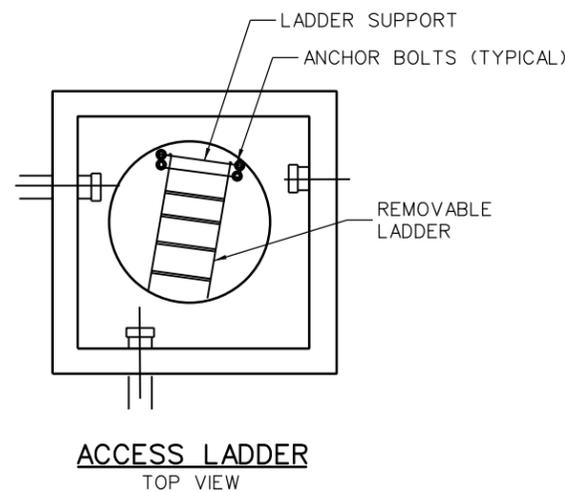
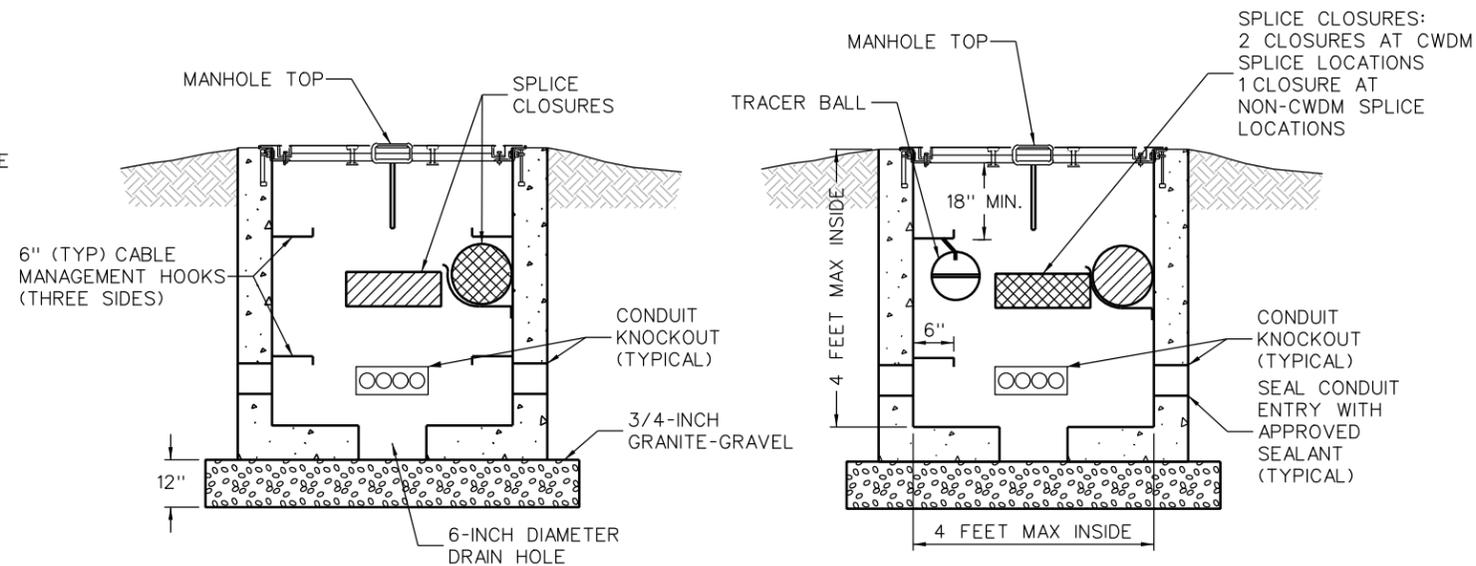
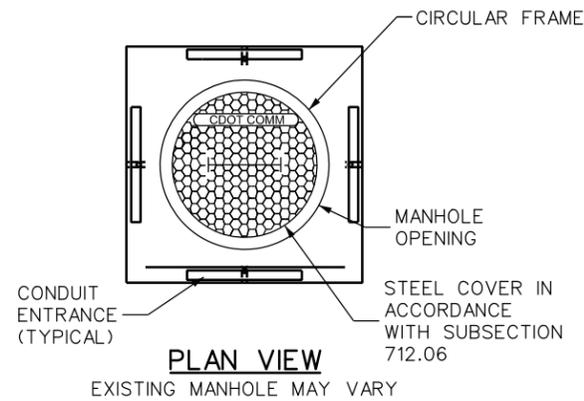
NOTE:
ALL DETAILS ARE FOR GENERAL INFORMATION ONLY. DETAILS WILL NEED TO BE REVIEWED AND MODIFIED FOR THE PROJECT.

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File Name: DET01_ITS Details Title Sheet.dgn		Date:	Comments:	Init.	425 C Corporate Circle Golden, CO 80401 Phone: 303-512-5801 Fax: 303-512-5878			No Revisions:		Designer: CDOT			Structure Numbers	
Horiz. Scale: NTS Vert. Scale:					HQ ITS BRANCH			Revised:		Detailer: CDOT			Sheet Subsets:	
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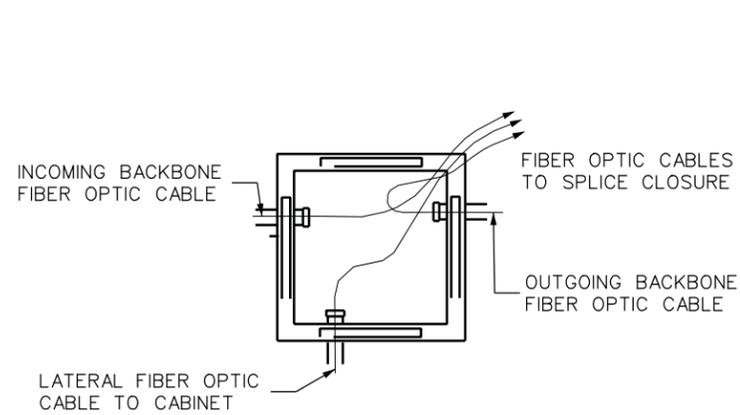
NOTES:

1. CONDUIT ENTERING MANHOLE SHALL NOT DEFLECT BY MORE THAN THE MANUFACTURER'S RECOMMENDATIONS FROM THE ALIGNMENT PRECEDING OR FOLLOWING MANHOLES.
2. SEE PROJECT PLAN SHEETS AND SPECIFICATIONS FOR THE QUANTITY OF BOTH FIBER OPTIC BACKBONE CABLE AND FIBER OPTIC LATERAL CABLE TO BE COILED IN EACH MANHOLE.
3. ALL FIBER SHALL BE LABELED PER PROJECT DETAIL SHEETS.
4. THE CONTRACTOR SHALL PROVIDE SUBMITTALS FOR ALL CABLE MANAGEMENT INCLUDING HOOKS, RACKS, FASTENERS, ANCHORS, AND STRAPS FOR USE INSIDE MANHOLES FOR APPROVAL BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.
5. FOR ALL EXISTING MANHOLES, FIBER MANAGEMENT HARDWARE SHALL BE PAID FOR WITH FIBER OPTIC CABLE PAY ITEM, NO ADDITIONAL PAYMENT SHALL BE MADE.
6. ACCESS LADDER SHALL BE REMOVABLE AND SHALL BE ENGINEERED TO SUPPORT 300 POUNDS. BOLTS FOR LADDER SUPPORT SHALL BE EITHER EPOXIED INTO CONCRETE OR SECURED BY USE OF EXPANSION ANCHORS.

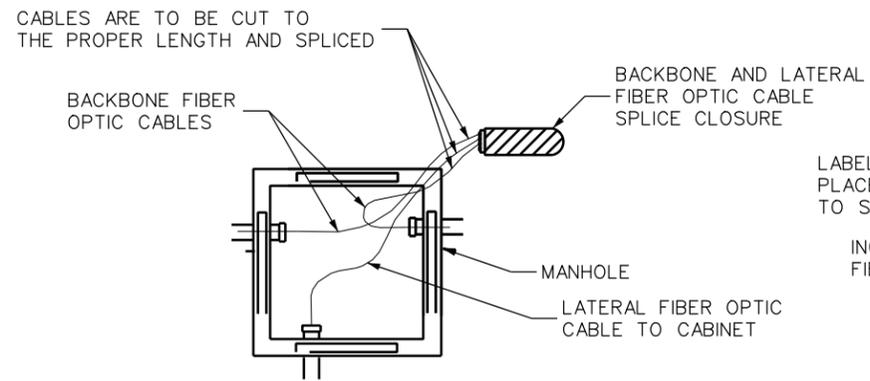


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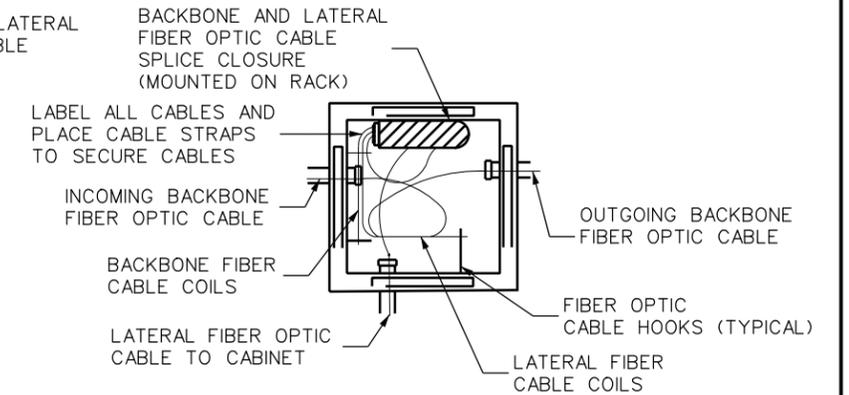
Print Date: 1/29/2016		Sheet Revisions			Colorado Department of Transportation 425 C Corporate Circle Golden, CO 80401 Phone: 303-512-5801 Fax: 303-512-5878 HQ ITS BRANCH	As Constructed No Revisions: Revised: Void:	MANHOLE (TRAFFIC MANAGEMENT SYSTEM)			Project No./Code	
File Name: DET02_Manhole (1 of 2).dgn		Date:	Comments:	Init.:						Designer: CDOT	Structure Numbers
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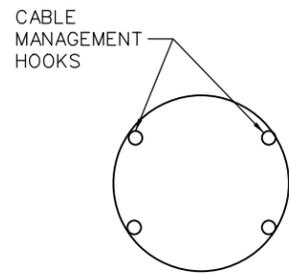
STEP 1 - NON CWDM
BRINGING FIBER CABLE INTO MANHOLE



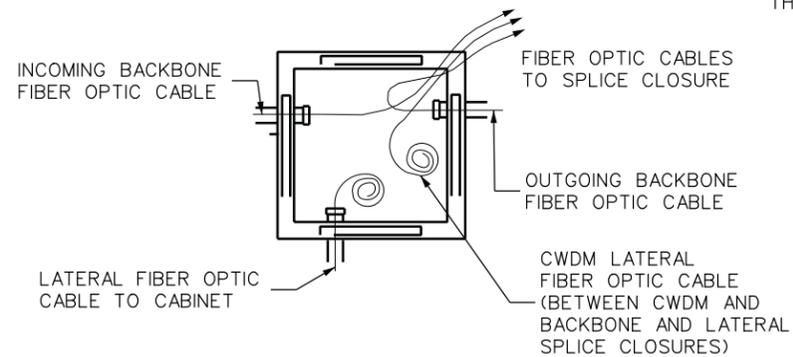
STEP 2 - NON CWDM
SPLICE PROCEDURE



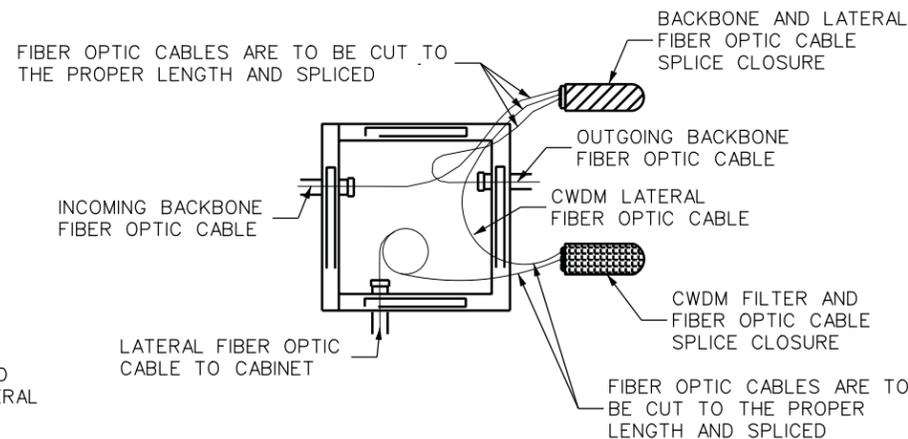
STEP 3 - NON CWDM
CLOSURE AND CABLE MANAGEMENT



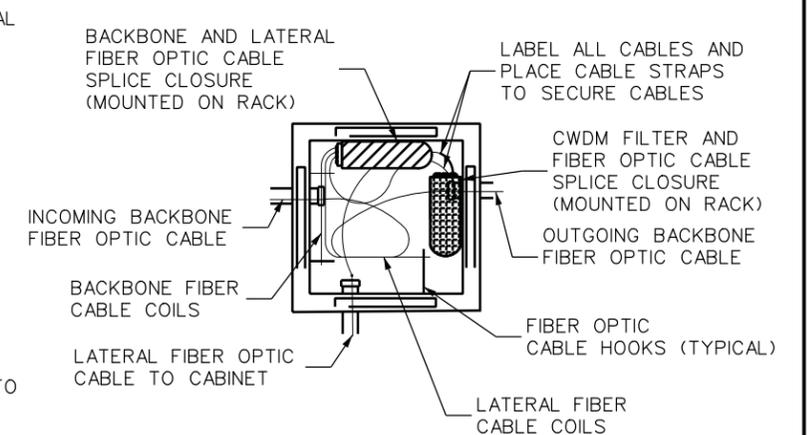
COILING OF FIBER INSIDE MANHOLE
(SIDE VIEW)



STEP 1 - CWDM
BRINGING FIBER CABLE INTO MANHOLE



STEP 2 - CWDM
SPLICE PROCEDURE



STEP 3 - CWDM
CLOSURE AND CABLE MANAGEMENT

FIBER OPTIC SPLICING SEQUENCE DETAILS

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MANHOLE (TRAFFIC MANAGEMENT SYSTEM)			
Designer:	CDOT	Structure Numbers:	
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LEGEND

	LOCATION MARKER (FIBER OPTIC) (DOME)
	PULL BOX
	MANHOLE (TMS)
	CDOT ITS CONDUIT - (NUMBER AND SIZE AS SHOWN IN PLANS)
	ELECTRIC LOCATION MARKER (UTILITY) (FLAT SLAT) AND ELECTRIC CONDUIT
	ELECTRIC LOCATION MARKER (UTILITY) (FLAT SLAT) AND CDOT TELEPHONE CONDUIT

LOCATION MARKER SPACING

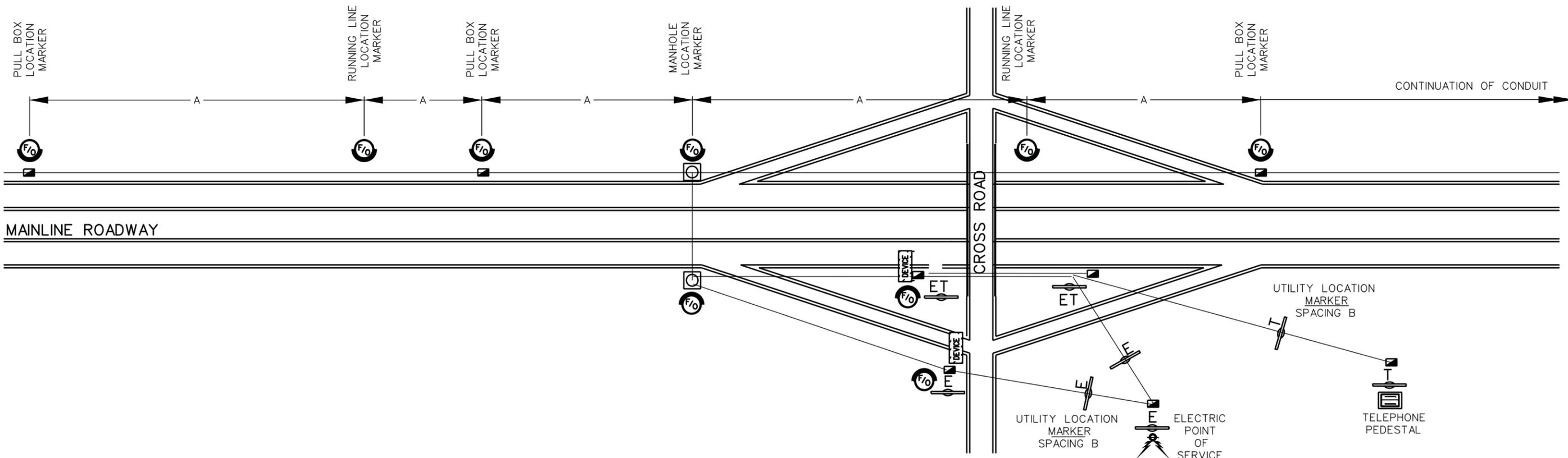
MEASUREMENT	DESCRIPTION	DISTANCE (FEET)
A	LOCATION MARKER (FIBER OPTIC) (DOME) SPACING	* 1000
B	LOCATION MARKER (UTILITY) (FLAT SLAT) SPACING	* ■

* LOCATION MARKER (UTILITY) (FLAT SLAT) FOR DEVICE TO POWER SOURCE ELECTRIC CONDUIT SHALL BE INSTALLED AT BEGINNING AND END OF UTILITY CONDUIT. IF UTILITY CONDUIT RUN IS LONGER THAN 500 FEET, ONE ADDITIONAL LOCATION MARKER (UTILITY) (FLAT SLAT) SHALL BE INSTALLED AT THE MIDPOINT OF CONDUIT RUN.

■ LOCATION MARKER (UTILITY) (FLAT SLAT) FOR DEVICE TO TELEPHONE SERVICE CONDUIT SHALL BE INSTALLED AT BEGINNING AND END OF UTILITY CONDUIT, AT ALL PULL BOXES AND AT A MAXIMUM SPACING OF 1000 FEET BETWEEN PULL BOXES.

LOCATION MARKER INSTALLATION NOTES:

1. AREA AROUND LOCATION MARKER INSTALLATION SHALL BE RETURNED TO EXISTING GRADE AND CONDITION. THIS WORK SHALL NOT BE PAID FOR SEPARATELY, BUT BE INCLUDED IN THE COST OF LOCATION MARKER ITEM.
2. LOCATION MARKER (FIBER OPTIC) (DOME) SHALL BE INSTALLED AT EACH PULL BOX AND MANHOLE ALONG BOTH THE BACKBONE AND LATERAL FIBER OPTIC CABLE RUNS THROUGHOUT THE PROJECT. ADDITIONAL MARKERS SHALL BE INSTALLED ALONG THE RUNNING LINE SO THAT SPACING IS LESS THAN OR EQUAL TO 1000 FEET.
3. LOCATION MARKER (UTILITY) (FLAT SLAT) SHALL BE INSTALLED AT BOTH THE UTILITY POINT OF SERVICE PULL BOX AND THE PULL BOX OR MANHOLE AT PROJECT DEVICE. ADDITIONAL MARKERS, IF REQUIRED, SHALL BE INSTALLED AT MID POINTS ALONG THE UTILITY LINE AS SHOWN ON THIS DETAIL.
4. CONCRETE FOOTING SUPPORT LOCATION MARKER (FIBER OPTIC) (DOME) AT PULL BOX LOCATIONS SHALL BE INCLUDED IN THE COST OF EACH PULL BOX SHOWN IN THE PROJECT.
5. CONCRETE FOOTING SUPPORT FOR LOCATION MARKER (FIBER OPTIC) (DOME) ALONG THE RUNNING LINE AND AT MANHOLES SHALL BE INCLUDED IN LOCATION MARKER (FIBER OPTIC) (DOME) ITEM.
6. LOCATION MARKER (UTILITY) (FLAT SLAT) SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. CONCRETE SUPPORT FOUNDATIONS SHALL NOT BE REQUIRED FOR LOCATION MARKER (UTILITY) (FLAT SLAT).
7. LANDSCAPE LOCATION MARKERS SHALL BE INSTALLED IN LANDSCAPE AREAS AND AREAS SUCH AS PARKING LOTS WHICH COULD HAVE VEHICULAR OR PEDESTRIAN TRAFFIC.
8. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER AN AS-BUILT DRAWING SHOWING THE INSTALLED LOCATIONS OF ALL MARKER TYPES.
9. LOCATION MARKERS SHALL HAVE INFORMATION LABELS ATTACHED WITH ADHESIVE TO WITHSTAND HEAT AND COLD. INFORMATION ON LABELS SHALL INCLUDE CDOT CONTACT INFORMATION, NUMBERS INDICATING THE HIGHWAY MILE POINT OF THE PULL BOX OR MANHOLE, TO THE HUNDRETH OF A MILE, SHALL BE INSTALLED BENEATH THE INFORMATION LABELS AS SHOWN ON SHEET TWO OF THIS PROJECT DETAIL.
10. WHERE REQUIRED ON NATIONAL FOREST SERVICE LAND, MARKERS SHALL BE BROWN (FED *20059) IN COLOR. INFORMATION LABELS SHALL HAVE BLACK LETTERING ON THE BROWN BACKGROUND.



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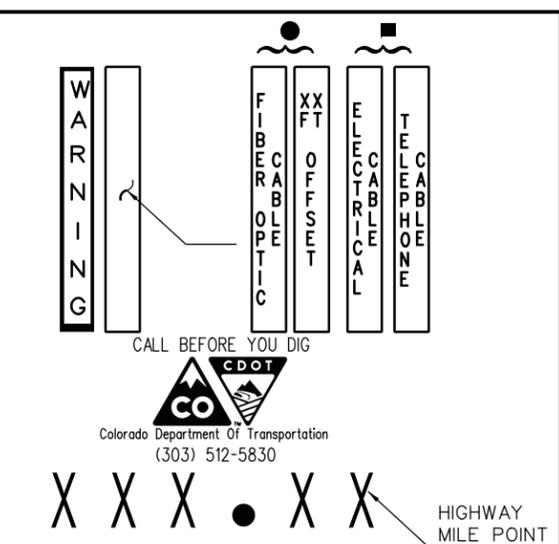
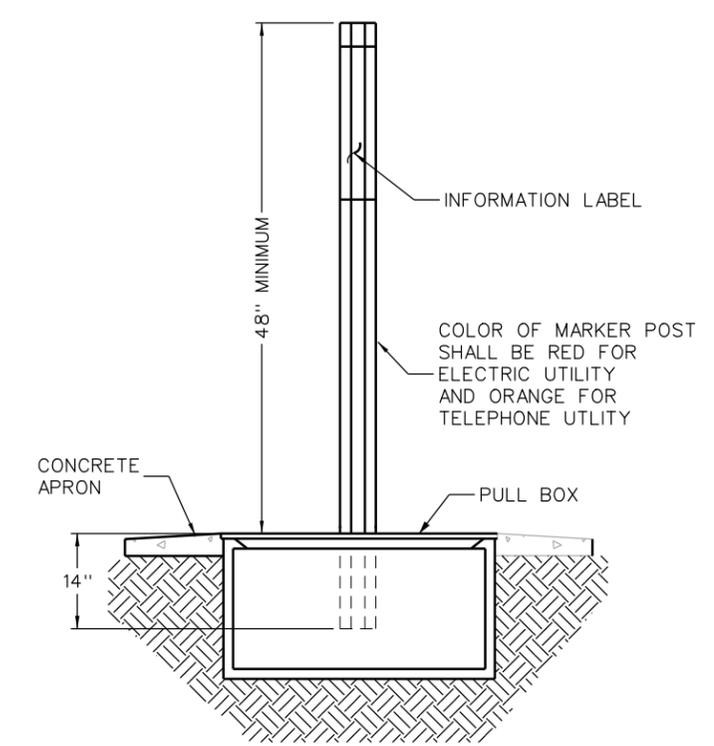
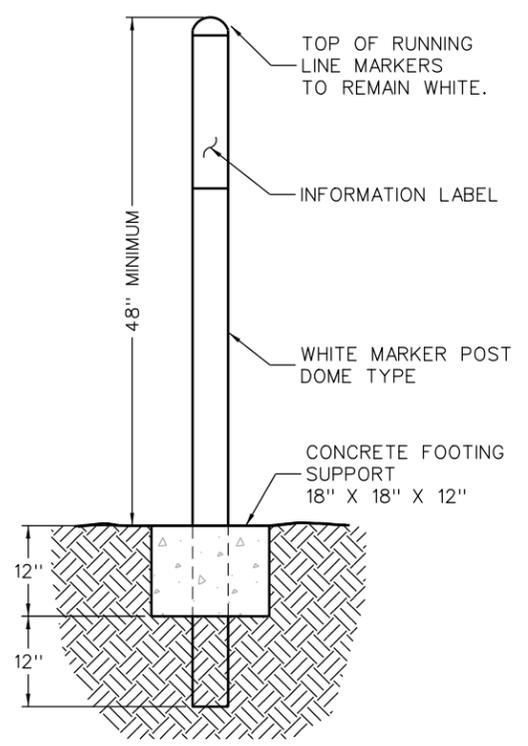
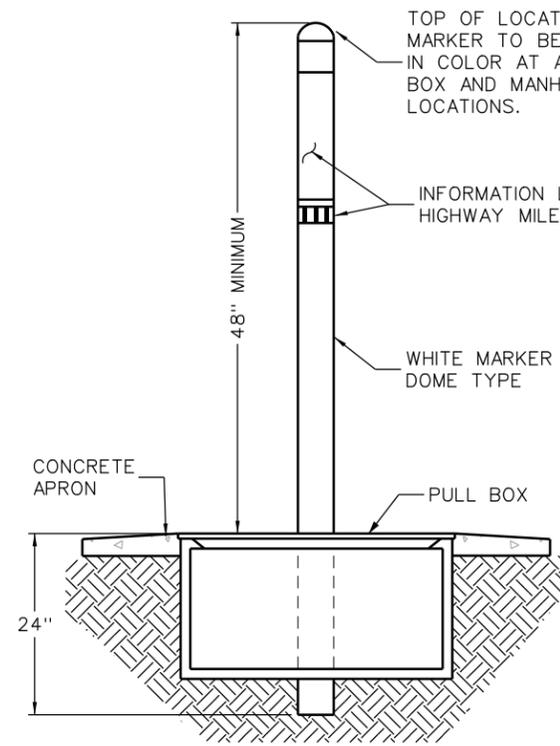
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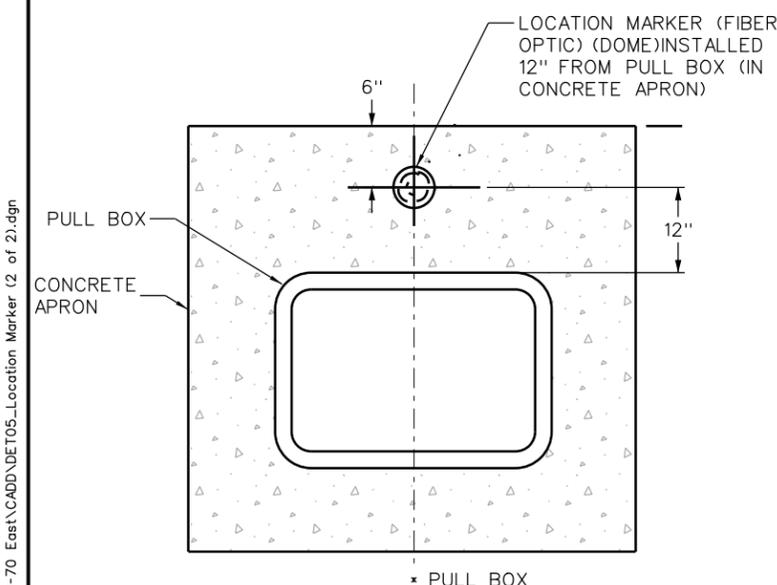
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LOCATION MARKERS PROJECT STANDARD			
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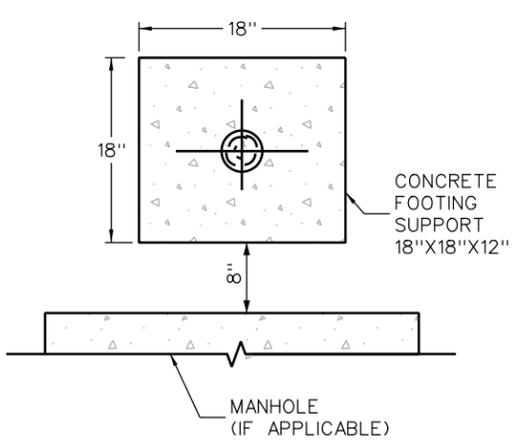
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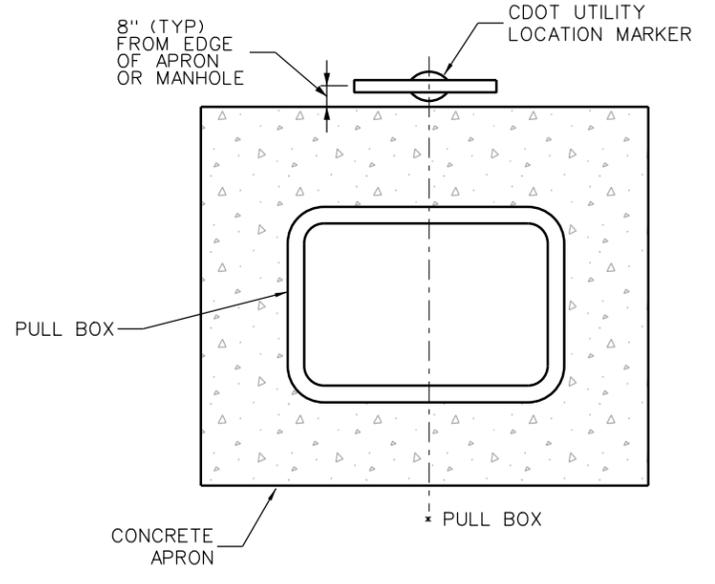
LOCATION MARKER INFORMATION LABELING
 LABEL WITH CDOT CONTACT INFORMATION
 BLACK LETTERING ON ORANGE BACKGROUND
 ● LOCATION MARKER (FIBER OPTIC) (DOME)
 ■ LOCATION MARKER (UTILITY) (FLAT SLAT)
 HIGHWAY MILE POINT DESIGNATION
 TO BE TO 100TH OF A MILE
 BLACK NUMBERS WITH WHITE BACKGROUND



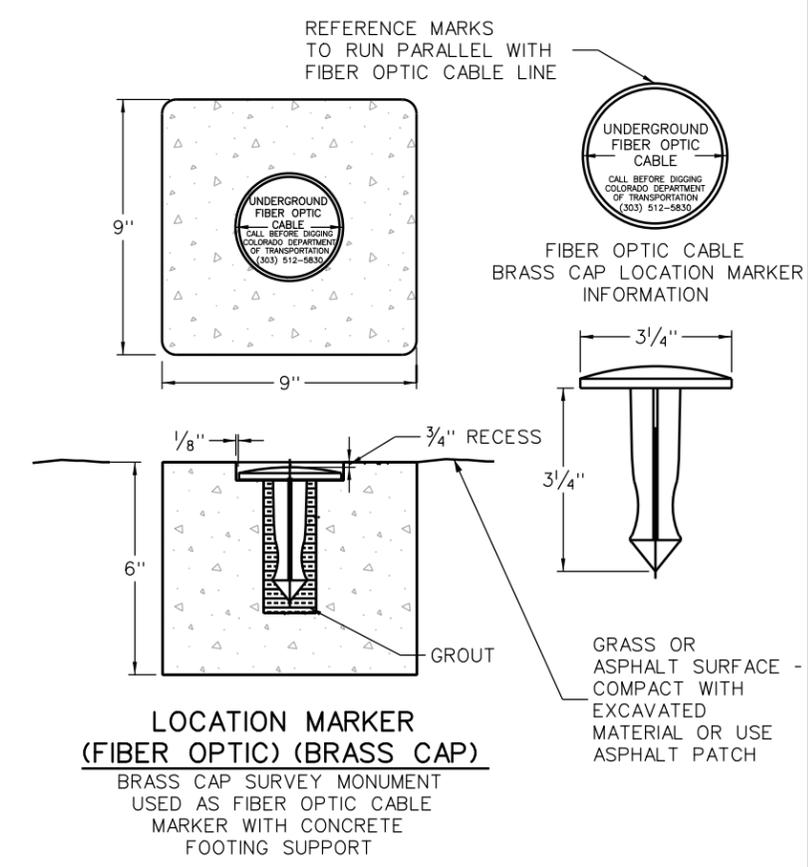
LOCATION MARKER (FIBER OPTIC) (DOME) AT PULL BOXES
 3" x 6" DOME TYPE POST



LOCATION MARKER (FIBER OPTIC) (DOME) ALONG RUNNING LINE AND AT MANHOLE
 3" x 6" DOME TYPE POST



LOCATION MARKER (UTILITY) (FLAT SLAT)
 3 1/2" x 62" FLAT TYPE POST ELECTRICAL POWER RUNNING LINES AND TELEPHONE RUNNING LINES



LOCATION MARKER (FIBER OPTIC) (BRASS CAP)
 BRASS CAP SURVEY MONUMENT USED AS FIBER OPTIC CABLE MARKER WITH CONCRETE FOOTING SUPPORT

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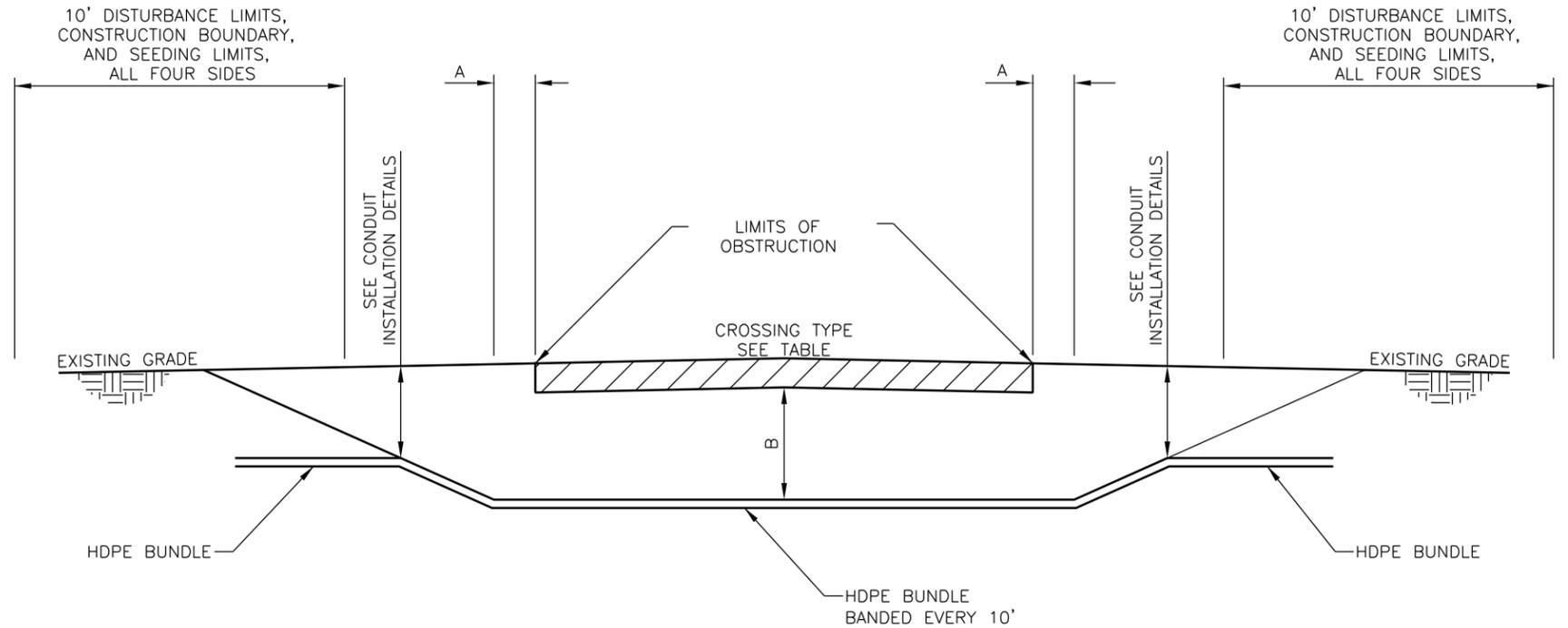
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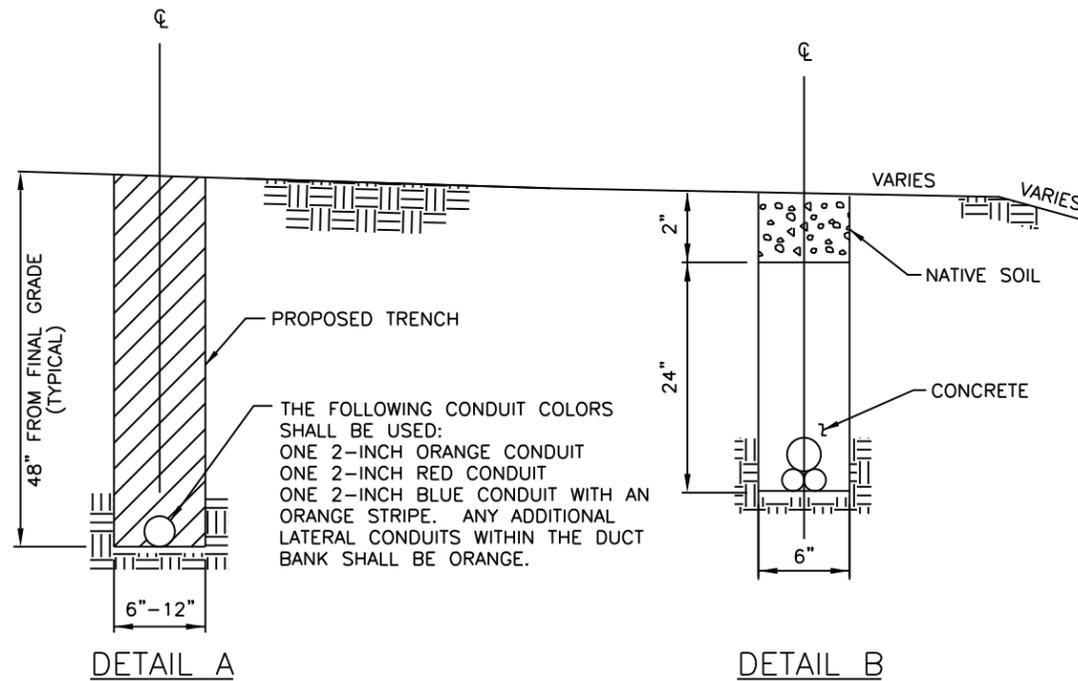
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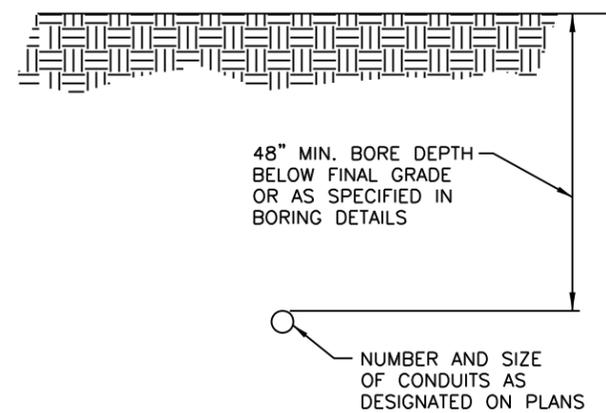
1. CONTRACTOR SHALL CONFORM TO THE APPLICABLE AGENCY REQUIREMENTS AND SPECIFICATION FOR BORE CROSSINGS.
2. EXCAVATIONS AND DISTURBANCE LIMITS REQUIRE SEEDING AND MULCHING.
3. CONTRACTOR SHALL BACKFILL AND REGRADE SITE TO MATCH EXISTING CONDITIONS.
4. CONTRACTOR MUST REPAIR ANY DAMAGE TO PAVEMENT CAUSED BY ERRANT BORING AT THEIR COST.
5. TRENCHES SHALL BE FILLED IN BY THE END OF THE WORK DAY. CONTRACTOR SHALL USE A BMP ON THE DOWNSTREAM SIDE OF ANY REMAINING SPOILS TO PREVENT THE TRANSPORT OF THE SEDIMENT DURING A RAIN EVENT.



DIRECTIONAL BORE PROFILE
NTS



TRENCHING IN FILL
NTS



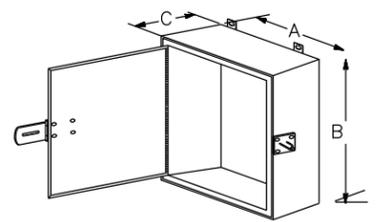
DIRECTIONAL BORE
NTS

CROSSING TYPE	A	B
CULVERT	5' MIN	48" MIN
DRIVEWAY	5' MIN	48" MIN
DITCH	15' MIN	48" MIN
CROSS ROAD	15' MIN	48" MIN
FREEWAY	15' MIN	48" MIN
PRAIRIE DOGS	15' MIN	84" MIN
TREE	20' MIN	84" MIN
WATERWAY	50' MIN	48" MIN
WETLAND	50' MIN	48" MIN

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Print Date: 1/29/2016 File Name: DET06_Conduit Installation.dgn Horiz. Scale: NTS Vert. Scale: As Noted JKS	Sheet Revisions <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Date:</th> <th>Comments</th> <th>Init.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date:	Comments	Init.										Colorado Department of Transportation 425 C Corporate Circle Golden, CO 80401 Phone: 303-512-5801 Fax: 303-512-5878 HQ ITS BRANCH	As Constructed No Revisions: Revised: Void:	CONDUIT INSTALLATION DETAIL Designer: CDOT Detailer: CDOT Sheet Subset: ITS Subset Sheets: of	Project No./Code Sheet Number 6
Date:	Comments	Init.															

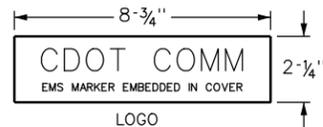
- DIRECTION OF FIBER OPTIC CABLE RUN (BACKBONE AND LATERAL CABLES)
- DEVICE ATTACHED (LATERAL CABLE)
- FOOTAGE MEASUREMENT AT PULL BOX OR MANHOLE (TMS) LOCATION (BACKBONE AND LATERAL CABLES)
- FIBER MANUFACTURER SERIAL NUMBER (BACKBONE AND LATERAL CABLES)
- NUMBER OF FIBERS IN CABLE (BACKBONE AND LATERAL CABLES)
- DATE OF INSTALLATION (BACKBONE AND LATERAL CABLES)



SURFACE MOUNTED TYPE
WEATHER TIGHT WITH LOCK

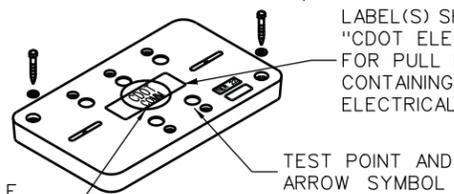
FIBER CABLE LABEL

TO BE ATTACHED TO EACH FIBER OPTIC CABLE LOCATED IN ALL PULL BOXES AND MANHOLES (TMS)



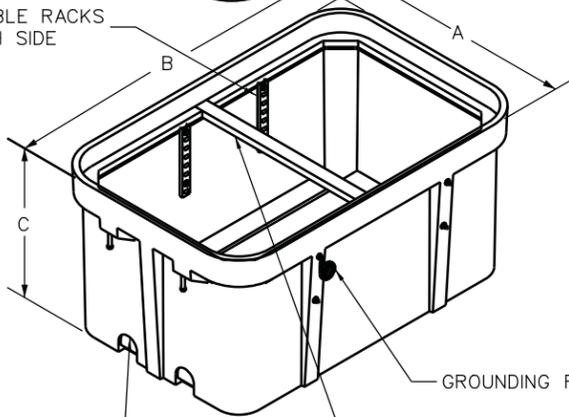
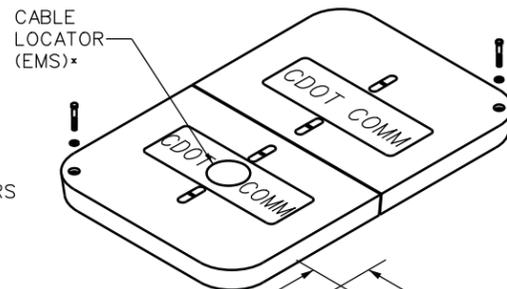
LOGO

LABEL(S) SHALL READ "CDOT ELEC" FOR PULL BOXES CONTAINING ONLY ELECTRICAL CONDUCTORS



CABLE LOCATOR (EMS)*
TEST POINT AND ARROW SYMBOL

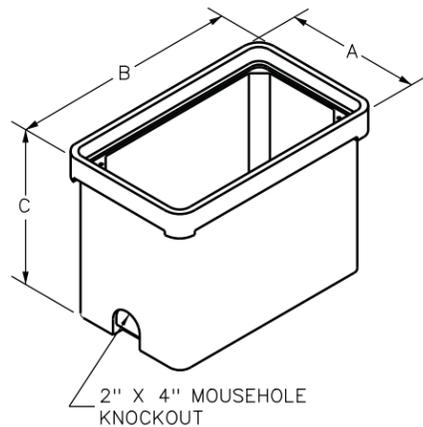
*ELECTRONIC MARKER SYSTEM (EMS)



12" CABLE RACKS
2 EACH SIDE

GROUNDING RIBBON

REMOVABLE SUPPORT



13" X 24" PULL BOX

24" X 36" PULL BOX (OR LARGER)

ITS PULL BOX TYPE	DIMENSIONS (INCHES)			KNOCKOUT MOUSE HOLE TYPE	COILED FIBER (FEET)	COILED TRACER WIRE (FEET)
	A	B	C			
PULL BOX - (13" x 24" x 18")	13	24	18	2	50	6
PULL BOX - (24" x 36" x 24")	24	36	24	4	50	6
PULL BOX - (30" x 48" x 24")	30	48	24	4	50	6
PULL BOX - (SURFACE MOUNTED)	24	24	8	NA	5	5

PULL BOX NOTES:

1. CONDUITS DEPICTED ON THIS TYPICAL DETAIL ARE REPRESENTATIVE ONLY. NUMBER OF CONDUITS INSTALLED AND CONDUIT SIZE SHALL BE AS REQUIRED.
2. DESIGNATION FOR THE INSTALLATION OF ELECTRICAL WIRING AND FIBER OPTIC CABLE IN THE BACKBONE CONDUIT SYSTEM IS DESCRIBED IN THE PROJECT SPECIFICATIONS.
3. CONDUIT CENTERLINE SHALL BE ALIGNED WITHIN THE PULL BOX TO FACILITATE FIBER OPTIC CABLE PULLING.
4. CONDUIT PLUGS SHALL BE INSTALLED IN ALL CONDUITS, BOTH WITH AND WITHOUT WIRE OR CABLE AND SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM.
5. WEATHERPROOF TAGS SHALL BE INSTALLED ON ALL FIBER CABLES AND SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM.
6. TRACER WIRE AND PULL TAPE SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM FOR BOTH BACKBONE AND LATERAL CONDUIT RUNS.
 - IF INSTALLATION INCLUDES MULTIPLE RUNS OF CONDUIT, PULL TAPE SHALL BE INSTALLED IN EACH INDIVIDUAL CONDUIT, TRACER WIRE SHALL BE INSTALLED IN THE CONDUIT CONTAINING FIBER OPTIC CABLE.
 - IF INSTALLATION INCLUDES ONLY ONE RUN OF CONDUIT, PULL TAPE AND TRACER WIRE SHALL BE INSTALLED IN SAME CONDUIT AS FIBER CABLE.
7. ALL PULL BOX TYPES SHALL BE PAID FOR UNDER THE CORRESPONDING PULL BOX ITEM, AND SHALL BE SIZED AS TABULATED AND SHOWN IN THE PLANS.
8. PULL BOXES SHALL HAVE A CONCRETE APRON SLOPED AWAY FROM PULL BOX OPENING. THE COST OF THE CONCRETE APRON SHALL BE PAID FOR AS PART OF PULL BOX ITEM.
9. SEE TABLE FOR THE QUANTITY OF EACH FIBER OPTIC BACKBONE AND LATERAL CABLE TO BE COILED IN ALL PULL BOXES.
10. FIBER OPTIC CABLE COILS WITHIN PULL BOXES SHALL BE TIED TO EACH CABLE RACK. PLASTIC WIRE TIES SHALL NOT BE ALLOWED. CAUTION SHALL BE TAKEN TO COIL THE FIBER CABLE PER MANUFACTURER'S RECOMMENDATIONS.
11. WORK TO INSTALL PULL BOX SHALL INCLUDE BUT NOT BE LIMITED TO SAW CUTTING OF PAVEMENT, REMOVAL OF PAVEMENT, CONCRETE, EARTHWORK, ALL LANDSCAPE RESTORATION AND SHALL BE PAID FOR AS PART OF PULL BOX. ALL MATERIAL SHALL BE CONTAINED BY AN APPROVED BMP AND NOT ALLOWED TO RUN OFF SITE.
12. PULL BOX TYPES AS DEPICTED ON THIS PROJECT DETAIL SHALL NOT BE INSTALLED IN THE ASPHALT OR CONCRETE SHOULDER OF THE ROADWAY.
13. A COMMUNICATIONS ELECTRONIC MARKER SYSTEM (EMS) SHALL BE EMBEDDED IN TO THE COVER AS SHOWN IN DETAILS ON THIS SHEET.
14. ALL NON-DELIBERATE TRAFFIC PULL BOXES AND COVERS MUST COMPLY WITH ALL TEST PROVISIONS OF LATEST EDITION OF THE ANSI/SCTE 77 "SPECIFICATION FOR UNDERGROUND ENCLOSURE INTEGRITY" AND MUST MEET THE TIER 22 APPLICATION. MARKING SHOWING THE TIER 22 RATING MUST BE LABELED OR STENCILED ON THE INSIDE AND OUTSIDE OF THE BOX AND ON THE UNDERSIDE OF THE COVER.
15. COVER MUST BE SECURED TO PULL BOX USING 3/8-7 LAG THREAD HEX HEAD BOLTS.
16. A COMPLIANCE LETTER FROM THE MANUFACTURER OF THE PULL BOXES SHALL BE SUBMITTED ALONG WITH MATERIAL SUBMITTALS. THE COMPLIANCE LETTER SHALL INDICATE THAT THE PULL BOX MANUFACTURER HAS MET OR EXCEEDED ALL TEST PROVISIONS OF THE LATEST EDITION OF THE ANSI/SCTE 77 & ALL OF CDOT REQUIREMENTS LISTED IN PLAN DETAILS.
17. ALL PULL BOX COVERS SHALL BE FURNISHED WITH 3/8 (35) X 1/16 (2), DEEP TEST POINT AREAS, WITH 2 - 3/8-7 LAG LONG STAINLESS STEEL HEX HEAD BOLTS, 2 - 3/8 (10) STAINLESS STEEL FLAT WASHERS, DIRECTIONAL LABELS AND 1- GROUND LABEL. THE MINIMUM NUMBER OF TEST POINT AREAS AND DIRECTIONAL LABELS SHALL EQUAL THE NUMBER OF CONDUIT BANKS ENTERING THE PULL BOX, UP TO A MAXIMUM OF 5 TEST POINTS. PULL BOXES WITH SPLIT LIDS SHALL HAVE TEST POINTS ON ONE SPLIT LID SECTION ONLY.
18. TEST POINT LABEL SHALL BE 1 1/2" DIAMETER ORANGE CIRCLE WITH BLACK ARROW GRAPHIC. ONE ARROW GRAPHIC SHALL BE INSTALLED FOR EACH TEST POINT USED INDICATING THE DIRECTION THE CONDUIT EXITS THE PULL BOX.
19. THE DEEP RECESS OF THE POLYMER CONCRETE PULL BOX SHALL BE CLEANED WITH AN ALCOHOL-BASED CLEANER PRIOR TO APPLYING LABELS.

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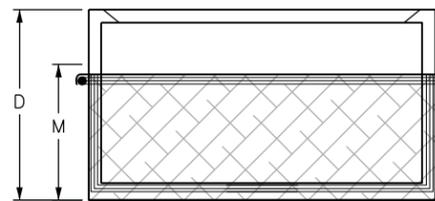
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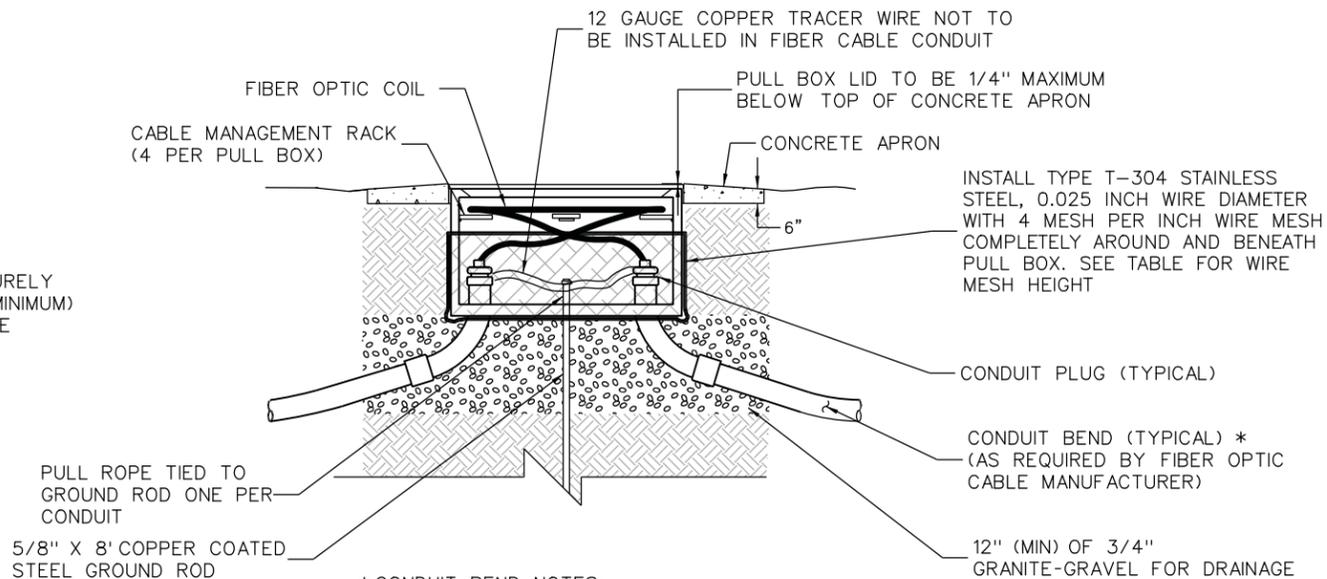
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PULL BOX DEPTH "D"	WIRE MESH HEIGHT "M" (FROM BOTTOM)
18"	12"
24"	18"
30"	18"
36"	18"

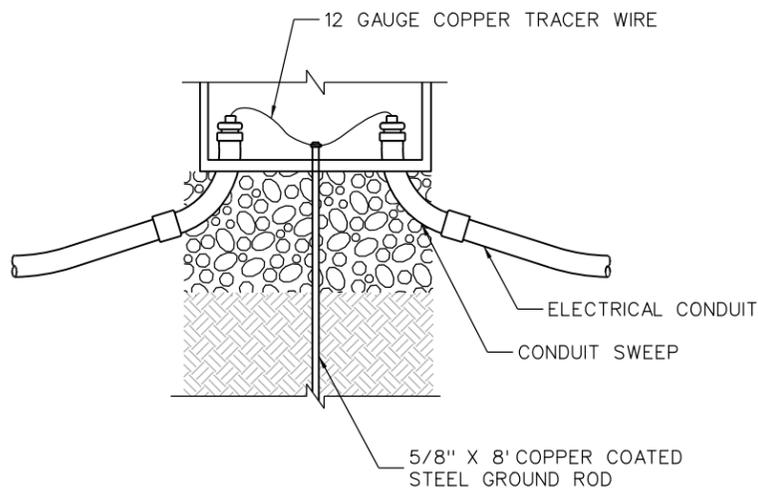


WIRE MESH DETAIL

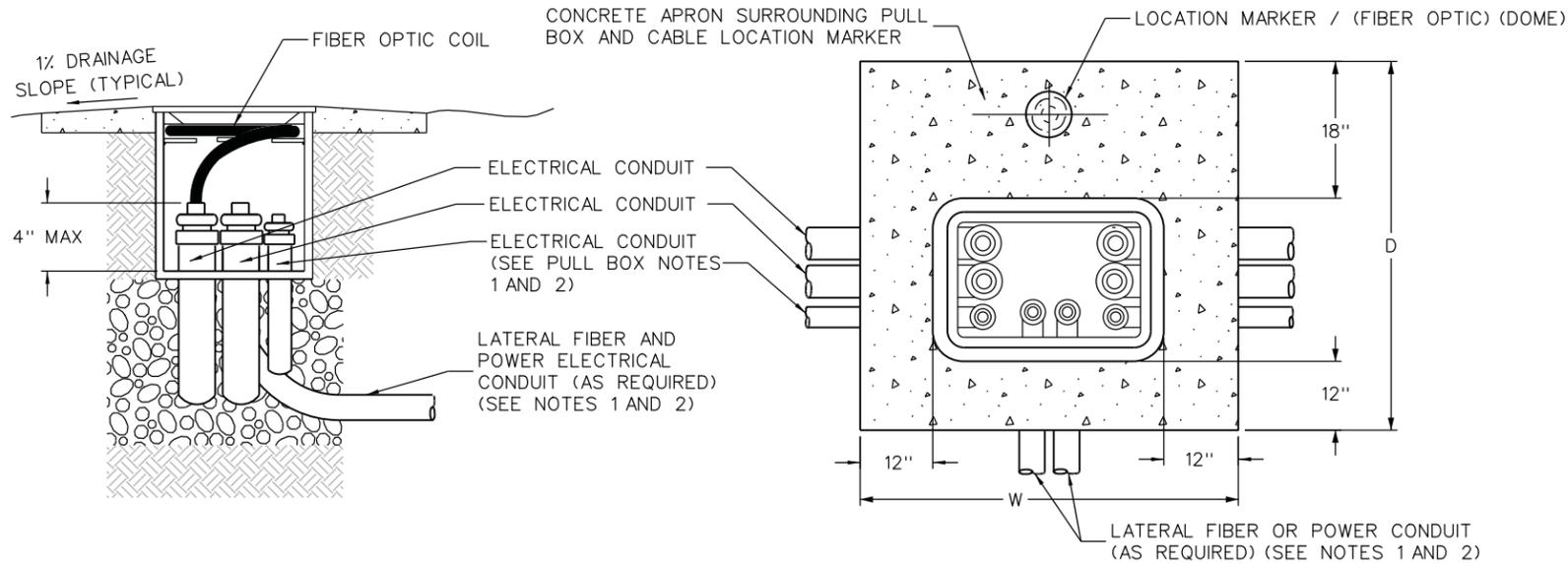
WRAP MESH SECURELY WITH 3 TURNS (MINIMUM) OF BUNDLING WIRE



- * CONDUIT BEND NOTES:
 1. MINIMUM RADIUS MUST NOT BE LESS THAN 32"
 2. MINIMUM SWEEP MUST NOT BE GREATER THAN 90 DEGREES



GROUNDING DETAIL



ITS PULL BOX TYPE	CONCRETE APRON DIMENSIONS (INCHES) (SEE NOTE)	
	W	D
PULL BOX - (13" x 24" x 18")	48	43
PULL BOX - (24" x 36" x 24")	60	54
PULL BOX - (30" x 48" x 24")	72	66

NOTE: APRON DIMENSIONS MAY VARY BASED ON PULL BOX WALL THICKNESS

ITS PULL BOX INSTALLATION

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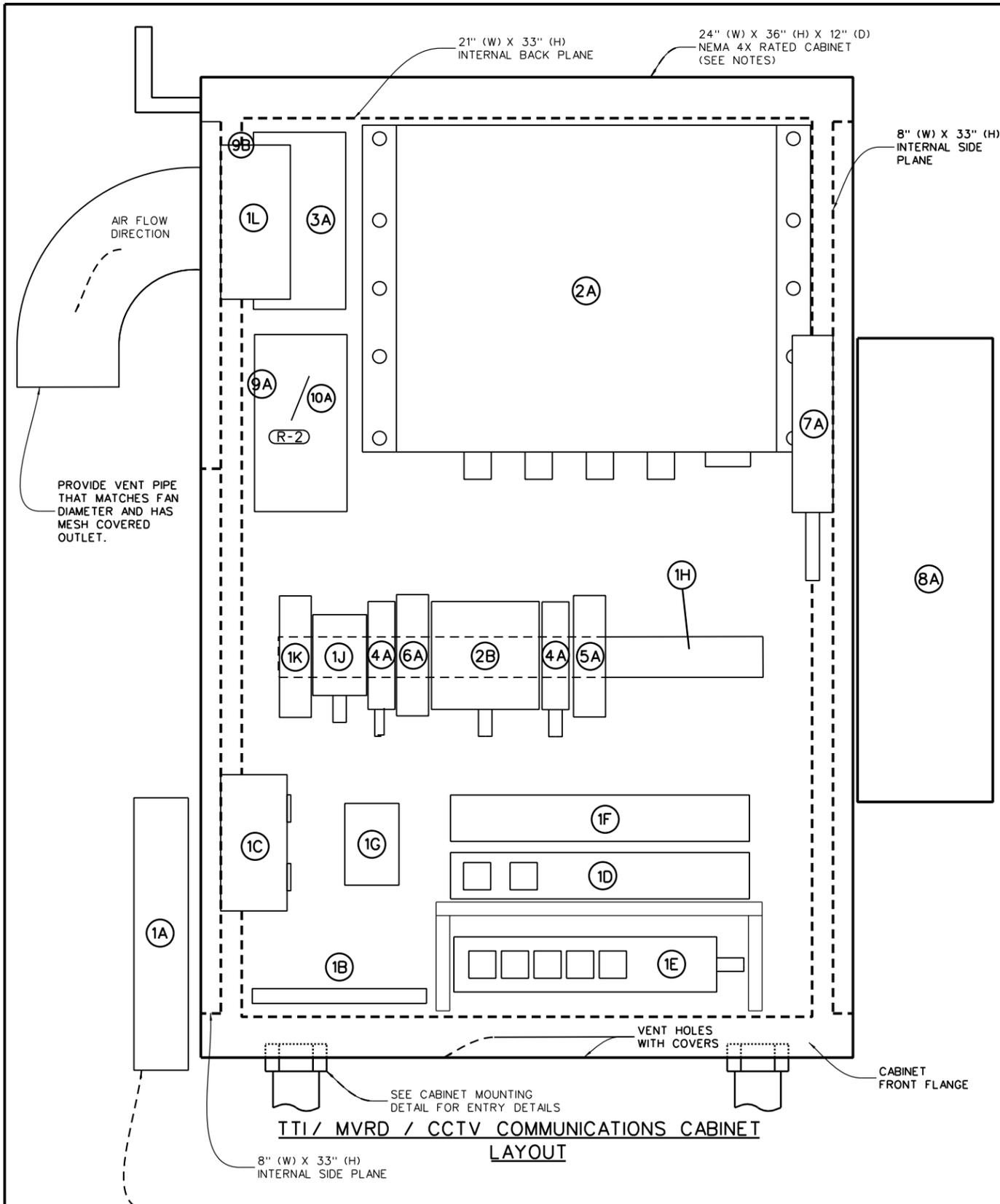
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	EQUIPMENT	MOUNTING DESCRIPTION (SEE NOTE 3)	COMPONENT SUBSET	COMMENTS
1A	DISCONNECT SWITCH	INDEPENDENT POLE-MOUNT	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM WHEN METER IS 50 FEET OR MORE AWAY OR OUT OF LINE OF SIGHT.
1B	GROUND BUS	SCREW	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1C	SINGLE GANG OUTLET BOX WITH 5-15R (GFCI)	SCREW / SIDE PANEL	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1D	POWER CONDITIONER	SCREW / SHELF MOUNT	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1E	SIX OUTLET POWER STRIP	VELCRO	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1F	POWER CONDITIONER BATTERY	SCREW / SHELF MOUNT	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1G	POWER CONDITIONER SNMP	VELCRO	CABINET POWER	PROVIDE NEW AS PART OF THIS ITEM.
1H	20-INCH DIN RAIL	SCREW	CABINET ATTACHMENT	PROVIDE NEW AS PART OF THIS ITEM.
1J	12 VDC POWER SUPPLY	DIN	CABINET - GENERAL POWER SUPPLY	PROVIDE NEW AS PART OF THIS ITEM.
1K	ENVIRONMENTAL CONTROL (THERMOSTAT)	DIN	CABINET VENTILATION	PROVIDE NEW AS PART OF THIS ITEM.
1L	COOLING FAN	SCREW	CABINET VENTILATION	PROVIDE NEW AS PART OF THIS ITEM.
2A	TTIREADER	SCREW	DEVICE - TTI	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
2B	24 VDC TTIPOWER SUPPLY	DIN	DEVICE - TTIPOWER	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
3A	CCTV PoE MIDSPAN	VELCRO	DEVICE - CCTV POWER	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
4A	SERIAL SURGE PROTECTOR	DIN	DEVICE SURGE - SFR, TTI	RELOCATE FROM OLD CABINET, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
5A	ETHERNET SURGE PROTECTOR	DIN	DEVICE SURGE - CCTV, RADIO	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
6A	SERIAL TO IP CONVERTER	DIN	DEVICE - COMM CONVERTER - SFR, VMS	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
7A	6-PORT FIBER OPTIC PATCH PANEL (ST)	SCREW	COMM - FIBER OPTIC	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
8A	ETHERNET SWITCH (3931)	SCREW / EXTERNAL	COMM - FIBER OPTIC-ETHERNET SWITCH	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
9A	CELLULAR WIRELESS MODEM	VELCRO	COMM - WIRELESS - CELLULAR	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
9B	CELLULAR WIRELESS ANTENNA	SCREW	COMM - WIRELESS - CELLULAR	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
10A	ETHERNET RADIO PoE MIDSPAN	VELCRO	COMM - WIRELESS - RADIO	PROVIDE NEW COMPONENT, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.

- NOTES:
- SEE TTI/MVRD/CCTV ONE-LINE DIAGRAMS FOR EQUIPMENT WIRING FOR EACH COMMUNICATIONS TYPE.
 - SEE PROJECT SPECIAL PROVISIONS FOR EQUIPMENT REQUIREMENTS.
 - SHELF - SITTING ON SHELF THAT IS ATTACHED TO AND SUPPORTED BY THE BACK PLANE
 SCREW - EQUIPMENT SCREWED TO THE CABINET BACK PLANE THROUGH PRE-DRILLED HOLES
 DIN - EQUIPMENT MOUNTED TO DIN RAIL
 VELCRO - MOUNTED TO BACK PLANE USING VELCRO EXTREME OR EQUIVALENT

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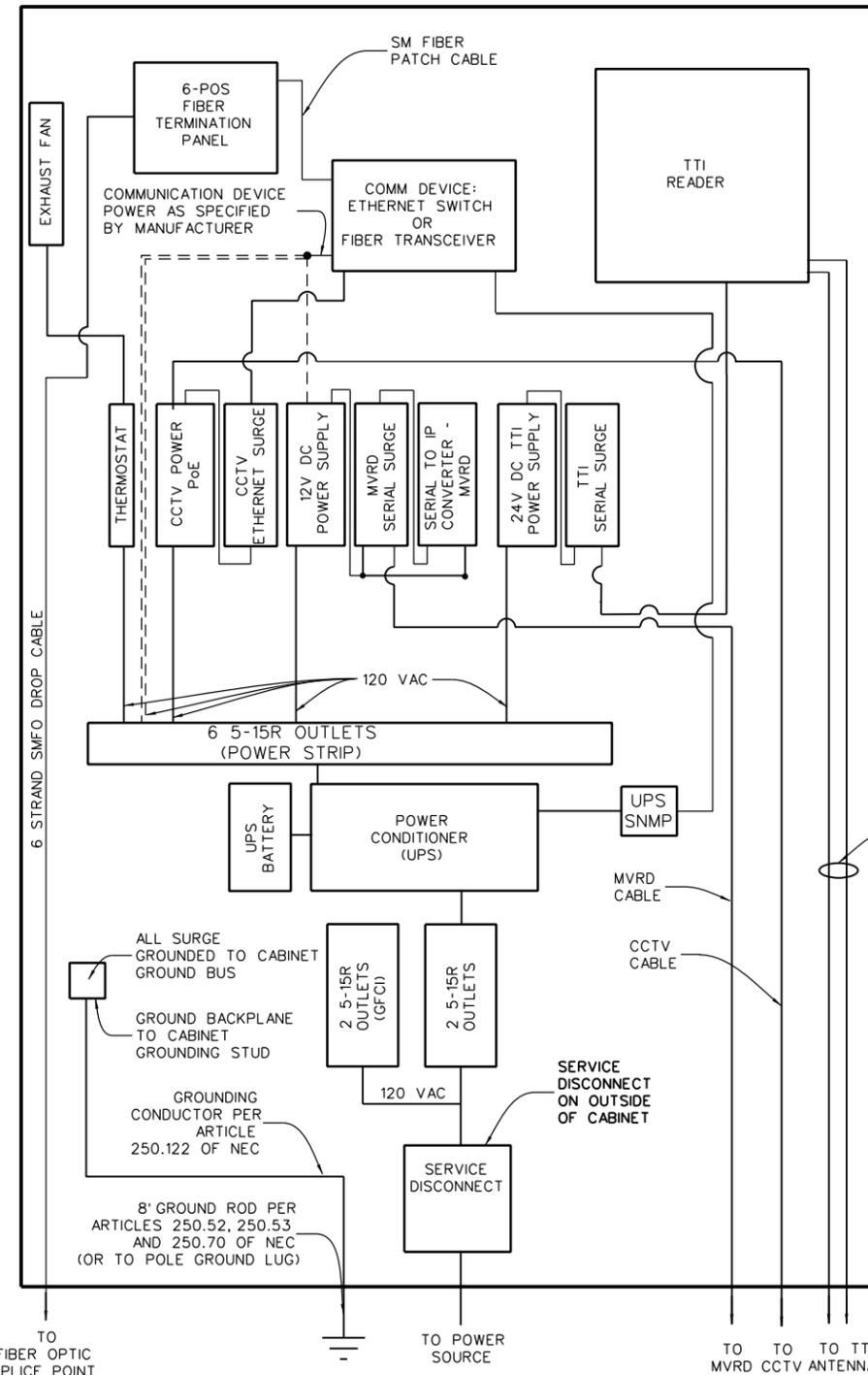
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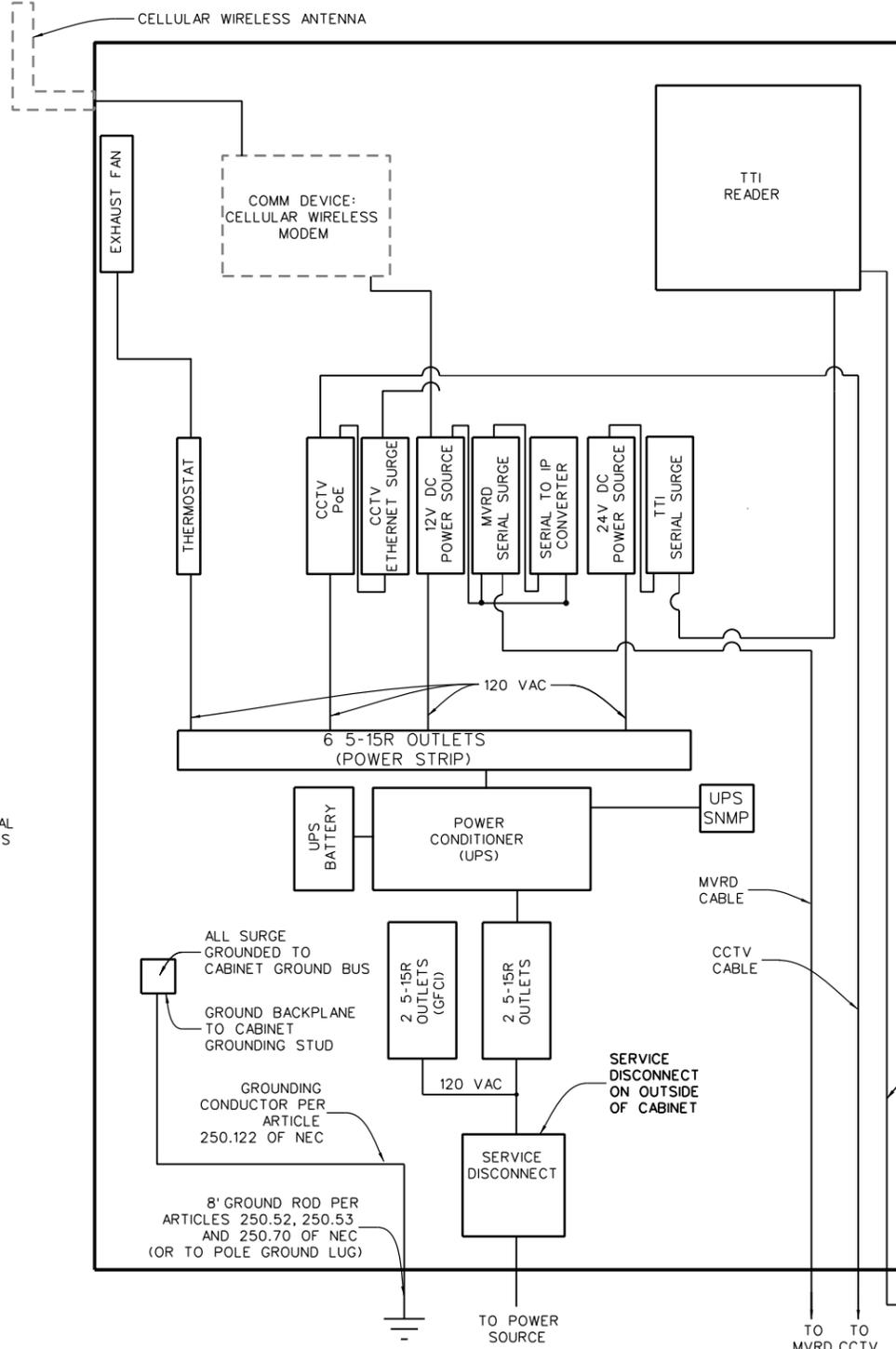
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TTI/ MVRD / CCTV COMMUNICATIONS CABINET
ONE-LINE DIAGRAM
FIBER COMM



TTI/ MVRD / CCTV COMMUNICATIONS CABINET
ONE-LINE DIAGRAM
CELLULAR OR RADIO COMM

COMMUNICATION DEVICE PORT DESIGNATIONS

ETHERNET SWITCH

SERVICE_NAME:	3930 PORTS	393J PORTS	DEVICE:
VIDEO	1 (RJ-45)	5 (RJ-45)	CCTV
FIELD SENSORS	2 (RJ-45)	6 (RJ-45)	TTI/ SFR / RWIS
VARIABLE MESSAGE SIGNS	3 (RJ-45)	7 (RJ-45)	VMS / DMS / LUS / BOS / VSL
SUBSYSTEM MGMT	4 (RJ-45)	8 (RJ-45)	UPS / SOLAR CONTROLLER
MULTI-DEVICE	5 (SFP)	1 (SFP)	RADIO
	6 (SFP)	2 (SFP)	
	7 (SFP)	3 (SFP)	
	8 (SFP)	4 (SFP)	

FIBER TRANSCEIVER

PORT #:	DEVICE:
PORT 1	- ANY
PORT 2	- ANY

CELLULAR WIRELESS MODEM

PORT #:	DEVICE:
PORT 1	- ANY
PORT 2	- ANY
PORT 3	- ANY

ETHERNET RADIO (AP)

PORT #:	DEVICE:
PORT 1	- BACKHAUL ETHERNET SWITCH

ETHERNET RADIO (CLIENT)

PORT #:	DEVICE:
PORT 1	- UNMANAGED L2 SWITCH TO DEVICE(S)

NOTES:

- ALL CABLES ENTERING THE CABINET SHALL BE LABELED WITH THE NAME OF THE EXTERNAL DEVICE CONNECTED
- EACH POWER CORD SHALL BE LABELED TO IDENTIFY THE DEVICE THAT IT POWERS
- ALL POWER CABLES SHALL BE RUN AND SECURED CLOSE TO THE CABINET BACKPLANE TO REDUCE THE POSSIBILITY OF ACCIDENTAL DISCONNECTCT
- ALL DATA CABLES CONNECTED TO COMMUNICATION EQUIPMENT SHALL BE RUN ON TOP OF OTHER CABLES TO EASE ACCESS FOR TROUBLESHOOTING, AND EACH END LABELED CORRESPONDING TO THE DEVICE AND PORT THAT IT CONNECTS.

NOTE: THESE DIAGRAMS EACH SHOW ONE COMBINATION OF COMPONENTS. MANY OTHER CONFIGURATIONS THAT WILL BE NEEDED ARE NOT SHOWN.

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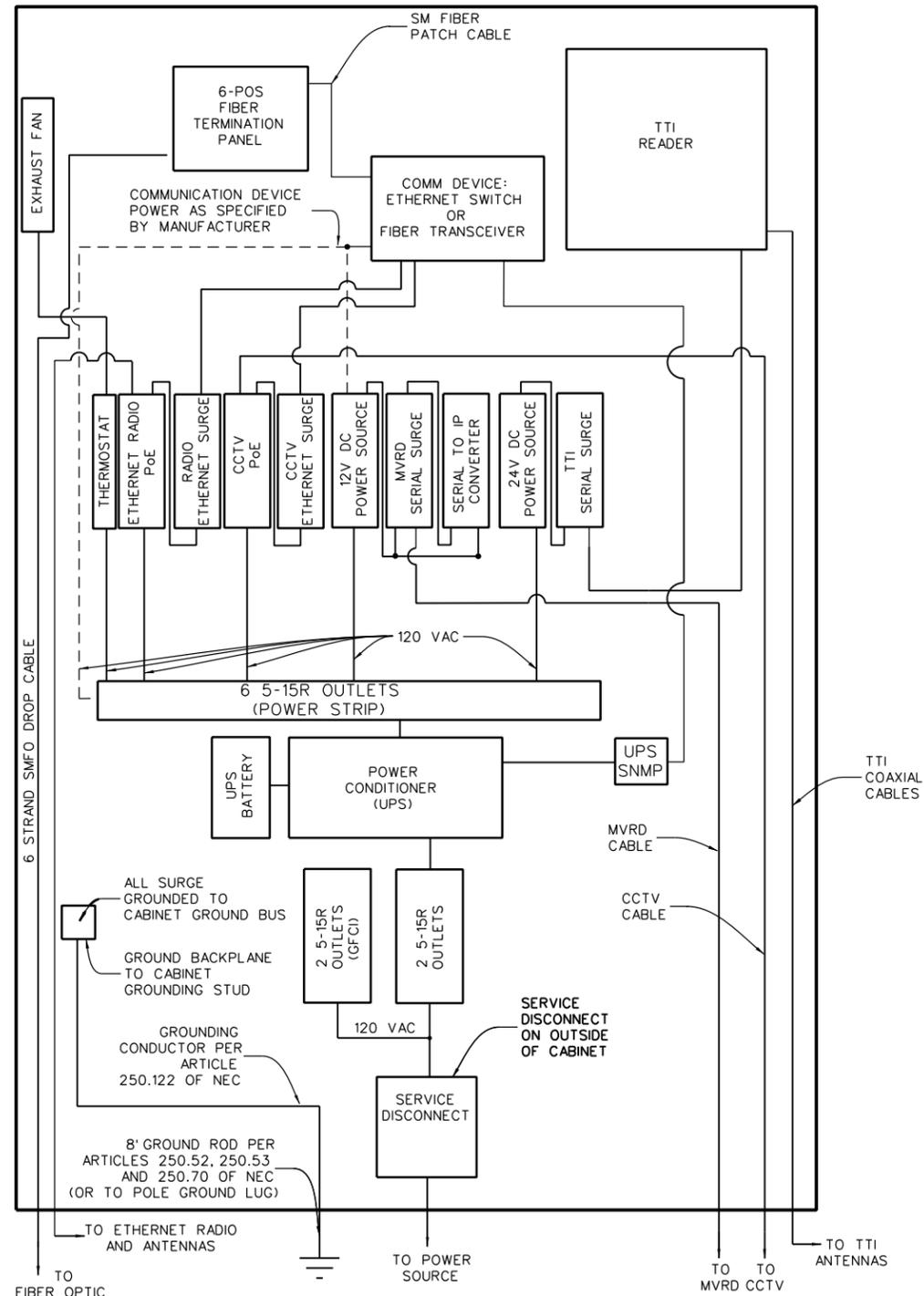
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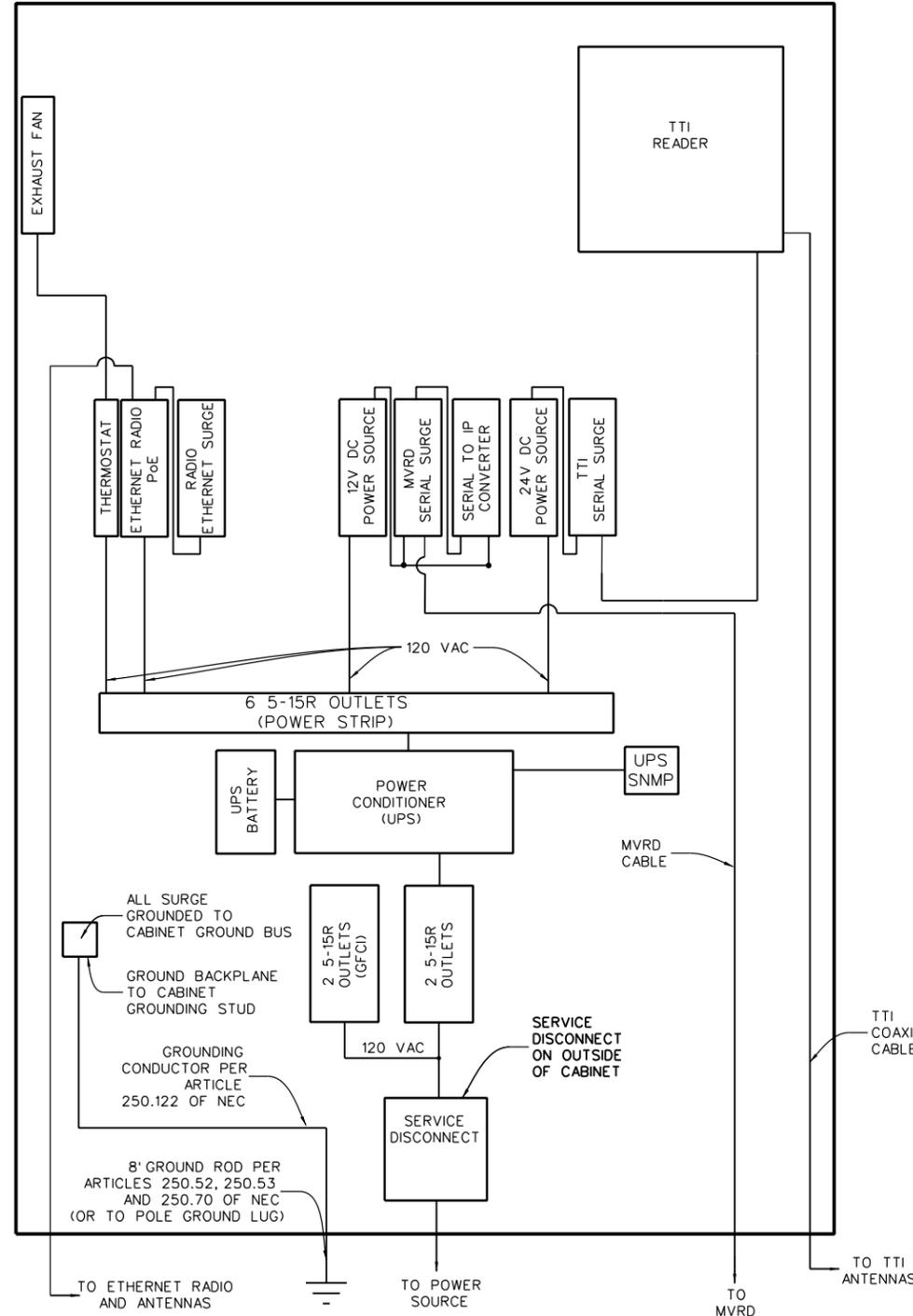
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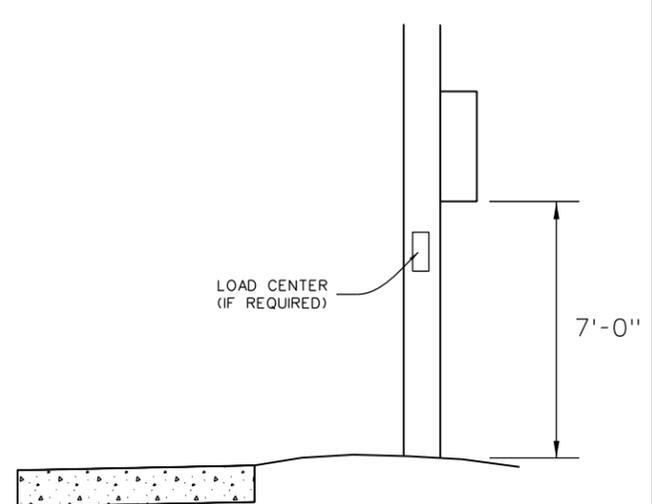


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ONE-LINE DIAGRAM
FIBER AND RADIO (AP) COMM

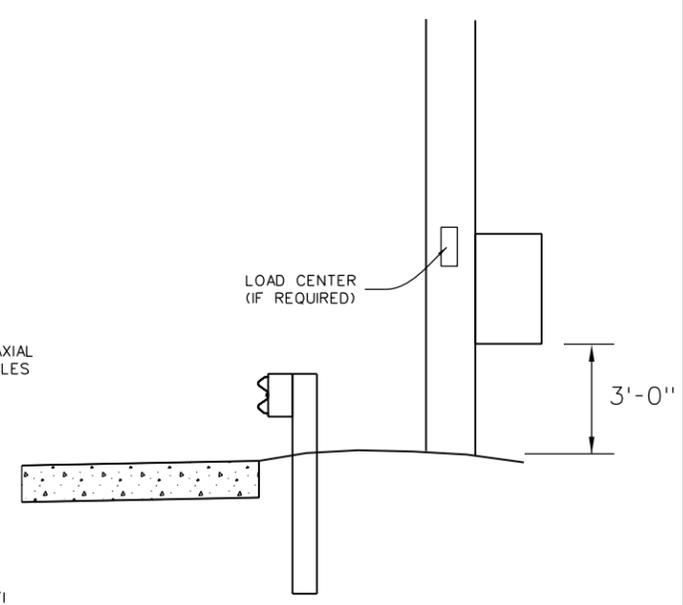


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ONE-LINE DIAGRAM
RADIO (CLIENT) COMM

NOTE: THESE DIAGRAMS EACH SHOW ONE COMBINATION OF COMPONENTS. MANY OTHER CONFIGURATIONS THAT WILL BE NEEDED ARE NOT SHOWN.



MOUNTING HEIGHT FOR POLE-MOUNTED CABINETS NOT BEHIND GUARDRAIL



MOUNTING HEIGHT FOR POLE-MOUNTED CABINETS BEHIND GUARDRAIL

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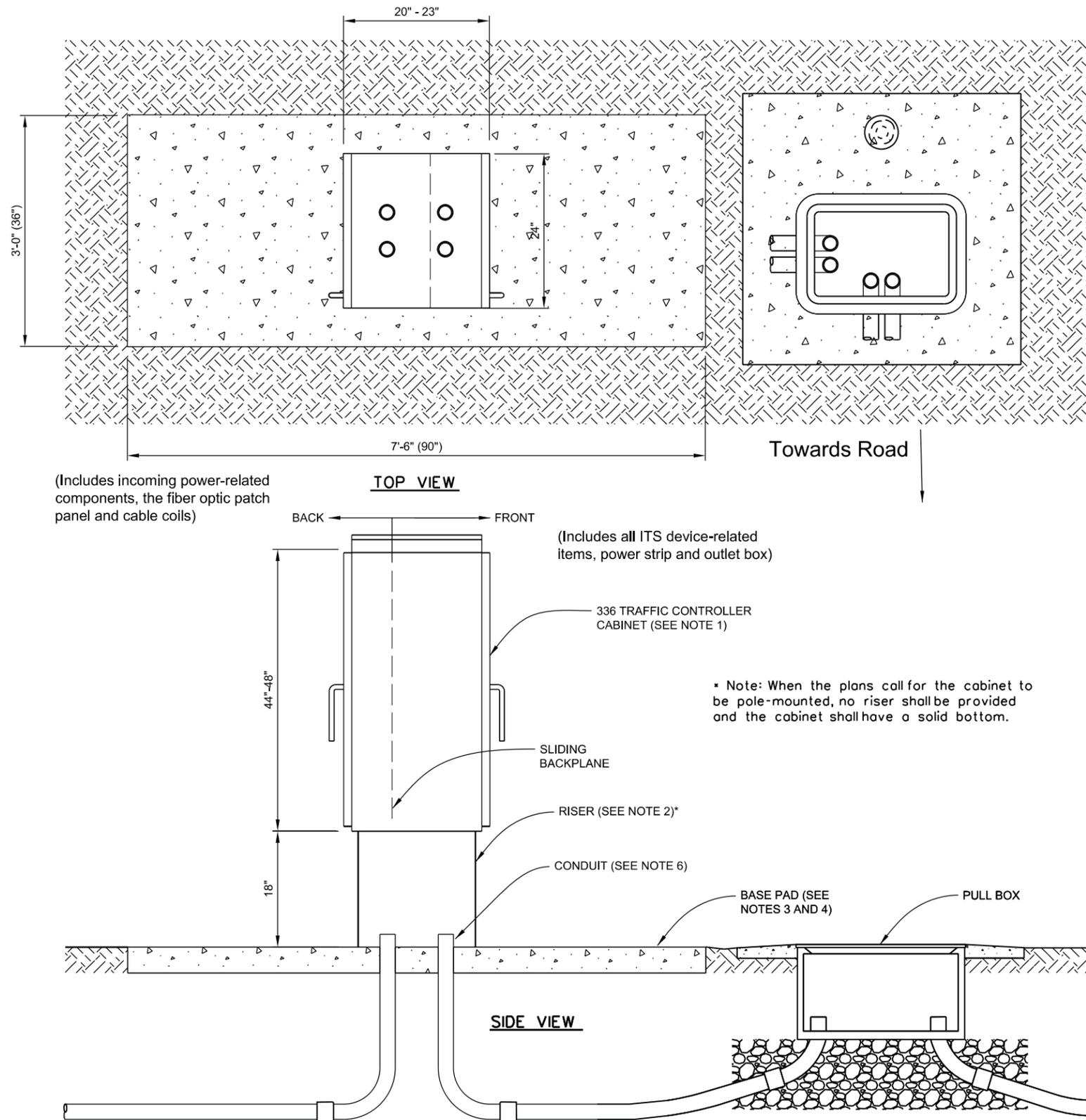
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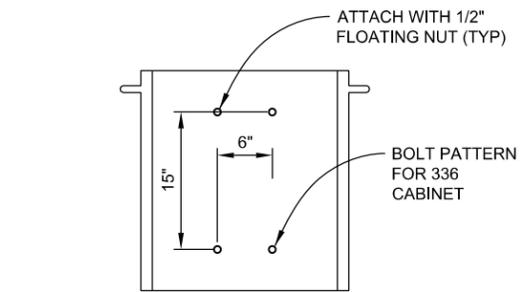
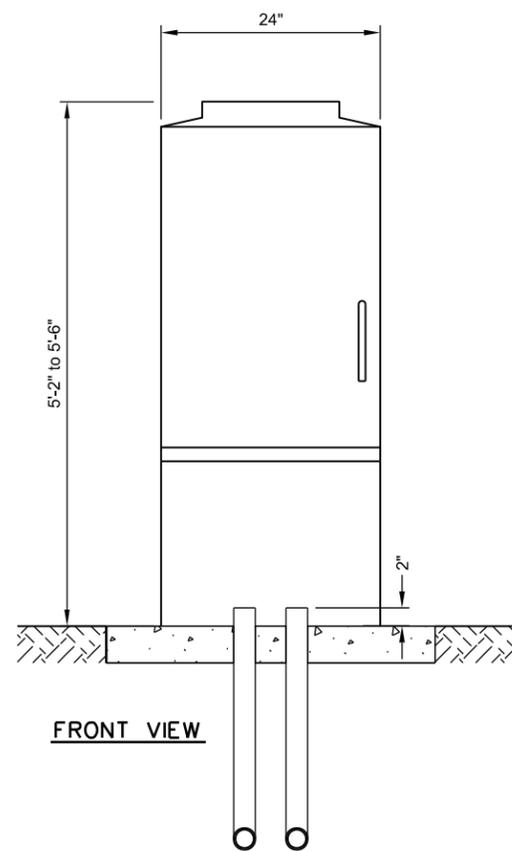
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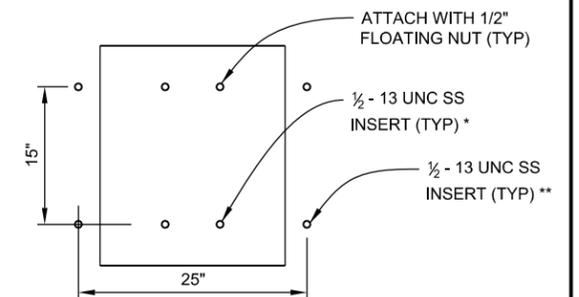


NOTES:

1. THE COMMUNICATIONS CABINET (TYPE 2) SHALL BE A 336 TRAFFIC CONTROLLER CABINET THAT IS CONSTRUCTED FROM ALUMINUM AND HAS NOMINAL DIMENSIONS OF 48" HIGH X 24" WIDE X 22" DEEP.
2. THE RISER SHALL BE CONSTRUCTED FROM ALUMINUM AND HAVE NOMINAL DIMENSIONS OF 18" HIGH X 24" WIDE X 24" DEEP. IT SHALL INCLUDE A CONNECTION MECHANISM THAT WILL ALLOW THE COMMUNICATIONS CABINET (TYPE 2) TO BE SOLIDLY ATTACHED TO IT. USE A TYPE (SIZE AND SHAPE) OF RISER COMPATIBLE WITH THE TYPE OF CONTROLLER CABINETS BEING SUPPLIED TO THE PROJECT.
3. THE BASE PAD SHALL BE NOMINALLY 4 INCHES THICK AND SHALL BE MADE OF EITHER CAST-IN-PLACE CONCRETE, PRECAST CONCRETE OR POLYMER CONCRETE. IT SHALL INCLUDE EMBEDDED INSERTS THAT WILL ALLOW THE RISER TO BE SOLIDLY ATTACHED TO IT.
4. THE BASE PAD DIMENSIONS SHOWN MAY VARY PER MANUFACTURER'S SPECIFICATIONS, BUT SHALL EXTEND AT LEAST 2'-6" BEYOND THE CABINET BASE ON EACH CABINET DOOR SIDE AND AT LEAST 6" BEYOND THE CABINET BASE ON THE OTHER TWO SIDES.
5. BOLT THE RISER TO THE BASE PAD AND BOLT THE CABINET TO THE RISER. THE JOINTS BETWEEN THE CABINET AND RISER, AND BETWEEN THE RISER AND THE BASE PAD SHALL BE SEALED WITH A QUALITY, CLEAR 100% SILICONE CAULK.
6. A MINIMUM OF (4) - 2" CONDUITS SHALL BE INSTALLED WITH EVERY CABINET. THE OPENINGS IN THE BASE PAD THROUGH WHICH THESE CONDUITS PROTRUDE SHALL HAVE A DIAMETER THAT IS NO MORE THAN 1/8" GREATER THAN THAT OF THE CONDUIT. THESE CONDUITS SHALL EXTEND INTO A NEARBY PULL BOX OR DEVICE POLE.
7. ALL WORK INVOLVING THE FURNISHING AND INSTALLATION OF THE BASE PAD, RISER AND CONTROLLER CABINET WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE COMMUNICATIONS CABINET (TYPE 2) PAY ITEM. THIS ITEM SHALL ALSO INCLUDE ALL IN-CABINET COMPONENTS THAT ARE NOT SPECIFICALLY PART OF A SEPARATE PAY ITEM.



CABINET TO RISER BOLT PATTERN



BASE PAD TO RISER BOLT PATTERN

* Location of inserts to match the bolt pattern of the bottom of the riser.
 ** For potential future installation of a 332 cabinet (without riser). During installation, Contractor shall install threaded bolts that will protect the inserts from the weather.

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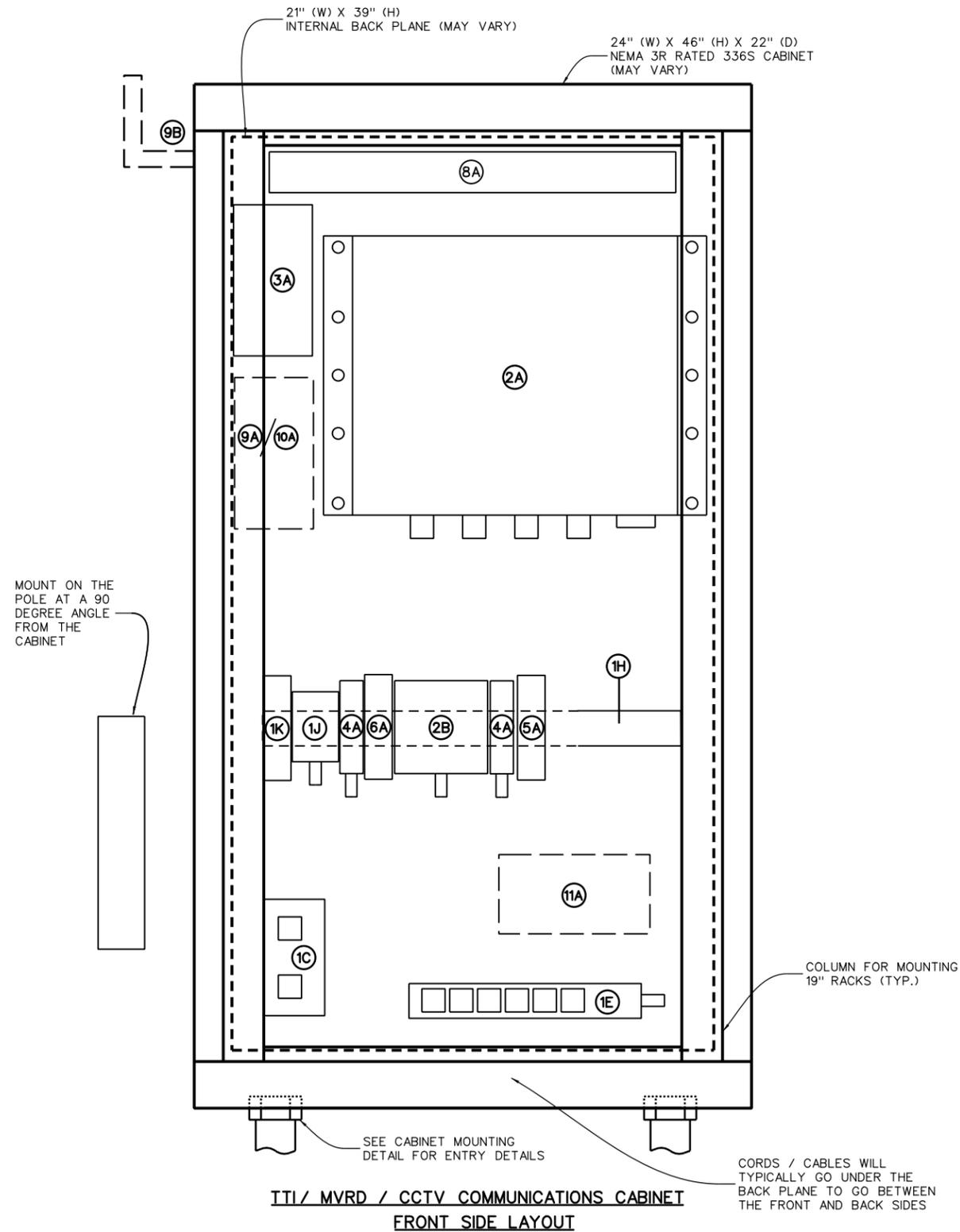
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COMMUNICATIONS CABINET (TYPE 2) CABINET AND FOUNDATION DETAIL			
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	EQUIPMENT	MOUNTING DESCRIPTION (SEE NOTE 3)	COMPONENT SUBSET	COMMENTS
1C	SINGLE GANG OUTLET BOX WITH 5-15R (GFCI)	SCREW / SIDE PANEL	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1E	SIX OUTLET POWER STRIP	VELCRO	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1H	20-INCH DIN RAIL	SCREW	CABINET - ATTACHMENT	PROVIDE NEW AS PART OF THIS ITEM.
1J	12 VDC POWER SUPPLY	DIN	CABINET - GENERAL POWER SUPPLY	PROVIDE NEW AS PART OF THIS ITEM.
1K	ENVIRONMENTAL CONTROL (THERMOSTAT) *	DIN	CABINET - VENTILATION	PROVIDE NEW AS PART OF THIS ITEM.
1L	COOLING FAN *	SCREW	CABINET - VENTILATION	PROVIDE NEW AS PART OF THIS ITEM.
2A	TTIREADER	SCREW	DEVICE - TTI	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
2B	24 VDC TTIPOWER SUPPLY	DIN	DEVICE - TTIPOWER	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
3A	CCTV PoE MIDSPAN	VELCRO	DEVICE - CCTV POWER	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
4A	SERIAL SURGE PROTECTOR	DIN	DEVICE SURGE - SFR, TTI	RELOCATE FROM OLD CABINET, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
5A	ETHERNET SURGE PROTECTOR	DIN	DEVICE SURGE - CCTV, RADIO	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
6A	SERIAL TO IP CONVERTER	DIN	DEVICE - COMM CONVERTER - SFR, VMS	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
8A	ETHERNET SWITCH (3930)	SCREW / EXTERNAL	COMM - FIBER OPTIC-ETHERNET SWITCH	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.
9A	CELLULAR WIRELESS MODEM	VELCRO	COMM - WIRELESS - CELLULAR	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
9B	CELLULAR WIRELESS ANTENNA	SCREW	COMM - WIRELESS - CELLULAR	PROVIDE NEW, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
10A	ETHERNET RADIO PoE MIDSPAN	VELCRO	COMM - WIRELESS - RADIO	PROVIDE NEW COMPONENT, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.
11A	SPREAD SPECTRUM RADIO	VELCRO	COMM - WIRELESS - RADIO	RELOCATE FROM OLD CABINET, WHEN APPLICABLE, AS PART OF A SEPARATE PAY ITEM.

* Cabinet shall include a ventilation system. Details may vary from those shown here.

NOTES:

- SEE TTI/MVRD/CCTV ONE-LINE DIAGRAMS FOR EQUIPMENT WIRING FOR EACH COMMUNICATIONS TYPE.
- SEE PROJECT SPECIAL PROVISIONS FOR EQUIPMENT REQUIREMENTS.
- SHELF - SITTING ON SHELF THAT IS ATTACHED TO AND SUPPORTED BY THE BACK PLANE
SCREW = EQUIPMENT SCREWED TO THE CABINET BACK PLANE THROUGH PRE-DRILLED HOLES
DIN = EQUIPMENT MOUNTED TO DIN RAIL
VELCRO = MOUNTED TO BACK PLANE USING VELCRO EXTREME OR EQUIVALENT

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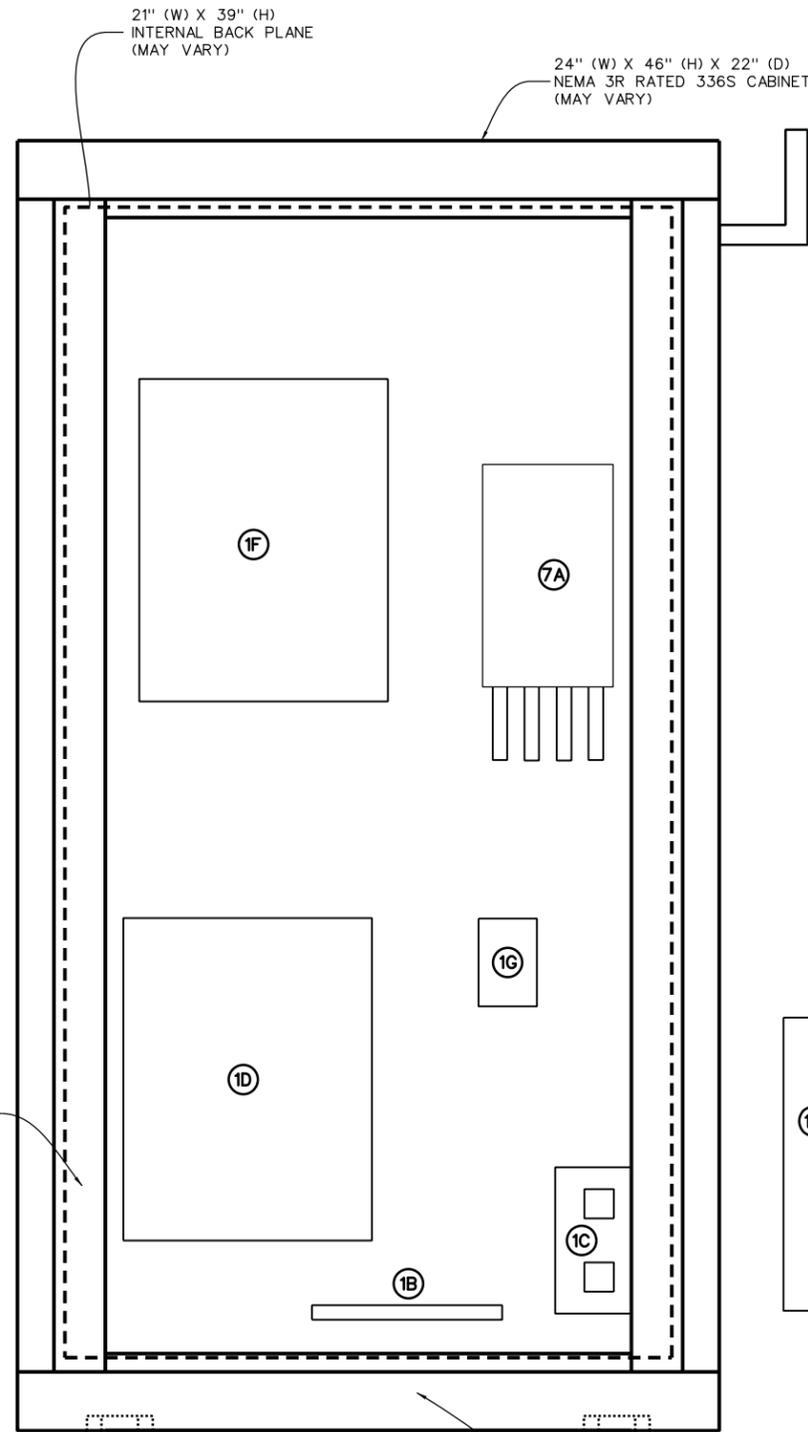
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As Constructed	COMMUNICATIONS CABINET (TYPE 2)		Project No./Code
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TTI/ MVRD / CCTV COMMUNICATIONS CABINET
FRONT SIDE LAYOUT

CORDS / CABLES WILL TYPICALLY GO UNDER THE BACK PLANE TO GO BETWEEN THE FRONT AND BACK SIDES

MOUNT ON THE POLE AT A 90 DEGREE ANGLE FROM THE CABINET

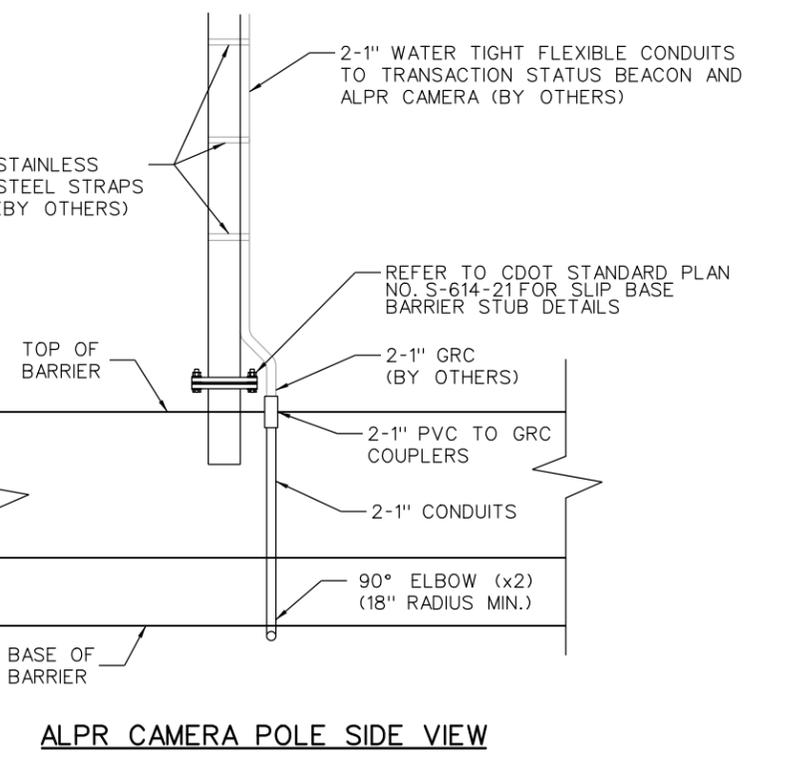
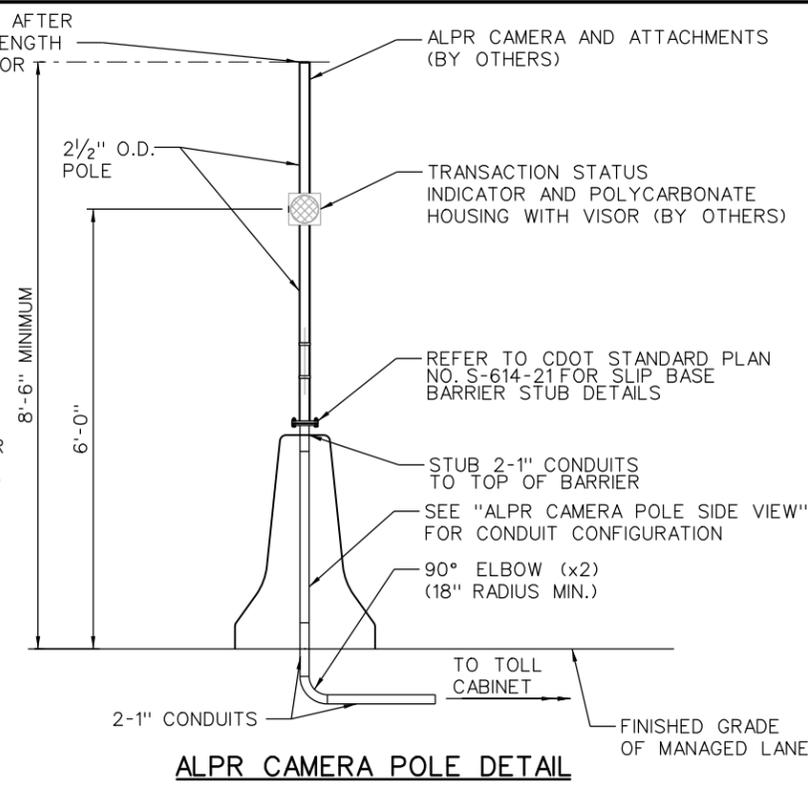
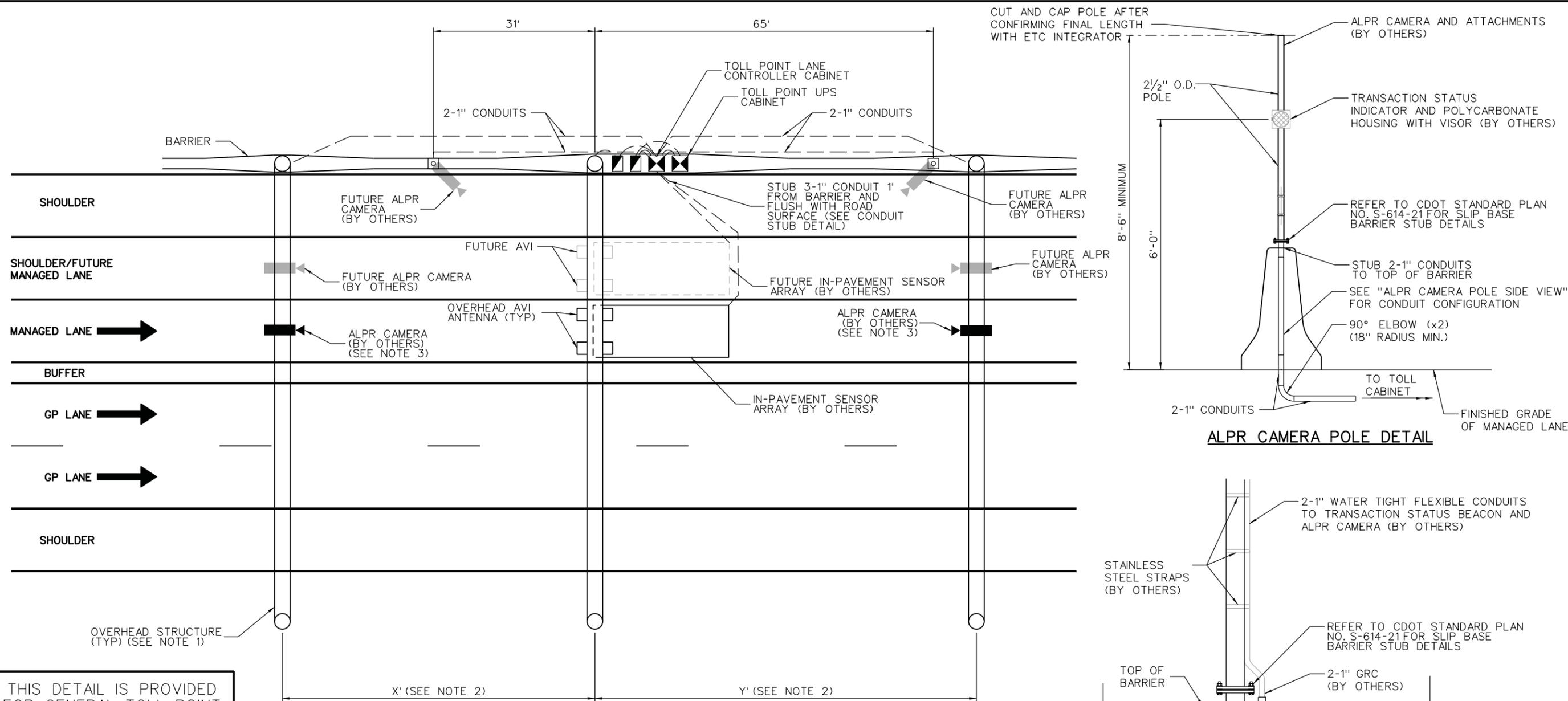
	EQUIPMENT	MOUNTING DESCRIPTION (SEE NOTE 3)	COMPONENT SUBSET	COMMENTS
1A	LOAD CENTER	INDEPENDENT POLE-MOUNT	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM WHEN METER IS 50 FEET OR MORE AWAY OR OUT OF LINE OF SIGHT.
1B	GROUND BUS	SCREW	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1C	SINGLE GANG OUTLET BOX WITH 5-15R	SCREW / SIDE PANEL	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1D	POWER CONDITIONER	SCREW / SHELF MOUNT	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1F	POWER CONDITIONER BATTERY	SCREW / SHELF MOUNT	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
1G	POWER CONDITIONER SNMP	VELCRO	CABINET - POWER	PROVIDE NEW AS PART OF THIS ITEM.
7A	FIBER OPTIC PATCH PANEL (ST)	SCREW	COMM - FIBER OPTIC	PROVIDE NEW AS PART OF A SEPARATE PAY ITEM.

- NOTES:
- SEE TTI/MVRD/CCTV ONE-LINE DIAGRAMS FOR EQUIPMENT WIRING FOR EACH COMMUNICATIONS TYPE.
 - SEE PROJECT SPECIAL PROVISIONS FOR EQUIPMENT REQUIREMENTS.
 - SHELF = SITTING ON SHELF THAT IS ATTACHED TO AND SUPPORTED BY THE BACK PLANE
 SCREW = EQUIPMENT SCREWED TO THE CABINET BACK PLANE THROUGH PRE-DRILLED HOLES
 DIN = EQUIPMENT MOUNTED TO DIN RAIL
 VELCRO = MOUNTED TO BACK PLANE USING VELCRO EXTREME OR EQUIVALENT

Kimberly Garber 1:21:36 PM P:\Projects\160227 CDOT 1-70 East\CADD\DET13_Comm Cabinet (Type 2) Detail (2 of 2).dgn

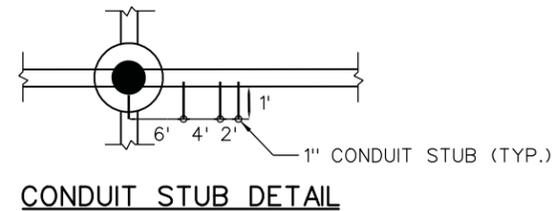
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File Name: DET13_Comm Cabinet (Type 2) Detail (2 of 2).dgn						Designer: CDOT
Horiz. Scale: NTS Vert. Scale: As Noted	JKS			Detailer: CDOT	Subset Sheets: of	

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THIS DETAIL IS PROVIDED FOR GENERAL TOLL POINT INFORMATION ONLY AND IS NOT PROJECT SPECIFIC.

LEGEND	
	CABINET
	PULL BOX
	CONDUIT
	ALPR CAMERA (BY OTHERS)



CONTRACTOR TO VERIFY STUB OUT LOCATIONS WITH ETC INTEGRATOR PRIOR TO INSTALLATION.

- NOTES:**
- CONTRACTOR SHALL DESIGN OVERHEAD TOLLING STRUCTURES TO SUPPORT ALL REQUIRED OVERHEAD DEVICES.
 - LONGITUDINAL SPACING OF OVERHEAD TOLLING STRUCTURES SHALL BE DETERMINED BY THE TOLL SYSTEM INTEGRATOR.
 - MOUNTING HEIGHT FOR THE OVERHEAD ALPR CAMERAS SHALL BE DETERMINED BY THE TOLL SYSTEM INTEGRATOR.

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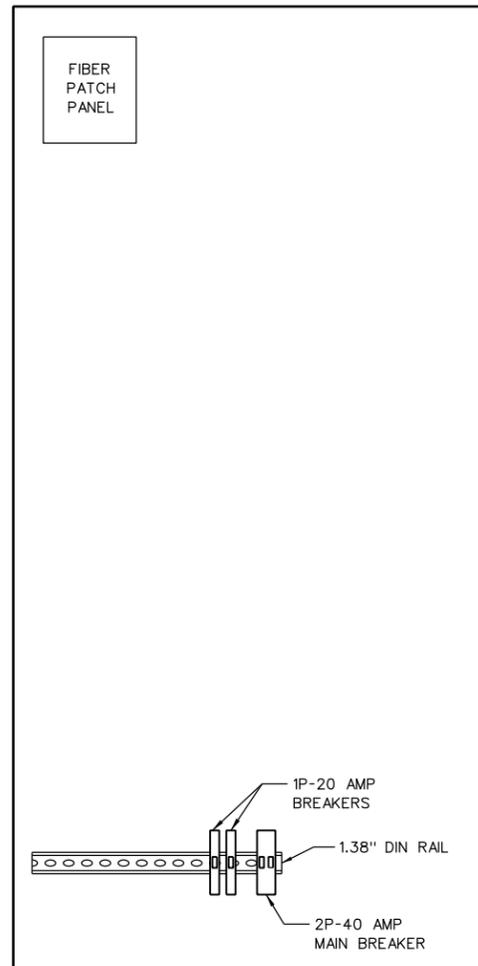
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DUAL LANE TOLL POINT LAYOUT			
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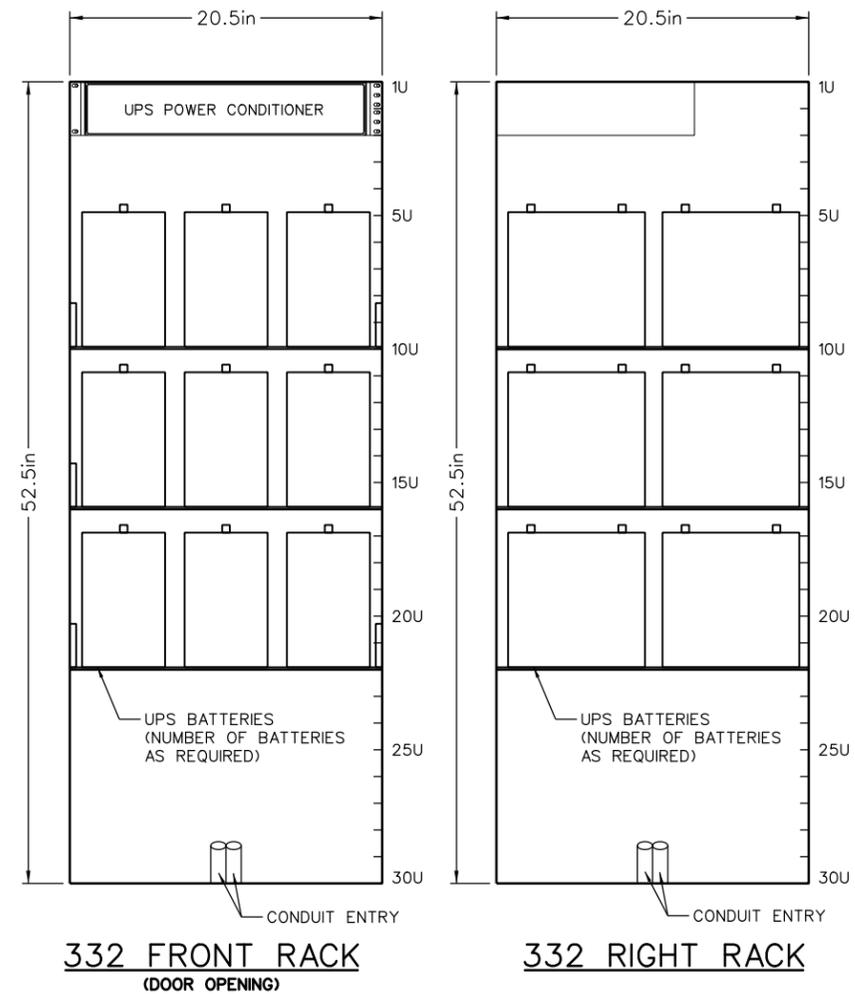
1U= 1 RACK UNIT= 1.75"



**TOLLING M STRETCH
BACKPLANE**
(DOOR OPENING)

NOTES:

- LAYOUT OF CABINET DEVICES IS SCHEMATIC IN NATURE. FINAL ARRANGEMENT IS TO BE SIMILAR FOR ALL ITS CABINETS OF THIS SIZE, AND COORDINATED WITH ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATOR.
- CONTRACTOR SHALL DELIVER TOLLING CABINET BACKPLANE, DIN RAIL, AND CIRCUIT BREAKERS TO ELECTRONIC TOLL COLLECTION SYSTEM INTEGRATOR.



332 FRONT RACK
(DOOR OPENING)

332 RIGHT RACK

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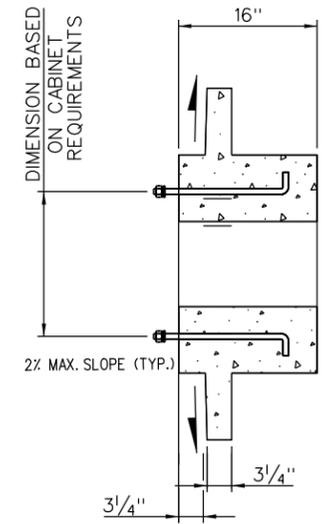
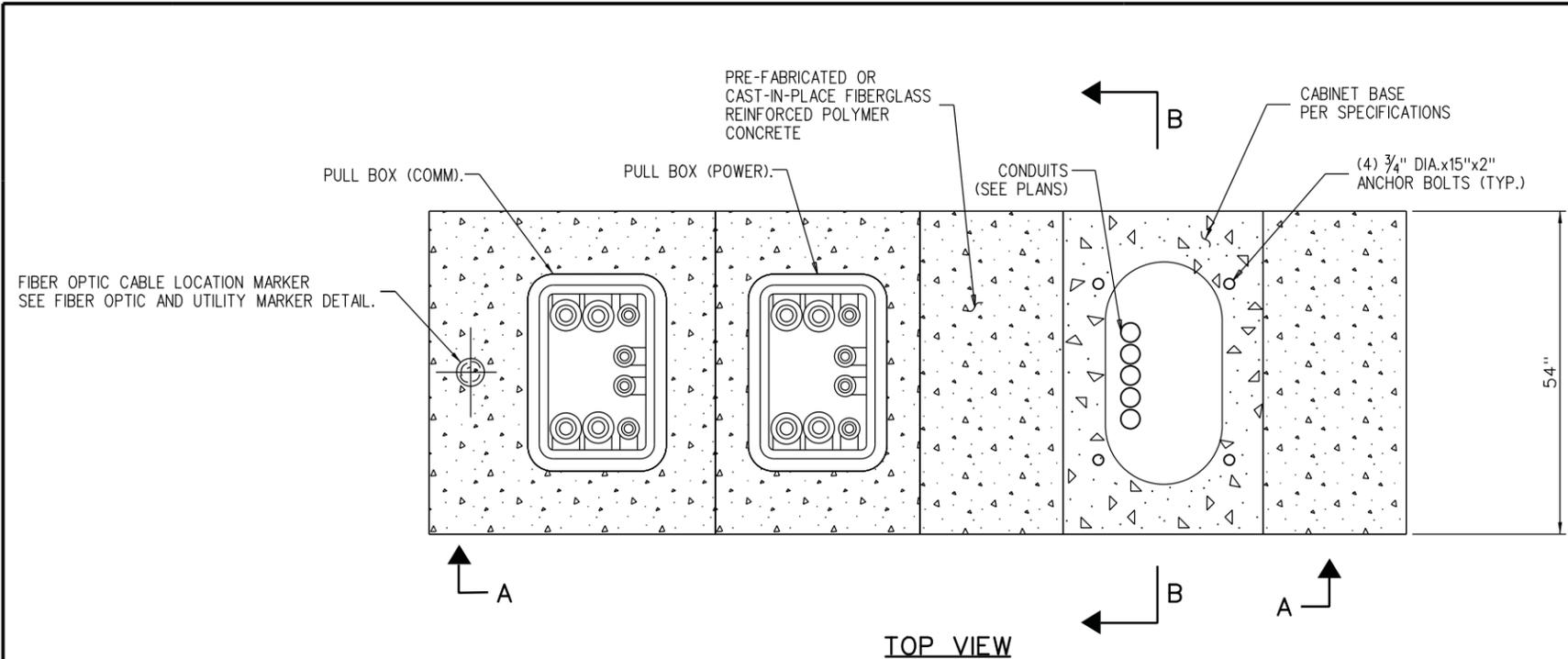
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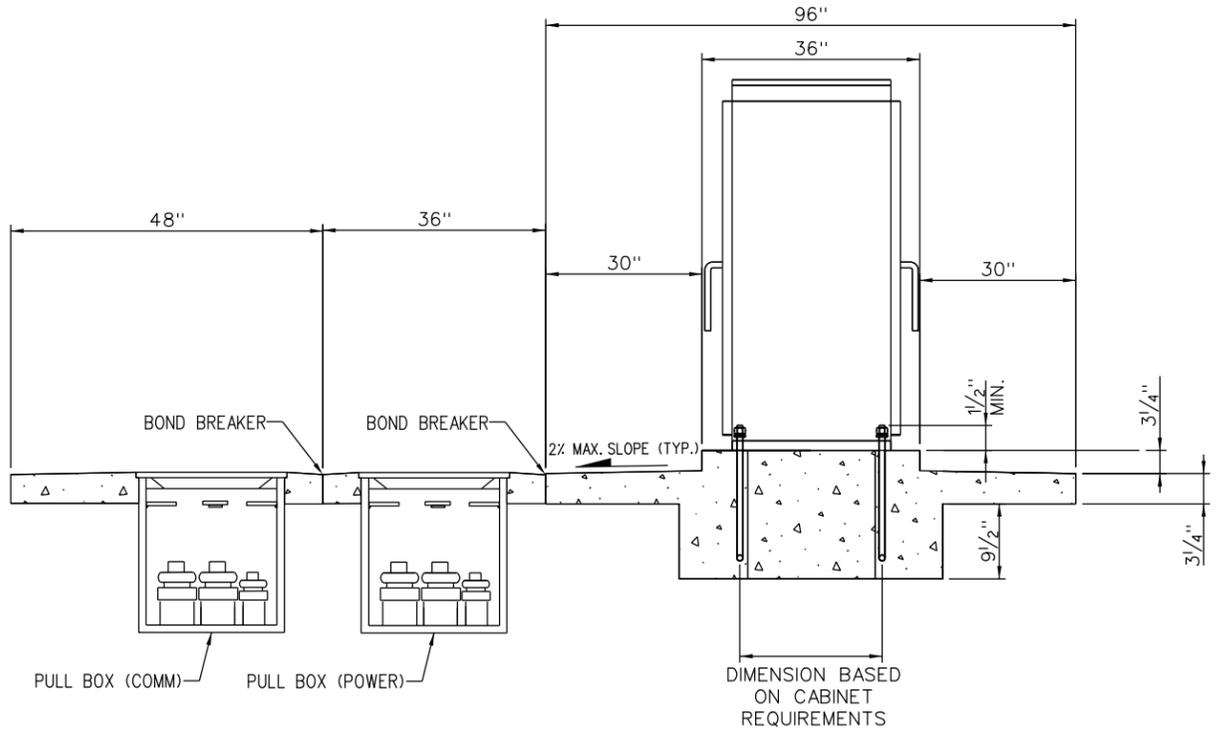
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TOLL POINT CABINET RACK DETAILS			
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Sheet Number 16



SECTION B-B



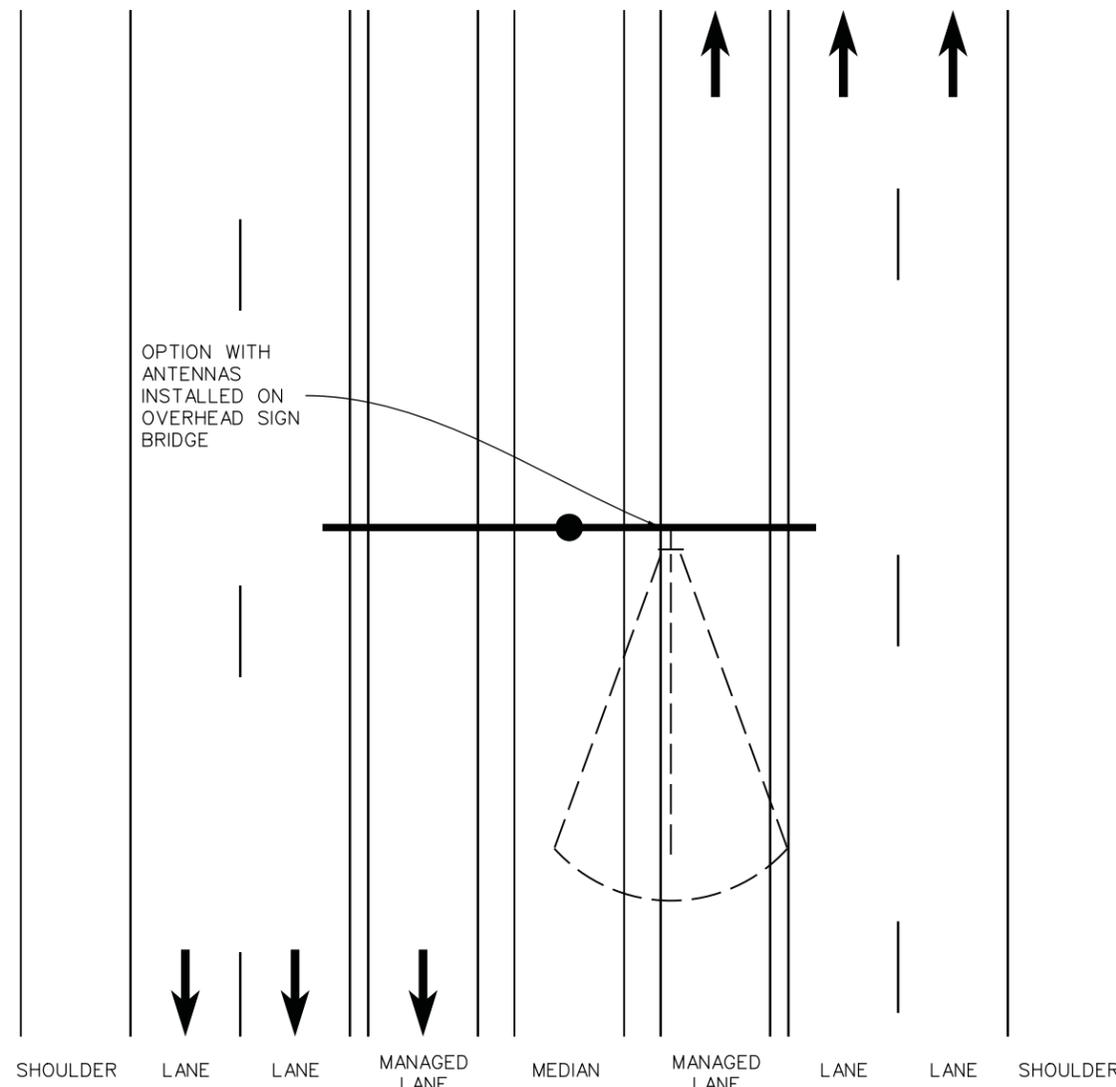
SECTION A-A
MODEL 332D FOUNDATION DETAILS

CONCRETE PAD NOTES

1. CONTRACTOR SHALL INSTALL PRE-FABRICATED OR CAST-IN-PLACE CONCRETE PAD. SEE SPECIFICATION FOR MORE INFORMATION ON THE CONCRETE MATERIAL.
2. CONTRACTOR SHALL PLACE A 3/4-INCH THICK CONCRETE PAD (CAST-IN-PLACE OR PRE-FABRICATED), AS INDICATED IN THE DETAILS, OR AS DIRECTED BY THE ENGINEER. THE CONCRETE PAD SHALL SLOPE AWAY FROM THE FIBERGLASS BASE AT A MAXIMUM 2% SLOPE.
3. THE PRE-FABRICATED OR CAST-IN-PLACE CABINET PAD SHALL BE FIBERGLASS REINFORCED POLYMER CONCRETE.
4. FIBERGLASS BASE DIMENSIONS SHOWN VARY PER MANUFACTURER'S SPECIFICATIONS.
5. CONCRETE PAD INCLUDES A 1'-6" FLAT BENCH AROUND PAD WITH SLOPES 3:1 MAX. SEE GRADING AND DRAINAGE PLANS FOR MORE INFORMATION.

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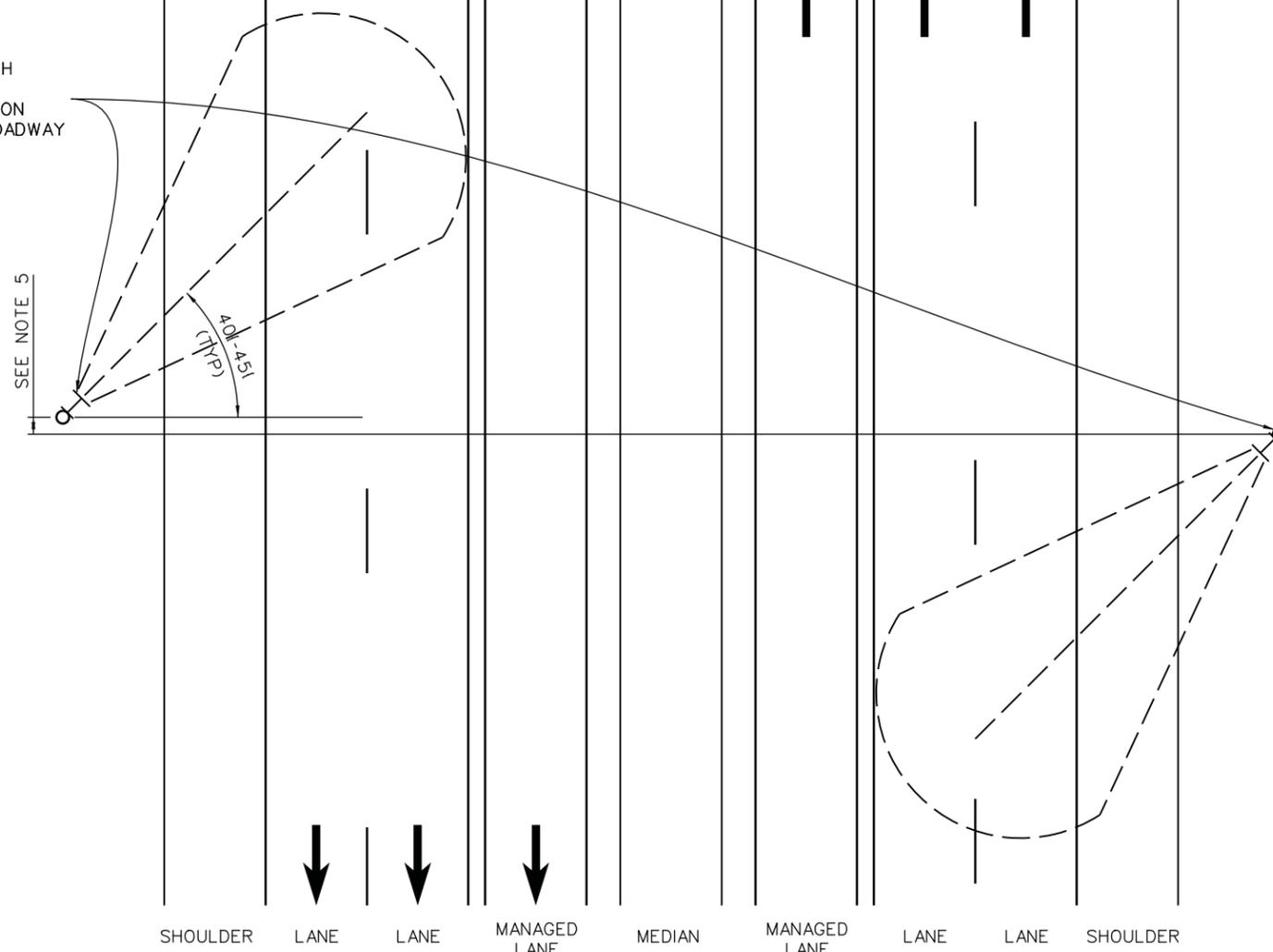
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File Name: DET16_Cabinet Foundation Detail1.dgn	Date:	Comments:	Init.:		No Revisions:	Designer: CDOT	Structure Numbers	
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**TTI ANTENNA AIMING-TYPICAL PLAN VIEW
EXPRESS LANE INSTALLATION**

OPTION WITH
ANTENNAS
INSTALLED ON
SIDE OF ROADWAY

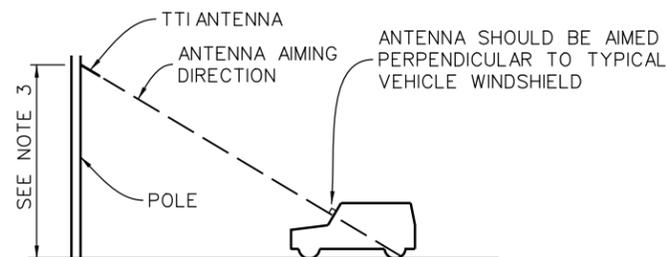
SEE NOTE 5



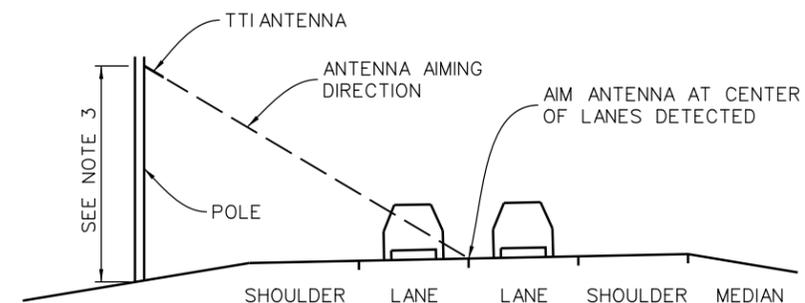
**TTI ANTENNA AIMING-TYPICAL PLAN VIEW
GP LANE INSTALLATION**

NOTES:

1. DETECTION FOR TWO GENERAL PURPOSE (GP) LANES AND ONE MANAGED LANE PER DIRECTION IS SHOWN. ADJUST AS NEEDED FOR SITE SPECIFIC NUMBER OF LANES AND DIRECTIONS DETECTED. EACH TTI SHALL BE LOCATED, AIMED, AND CONFIGURED TO READ EITHER THE MANAGED LANE OR THE GP LANES ONLY, WITHOUT CROSS-READING LANE TYPES.
2. SEE MANUFACTURER INSTALLATION INSTRUCTIONS FOR EQUIPMENT CONFIGURATION, AIMING, AND ADDITIONAL ANTENNA MOUNTING REQUIREMENTS.
3. ANTENNA MOUNTING HEIGHT VARIES BY LOCATION. ADJUST ANTENNA MOUNTING HEIGHT TO ADDRESS AIMING CRITERIA IN PLAN, SECTION, AND PROFILE VIEWS.
4. ANTENNA SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS AND CALIBRATED TO ONLY READ DESIRED LANE(S).
5. OFFSET ANTENNA INSTALLATIONS AND SELECT READER FREQUENCIES BASED ON MANUFACTURER RECOMMENDATIONS IN ORDER TO MINIMIZE INTERFERENCE BETWEEN ANTENNA READERS.



TTI ANTENNA AIMING-TYPICAL PROFILE VIEW



TTI ANTENNA AIMING-TYPICAL SECTION VIEW

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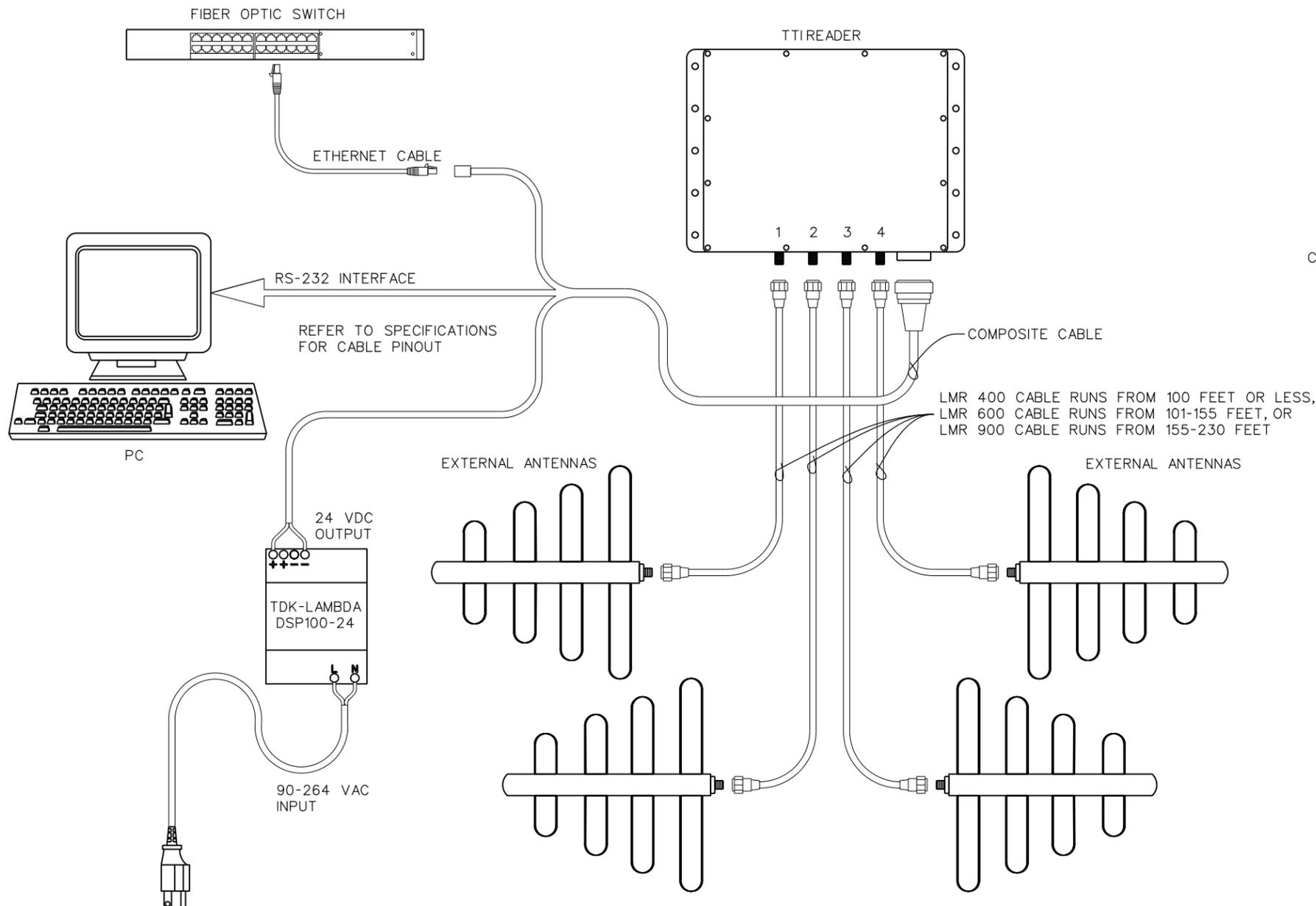
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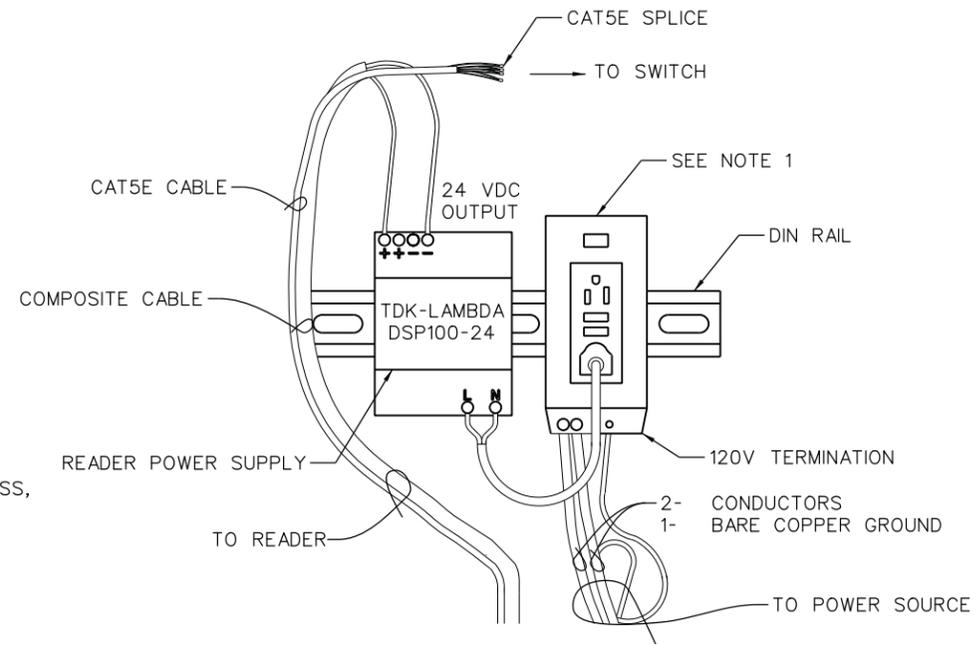
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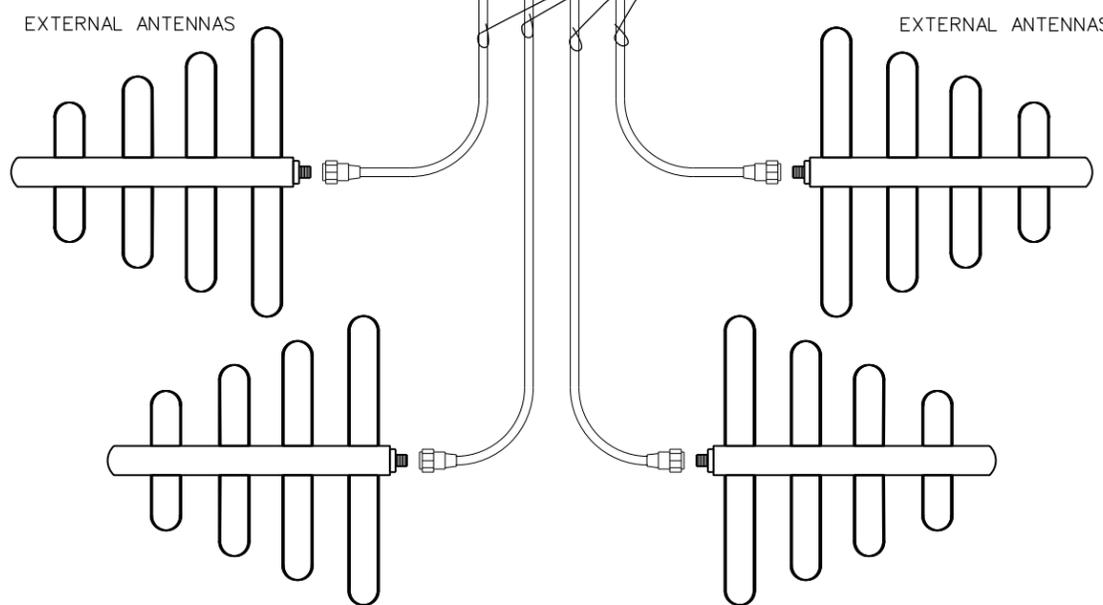
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LMR 400 CABLE RUNS FROM 100 FEET OR LESS,
 LMR 600 CABLE RUNS FROM 101-155 FEET, OR
 LMR 900 CABLE RUNS FROM 155-230 FEET



TTI CABINET WIRING



TTI ANTENNA WIRING DETAIL

		ANTENNA PORT			
		1	2	3	4
TRAFFIC DETECTION DIRECTION	GENERAL PURPOSE LANES	NORTH BOUND	SOUTH BOUND	EAST BOUND	WEST BOUND
	MANAGED LANE	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND

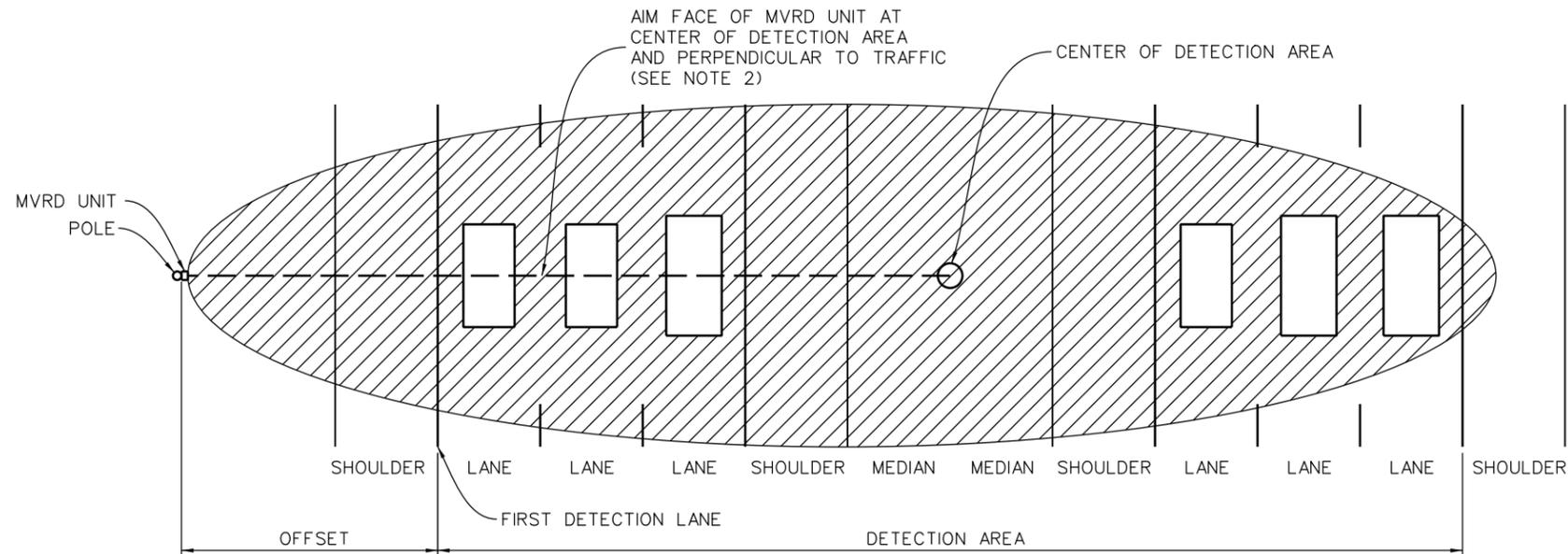
TTI ANTENNA PORT MAPPING

NOTES:

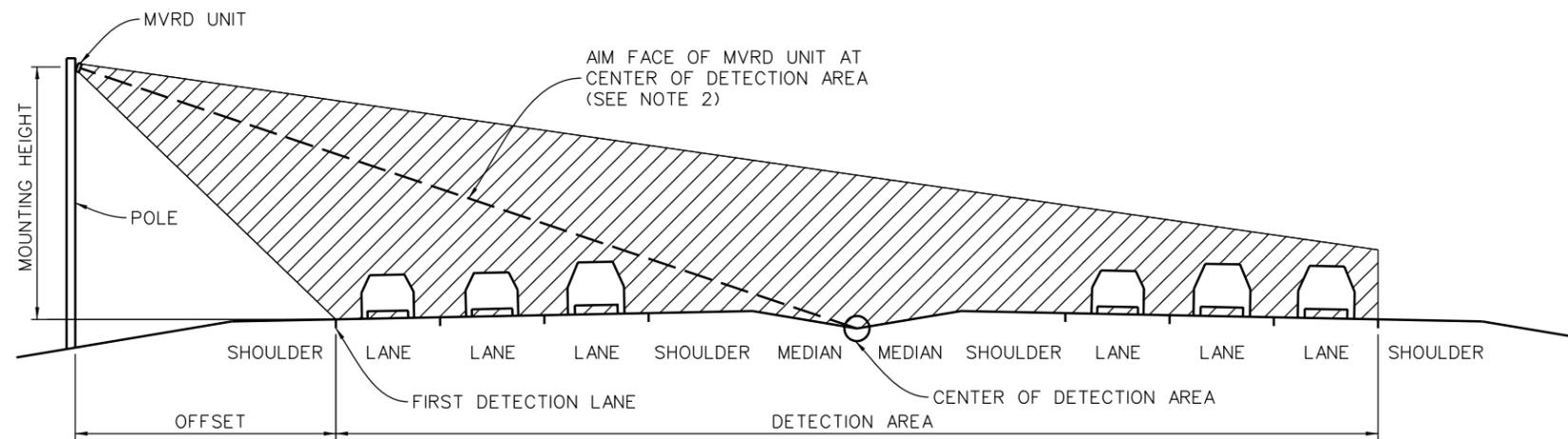
- CONNECT THE READER POWER SUPPLY TO A DIN RAIL MOUNTED GFCI ONLY IN TTICABINETS; OTHERWISE, CONNECT TO THE CONDITIONED POWER STRIP PROVIDED IN THE CABINET.

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TYPICAL MVRD INSTALLATION TOP VIEW



TYPICAL MVRD INSTALLATION CROSS SECTION

NOTES:

1. THIS DETAIL SPECIFIC TO WAVETRONIX SMARTSENSOR MVRD INSTALLATION.
2. SHOWN FOR BI-DIRECTIONAL DETECTION. SAME PRINCIPLES APPLY WHEN ONLY ONE DIRECTION OF TRAFFIC IS DETECTED.
3. SEE MANUFACTURER INSTALLATION INSTRUCTIONS FOR EQUIPMENT CONFIGURATION.
4. WAVETRONIX SMARTSENSOR HAS A DISTANCE LIMITATION OF 250' FROM DETECTOR TO FAR SIDE OF DETECTION AREA.
5. SEE STRUCTURAL DETAIL FOR MOUNTING DETAILS AT SIGN STRUCTURE LOCATIONS.

MVRD Mounting Recommendations

Offset from first detection lane (ft)	Recommended Mounting Height (ft)	Minimum Mounting Height (ft)	Maximum Mounting Height (ft)
6	12	9	19*
7	12	9	19*
8	12	9	20*
9	12	9	21
10	12	9	22
11	12	9	23
12	13	10	24
13	13	11	25
14	14	11	26
15	15	12	26
16	15	12	27
17	16	13	28
18	17	14	29
19	17	14	30
20	18	15	30
21	19	15	31
22	20	16	31
23	22	16	32
24	24	16	33
25	26	17	33
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38	31	21	42
39	33	21	43
40	33	22	43
41	34	22	44
42	34	22	44
43	35	22	45
44	35	23	46
45	36	23	46
46	36	23	47
47	36	24	48
48	38	24	48
49	38	24	49
50-230	39	25	Must be ≤ offset

*Reduction in the number of reported speeds

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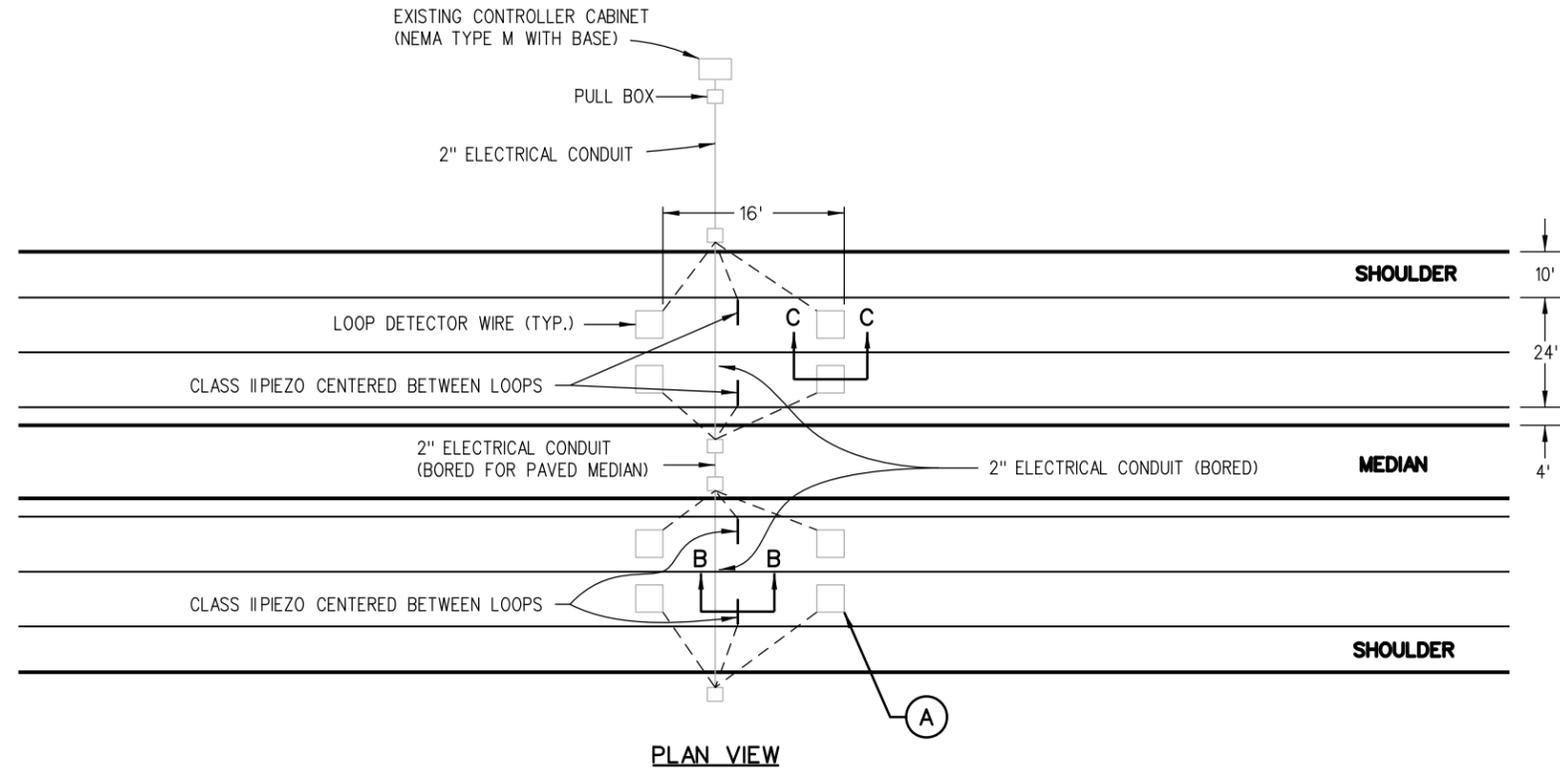
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MVRD INSTALLATION TYPICAL			
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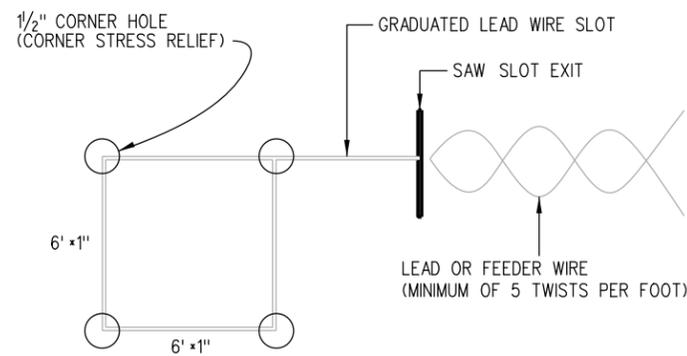
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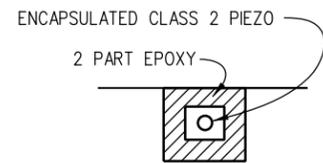
LOOP GEOMETRICS AND INSTALLATION

GENERAL NOTES

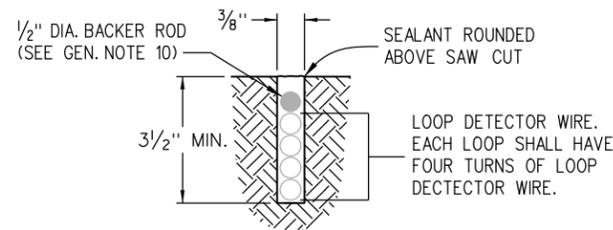
1. ALL DETECTOR LOOPS SHALL MEASURE 6 FT. X 6 FT. (WITHIN 1 INCH TOLERANCE).
2. LOOPS SHALL BE CENTERED IN THE TRAVEL LANE WITH TWO SIDES PARALLEL TO THE LANE STRIPING.
3. ALL LOOP, LOOP LEAD, AND FEEDER WIRE SAW SLOTS SHALL BE CUT TO A MINIMUM DEPTH OF 3/2 INCHES.
4. SLOTS SHALL BE SAWED AFTER PLANING AND BEFORE LAYING OF THE FIRST LIFT OF PAVEMENT WHEN APPLICABLE.
5. ALL LOOP CORNERS SHALL BE ROUNDED USING A 1/2 INCH HOLE DRILLED TO A MINIMUM DEPTH OF 3/2 INCHES.
6. MINIMUM SAW SLOT WIDTH SHALL BE 3/8 INCH.
7. BEFORE INSTALLATION OF THE WIRE, ALL SAW SLOTS SHALL BE CLEANED OF DEBRIS USING WATER AND COMPRESSED AIR. SURFACE AND SLOTS MUST BE ALLOWED TO DRY.
8. ALL LOOPS SHALL BE FOUR TURNS OF THE ABOVE SPECIFIED LOOP WIRE. THE WIRE SHALL BE SEATED IN THE BOTTOM OF THE SAW SLOT.
9. WIRE SPLICES WILL NOT BE PERMITTED IN THE SAW SLOTS. ALL LOOPS SHALL BE CONTINUOUS IN THE PAVEMENT AND TO THE PULL BOX.
10. A BACKER ROD WITH 1/2 INCH DIA. SHALL BE INSTALLED TO INSURE WIRES DO NOT FLOAT TO THE SURFACE DURING GROUTING.
11. ALL SAW SLOTS AND DRILL HOLES SHALL BE SEALED USING A TWO-PART SELF CURING, SELF BONDING WEATHERPROOF EPOXY. EXCESS EPOXY SHALL BE REMOVED TO AVOID UNNECESSARY HIGH SPOTS.
12. PIEZO SENSORS SHALL BE INSTALLED AT THE EXACT MIDPOINT BETWEEN THE LOOPS IN EACH LANE AND TO THE RIGHT OR LEFT SIDE OF THE LINE, CENTERED IN THE WHEEL PATH.
13. PIEZO SENSORS SHALL BE INSTALLED IN COMPLIANCE WITH THE MANUFACTURER'S SPECIFICATIONS, A COPY OF WHICH SHALL BE SUPPLIED TO THE ENGINEER PRIOR TO INSTALLATION.
14. LOOP SETS (TWO LOOPS IN A SERIES) WITHIN A SINGLE LANE SHALL BE SEPARATED BY 10 FEET RESULTING IN A DISTANCE OF 16 FEET FROM LEADING EDGE TO LEADING EDGE (WITHIN 1 INCH TOLERANCE).
15. NO MORE THAN ONE SET OF LOOP LEAD WIRES SHALL BE PLACED IN A SAW SLOT.
16. PULL BOXES MUST CONTAIN AN ADDITIONAL 3 FEET OF LOOP WIRE WHICH ENTERS AND/OR EXITS THE PULL BOX.
17. ALL LOOPS AND LOOP LEADS SHALL BE CLEARLY LABELED IN EACH PULL BOX.
18. MULTIPLE PAIR BELDEN CABLE MAY BE USED IN CONDUIT.
19. COORDINATE INSTALLATION WITH MIKE DELCUPP, CDOT DIVISION OF TRANSPORTATION DEVELOPMENT, AT 303-757-9816. CALL 5 DAYS IN ADVANCE FOR LAYOUT ASSISTANCE.



DETAIL A
LOOP DETECTOR WIRE



SECTION B-B
TYPICAL PIEZO SECTION



SECTION C-C
LOOP DETECTOR WIRE INSTALLATION

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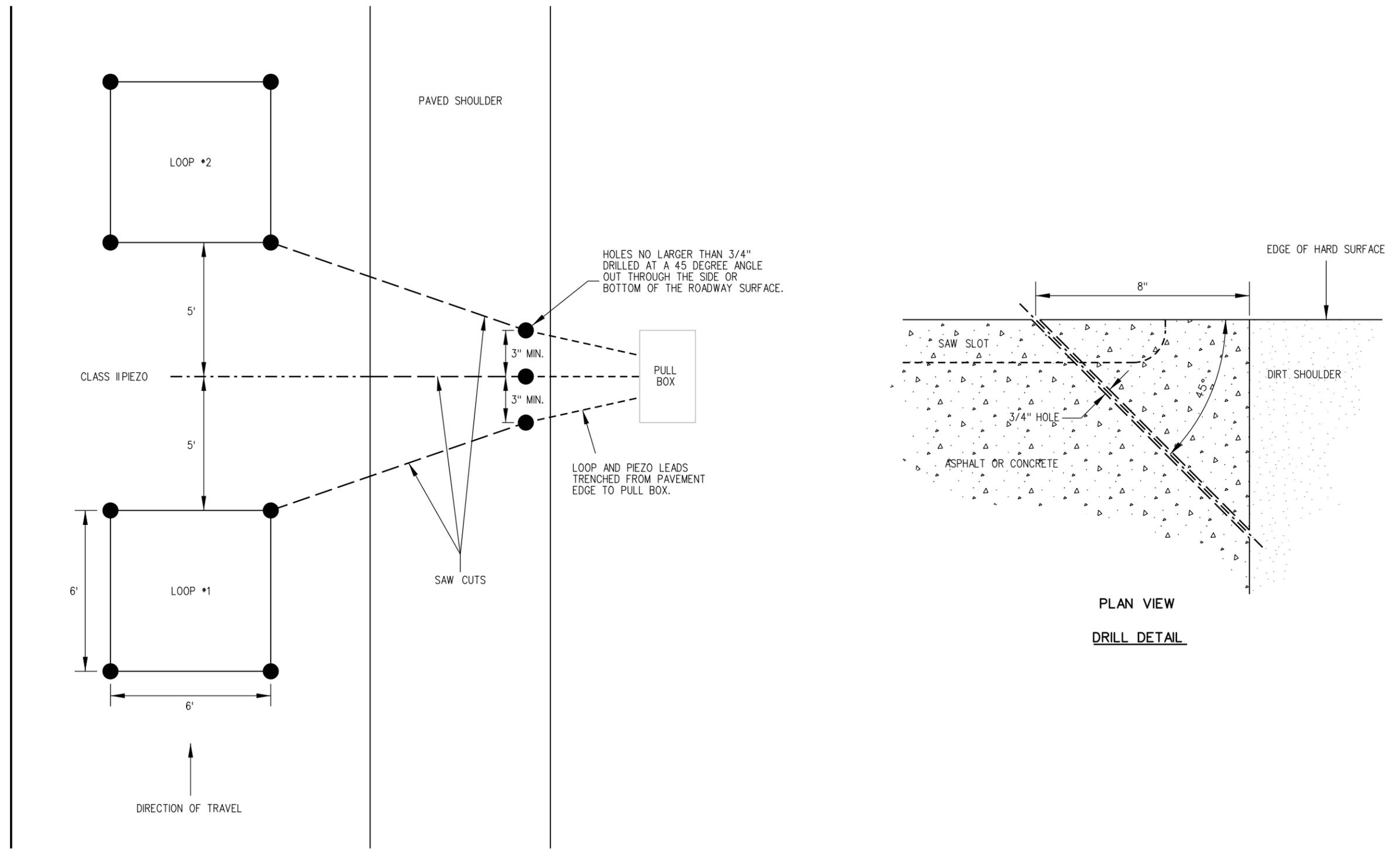
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PIEZO PLACEMENT AND SAW CUTTING FOR AN ATR AXLE CLASSIFICATION SITE

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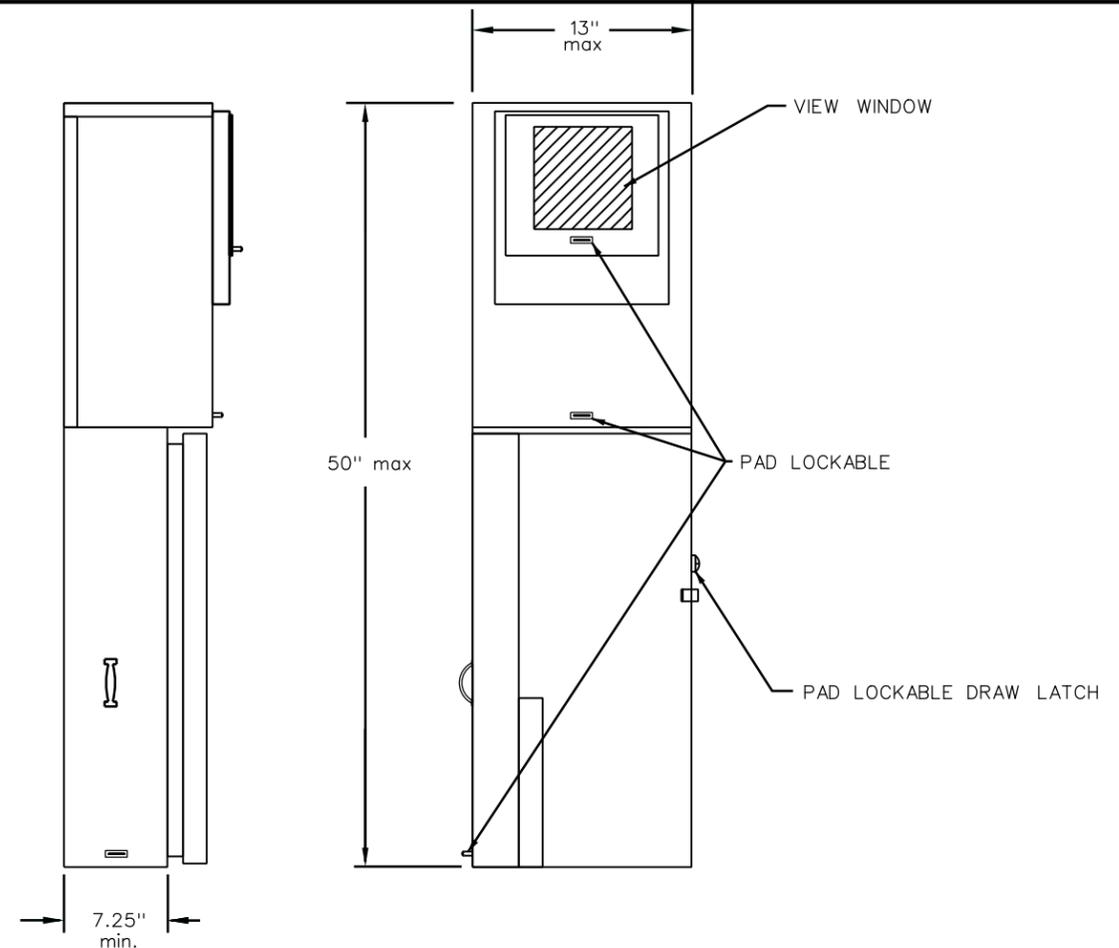
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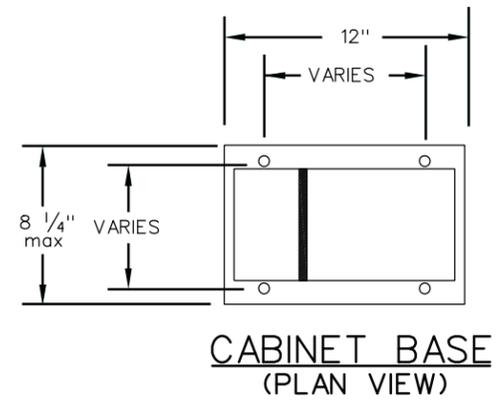
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METER CABINET
(LEFT SIDE VIEW)

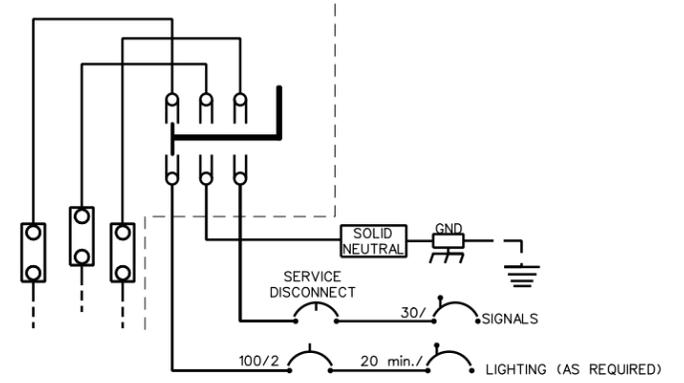
METER CABINET
(FRONT VIEW)



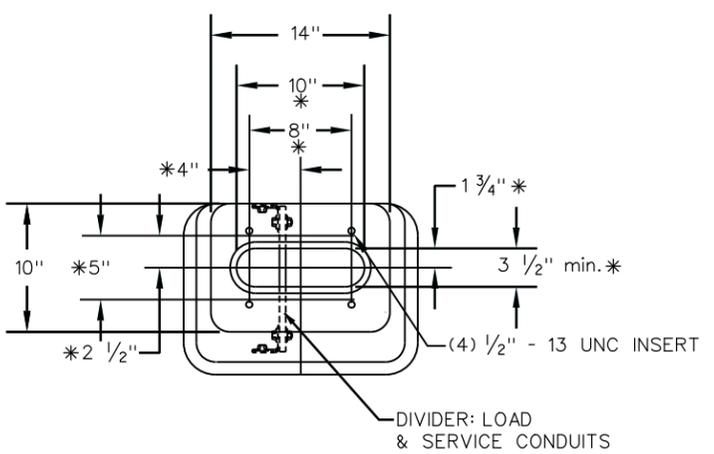
CABINET BASE
(PLAN VIEW)

NOTES

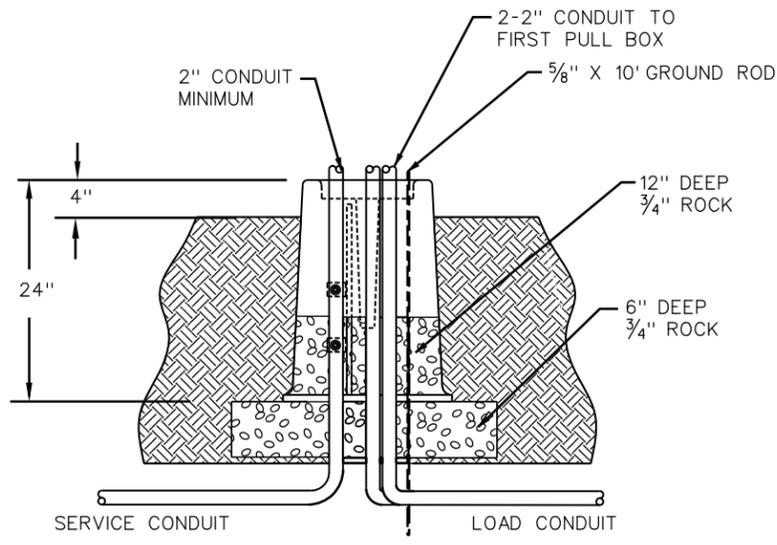
1. METER CABINET SHALL MEET THE ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE (EUSERC) GUIDELINES.
2. PHENOLIC NAME PLATES SHALL BE PROVIDED AS REQUIRED.
3. A PLASTIC COVERED WIRING DIAGRAM SHALL BE ATTACHED TO THE INSIDE OF THE FRONT DOOR.
4. WEIGHT OF FOUNDATIONS SHALL BE STENCILED ON ONE SIDEWALL OF THE FOUNDATION.
- * 5. THROAT & BOLT PATTERNS MAY CHANGE TO VARIOUS SERVICE PEDESTAL MANUFACTURERS REQUIREMENTS.



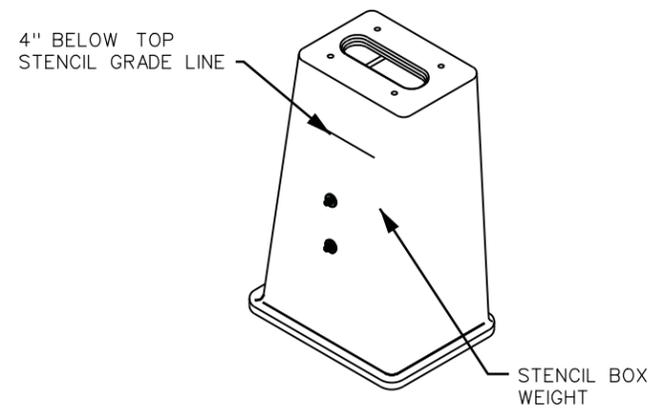
WIRING DIAGRAM



CABINET FOUNDATION
(PLAN VIEW)



CABINET FOUNDATION
(FRONT VIEW)



CABINET FOUNDATION
(ISOMETRIC VIEW)

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File Name: DET22_Service Pedestal Foundation.DGN	
Horiz. Scale: NTS Vert. Scale: As Noted	
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SERVICE PEDESTAL FOUNDATION			
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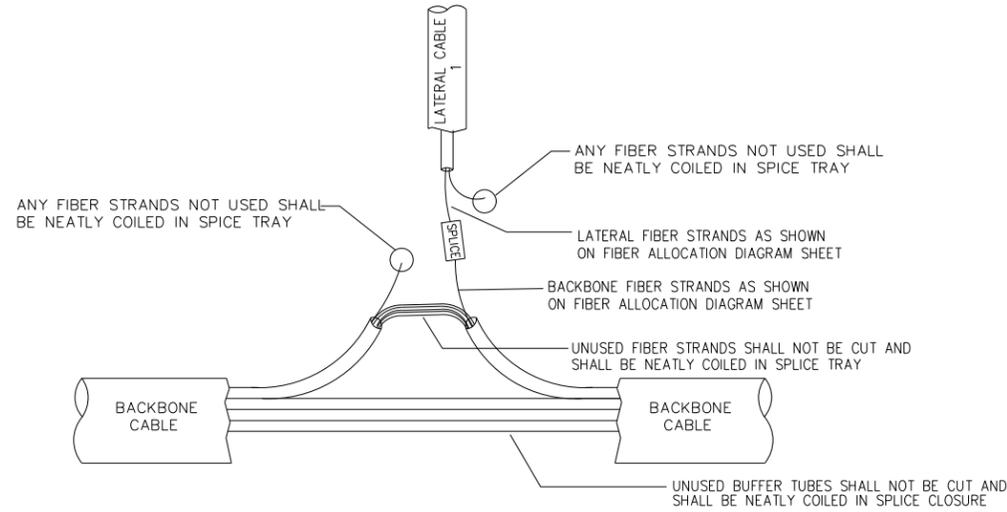
Project No./Code
Sheet Number 23

SHEET NOTES:

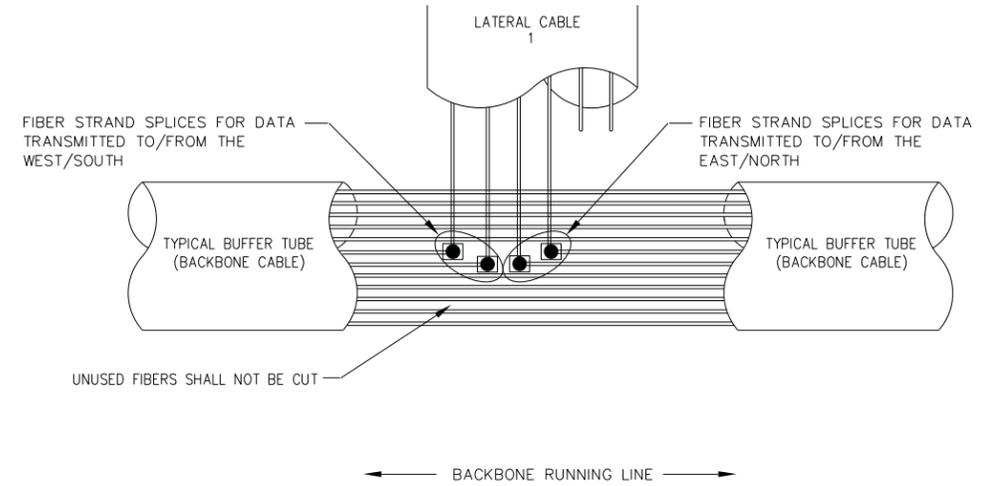
- Where noted in the plans, Fiber Optic Cable shall be spliced in the manner shown. Additional splicing will not be allowed unless approved by the Engineer. In no case shall splicing cause the total optical signal attenuation to exceed the power budget specified by the device specifications and Project Specifications.
- Cable splices shall be housed in a weather proof fiber optic splice closures.
- Only the fiber buffer tubes and fiber strands proposed for splicing shall be cut and accessed. All other buffer tubes and fiber strands shall remain uncut and coiled in the splice closure.
- Contractor shall verify fiber splicing direction as it pertains to each Ethernet switch in the Coarse Wavelength Division Multiplexing optical network.

- The Contractor shall label the splice tray with the following, as shown on this sheet for backbone splice:
 - Backbone buffer tube and direction
 - Lateral buffer tube and direction, for both lateral fiber cable 1 and 2.
 - For splices, label both the backbone fiber strand and the lateral fiber strand.
- The Contractor shall label the splice tray with the following, as shown on this sheet for lateral cable / lambda filter splice:
 - Lateral cable #1
 - Lateral cable #2
 - Lateral fiber strand and lambda wavelength

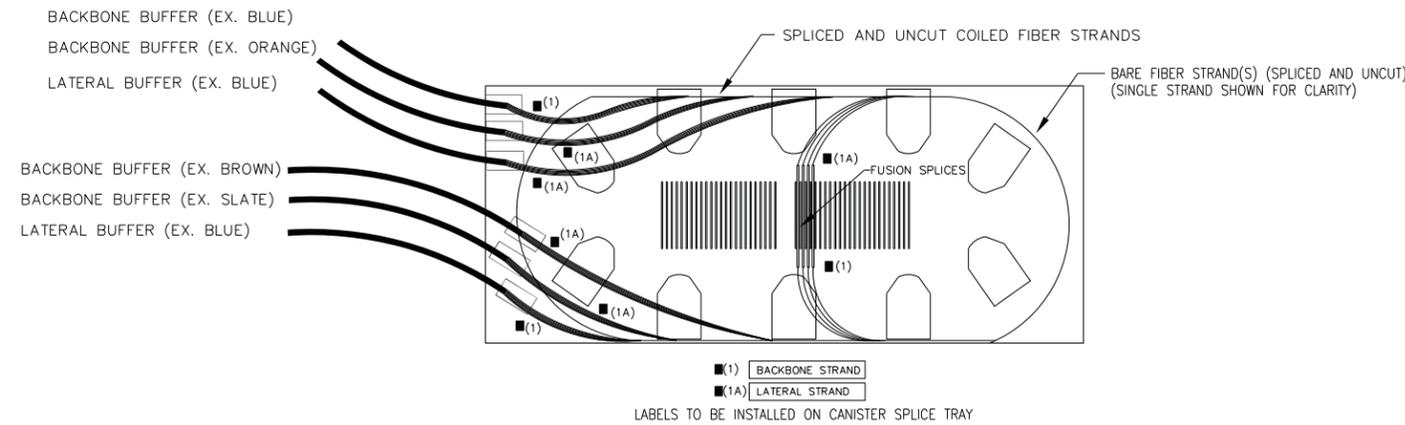
- The Contractor shall label each individual lambda filter pigtail with the associated usage, COMMON, PASS and REFLECT. Labeling tag shall be affixed to each pigtail strand.
- For backbone, lateral and lambda filter splice details see Coarse Wavelength Division Multiplexing splice detail sheet.
- CWDM splices in splice tray shall be a combination of lateral fiber cable strands spliced to lambda filter pigtails and lambda filter pigtails spliced to lambda pigtails.



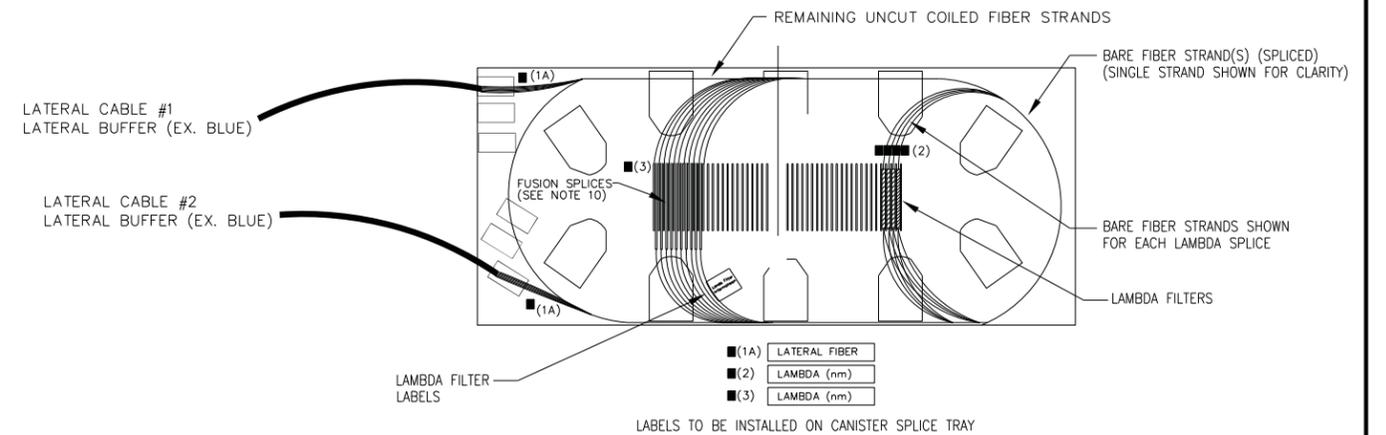
LATERAL TO BACKBONE CABLE SPLICING DETAIL
SCHEMATIC DETAIL ONLY, SPLICE CLOSURE NOT SHOWN FOR CLARITY



LATERAL CABLE SPLICING DETAIL
DIRECTION OF DEVICE DATA SPLICE DETAIL



DETAIL OF BACKBONE TO LATERAL SPLICE TRAY LABELING NON-CWDM



DETAIL OF LATERAL CABLE TO LAMBDA FILTER AND SPLICE TRAY LABELING

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File Name: DET24_Lateral Splicing.dgn
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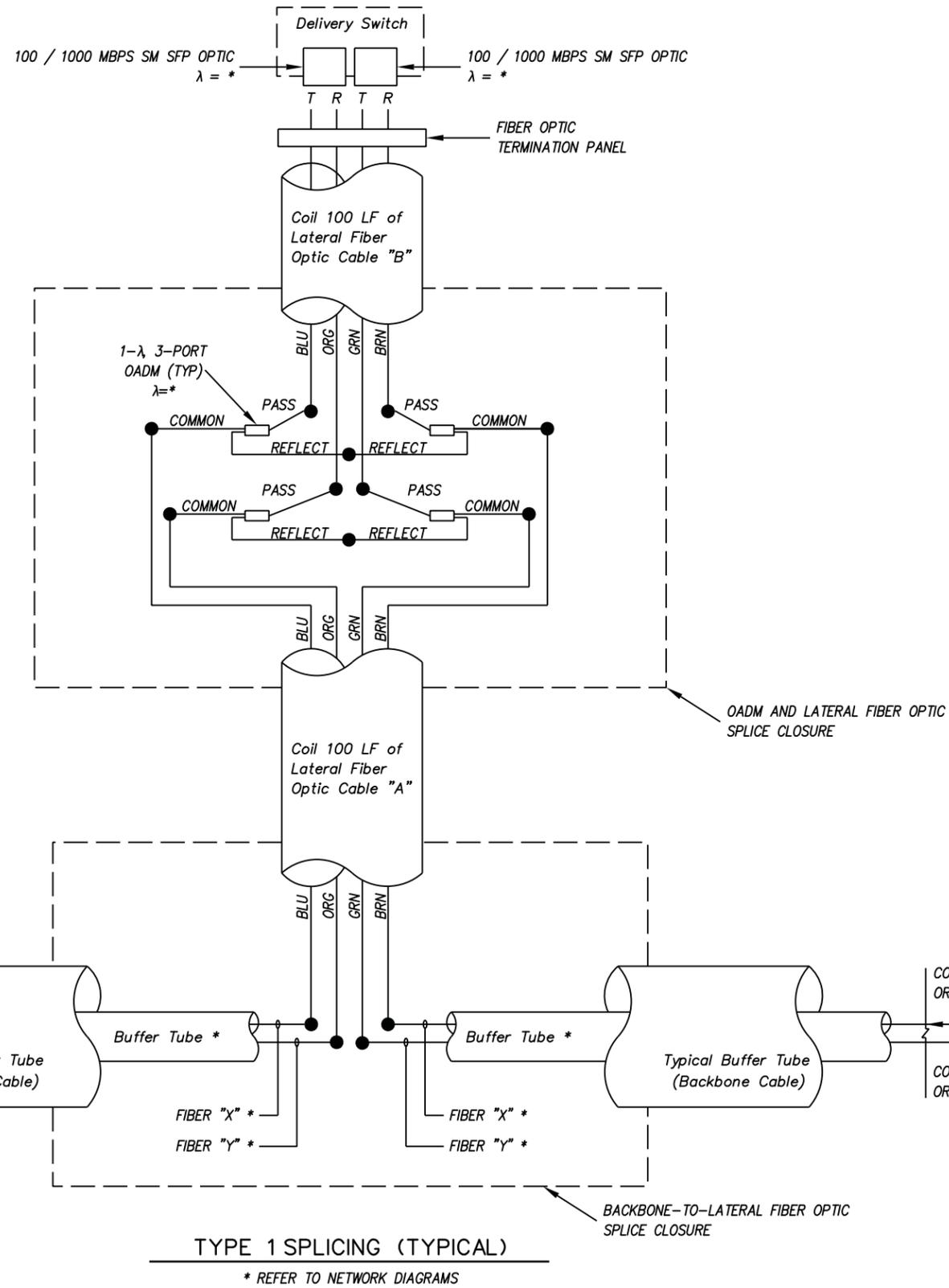
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FIBER OPTIC SPLICING DETAIL BACKBONE TO LATERAL SPLICING			
Designer:	CDOT	Structure Numbers:	
Detailer:	CDOT	Sheet Subset:	ITS
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Project No./Code
Sheet Number 25



NOTES

1. THIS DETAIL IS SCHEMATIC IN NATURE AND IS ONLY INTENDED TO DEPICT HOW THE FIBER LATERAL(S) ARE TIED INTO THE CWDM SUBRING. THE CONTRACTOR SHALL REFER TO DOCUMENTATION PROVIDED BY THE CWDM FILTER MANUFACTURER FOR DETAILS ON THE WAVELENGTHS, ORIENTATION, AND PIGTAIL DESIGNATIONS (COMMON, REFLECT, OR PASS) FOR THE CWDM FILTERS PROVIDED ON THIS PROJECT.
2. THE CONTRACTOR IS REQUIRED TO SUBMIT CWDM FILTER AND SPLICING INFORMATION TO THE PROJECT ENGINEER PRIOR TO SPLICING. REFER TO ITEMS INCLUDED IN THE REVISION OF SECTION 614 SPECIFICATIONS FOR REQUIREMENTS.

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File Name: DET25_CWDM Splicing.dgn
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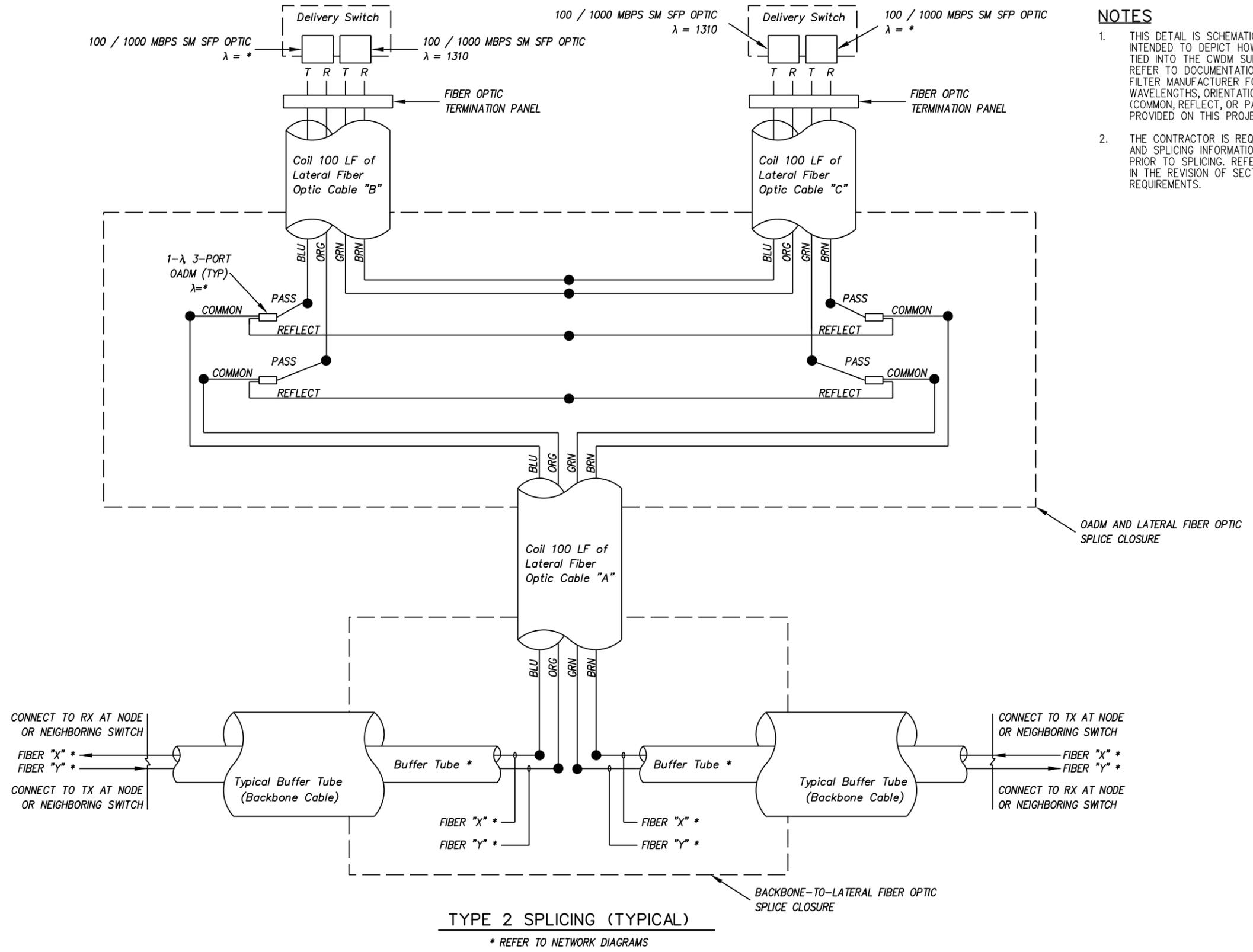
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FIBER OPTIC SPLICING DETAIL CWDM SPLICING TYPE 1 TYPICAL			
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Detailer:	CDOT	Numbers	
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Project No./Code
Sheet Number 26



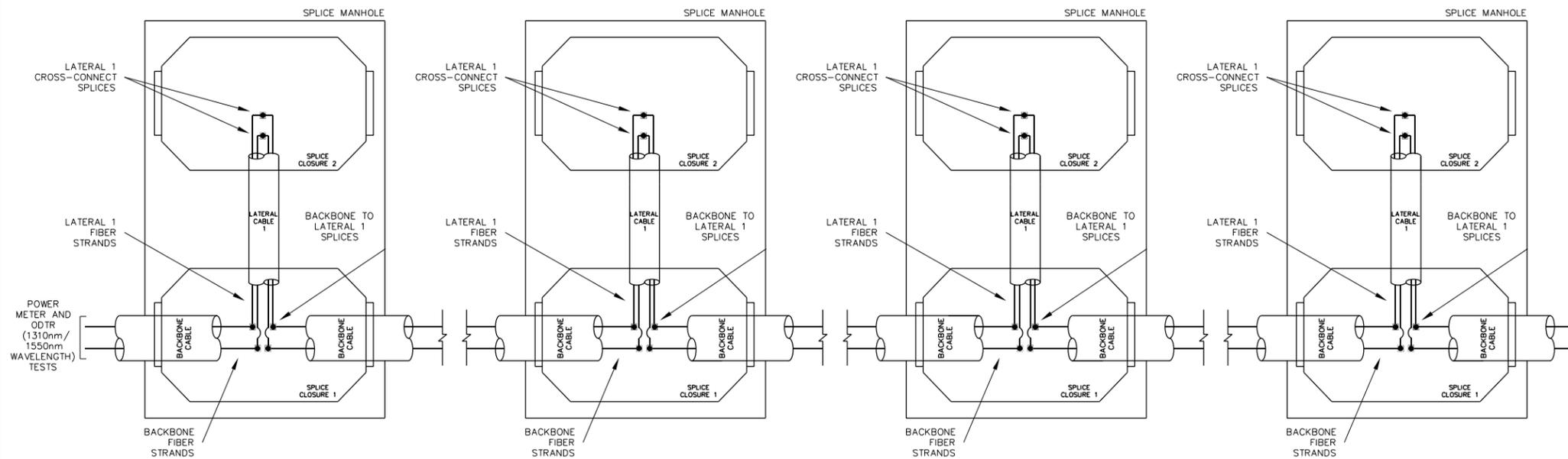
NOTES

1. THIS DETAIL IS SCHEMATIC IN NATURE AND IS ONLY INTENDED TO DEPICT HOW THE FIBER LATERAL(S) ARE TIED INTO THE CWDM SUBRING. THE CONTRACTOR SHALL REFER TO DOCUMENTATION PROVIDED BY THE CWDM FILTER MANUFACTURER FOR DETAILS ON THE WAVELENGTHS, ORIENTATION, AND PIGTAIL DESIGNATIONS (COMMON, REFLECT, OR PASS) FOR THE CWDM FILTERS PROVIDED ON THIS PROJECT.
2. THE CONTRACTOR IS REQUIRED TO SUBMIT CWDM FILTER AND SPLICING INFORMATION TO THE PROJECT ENGINEER PRIOR TO SPLICING. REFER TO ITEMS INCLUDED IN THE REVISION OF SECTION 614 SPECIFICATIONS FOR REQUIREMENTS.

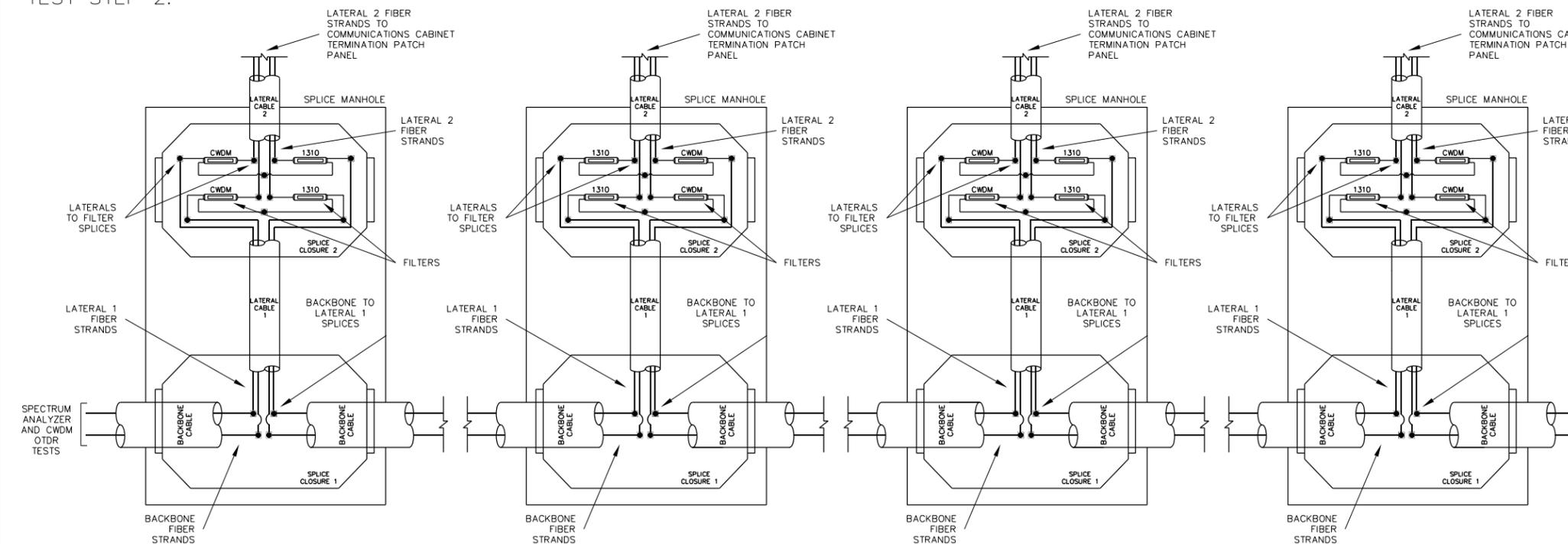
Kimberly Garber 1/21/16 PM 1:47 P:\Projects\160227 CDOT 1-70 East\CADD\DET26_CWDM Splicing.dgn

Print Date: 1/29/2016		Sheet Revisions	Colorado Department of Transportation	As Constructed	FIBER OPTIC SPLICING DETAIL CWDM SPLICING TYPE 2 TYPICAL	Project No./Code
File Name: DET26_CWDM Splicing.dgn		Date: Comments Init.	425 C Corporate Circle Golden, CO 80401 Phone: 303-512-5801 Fax: 303-512-5878	No Revisions:	Designer: CDOT	
Horiz. Scale: NTS Vert. Scale: As Noted			HQ ITS BRANCH	Revised:	Detailer: CDOT	
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TEST STEP 1:



TEST STEP 2:



SHEET NOTES:

THE CONTRACTOR SHALL CONDUCT THE STEPS SHOWN ON THE SAMPLE TESTING PROCEDURE SHEETS TO ENSURE THE PROPER SPLICING OF THE BACKBONE FIBER CABLE TO THE LATERAL #1 FIBER CABLE PRIOR TO ANY CWDM LAMBDA FILTER SPLICING. THESE PROCEDURES WILL ALSO ALLOW FOR THE CONTRACTOR TO CONDUCT THE REQUIRED POWER METER TEST AND OPTICAL TIME-DOMAIN REFLECTOMETER (OTDR) TEST AT BOTH THE 1310nm / 1550nm WAVELENGTHS FOR EACH INDIVIDUAL FIBER PAIR BEFORE ANY CWDM LINEAR FIBER CONNECTION SPLICING BEGINS. SPLICE AND TEST STEPS FOR TEST STEP #1 (PRIOR TO ANY CWDM LAMBDA FILTER SPLICING). THE APPROPRIATE FIBER STRANDS FROM LATERAL #1 FIBER CABLE SHALL BE SPLICED TO THE APPROPRIATE FIBER OPTIC BACKBONE CABLE STRANDS IN SPlice CLOSURE 1 PER THE FIBER SPLICING DIAGRAMS INCLUDED IN THE PLAN PACKAGE.

2. THE LATERAL FIBER STRANDS OF THE CWDM END OF LATERAL #1 FIBER CABLE SHALL BE TEMPORARILY SPLICED IN SPlice CLOSURE 2 IN A CROSS-CONNECTION MANNER TO ACHIEVE CONTINUITY IN THE BACKBONE FIBER STRAND PAIRS. COMPLETE BACKBONE FIBER CONTINUITY THROUGHOUT THE LINEAR LENGTH OF THE BACKBONE FIBER STRANDS (LINK) WILL BE ACHIEVED AT THIS TIME FOR TESTING.

3. THE CROSS-CONNECTION SPLICING OF LATERAL #1 FIBER CABLE IS A TEMPORARY SPLICE FOR TESTING PURPOSES ONLY. THIS SPLICE SHALL BE MADE AND SHALL MEET THE SAME LOSS PARAMETERS AS STATED IN THE PROJECT SPECIAL PROVISIONS. NO MECHANICAL SPLICES SHALL BE ALLOWED.

4. FINAL POWER METER AND OTDR TESTS OF THE BACKBONE FIBER STRANDS AND LATERAL #1 FIBER CABLE STRANDS SHALL BE CONDUCTED PER THE PROJECT SPECIAL PROVISIONS. THE TEST RESULTS SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR REVIEW AND ACCEPTANCE PRIOR TO ANY SPLICING OF THE CWDM FILTERS.

5. ONCE THE TEST RESULTS HAVE BEEN APPROVED, THE TEMPORARY SPLICES ON LATERAL #1 FIBER CABLE MAY BE BROKEN AND THE FINAL CWDM LAMBDA FILTER SPLICING TO LATERAL #1 FIBER CABLE AND LATERAL #2 FIBER CABLE MAY BE COMPLETED.

SPLICE AND TEST STEPS FOR TEST STEP#2 (PRIOR TO ANY CWDM LAMBDA FILTER SPLICING)

1. SPLICING OF THE CWDM LAMBDA FILTERS TO BOTH LATERAL #1 AND #2 FIBER CABLES SHALL BE PER THE SPLICING DIAGRAMS INCLUDED IN THE PLAN PACKAGE.

2. LATERAL FIBER STRANDS FROM LATERAL #2 FIBER CABLE SHALL BE TERMINATED IN THE FIELD COMMUNICATIONS CABINET TERMINATION PATCH PANEL.

3. AN OPTICAL POWER TEST FROM BOTH THE UPSTREAM AND DOWNSTREAM ETHERNET SWITCH AND/OR FROM THE NODE BUILDING ETHERNET SWITCH SHALL BE CONDUCTED TO DETERMINE THE PROPER RECEIVE ATTENUATOR TO BE INSTALLED. THESE TEST RESULT SHALL BE SUBMITTED TO THE PROJECT ENGINEER PRIOR TO THE NETWORK TURN UP.

4. FINAL CWDM TESTING SHALL BE CONDUCTED WITH A CWDM OTDR AND SPECTRUM ANALYZER TO ENSURE THAT ALL CWDM LAMBDA FILTER SPLICING WAS CONDUCTED CORRECTLY PRIOR TO THE NETWORK TURN UP.

5. ANY CWDM TROUBLESHOOTING SHALL BE CONDUCTED FROM ANY COMBINATION OF REGENERATION NODE BUILDING TO FIELD NODE OR FROM FIELD NODE TO NODE USING THE CWDM OTDR AND/OR THE SPECTRUM ANALYZER UNIT UNTIL ALL COMMUNICATION ISSUES ARE RESOLVED. ANY SPLICING ASSOCIATED WITH THIS TROUBLESHOOTING SHALL ALSO BE CONDUCTED TO ACHIEVE A FULLY FUNCTIONAL CWDM NETWORK.

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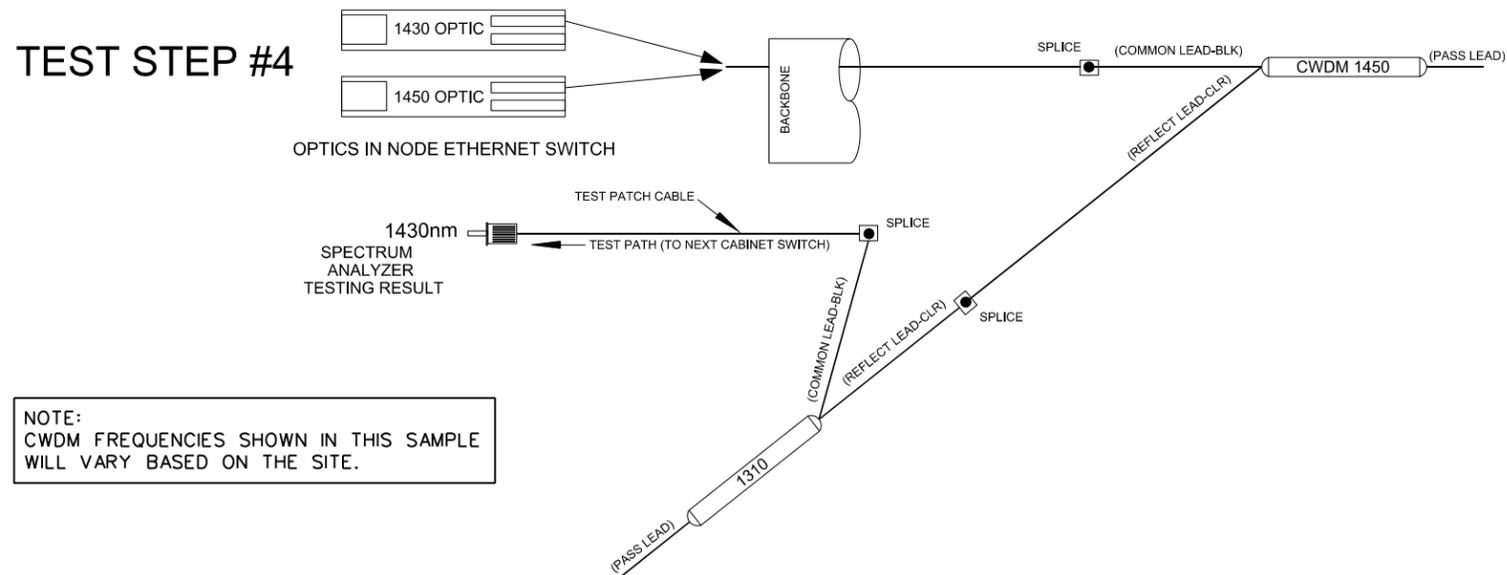
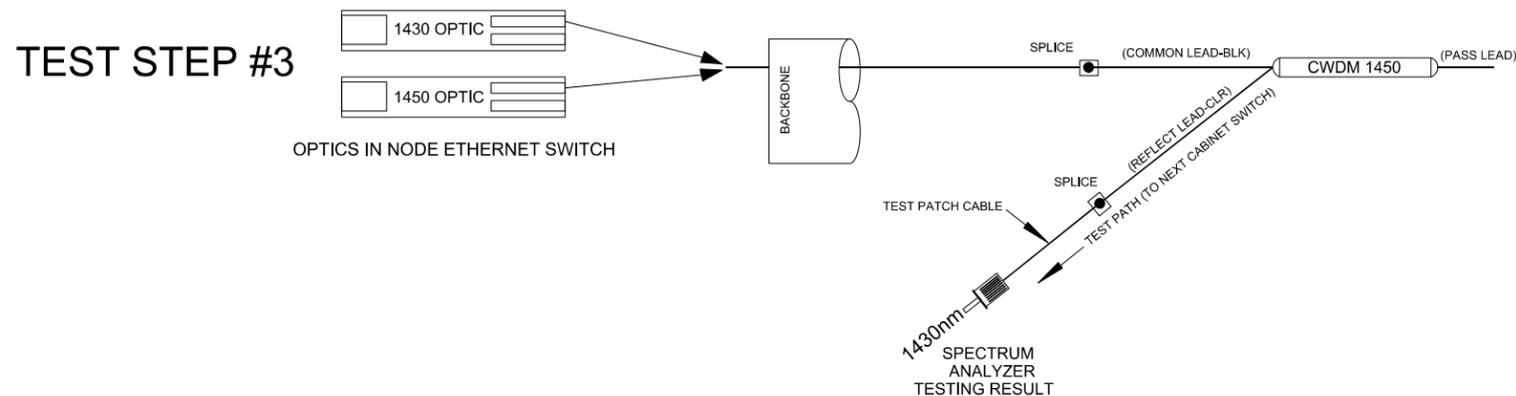
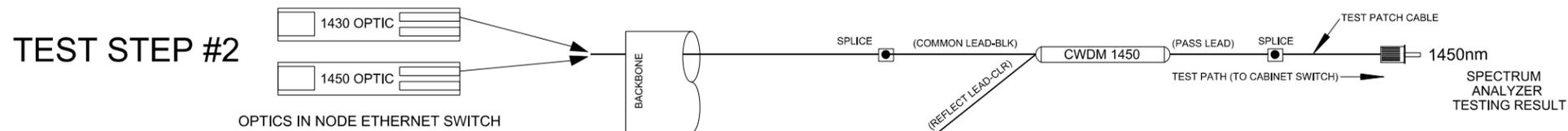
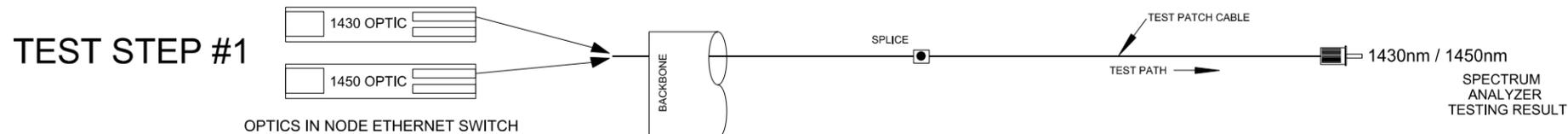
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SAMPLE TESTING PROCEDURE CWDM SPLICE TEST DETAIL			
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NOTE:
CWDM FREQUENCIES SHOWN IN THIS SAMPLE
WILL VARY BASED ON THE SITE.

Sheet Notes:

Test Step #1 - Splice test patch cable to backbone strand to test wavelengths from cable end or node building.

Result - Spectrum Analyzer should show both 1430nm and 1450nm optics.

Test Step #2 - Splice 1450nm CWDM filter common lead to backbone strand, splice test patch cable onto pass side of CWDM filter, (drop off wavelength to cabinet).

Result - Spectrum Analyzer should show 1450nm optic.

Test Step #3 - Splice 1450nm CWDM filter common lead to backbone strand, splice test patch cable onto reflect lead of CWDM filter, (1430nm to next cabinet switch).

Result - Spectrum Analyzer should show 1430nm optic.

Test Step #4 - Splice 1450nm CWDM filter common lead to backbone strand, splice 1310 filter reflect lead onto reflect lead of 1450 CWDM filter, splice test patch cable onto common of 1310 filter, (1430nm to next cabinet switch).

Result - Spectrum Analyzer should show 1430nm optic.

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SAMPLE TESTING PROCEDURE PIGTAIL SPLICE TEST DETAIL			
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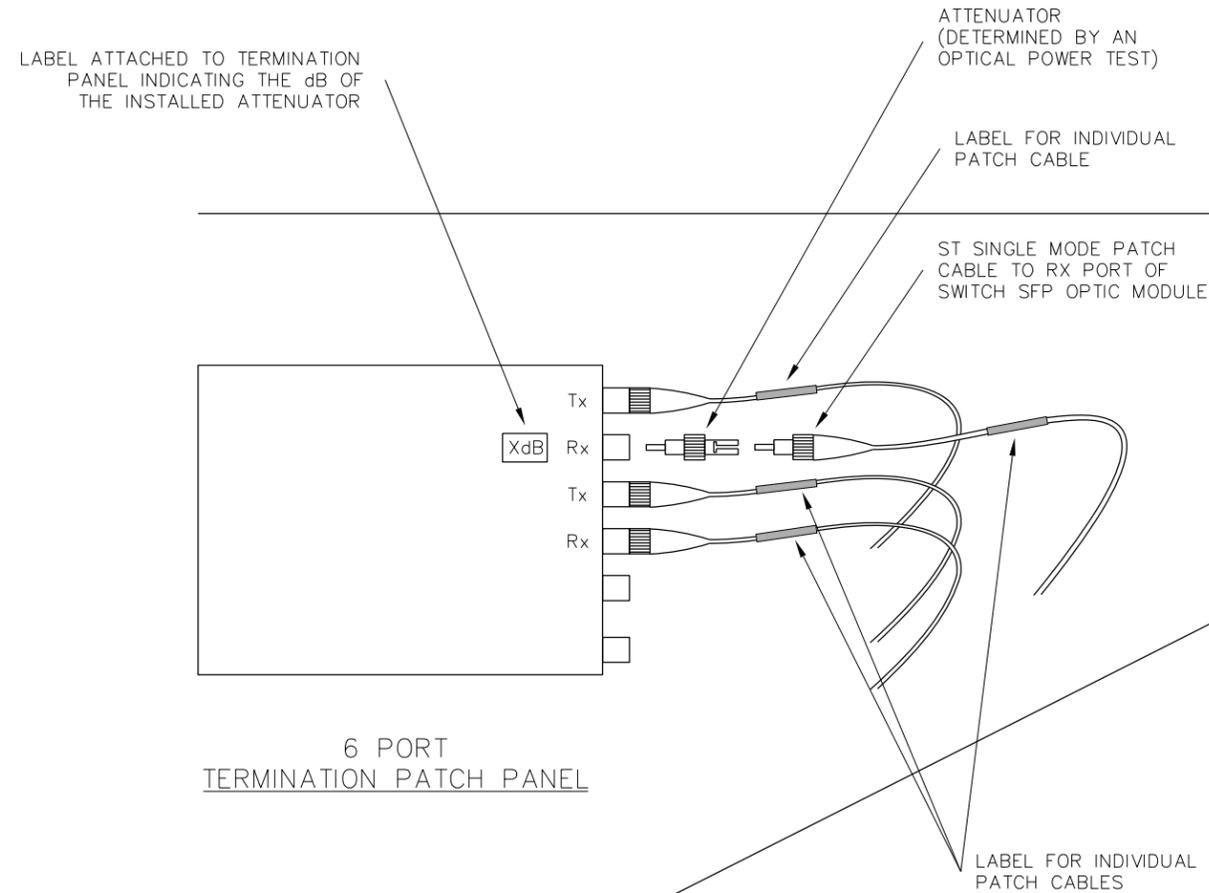
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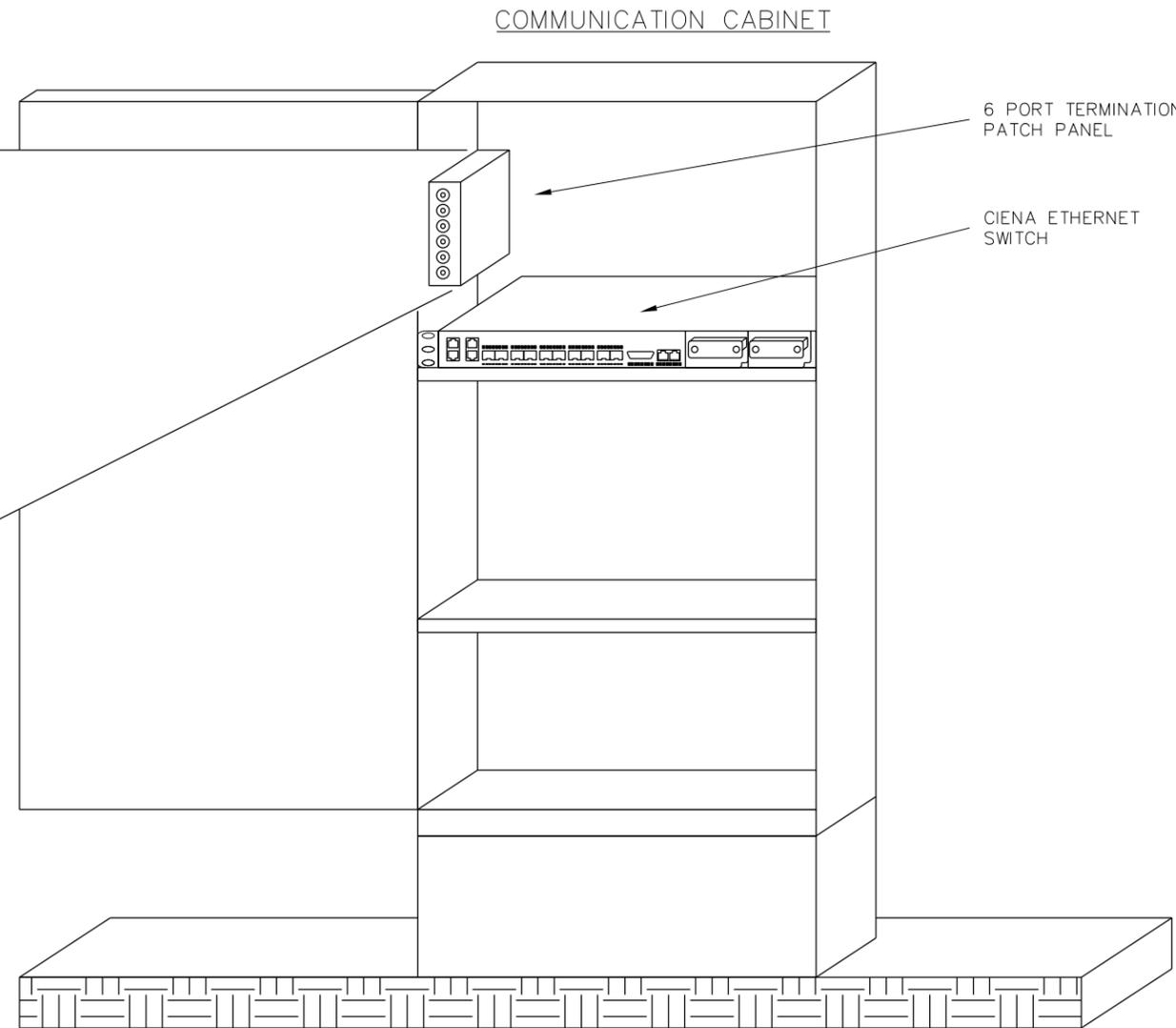
RECEIVE ATTENUATOR

SHEET NOTES:

1. THE CONTRACTOR SHALL TEST THE OPTICAL POWER FROM BOTH THE UPSTREAM AND DOWNSTREAM ETHERNET SWITCH AND/OR FROM THE NODE BUILDING ETHERNET SWITCH TO DETERMINE THE PROPER ATTENUATOR TO BE INSTALLED.
2. THE OPTICAL POWER TEST SHALL BE CONDUCTED BY CONNECTING THE TEST EQUIPMENT TO THE SFP OPTIC SIDE CONNECTOR OF THE FIBER OPTIC PATCH CABLE.
3. A 6 PORT TERMINATION PANEL IS SHOWN ON THIS SHEET. THE SAME ATTENUATION TESTING AND INSTALLATION SHALL BE CONDUCTED ON A 24 PORT EQUIPMENT RACK MOUNTED TERMINATION PANEL.
4. THE DECIBEL (dB) RATING OF THE ATTENUATOR INSTALLED SHALL BE LABELED ON THE TERMINATION PANEL ADJACENT TO THE BULKHEAD PORT THAT THE ATTENUATOR IS CONNECTED TO.
5. ST SINGLE MODE PATCH CABLE SHALL BE CONNECTED TO ATTENUATOR. ATTENUATOR AND ST SINGLE MODE PATCH CABLE SHALL THEN BE CONNECTED TO THE CWDM RECEIVE OPTIC TERMINATION PANEL PORT.
6. SEE PROJECT DETAIL SHEETS AND PROJECT SPECIFICATIONS FOR ALL REQUIRED LABELING OF THE OPTIC PATCH CABLES.



6 PORT TERMINATION PATCH PANEL



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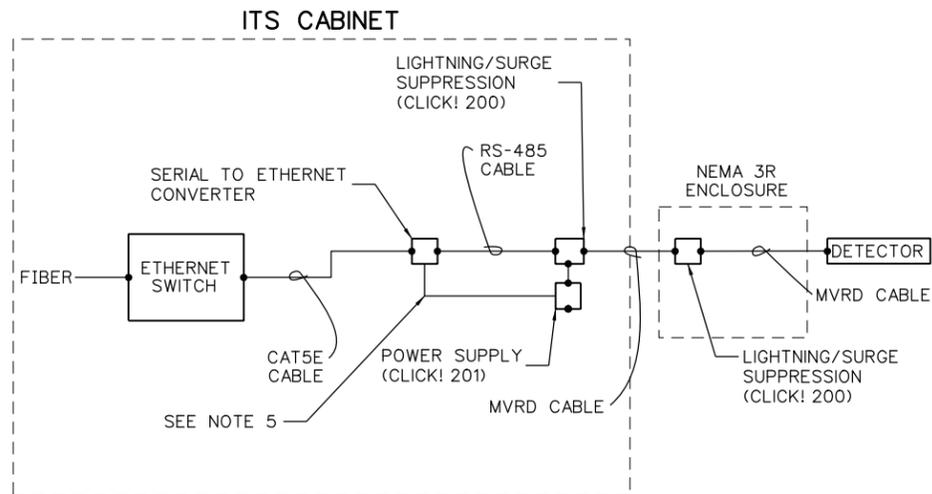
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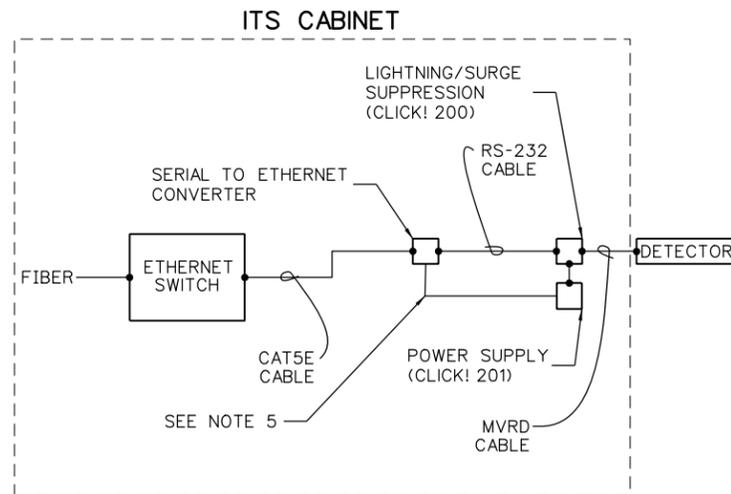
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FIELD ATTENUATOR INSTALLATION DETAIL			
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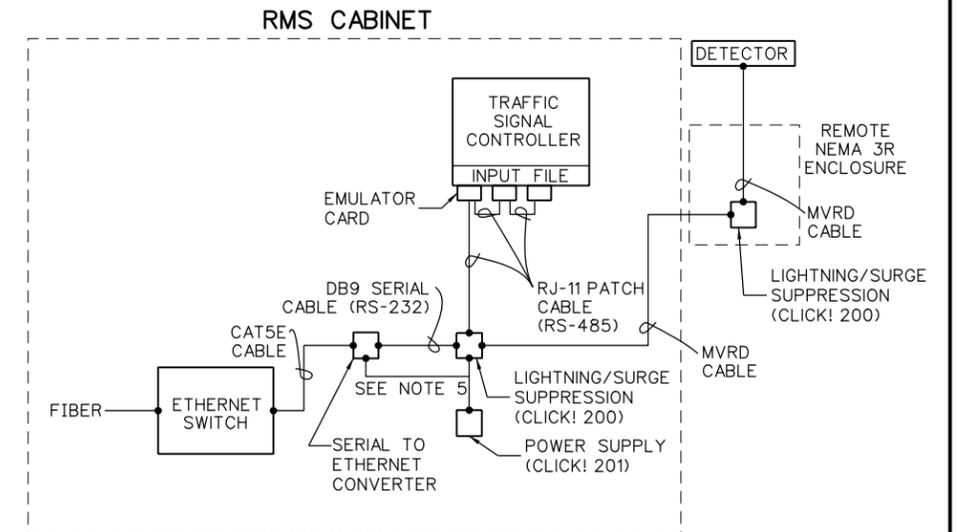
Project No./Code
Sheet Number 30



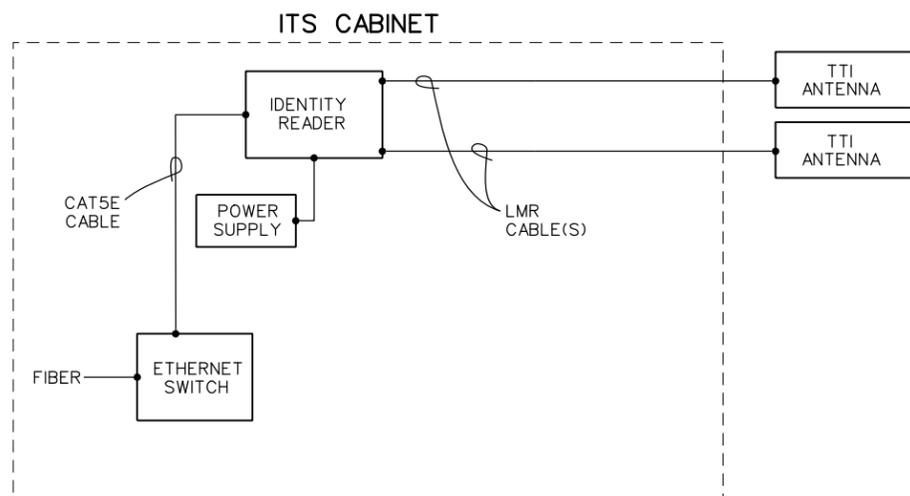
MVRD COMMUNICATION BLOCK DIAGRAM (DISTANCE >100') OR ON SEPARATE STRUCTURE



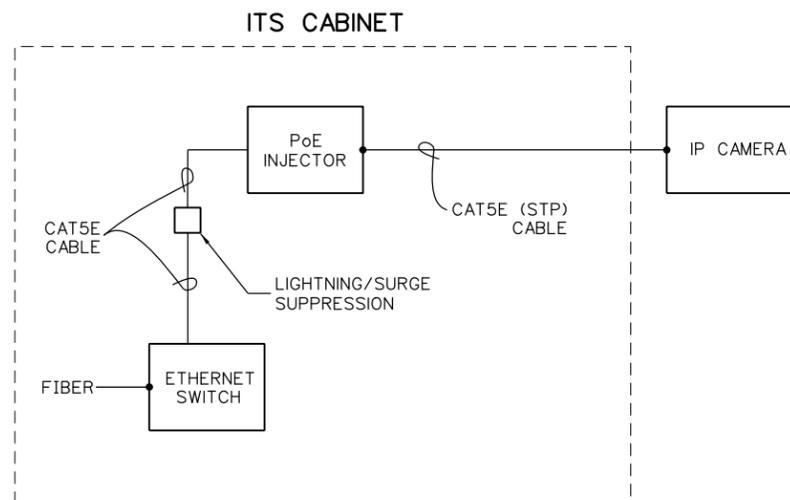
MVRD COMMUNICATION BLOCK DIAGRAM (DISTANCE <100') AND ON SAME STRUCTURE



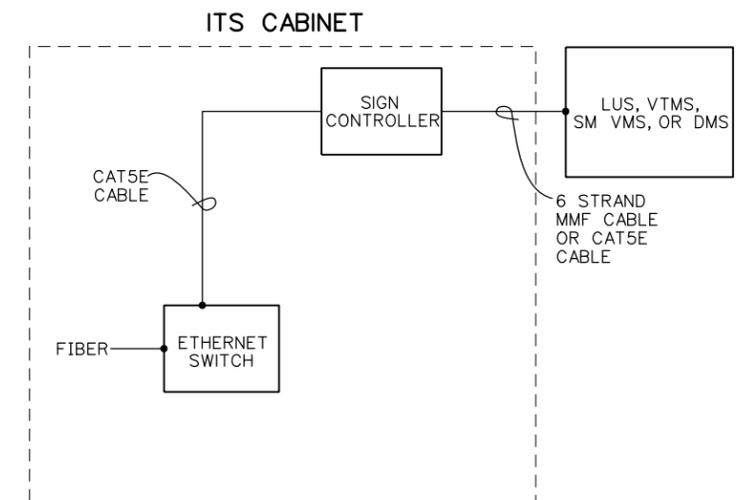
RAMP METER CONTROLLER (w/MVRD) COMMUNICATION BLOCK DIAGRAM



TTI COMMUNICATION BLOCK DIAGRAM



CCTV (IP CAMERA) COMMUNICATION BLOCK DIAGRAM



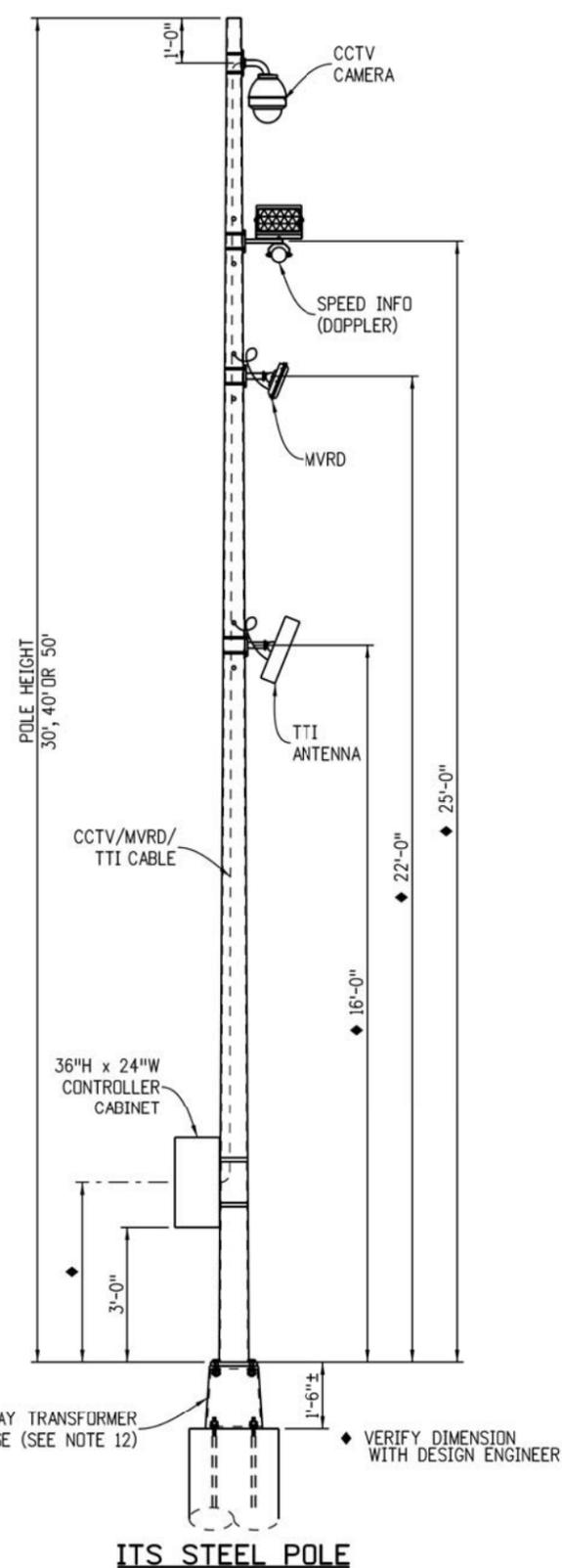
VTMS / DMS COMMUNICATION BLOCK DIAGRAM

NOTES:

1. TYPICAL CABLING FOR ITS EQUIPMENT IS SHOWN. SEE PLANS FOR LOCATIONS AND QUANTITIES OF EQUIPMENT.
2. ONLY COMMUNICATIONS EQUIPMENT SHOWN (EXCEPT AS NOTED).
3. FOR CABINETS WITH MULTIPLE PERIPHERAL ITS DEVICES, REFER TO BLOCK DIAGRAM OF DEVICE TYPE FOR CONNECTION TO THE FIELD ETHERNET SWITCH.
4. ALL COMMUNICATION CABLING SHALL BE PER APPROPRIATE PROJECT SPECIAL PROVISION AND MANUFACTURER RECOMMENDATION.
5. POWER CLICK! MODULES USING A COMMON DIN RAIL MOUNTED QUICK DISCONNECT "T" BUS (GREEN) PROVIDED BY WAVETRONIX.
6. CAT5E (STP) CABLES SHALL HAVE THE SHIELDING BONDED AT THE CABINET END ONLY, WITH THE EXCEPTION OF THE IP CAMERAS WHERE BOTH ENDS OF THE SHIELDING SHALL BE BONDED.
7. ALL CABLING THAT ENTERS/LEAVES A CABINET/ENCLOSURE SHALL PASS THROUGH A LIGHTNING/SURGE SUPPRESSION DEVICE BEFORE CONNECTING TO ANY EQUIPMENT IN THE CABINET/ENCLOSURE, WITH THE EXCEPTION OF THE POE INJECTOR FOR IP CAMERAS.
8. ALL CATX CABLES ARE USED FOR IP COMMUNICATIONS UNLESS OTHERWISE NOTED.

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Print Date: 1/29/2016	Sheet Revisions			Colorado Department of Transportation	As Constructed	COMMUNICATION BLOCK DIAGRAM			Project No./Code
File Name: DET30_Comm Block Diagram.dgn	Date:	Comments	Init.						
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GENERAL NOTES

1. ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS SHOWN IN THE MATERIALS TABLE.
2. POLES SHALL BE FABRICATED INTO THE LARGEST PRACTICAL SECTIONS PRIOR TO FINISHING. SPLICE LOCATIONS AND DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND THE CONTRACTOR SHALL NOT COMMENCE FABRICATION UNTIL SUCH SPLICE LOCATIONS ARE APPROVED. THE MINIMUM LENGTH OF ANY TELESCOPIC (SLIP TYPE) FIELD SPLICES SHALL BE 1.5 TIMES THE INSIDE DIAMETER OF THE EXPOSED END OF THE FEMALE SECTION.
3. ALL CONCRETE SHALL BE CLASS BZ WITH AIR ENTRAINMENT; REINFORCING STEEL SHALL BE GRADE 60. CAISSON FOUNDATIONS SHALL REACH THE SEVEN DAY PREDICTED STRENGTH BEFORE POLES ARE ERECTED THEREON.
4. A DISCONNECT FOR THE POWER SUPPLY TO THE CAMERA SHALL BE PROVIDED AS SHOWN IN THE ROADWAY PLANS.
5. POLE SHALL BE GROUNDED AND BONDED IN ACCORDANCE WITH SECTION 614.10(c) AND THE NATIONAL ELECTRICAL CODE.
6. NPS = NOMINAL PIPE SIZE; O.D. = OUTSIDE DIAMETER.
7. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SUBSECTION 105.02 OF THE STANDARD SPECIFICATIONS.
8. CAISSONS, POLES AND SURVEY WORK SHALL BE PAID FOR IN ACCORDANCE WITH BID ITEMS 503, 614 AND 625 RESPECTIVELY.
9. THERE SHALL BE NO PENETRATIONS OF POLES OTHER THAN AS SHOWN ON THESE PLANS UNLESS APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
10. ATTACH CONTROLLER CABINET TO POST WITH TWO 3/4" WIDE STAINLESS STEEL BANDS AND STAINLESS STEEL FLARED LEG BRACKETS WITH HEX HEAD BOLTS (BAND-IT D315 OR EQUIVALENT).
11. ALL POLES SHALL BE HOT-DIP GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION AS PER ASTM A123, UNLESS PAINTING IS CALLED FOR ON THE PLANS. PAINTING SHALL CONFORM TO SECTION 522, DUPLEX COATING SYSTEM. ALL NUTS, BOLTS AND WASHERS FOR POLE STRUCTURES SHALL BE GALVANIZED AFTER FABRICATION AS PER ASTM A123 OR ASTM A153, AS APPROPRIATE, AND SHALL NOT BE PAINTED.
12. ALL TRANSFORMER BASES SHALL BE TBI-17, CAST FROM 356 ALUMINUM ALLOY AND HEAT TREATED TO A T6 TEMPER CONDITION. TRANSFORMER BASE OR OTHER APPROVED BREAKAWAY DEVICE SHALL CONFORM TO THE REQUIREMENTS OF AASHTO SPECIFICATIONS.

DESIGN DATA

SPECIFICATIONS:

DESIGN: "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (2013 AASHTO).

WIND DESIGN: 110 MPH VELOCITY (3-SECOND GUST)
1" MAXIMUM POLE TOP DEFLECTION @ 30 MPH VELOCITY (NO GUST FACTOR)

FATIGUE DESIGN: COMBINED WIND EFFECT STATIC LIMIT-STATE PRESSURE RANGE = 6.5 PSF APPLIED TO POLE AND ATTACHMENTS

LOADINGS:

1. TOP OF POLE: 5.00 SF EPA, 210 LB
2. 25' FROM BASE: 2.00 SF EPA, 30 LB
3. 22' FROM BASE: 1.50 SF EPA, 5 LB
4. 15' FROM BASE: 3.50 SF EPA, 10 LB
5. 6' FROM BASE: 10.00 SF EPA, 100 LB

CONSTRUCTION: CDOT STANDARD SPECIFICATIONS, THESE SHEETS AND PROJECT PLANS.

ITS STEEL POLE X-SECTION SHEET(S) SHALL SHOW:

1. POLE LOCATION (HIGHWAY, STATION OR MILEPOST, AND DIRECTION)
2. OFFSET FROM SHOULDER
3. POLE HEIGHT
4. CAISSON DIAMETER AND MINIMUM EMBEDMENT
5. TOP OF CAISSON ELEVATION
6. CAISSON PAY LENGTH
7. STATION OR MILEPOST, AND OFFSET TO CAISSON
8. LOCATION OF DISCONNECT FOR THE POWER SUPPLY
9. AS CONSTRUCTED BLOCK
10. SITE SPECIFIC EQUIPMENT (NEEDED FOR SHOP DRAWING REVIEW)

GENERAL NOTES (CONTINUED)

13. A FIBER OPTIC DISCONNECT SHALL BE PROVIDED AT THE BREAKAWAY BASE. THE DISCONNECT SHALL DISENGAGE UPON IMPACT AND ALLOW FOR FULLY RESTORED CONNECTION WITHOUT FIELD REPAIR OR TERMINATION OF FIBER OPTIC CABLE.
 14. WELDING OF STEEL SHALL CONFORM TO THE REQUIREMENTS OF AWS D 1.1. ALL AREAS TO BE WELDED SHALL BE GROUND TO BRIGHT METAL. NO BUTT WELD SPLICES WILL BE PERMITTED. ALL WELDING AND REQUIRED TESTING SHALL BE COMPLETE BEFORE ANY MATERIAL IS GALVANIZED.
- ENHANCED MAGNETIC PARTICLE TESTING SHALL BE PERFORMED ON AREAS DEFINED IN AWS D1.1 AND HEREIN. ENHANCED MAGNETIC PARTICLE TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH ASTM E 709 AND AWS D 1.1, EXCEPT AS AMENDED HEREIN. ALTERNATING CURRENT SHALL BE USED. THE YOKE SPACING SHALL BE BETWEEN 2 AND 4 INCHES. THE MINIMUM LIFTING POWER SHALL BE 10 LBS. RED DRY PARTICLES SHALL BE USED. THE LIGHT INTENSITY SHALL MEET ASTM E 709, SECTION 7. PARTICLE APPLICATION AND SPECIMEN PREPARATION SHALL MEET THE REQUIREMENTS OF ASTM E 709 SECTIONS 9 AND 15, EXCEPT WHITE NON-AQUEOUS DEVELOPER MEETING ASTM E 165, TYPE 3, SHALL BE APPLIED TO THE TEST SURFACE PRIOR TO TESTING.
- THE YOKES SHALL BE SET IN TWO POSITIONS WHEN TESTING THE WELD OR BASE METAL. THEY SHALL BE POSITIONED BOTH NORMAL AND PARALLEL WITH RESPECT TO THE WELD AXIS AND ROLLING DIRECTION OF THE BASE METAL.
- ENHANCED MAGNETIC PARTICLE TESTS SHALL BE PERFORMED AT THE FOLLOWING LOCATIONS:
- (1) BASE METAL. ALL AREAS CONTACTED BY THE CARBON ARC GOUGE ELECTRODE, THE ELECTRODE CUP, AND THE WELDING ELECTRODE. ALL THREE CONDITIONS ARE ARC STRIKES.
 - (2) FILLET WELDS. EACH DESIGN WELD SIZE ON MAIN MEMBER TO MAIN MEMBER AND SECONDARY MEMBER TO MAIN MEMBER WELDMENTS. ALL STOP-STARTS AND WELD TERMINI. ALL LINEAR INDICATIONS SHALL FURTHER BE EVALUATED WITH 10X OR 30X MAGNIFICATION. VERIFICATION SHALL BE RESOLVED BY EXCAVATION.
 - (3) GROOVE WELDS. ALL THROUGH THICKNESS EDGES ON TRANSVERSE BUTT JOINT WELDMENTS IN TENSION AREAS.
 - (4) REPAIRS. ALL REPAIR WELDS TO CORRECT DEFECTS IN GROOVE AND FILLET WELDS, PLATE CUT EDGES, CORRECTION OF FABRICATION ERRORS IN CUTTING, PUNCHING, DRILLING, OR FITTING, AND MEMBERS WHICH ARE TACKED OR WELDED AND SUBSEQUENTLY CUT APART AND REWELDED.
15. ALL CIRCUMFERENTIAL AND ALL LONGITUDINAL PIPE SEAM WELDS WITHIN 5" OF FULL PENETRATION CIRCUMFERENTIAL GROOVE WELDS SHALL BE FULL PENETRATION GROOVE WELDS AND SHALL BE INSPECTED AS SPECIFIED HEREIN. THE ACCEPTABLE MAXIMUM WELD UNDERCUT IS 0.01".

MATERIALS

COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)
POLE SHAFT	A595 GR. A OR A572	55
BASE PLATES	A36	36
POLE TOP PLATE	A36	36
TRANSFORMER BASE	B26	20
ANCHOR BOLTS	F1554 GR. 55	55
H.S. BOLTS	A325	---
H.S. NUTS	A563	---
WASHERS	F436	---
GALVANIZING	A123 & A153	---

INDEX

1. ITS STEEL POLE WITH CCTV MOUNT - GENERAL NOTES
2. ITS STEEL POLE WITH CCTV MOUNT - POLE DETAILS
3. ITS STEEL POLE WITH CCTV MOUNT - FOUNDATION DETAILS

-GENERAL NOTES-

Kimberly Garber 1/21/14 9:49 PM P:\Projects\160227 CDOT 1-70 East\CADD\DET31_Breakaway Tapered ITS Steel Pole.dgn

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 File Name: DET31_Breakaway Tapered ITS Steel Pole.dgn
 Horiz. Scale: NTS Vert. Scale: As Noted
 JKS

Sheet Revisions		
Date:	Comments	Init.

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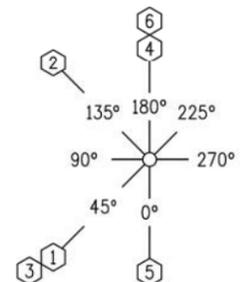
425 C Corporate Circle
 Golden, CO 80401
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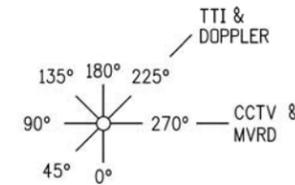
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BREAKAWAY TAPERED ITS STEEL POLE			
Designer:	CDOT	Structure	
Detailer:	CDOT	Numbers	
Sheet Subset:	ITS	Subset Sheets:	of

Project No./Code
 Sheet Number **32**

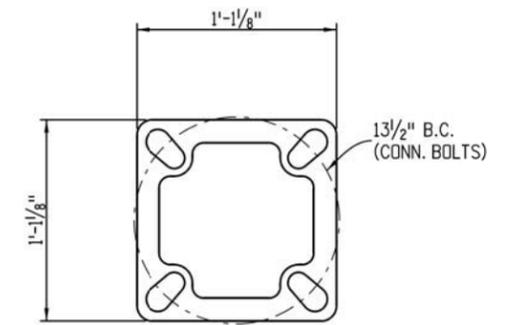


ORIENTATION VIEW
(PENETRATIONS)

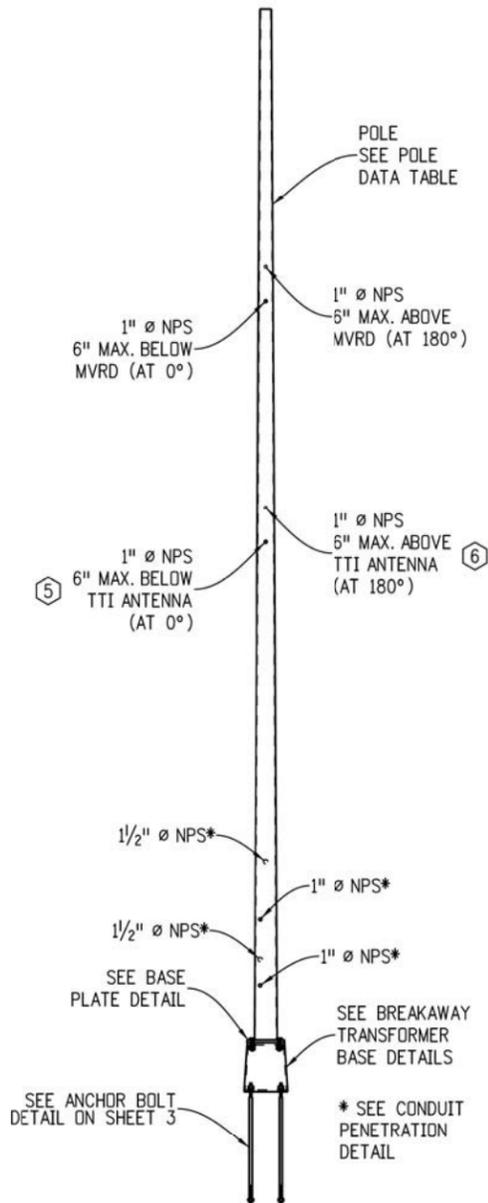


ORIENTATION VIEW
(DEVICES)

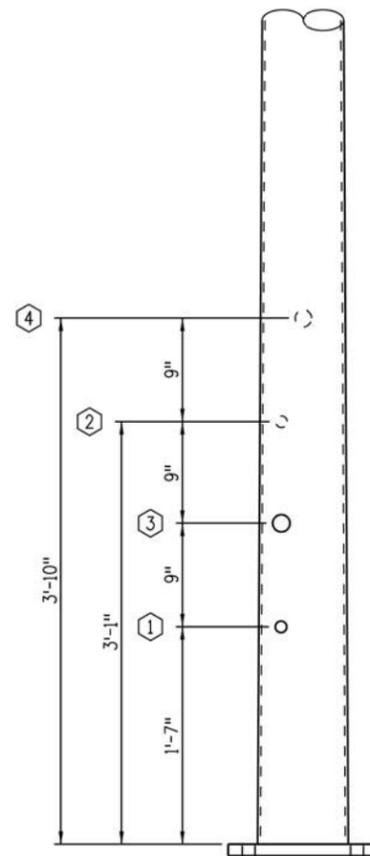
POLE DATA			
POLE HEIGHT (FT)	BASE DIAMETER (IN)	TOP DIAMETER (IN)	WALL THICKNESS
30'	8.00	4.00	11 GA
40'	9.00	4.00	7 GA
50'	10.00	4.00	1/4"



TOP

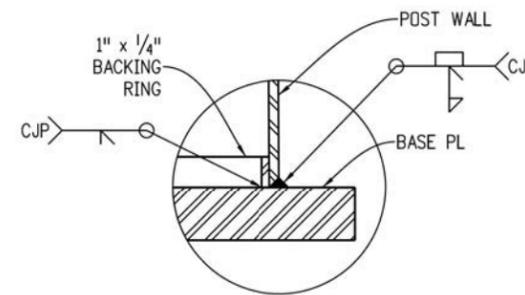


POST ELEVATION

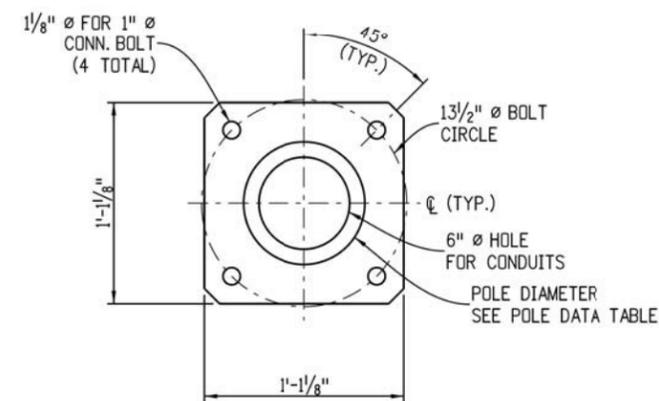


CONDUIT PENETRATION DETAIL

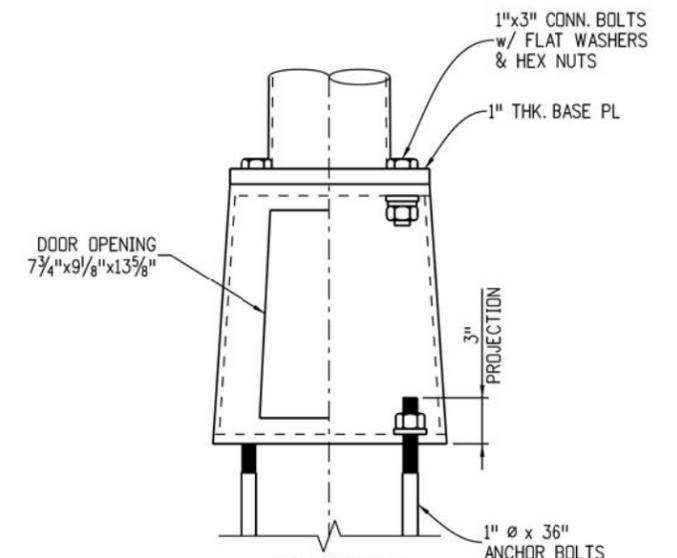
① AND ② 1" Ø NPS
③ AND ④ 1 1/2" Ø NPS
PLUG ALL THREADED PENETRATIONS WITH RECESSED PLUGS



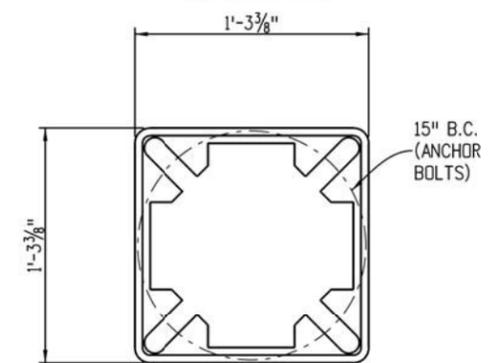
WELD DETAIL



BASE PLATE DETAIL



ELEVATION



BOTTOM

BREAKAWAY TRANSFORMER BASE DETAILS

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Golden, CO 80401
Phone: 303-512-5801 Fax: 303-512-5878

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No Revisions:
Revised:
Void:

BREAKAWAY TAPERED ITS STEEL POLE			
Designer:	CDOT	Structure Numbers:	
Detailer:	CDOT	Subset Sheets:	of
Sheet Subset:	ITS		

Project No./Code
Sheet Number 33

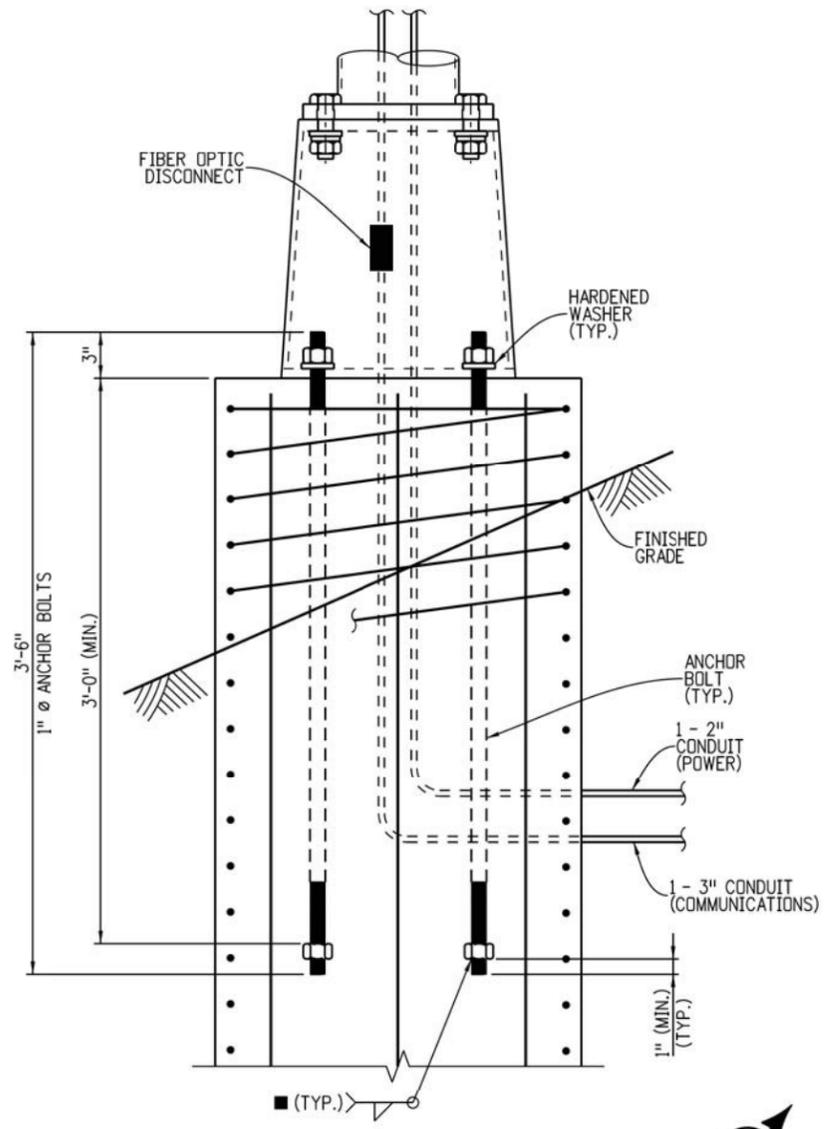
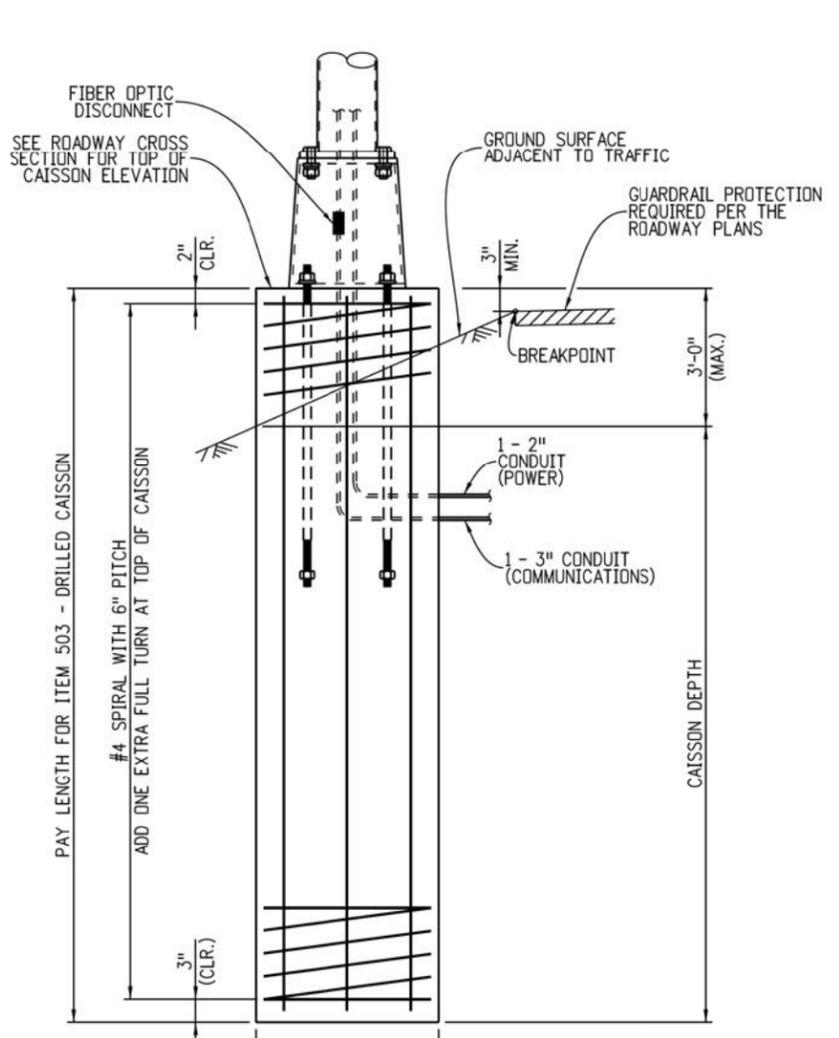
CAISSON DRILLING AND INSTALLATION NOTES

- CAISSONS SHALL BE PLACED AGAINST UNDISTURBED EARTH. WET OR CAVING HOLES SHALL BE BACKFILLED WITH FLOW-FILL AND REDRILLED AFTER A THREE DAY CURING PERIOD WITHOUT THE USE OF A CASING; OR OTHER METHOD APPROVED BY THE ENGINEER.
- THE DESIGN HEREIN ASSUMES THAT POLE SUPPORTS ARE INSTALLED WITHIN THE ROADWAY PRISM WITH THE FOLLOWING SOIL PARAMETERS:

 SOIL DENSITY = 110 LB./CU. FT.
 SOIL COHESION = 750 LB./SQ. FT. FOR MEDIUM STIFF COHESIVE SOIL
 SOIL ϕ ANGLE = 30° FOR MEDIUM DENSE COHESIONLESS SOIL
 SF = 3.0 FOR FLEXURAL RESISTANCE.
- CONTACT THE ENGINEER IF ANY OF THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED DURING DRILLING:
 (A) POLE SUPPORT WILL NOT BE INSTALLED WITHIN THE ROADWAY PRISM.
 (B) THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.
 (C) THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.
 (D) THE FOUNDATION SOILS ARE NOT HOMOGENOUS.
 (E) FIRM BEDROCK IS ENCOUNTERED.
 (F) HIGH GROUNDWATER IS ENCOUNTERED.
 (G) LARGE BOULDERS ARE ENCOUNTERED.
- THE CONTRACTOR SHALL PROVIDE A SURVEY OF THE POLE FOUNDATION TO VERIFY PLACEMENT SOON AFTER WORK ON THE FOUNDATION HAS BEEN COMPLETED. THE SURVEY SHALL CONFORM TO THE REQUIREMENTS OF SECTION 625, CONSTRUCTION SURVEYING. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A COPY OF THE SURVEY NOTES DETAILING THE FOUNDATION LOCATION AND ELEVATION AND THE ANCHOR BOLT LOCATIONS, PROJECTIONS, AND ORIENTATIONS. THE ELEVATION OF THE GROUND SURROUNDING THE FOUNDATION SHALL ALSO BE PROVIDED. THE CONTRACTOR SHALL COMPARE THE SURVEY INFORMATION TO THE REVIEWED SHOP DRAWINGS AND RECONCILE ANY DIFFERENCES BETWEEN THEM. THE CONTRACTOR SHALL SUBMIT ALL PROPOSED ADJUSTMENTS OR MODIFICATIONS TO THE ENGINEER FOR APPROVAL.

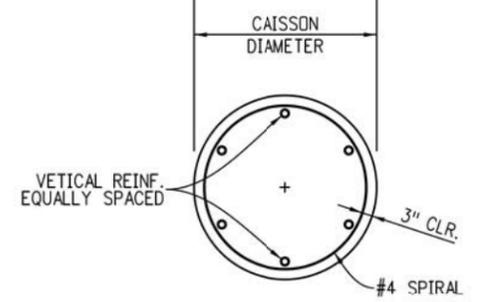
NOTES

- THREAD UPPER 8" AND GALVANIZE UPPER 1'-0" OF THE ANCHOR BOLTS.
- ANCHOR BOLTS SHALL BE SET WITH A STEEL TEMPLATE UNTIL THE CONCRETE HAS CURED AT LEAST TWO DAYS.
- THERE SHALL BE NO GROUT PAD INSTALLED ON TOP OF THE EXISTING FOUNDATIONS.
- THE ANCHOR BOLTS SHALL BE TIGHTENED USING THE TURN-OF-NUT METHOD. THE BOLTS SHALL FIRST BE TIGHTENED TO SNUG TIGHT, WHICH IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE UPPER AND LOWER NUTS/WASHERS ARE IN FIRM CONTACT WITH THE BASE PLATE. THE UPPER AND LOWER NUTS SHALL EACH THEN BE ROTATED AN ADDITIONAL 1/2 TURN (30° ± 5°) USING A SLUGGING WRENCH.



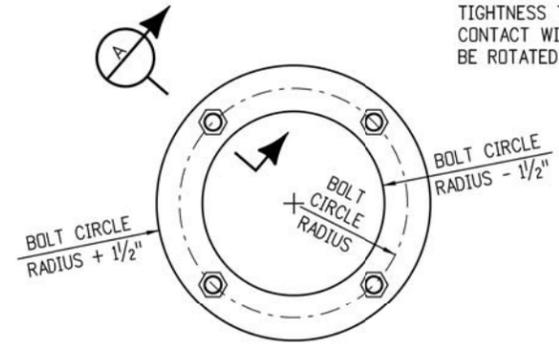
ANCHOR BOLT DETAIL

WELDING PROCEDURE IS NOT REQUIRED FOR THIS WELD

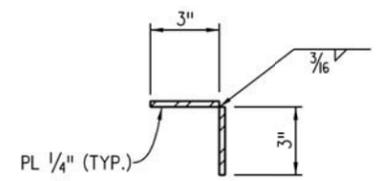


CAISSON FOUNDATION DETAILS

POLE HEIGHT	PIPE O.D. AT BASE (IN)	CAISSON DIAMETER (IN)	CAISSON DEPTH (FT)	VERTICAL REINF.
30'	8	24	8	6 - #8
40'	9	24	9	6 - #8
50'	10	24	10	6 - #8



BOLT TEMPLATE



SECTION A-A

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Sheet Revisions		
Date:	Comments	Init.

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HQ ITS BRANCH JKS

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 No Revisions:
 Revised:
 Void:

BREAKAWAY TAPERED ITS STEEL POLE
 Designer: CDOT
 Detailer: CDOT
 Sheet Subset: ITS
 Structure Numbers:
 Subset Sheets: of

Project No./Code
 Sheet Number **34**

GENERAL NOTES (CONTINUED)

12. WELDING OF STEEL SHALL CONFORM TO THE REQUIREMENTS OF AWS D 1.1. ALL AREAS TO BE WELDED SHALL BE GROUND TO BRIGHT METAL. NO BUTT WELD SPLICES WILL BE PERMITTED. ALL WELDING AND REQUIRED TESTING SHALL BE COMPLETE BEFORE ANY MATERIAL IS GALVANIZED.

ENHANCED MAGNETIC PARTICLE TESTING SHALL BE PERFORMED ON AREAS DEFINED IN AWS D1.1 AND HEREIN. ENHANCED MAGNETIC PARTICLE TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH ASTM E 709 AND AWS D 1.1, EXCEPT AS AMENDED HEREIN. ALTERNATING CURRENT SHALL BE USED. THE YOKE SPACING SHALL BE BETWEEN 2 AND 4 INCHES. THE MINIMUM LIFTING POWER SHALL BE 10 LBS. RED DRY PARTICLES SHALL BE USED. THE LIGHT INTENSITY SHALL MEET ASTM E 709, SECTION 7. PARTICLE APPLICATION AND SPECIMEN PREPARATION SHALL MEET THE REQUIREMENTS OF ASTM E 709 SECTIONS 9 AND 15, EXCEPT WHITE NON-AQUEOUS DEVELOPER MEETING ASTM E 165, TYPE 3, SHALL BE APPLIED TO THE TEST SURFACE PRIOR TO TESTING.

THE YOKES SHALL BE SET IN TWO POSITIONS WHEN TESTING THE WELD OR BASE METAL. THEY SHALL BE POSITIONED BOTH NORMAL AND PARALLEL WITH RESPECT TO THE WELD AXIS AND ROLLING DIRECTION OF THE BASE METAL.

ENHANCED MAGNETIC PARTICLE TESTS SHALL BE PERFORMED AT THE FOLLOWING LOCATIONS:

- (1) BASE METAL. ALL AREAS CONTACTED BY THE CARBON ARC GOUGE ELECTRODE, THE ELECTRODE CUP, AND THE WELDING ELECTRODE. ALL THREE CONDITIONS ARE ARC STRIKES.
- (2) FILLET WELDS. EACH DESIGN WELD SIZE ON MAIN MEMBER TO MAIN MEMBER AND SECONDARY MEMBER TO MAIN MEMBER WELDMENTS. ALL STOP-STARTS AND WELD TERMINI. ALL LINEAR INDICATIONS SHALL FURTHER BE EVALUATED WITH 10X OR 30X MAGNIFICATION. VERIFICATION SHALL BE RESOLVED BY EXCAVATION.
- (3) GROOVE WELDS. ALL THROUGH THICKNESS EDGES ON TRANSVERSE BUTT JOINT WELDMENTS IN TENSION AREAS.
- (4) REPAIRS. ALL REPAIR WELDS TO CORRECT DEFECTS IN GROOVE AND FILLET WELDS, PLATE CUT EDGES, CORRECTION OF FABRICATION ERRORS IN CUTTING, PUNCHING, DRILLING, OR FITTING, AND MEMBERS WHICH ARE TACKED OR WELDED AND SUBSEQUENTLY CUT APART AND REWELDED.

13. ALL CIRCUMFERENTIAL AND ALL LONGITUDINAL PIPE SEAM WELDS WITHIN 5" OF FULL PENETRATION CIRCUMFERENTIAL GROOVE WELDS SHALL BE FULL PENETRATION GROOVE WELDS AND SHALL BE INSPECTED AS SPECIFIED HEREIN. THE ACCEPTABLE MAXIMUM WELD UNDERCUT IS 0.01".

MATERIALS

COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)
POSTS SHAFT	A595 GR. A OR A572	55
BASE PLATES	A36	36
POLE TOP PLATE	A36	36
TENON - D.O.M. TUBING	---	50
ANCHOR BOLTS	F1554 GR. 55	55
H.S. BOLTS	A325	---
H.S. NUTS	A563	---
WASHERS	F436	---
GALVANIZING	A123 & A153	---

INDEX

- 1. CCTV POLE WITH LOWERING DEVICE - GENERAL NOTES
- 2. CCTV POLE WITH LOWERING DEVICE - POLE DETAILS (1)
- 3. CCTV POLE WITH LOWERING DEVICE - POLE DETAILS (2)
- 4. CCTV POLE WITH LOWERING DEVICE - FOUNDATION DETAILS

GENERAL NOTES

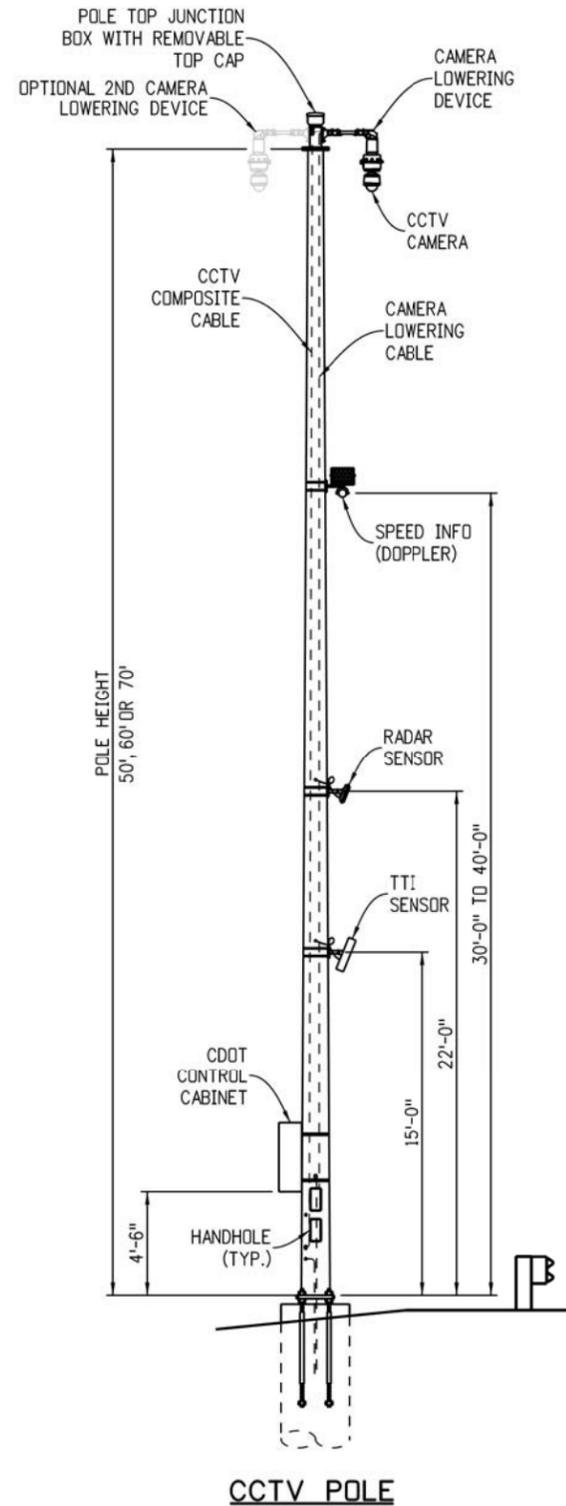
1. ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS SHOWN IN THE MATERIALS TABLE.
2. POLES SHALL BE FABRICATED INTO THE LARGEST PRACTICAL SECTIONS PRIOR TO GALVANIZING. SPLICE LOCATIONS AND DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND THE CONTRACTOR SHALL NOT COMMENCE FABRICATION UNTIL SUCH SPLICE LOCATIONS ARE APPROVED. THE MINIMUM LENGTH OF ANY TELESCOPIC (SLIP TYPE) FIELD SPLICES SHALL BE 1.5 TIMES THE INSIDE DIAMETER OF THE EXPOSED END OF THE FEMALE SECTION.
3. ALL CONCRETE SHALL BE CLASS BZ WITH AIR ENTRAINMENT; REINFORCING STEEL SHALL BE GRADE 60. CAISSON FOUNDATIONS SHALL REACH THE SEVEN DAY PREDICTED STRENGTH BEFORE POLES ARE ERECTED THEREON.
4. A DISCONNECT FOR THE POWER SUPPLY TO THE CAMERA SHALL BE PROVIDED AS SHOWN IN THE ROADWAY PLANS.
5. POLE SHALL BE GROUNDED AND BONDED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.
6. NPS = NOMINAL PIPE SIZE; O.D. = OUTSIDE DIAMETER.
7. SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SUBSECTION 105.02 OF THE STANDARD SPECIFICATIONS.
8. CAISSONS, POLES AND SURVEY WORK SHALL BE PAID FOR IN ACCORDANCE WITH BID ITEMS 503, 614 AND 625 RESPECTIVELY.
9. THERE SHALL BE NO PENETRATIONS OF POLES OTHER THAN AS SHOWN ON THESE PLANS UNLESS APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
10. ATTACH CONTROLLER CABINET TO POST WITH TWO 1/2" WIDE STAINLESS STEEL BANDS AND STAINLESS STEEL FLARED LEG BRACKETS WITH HEX HEAD BOLTS (BAND-IT D315 OR EQUIVALENT).
11. ALL PIPE MEMBERS SHALL BE HOT-DIP GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION AS PER ASTM A123, UNLESS PAINTING IS CALLED FOR ON THE PLANS. PAINTING SHALL CONFORM TO SECTION 522, DUPLEX COATING SYSTEM. ALL NUTS, BOLTS AND WASHERS FOR POLE STRUCTURES SHALL BE GALVANIZED AFTER FABRICATION AS PER ASTM A123 OR ASTM A153, AS APPROPRIATE, AND SHALL NOT BE PAINTED.

DESIGN DATA

SPECIFICATIONS:
 DESIGN: "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (2013 AASHTO).
 WIND DESIGN: 110 MPH VELOCITY (3-SECOND GUST)
 1" MAXIMUM POLE TOP DEFLECTION @ 30 MPH VELOCITY (NO GUST FACTOR)
 FATIGUE DESIGN: COMBINED WIND EFFECT STATIC LIMIT-STATE PRESSURE RANGE = 6.5 PSF APPLIED TO POLE AND ATTACHMENTS
 LOADINGS:
 1. TOP OF POLE: 5.00 SF EPA, 210 LB
 2. 40' FROM BASE: 2.00 SF EPA, 30 LB
 3. 22' FROM BASE: 1.50 SF EPA, 5 LB
 4. 15' FROM BASE: 3.50 SF EPA, 10 LB
 5. 6' FROM BASE: 10.00 SF EPA, 100 LB
 CONSTRUCTION: CDOT STANDARD SPECIFICATIONS, THESE SHEETS AND PROJECT PLANS.

CCTV POLE X-SECTION SHEET(S) SHALL SHOW:

1. POLE LOCATION (HIGHWAY, STATION AND DIRECTION)
2. OFFSET FROM SHOULDER
3. POLE HEIGHT
4. CAISSON DIAMETER AND MINIMUM EMBEDMENT
5. TOP OF CAISSON ELEVATION
6. CAISSON PAY LENGTH
7. STATIONS AND OFFSETS TO CAISSON
8. GUARDRAIL PROTECTION LIMITS
9. LOCATION OF DISCONNECT FOR THE POWER SUPPLY
10. LOCATION OF REMOTE ACCESS CABINET ON POLE
11. AS CONSTRUCTED BLOCK



CCTV POLE

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Sheet Revisions		
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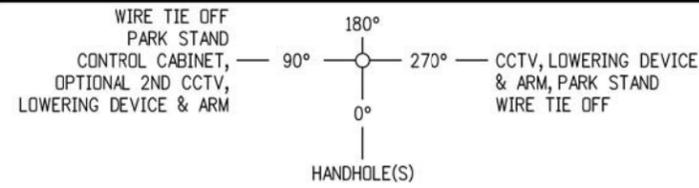
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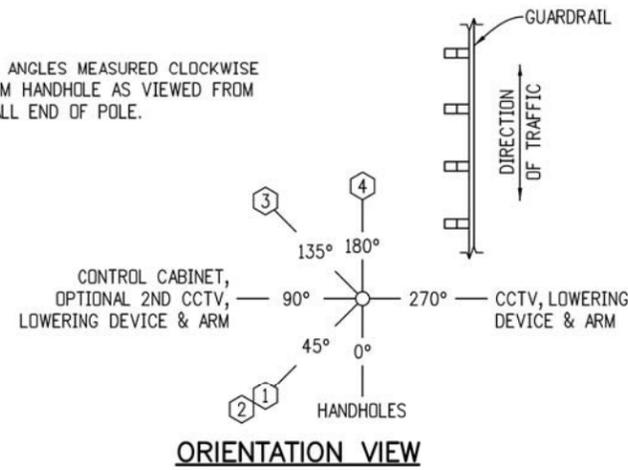
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- POLE DETAILS (1) -

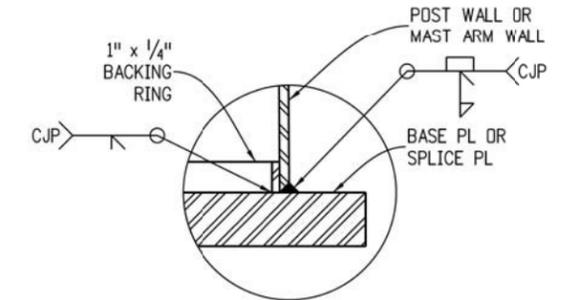


ORIENTATION VIEW

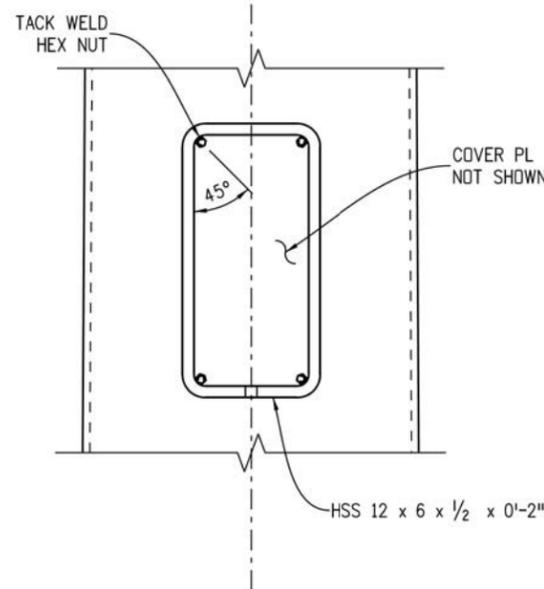
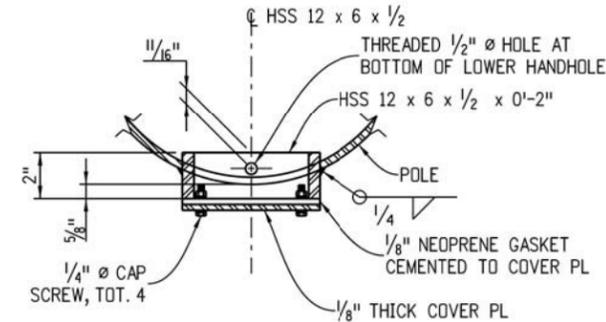
ALL ANGLES MEASURED CLOCKWISE FROM HANDHOLE AS VIEWED FROM SMALL END OF POLE.



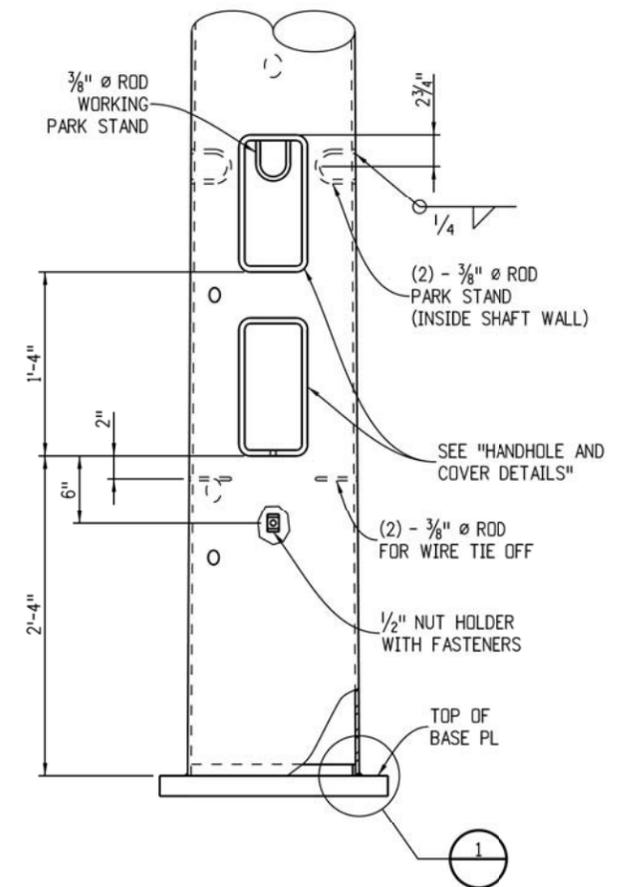
POLE DATA			
POLE HEIGHT (FT)	BASE DIAMETER (IN)	TOP DIAMETER (IN)	WALL THICKNESS (IN)
50'	15.00	8.00	0.3125
60'	19.00	10.60	0.3125
70'	24.00	14.20	0.3750



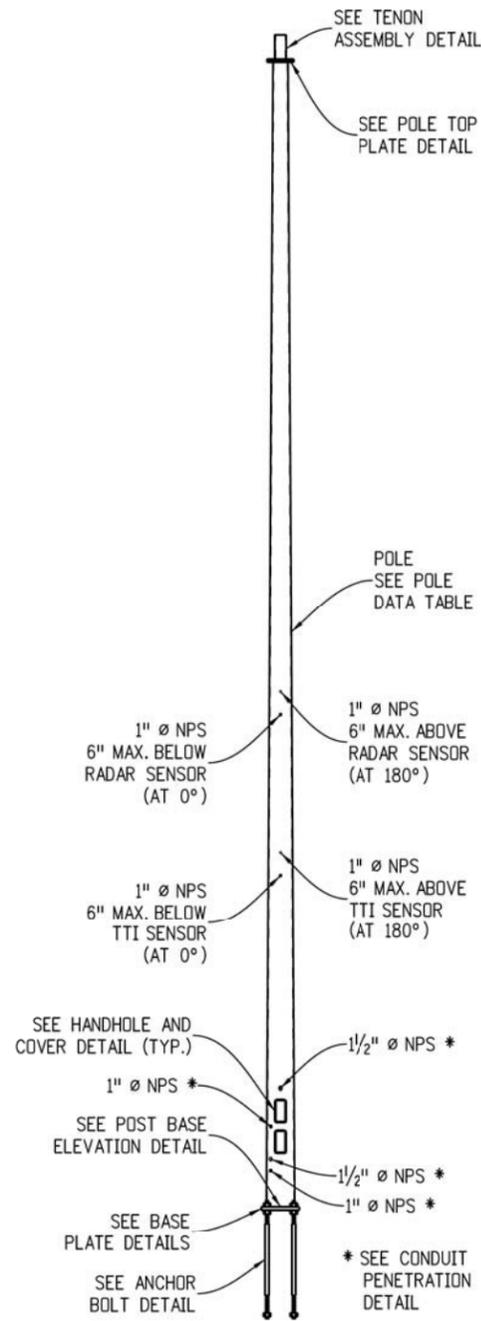
DETAIL 1



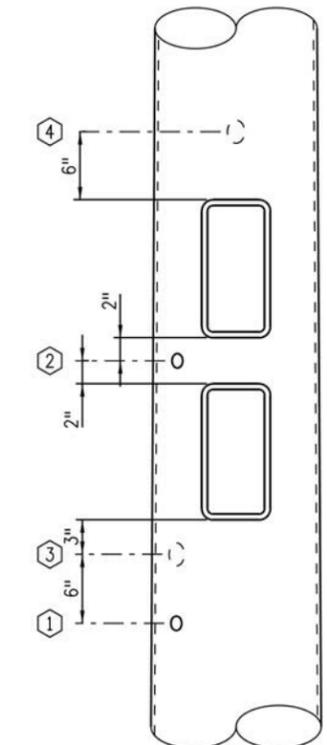
HANDHOLE AND COVER DETAILS



POST BASE ELEVATION



POST ELEVATION



CONDUIT PENETRATION DETAIL

1 AND 2 1" Ø NPS
3 AND 4 1 1/2" Ø NPS
PLUG ALL THREADED PENETRATIONS WITH RECESSED PLUGS

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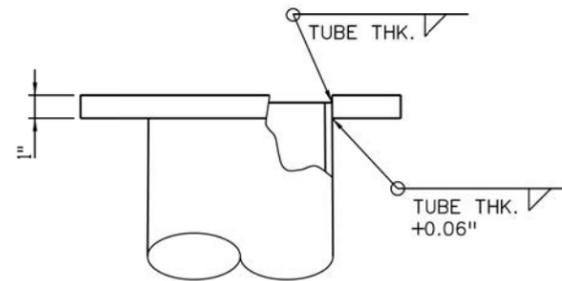
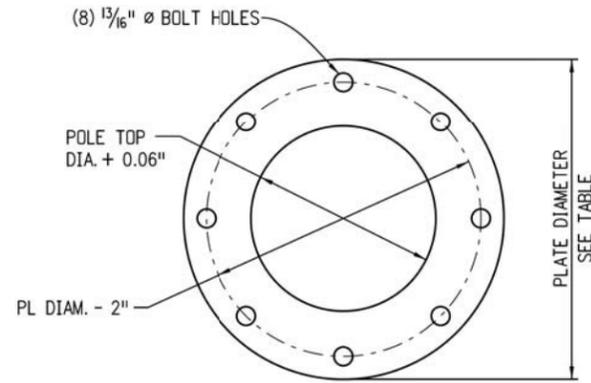
CCTV POLE WITH LOWERING DEVICE

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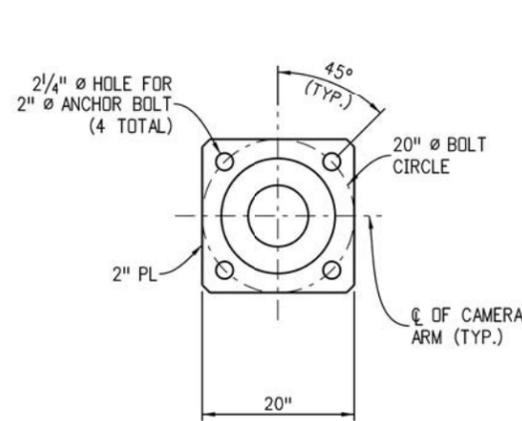
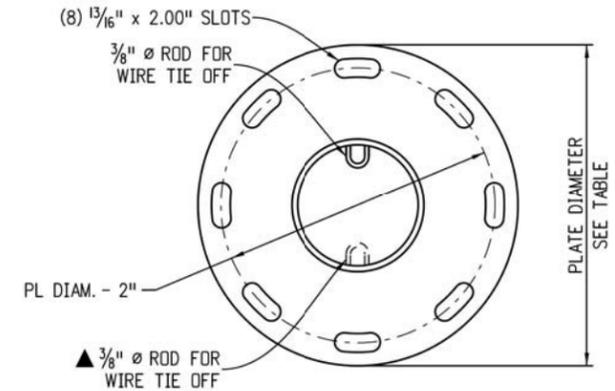
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Structure Numbers
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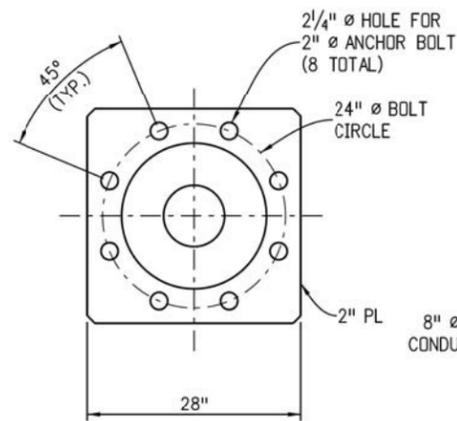
TENON/TOP PLATE	
POLE HEIGHT (FT)	PLATE DIAMETER (IN)
50'	14.00
60'	18.00
70'	22.00



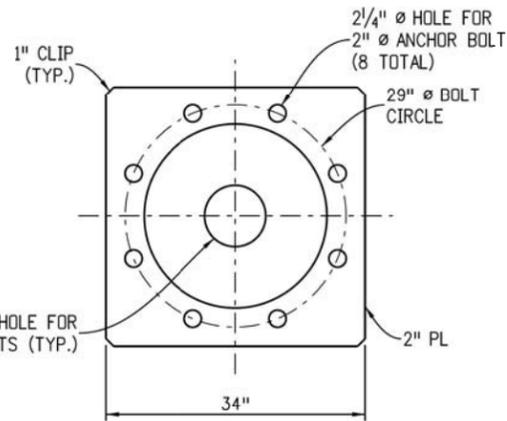
POLE TOP PLATE



50' POLE

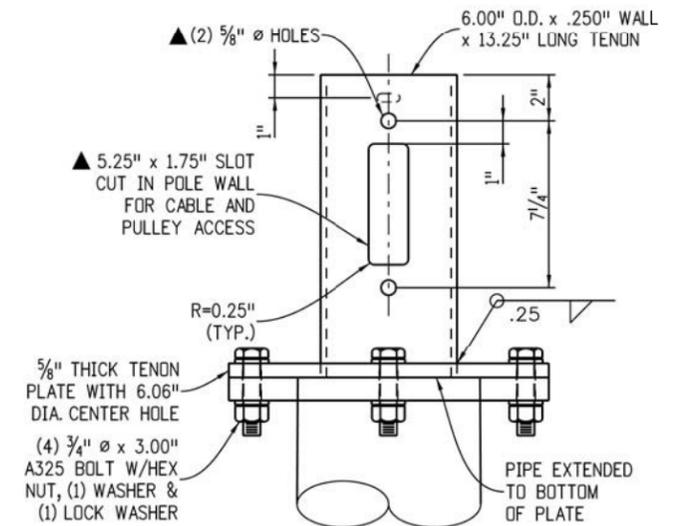


60' POLE



70' POLE

BASE PLATE DETAILS



TENON ASSEMBLY

▲ PROVIDE FOR 2ND OPTIONAL CAMERA LOWERING DEVICE

Kimberly Garber 1:30:30 PM P:\Projects\160227 CDOT 1-70 East\CADD\DET36 CCTV Pole with Lowering Device.dgn

Print Date: 1/29/2016	0000
File Name: DET36_CCTV Pole with Lowering Device.dgn	
Horiz. Scale: NTS Vert. Scale: As Noted	
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Date:	Comments	Init.

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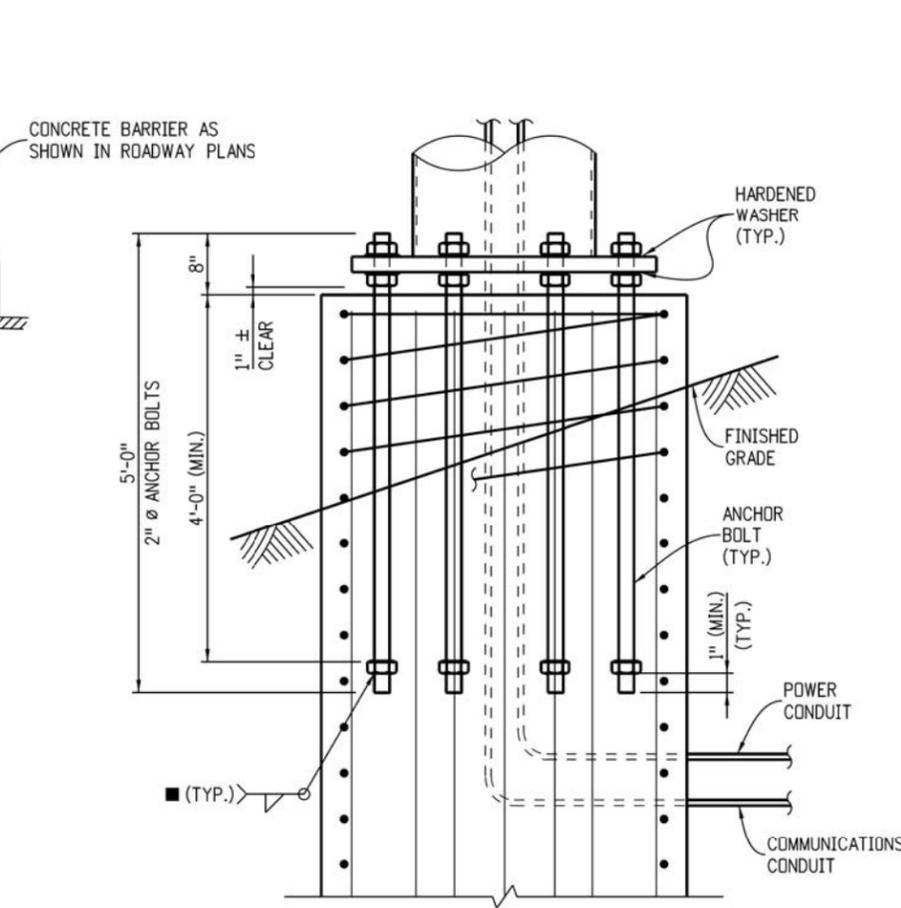
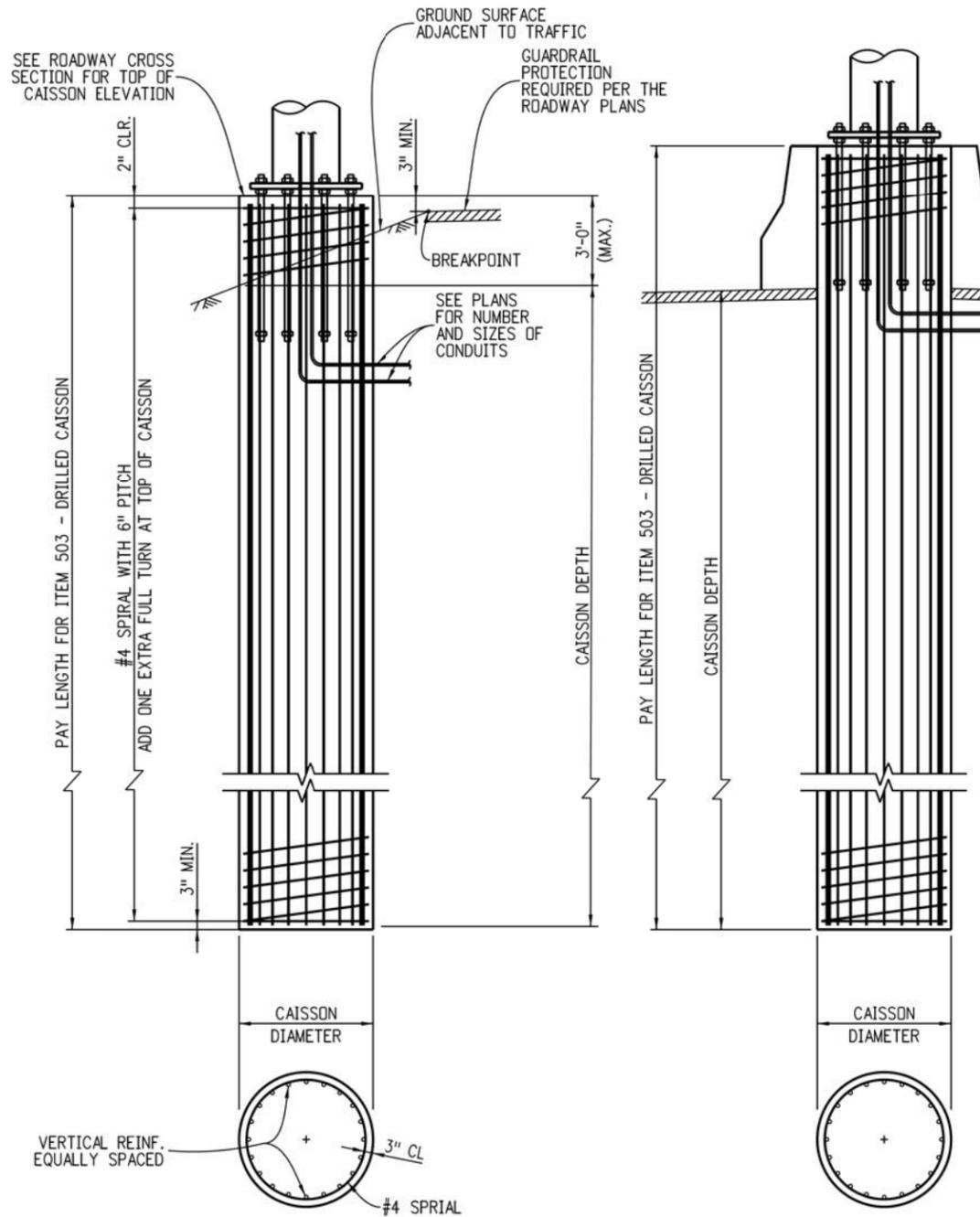
425 C Corporate Circle
Golden, CO 80401
Phone: 303-512-5801 Fax: 303-512-5878

HQ ITS BRANCH JKS

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Void:

CCTV POLE WITH LOWERING DEVICE			
Designer:	CDOT	Structure Numbers	
Detailer:	CDOT		
Sheet Subset:	ITS	Subset Sheets:	of

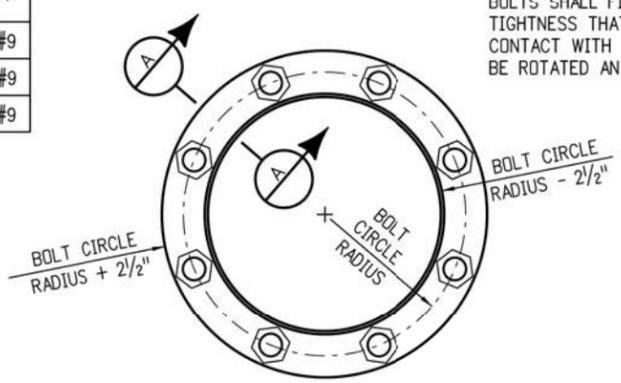
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Sheet Number



ANCHOR BOLT DETAIL

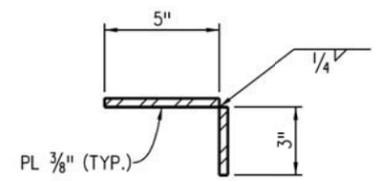
■ WELDING PROCEDURE IS NOT REQUIRED FOR THIS WELD

POLE HEIGHT	PIPE O.D. AT BASE (IN)	CAISSON DIAMETER (IN)	CAISSON DEPTH (FT)	VERTICAL REINF.
50'	15	36	15	12 - #9
60'	19	42	18	14 - #9
70'	24	48	21	18 - #9



BOLT TEMPLATE

(8 BOLT SHOWN, 4 BOLT SIMILAR)



SECTION A

CAISSON DRILLING AND INSTALLATION NOTES

- CAISSONS SHALL BE PLACED AGAINST UNDISTURBED EARTH. WET OR CAVING HOLES SHALL BE BACKFILLED WITH FLOW-FILL AND REDRILLED AFTER A THREE DAY CURING PERIOD WITHOUT THE USE OF A CASING; OR OTHER METHOD APPROVED BY THE ENGINEER.
- THE DESIGN HEREIN ASSUMES THAT POLE SUPPORTS ARE INSTALLED WITHIN THE ROADWAY PRISM WITH THE FOLLOWING SOIL PARAMETERS:

SOIL DENSITY = 110 LB./CU. FT.
SOIL COHESION = 750 LB./SQ. FT. FOR MEDIUM STIFF COHESIVE SOIL
SOIL φ ANGLE = 30° FOR MEDIUM DENSE COHESIONLESS SOIL
SF = 3.0 FOR FLEXURAL RESISTANCE.
- CONTACT THE ENGINEER IF ANY OF THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED DURING DRILLING:
(A) POLE SUPPORT WILL NOT BE INSTALLED WITHIN THE ROADWAY PRISM.
(B) THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.
(C) THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.
(D) THE FOUNDATION SOILS ARE NOT HOMOGENOUS.
(E) FIRM BEDROCK IS ENCOUNTERED.
(F) HIGH GROUNDWATER IS ENCOUNTERED.
(G) LARGE BOULDERS ARE ENCOUNTERED.
- THE CONTRACTOR SHALL PROVIDE A SURVEY OF THE POLE FOUNDATION TO VERIFY PLACEMENT SOON AFTER WORK ON THE FOUNDATION HAS BEEN COMPLETED. THE SURVEY SHALL CONFORM TO THE REQUIREMENTS OF SECTION 625, CONSTRUCTION SURVEYING. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER A COPY OF THE SURVEY NOTES DETAILING THE FOUNDATION LOCATION AND ELEVATION AND THE ANCHOR BOLT LOCATIONS, PROJECTIONS, AND ORIENTATIONS. THE ELEVATION OF THE GROUND SURROUNDING THE FOUNDATION SHALL ALSO BE PROVIDED. THE CONTRACTOR SHALL COMPARE THE SURVEY INFORMATION TO THE REVIEWED SHOP DRAWINGS AND RECONCILE ANY DIFFERENCES BETWEEN THEM. THE CONTRACTOR SHALL SUBMIT ALL PROPOSED ADJUSTMENTS OR MODIFICATIONS TO THE ENGINEER FOR APPROVAL.

NOTES

- THREAD UPPER 8" AND GALVANIZE UPPER 1'-0" OF THE ANCHOR BOLTS.
- ANCHOR BOLTS SHALL BE SET WITH A STEEL TEMPLATE UNTIL THE CONCRETE HAS CURED AT LEAST TWO DAYS.
- THERE SHALL BE NO GROUT PAD INSTALLED ON TOP OF THE EXISTING FOUNDATIONS.
- THE ANCHOR BOLTS SHALL BE TIGHTENED USING THE TURN-OF-NUT METHOD. THE BOLTS SHALL FIRST BE TIGHTENED TO SNUG TIGHT, WHICH IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE UPPER AND LOWER NUTS/WASHERS ARE IN FIRM CONTACT WITH THE BASE PLATE. THE UPPER AND LOWER NUTS SHALL EACH THEN BE ROTATED AN ADDITIONAL 1/2 TURN (30° ± 5°) USING A SLUGGING WRENCH.

ROADSIDE SHOULDER INSTALLATION

MEDIAN RAIL INSTALLATION

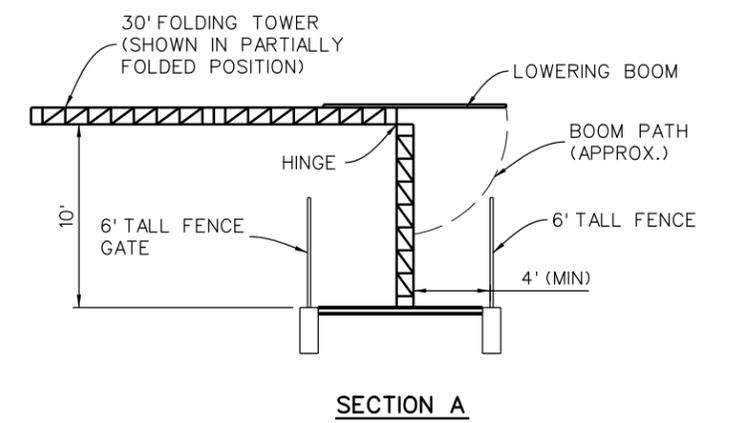
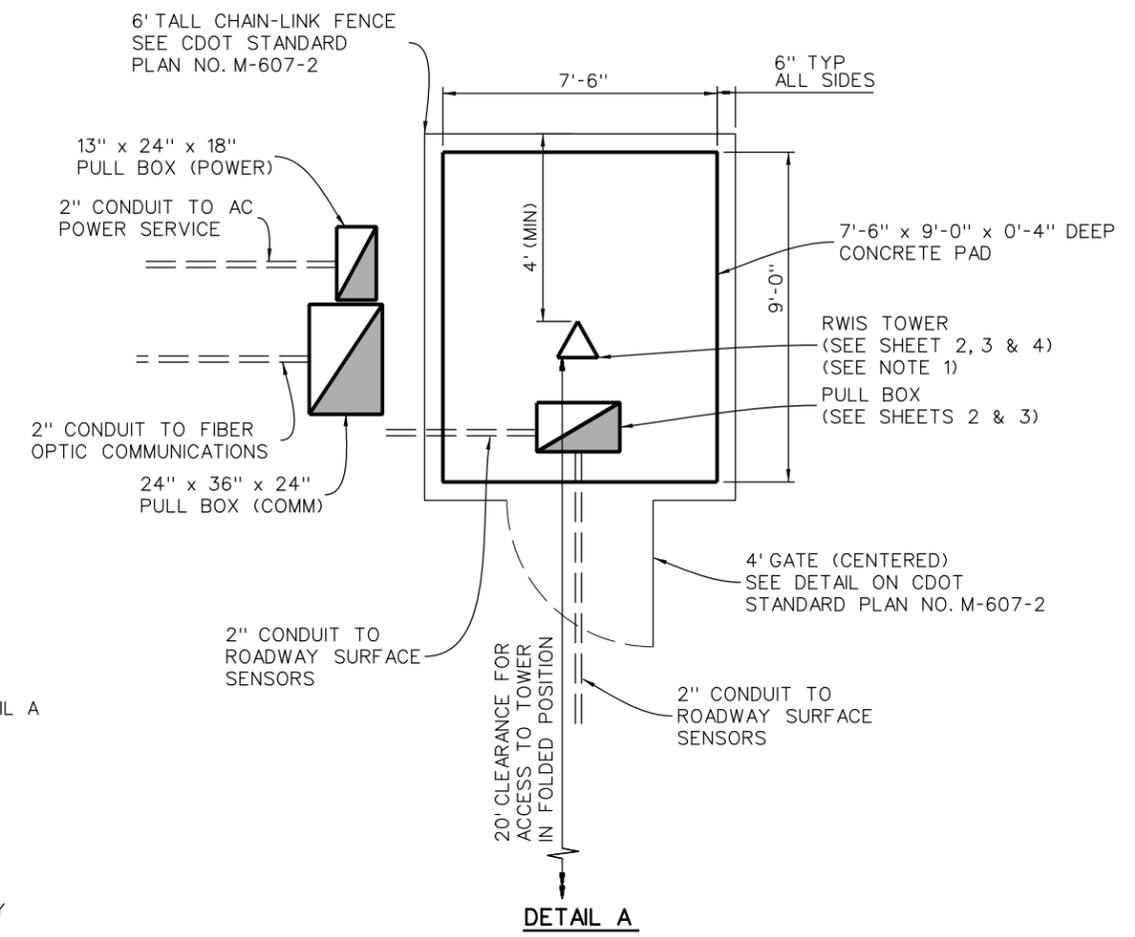
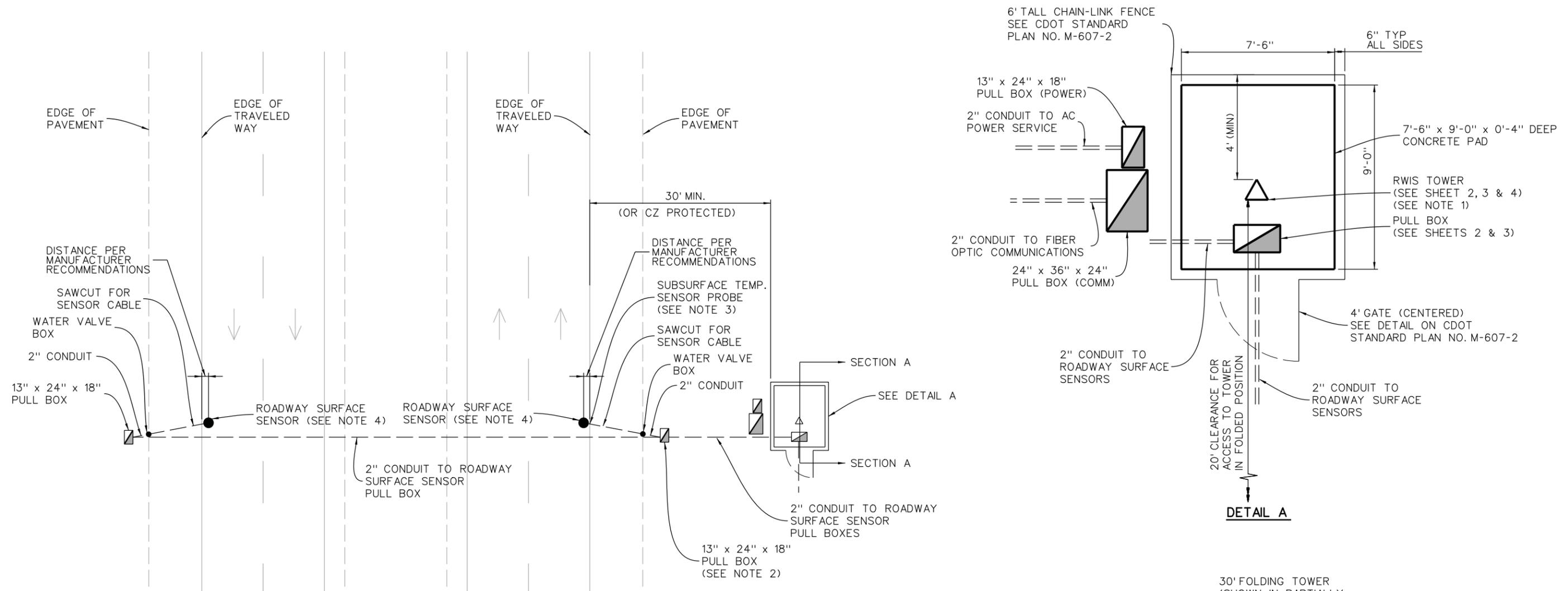
(SEE ROADSIDE SHOULDER INSTALLATION FOR ADDITIONAL INFORMATION)

CAISSON FOUNDATION DETAILS

Kimberly Garber 1:31:17 PM P:\Projects\PI60227 CDOT 1-70 East\CAD\DET37_CCTV Pole with Lowering Device.dgn

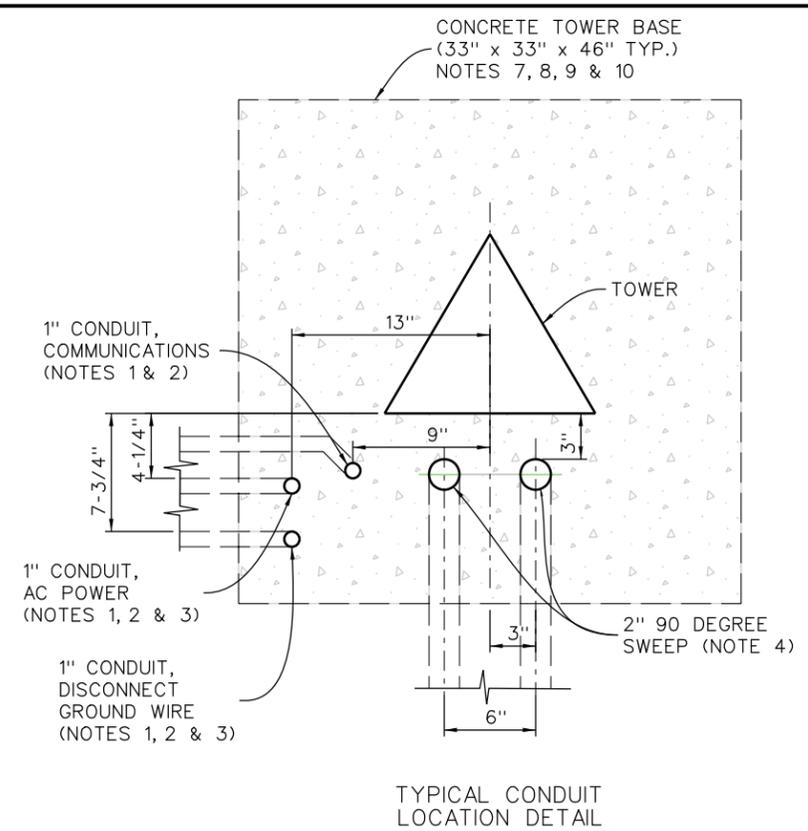
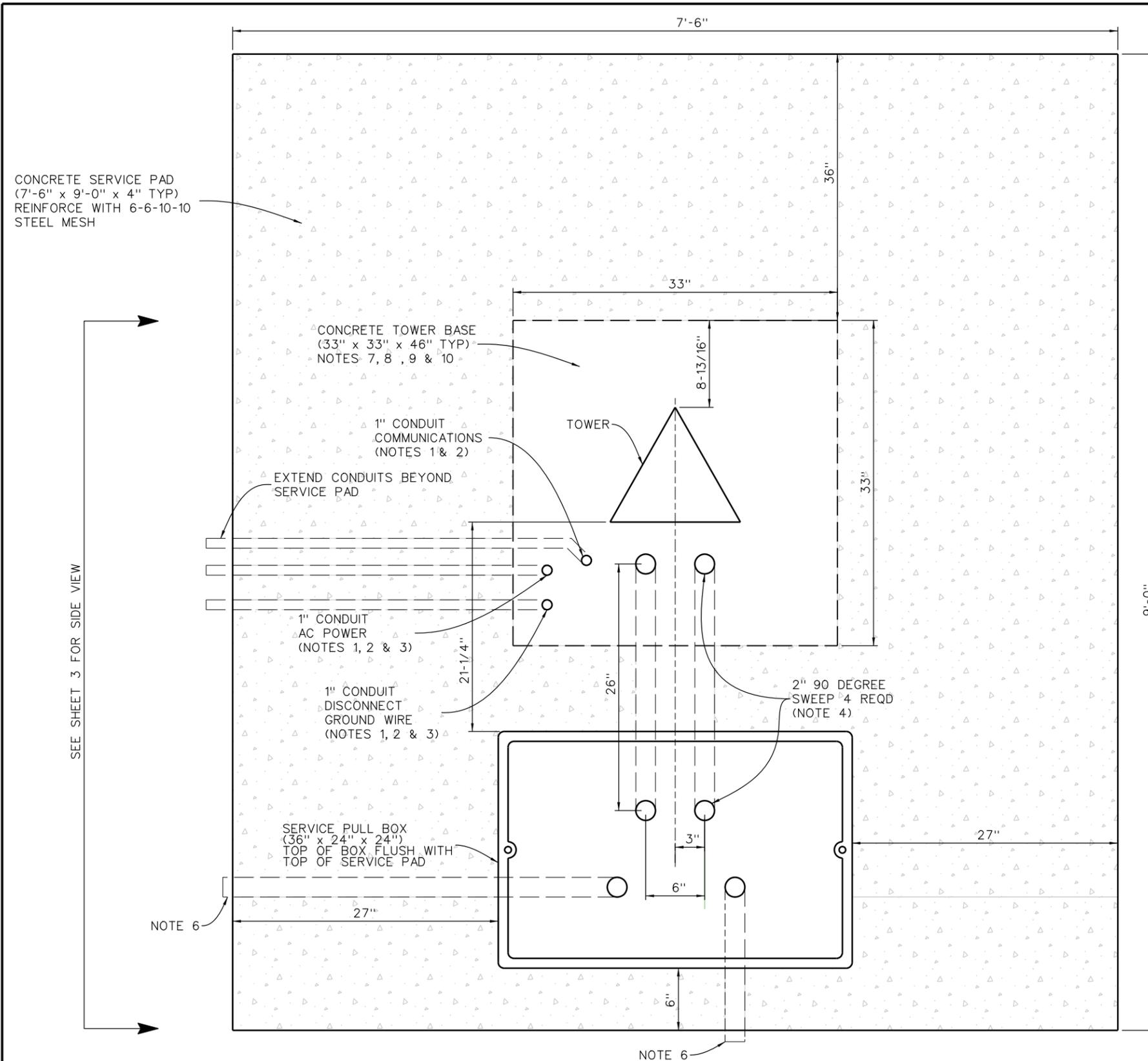
Print Date: 1/29/2016	Sheet Revisions			Colorado Department of Transportation	As Constructed	CCTV POLE WITH LOWERING DEVICE		Project No./Code
File Name: DET37_CCTV Pole with Lowering Device.dgn	Date:	Comments	Init.			No Revisions:	Designer: CDOT	
Horiz. Scale: NTS	Vert. Scale: As Noted			425 C Corporate Circle Golden, CO 80401 Phone: 303-512-5801 Fax: 303-512-5878 HQ ITS BRANCH	Revised:	Detailer: CDOT		
	JKS				Void:	Sheet Subset: ITS	Subset Sheets: of	Sheet Number 38

Kimberly Garber 1:32:58 PM P:\Projects\PI60227 CDOT I-70 East\CADD\DET38_RWIS (1 of 4).dgn



- NOTES:
1. TOWER HINGE SHALL FACE GATE TO ALLOW TOWER TO BE FOLDED DOWN THROUGH OPEN GATE. FENCE INSTALLATION SHALL NOT IMPEDE LOWERING BOOM THAT EXTENDS OPPOSITE OF TOWER HINGE. CONTRACTOR SHALL VERIFY PROPER ORIENTATION AND NOTIFY ENGINEER PRIOR TO SETTING TOWER ON TOWER BASE. SEE 'SECTION A'.
 2. PULL BOX NOT REQUIRED IF TOWER BASE LOCATED WITHIN 20 FEET OF EDGE OF PAVEMENT.
 3. DRILL 1 1/4" DIAMETER HOLE TO 18" DEPTH FOR SUBSURFACE TEMPERATURE PROBE (SUBPROBE) INSTALLATION. HOLE TO BE DRILLED ON SHOULDER STRIPE NEXT TO SAWCUT USED FOR SENSOR CABLES.
 4. WIRELESS ROADWAY SURFACE SENSORS ARE AN ALTERNATIVE ROADWAY SURFACE SENSOR TYPE. SEE RWIS PROJECT SPECIAL PROVISION FOR PROJECT SPECIFIC SENSOR TYPES. MAXIMUM CABLE LENGTH FOR WIRED ROADWAY SURFACE SENSOR IS 5000 FT.

Print Date: 1/29/2016		Colorado Department of Transportation 		As Constructed	RWIS SITE DETAIL PROJECT STANDARD		Project No./Code	
File Name: DET38_RWIS (1 of 4).dgn		Date:	Comments:	Init.:	No Revisions:	Designer: CDOT	Structure Numbers:	
Horiz. Scale: NTS Vert. Scale: As Noted					Revised:	Detailer: CDOT		
JKS					Void:	Sheet Subset: ITS	Subset Sheets: of	Sheet Number 39



- NOTES:
1. ALL CONDUITS SHALL BE SCHEDULE 80 PVC.
 2. STUB OUT 1" POWER SERVICE, DISCONNECT GROUND AND COMMUNICATIONS CONDUITS BEYOND TOWER BASE AND SERVICE PAD. CONDUIT STUB OUTS ARE INCLUDED IN THE RWIS PAY ITEM.
 3. CONDUIT LOCATIONS SHOWN ARE FOR A SQUARE D TYPE D SAFETY SWITCH CATALOG # D221NRB.
 4. TWO 2" 90 DEGREE SWEEPS ARE ASSEMBLED TO FORM A 'U'. SWEEPS ARE 2" MINIMUM OVERSIZED FOR NUMBER OF CABLES INSTALLED. SEE SHEET 3.
 5. INSTALL ALL CONDUITS IN TOWER BASE CONCRETE TO PERMIT CONTINUATION TO REMOTE PROCESSING UNIT (RPU) ENCLOSURE.
 6. STUB OUT CONDUIT FROM SERVICE PULL BOX TO BEYOND SERVICE PAD FOR SENSOR CABLES.
 7. CLASS B CONCRETE REQUIRED.
 8. CONCRETE BASE SHALL BE DESIGNED FOR 2000 PSF SOIL BEARING CAPACITY. USE OF GEOTECHNICAL ENGINEER MAY BE NECESSARY TO VERIFY SOIL CAPACITY OR RECOMMEND ALTERATION IF SOIL CONDITIONS ARE QUESTIONABLE.
 9. DIMENSIONS OF CONCRETE BASE ARE MINIMUM RECOMMENDED. FINAL SIZE SHALL BE PER MANUFACTURER INSTALLATION INSTRUCTIONS, ADJUSTING AS REQUIRED FOR LOCAL FROST CONDITIONS AND SOIL CAPACITY.
 10. SEE MANUFACTURER DRAWINGS FOR TOWER BASE FORMING DETAILS.

Kimberly Garber 1:32:58 PM P:\Projects\PI60227\CDOT\1-70 East\CADD\DET39_RWIS (2 of 4).dgn

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Date:	Comments	Init.

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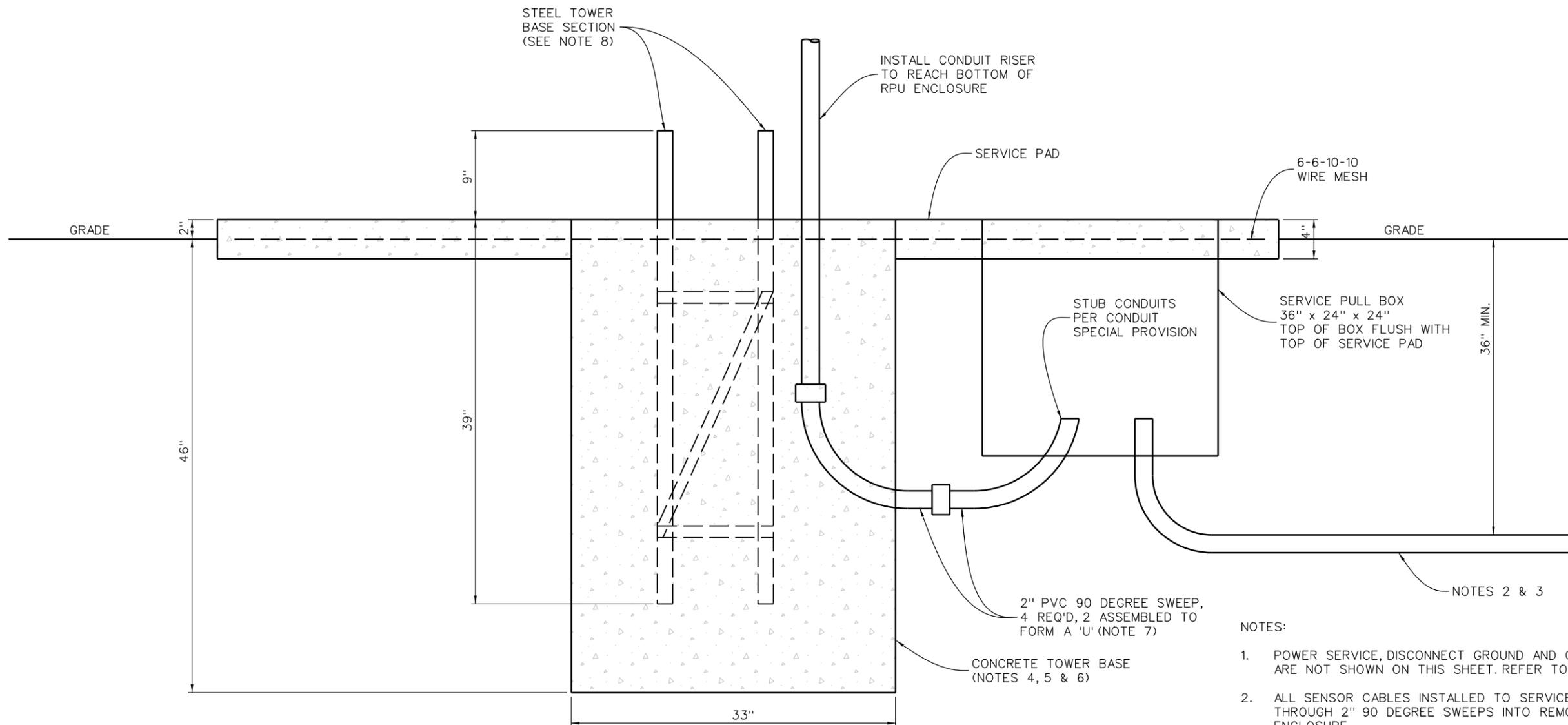
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Golden, CO 80401
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RWIS SITE DETAIL PROJECT STANDARD			
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Project No./Code
Sheet Number 40



NOTES:

1. POWER SERVICE, DISCONNECT GROUND AND COMMUNICATIONS CONDUITS ARE NOT SHOWN ON THIS SHEET. REFER TO SHEET 2.
2. ALL SENSOR CABLES INSTALLED TO SERVICE PULL BOX AND PULLED THROUGH 2" 90 DEGREE SWEEPS INTO REMOTE PROCESSING UNIT (RPU) ENCLOSURE.
3. STUB OUT CONDUIT FROM SERVICE PULL BOX TO BEYOND SERVICE PAD FOR SENSOR CABLES. CONDUIT STUB OUTS INCLUDED IN THE RWIS PAY ITEM
4. CLASS B CONCRETE REQUIRED.
5. CONCRETE BASE SHALL BE DESIGNED FOR 2000 PSF SOIL BEARING CAPACITY. CONTRACTOR TO NOTIFY ENGINEER IF UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED.
6. DIMENSIONS OF CONCRETE BASE ARE MINIMUM RECOMMENDED. FINAL SIZE SHALL BE PER MANUFACTURER INSTALLATION INSTRUCTIONS, ADJUSTING AS REQUIRED FOR LOCAL FROST CONDITIONS AND SOIL CAPACITY.
7. CONDUIT SWEEPS ARE 2" MINIMUM, OVERSIZE FOR NUMBER OF CABLES INSTALLED.
8. SEE MANUFACTURER INSTALLATION INSTRUCTIONS FOR TOWER ATTACHMENT DETAILS.

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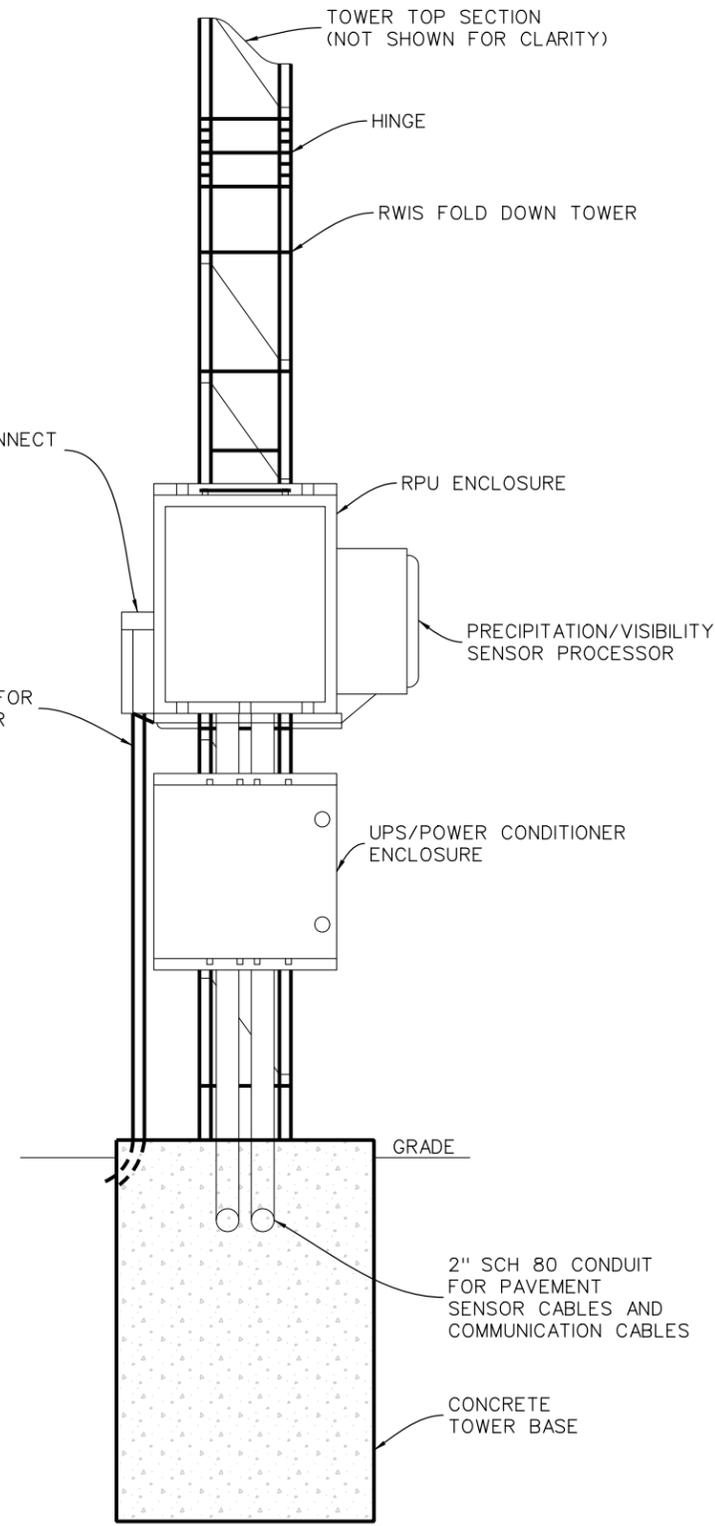
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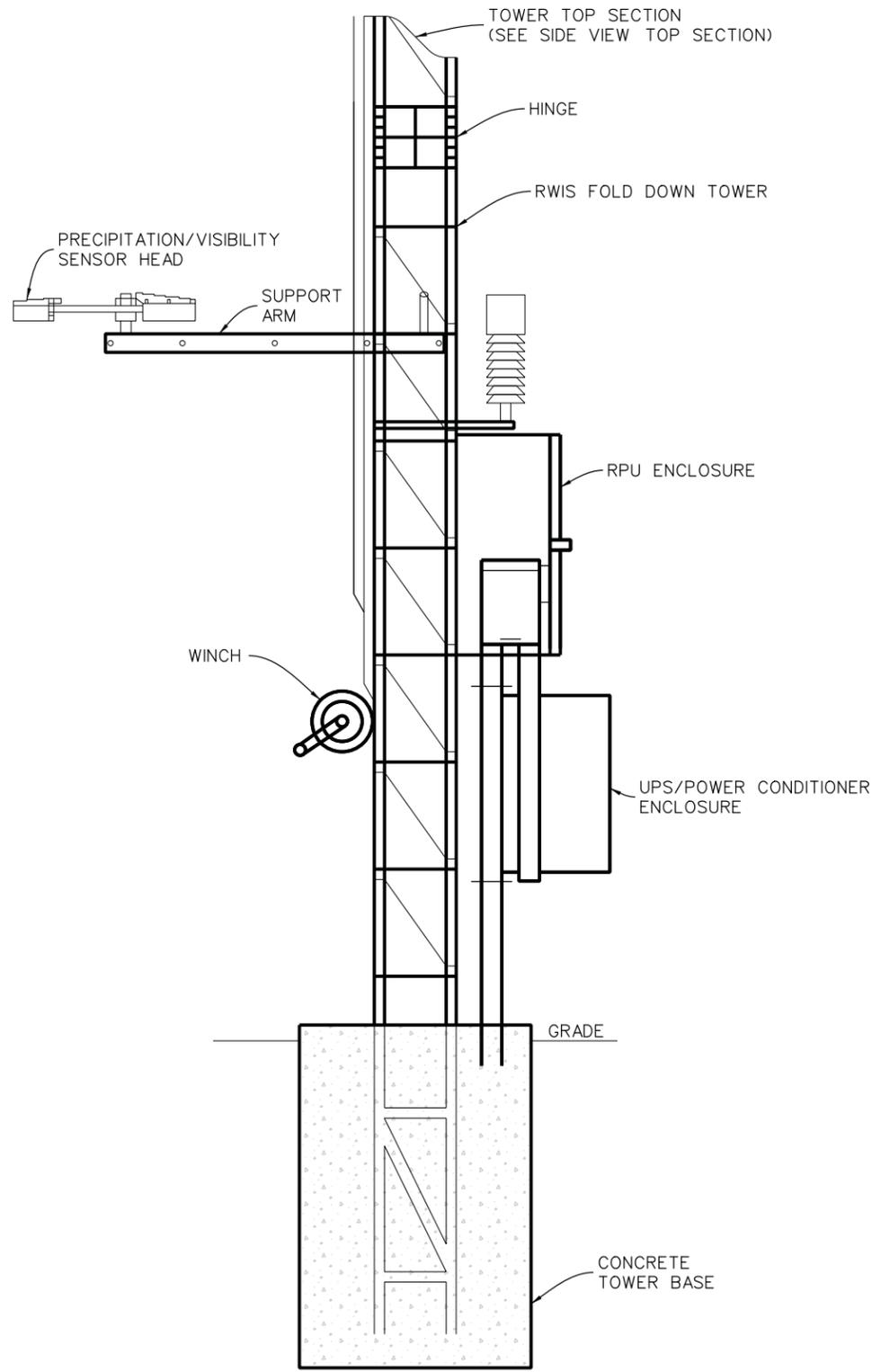
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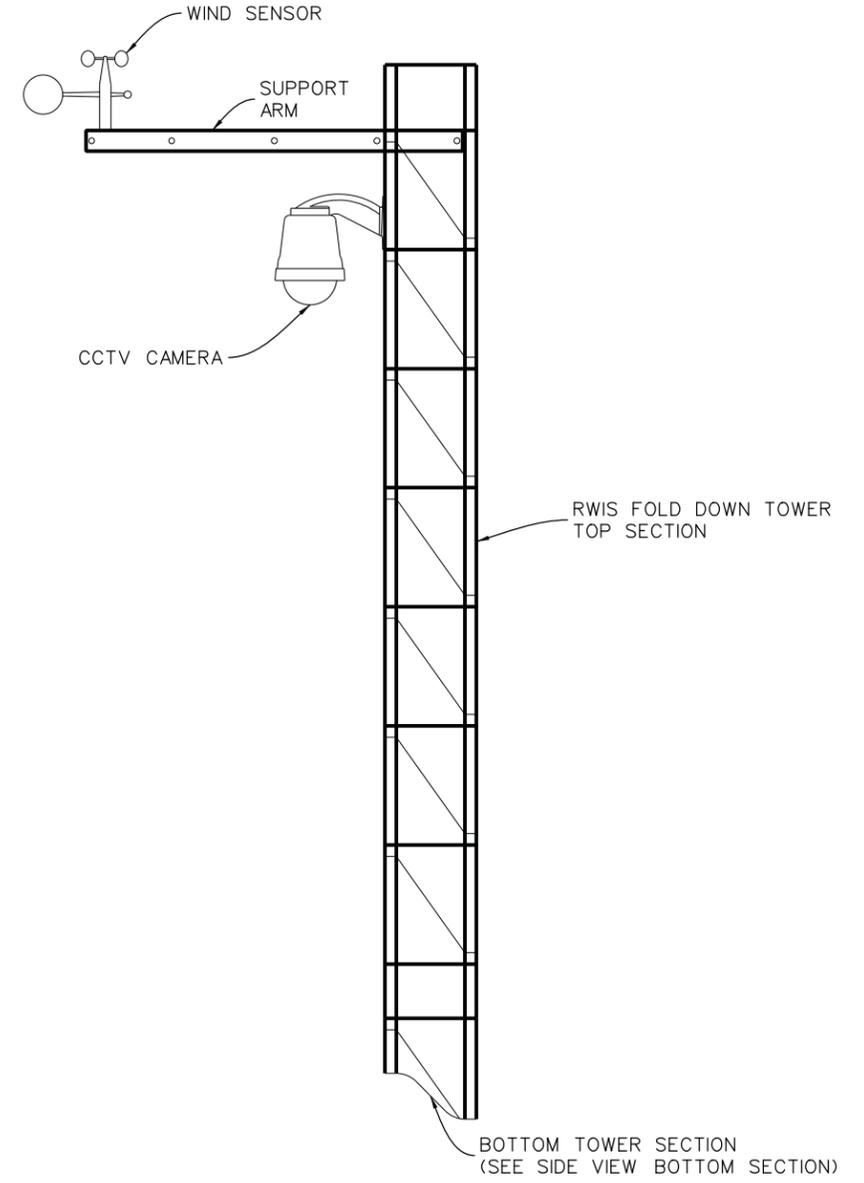
RWIS TOWER ASSEMBLY FRONT VIEW BOTTOM SECTION

SCALE: 1"=2'-0"



RWIS TOWER ASSEMBLY SIDE VIEW BOTTOM SECTION

SCALE: 1"=2'-0"



RWIS TOWER ASSEMBLY SIDE VIEW TOP SECTION

SCALE: 1"=2'-0"

NOTES:

1. ASSEMBLE AND ERECT TOWER IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS SUPPLIED WITH THE TOWER.
2. BASIC EQUIPMENT CONFIGURATION SHOWN, SEE PROJECT SPECIAL PROVISION FOR REQUIRED EQUIPMENT.

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File Name: DET41_RWIS (4 of 4).dgn
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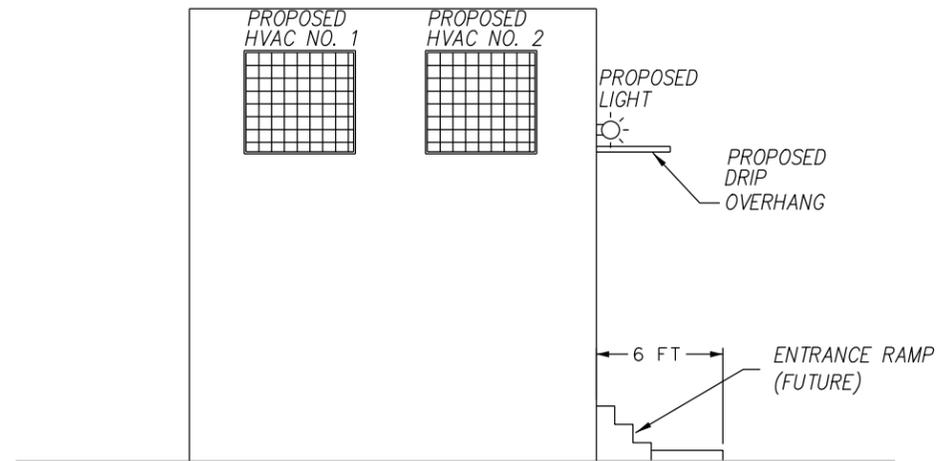
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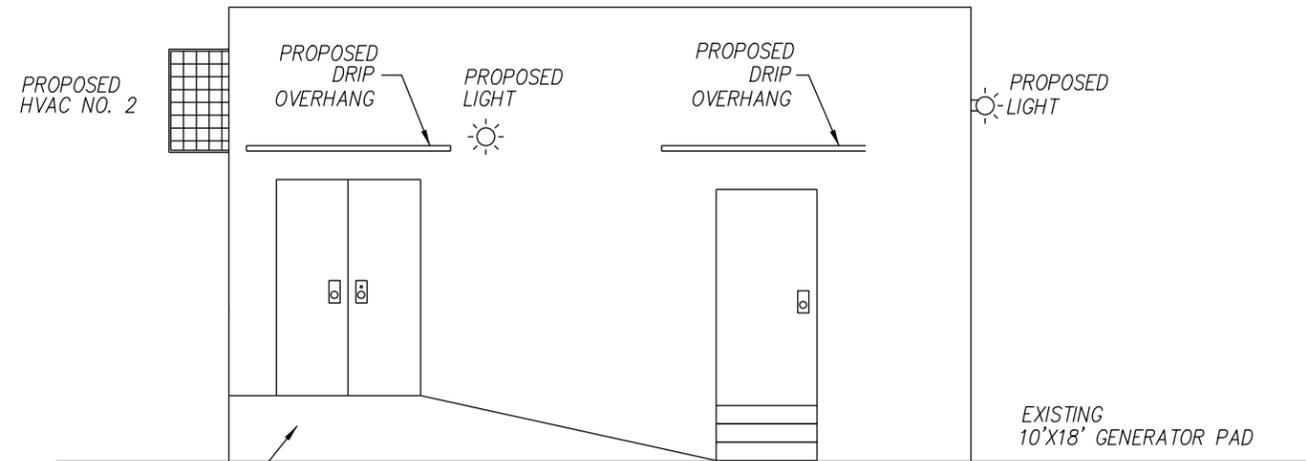
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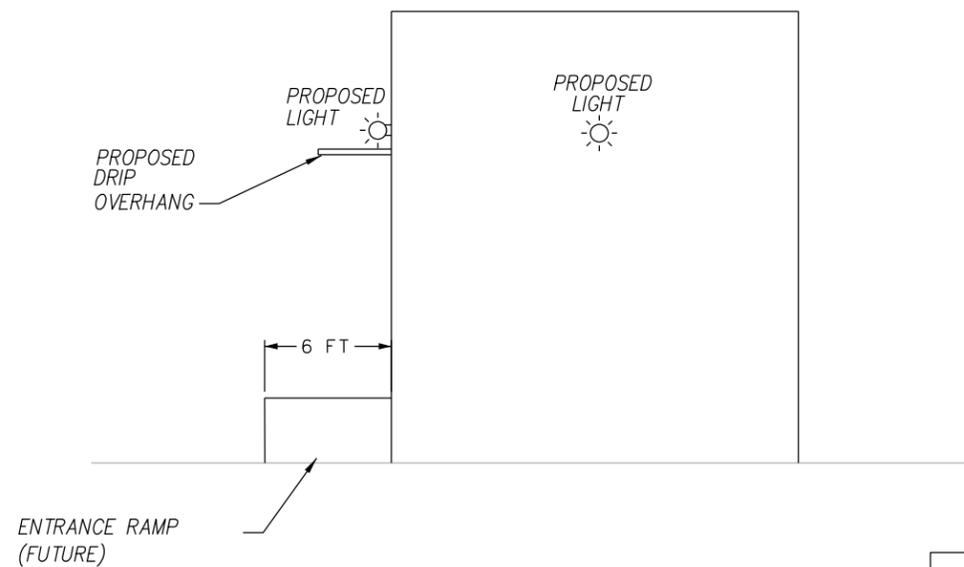
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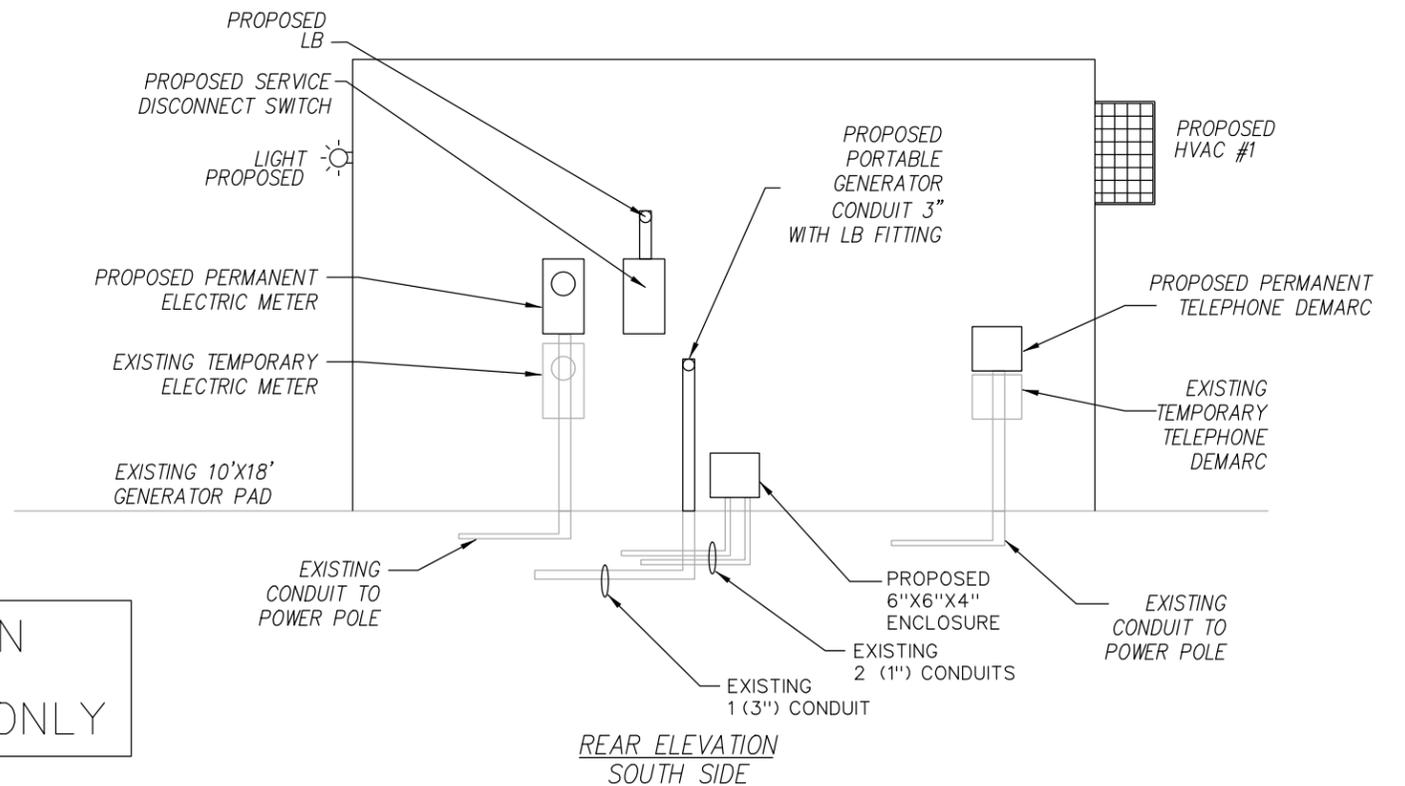
LEFT SIDE ELEVATION
EAST SIDE



FRONT ELEVATION
NORTH SIDE



RIGHT SIDE ELEVATION
WEST SIDE



REAR ELEVATION
SOUTH SIDE

THIS ELEVATION
PLAN IS FOR
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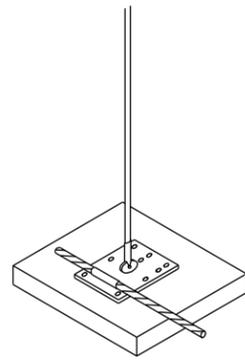
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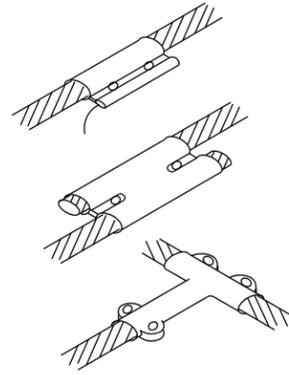
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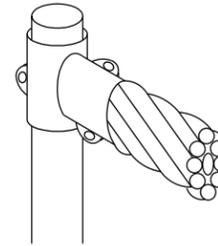
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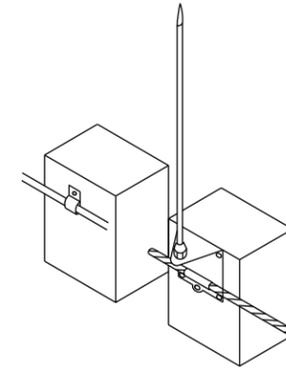
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(NOT TO SCALE)



TYPICAL CABLE SPLICERS
(NOT TO SCALE)

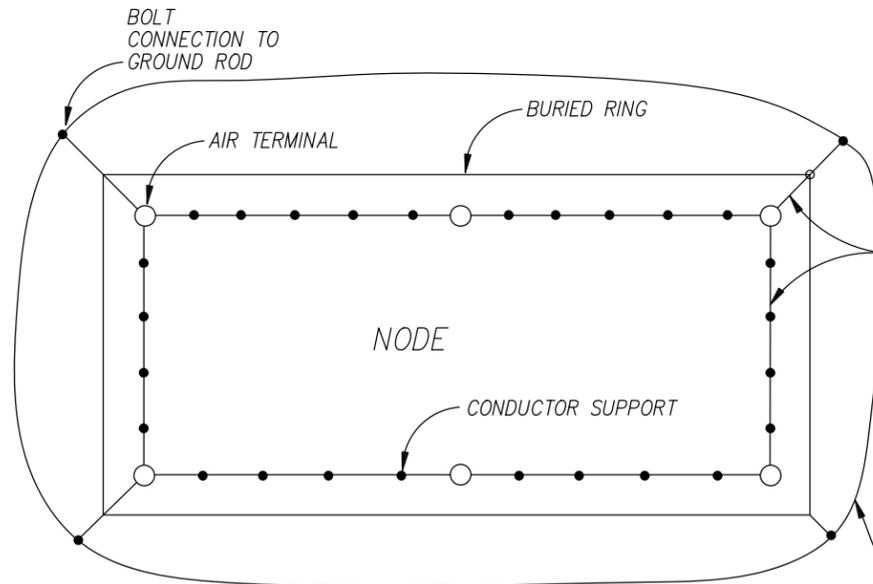


GROUND ROD BOLT CONNECTION
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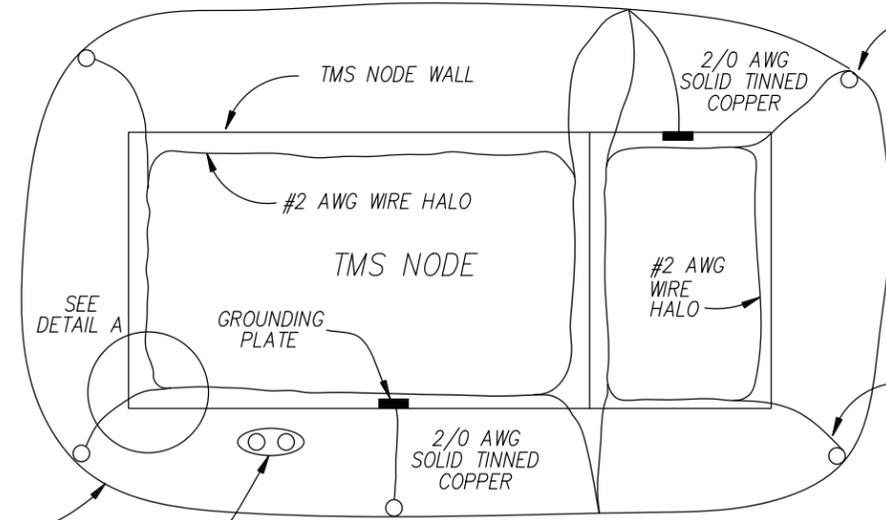
TYPICAL OFFSET BASED AIR TERMINAL
(NOT TO SCALE)

NOTE:
EXTERIOR GROUNDING RING WILL BE INSTALL
BY CDOT PRIOR TO BUIDLING DELIVERY.
ALL OTHER GROUNDING REQUIREMENTS
ARE RESPONSIBILITY OF BUILDING MANUFACTURE.



PLAN VIEW

INDUSTRY STANDARD CABLE
32 STRANDS OF NO. 16 AWG
COPPER WIRE



TMS GROUNDING LAYOUT

5/8" X 10'
COPPER CLAD
GROUND ROD

2/0 AWG
SOLID TINNED
COPPER

TMS NODE WALL

#2 AWG WIRE HALO

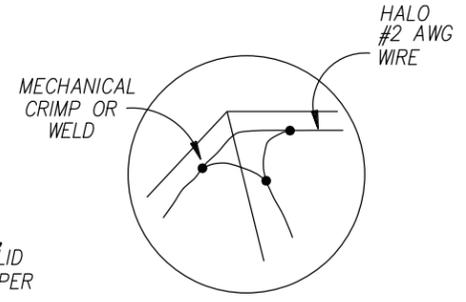
TMS NODE

GROUNDING
PLATE

2/0 AWG
SOLID TINNED
COPPER

BURIED GROUND RING
2/0 AWG SOLID TINNED
COPPER

ELECTRICAL SERVICE
GROUNDING RODS



OMNI-DIRECTIONAL DROP
(FOR INTERIOR HALO SYSTEM ONLY)
DETAIL A

THIS GROUNDING RING
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Date:	Comments	Init.

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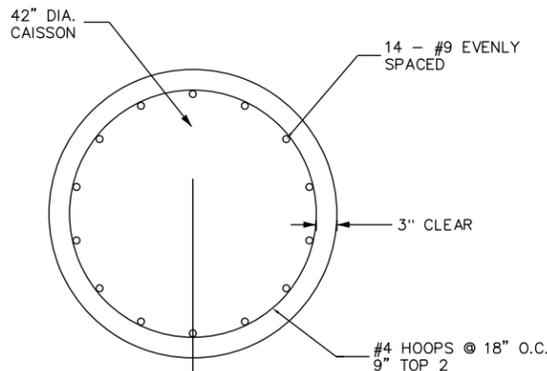
425 C Corporate Circle
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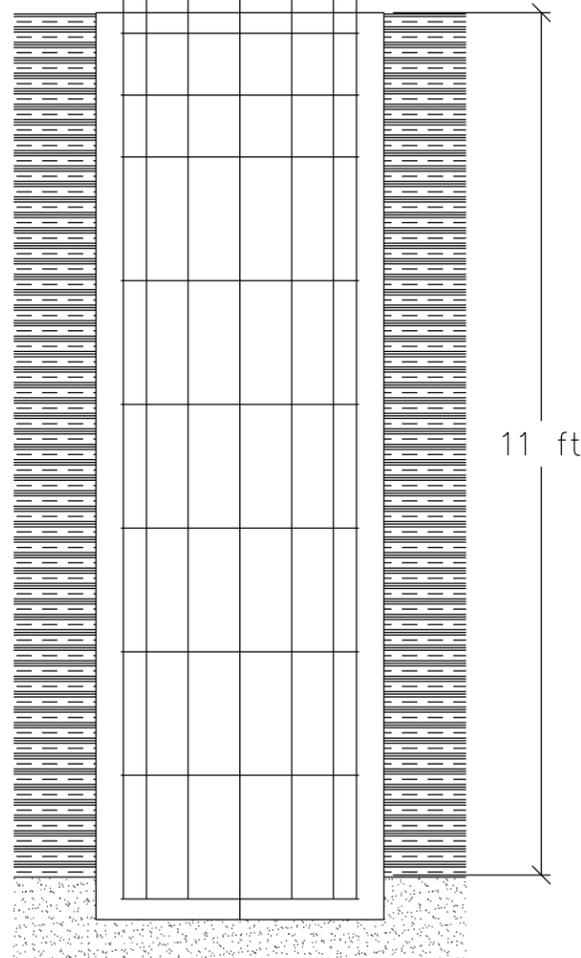
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NODE GROUNDING RINGS			
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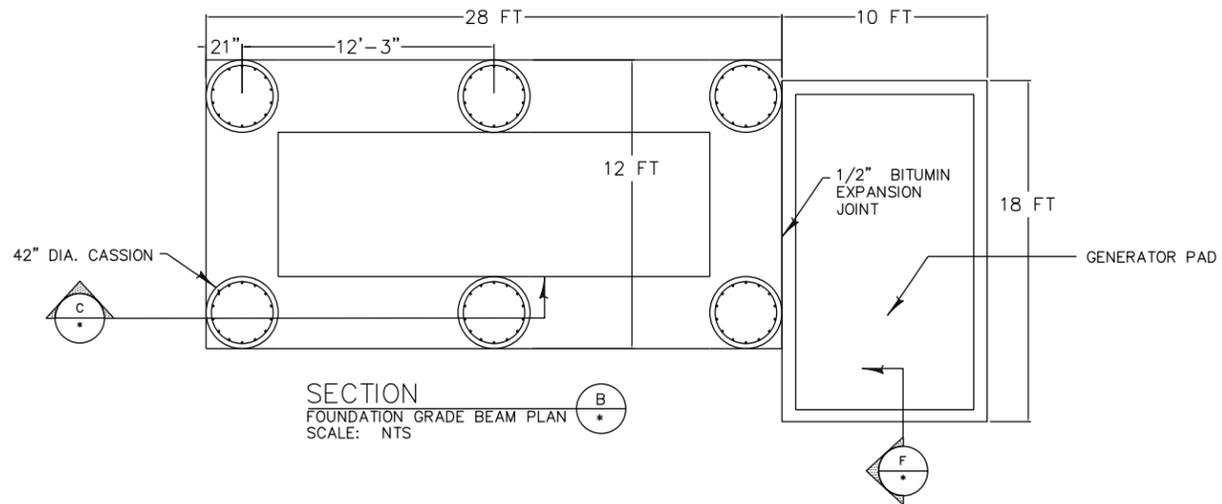
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PLAN VIEW
ELEVATION

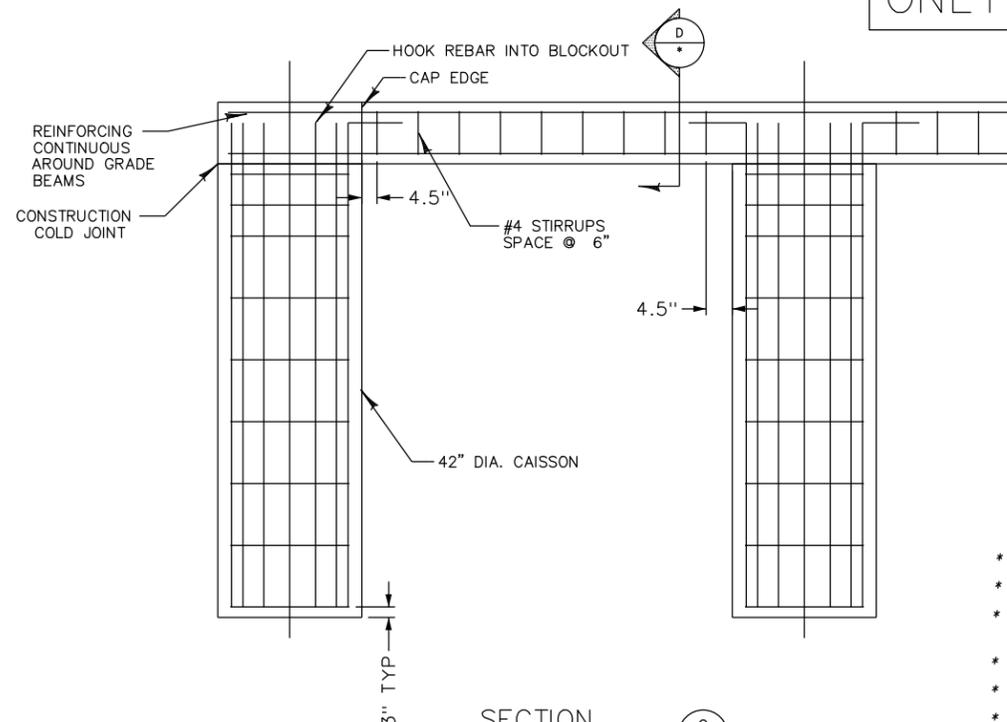


SECTION
42" DIA. CAISSON
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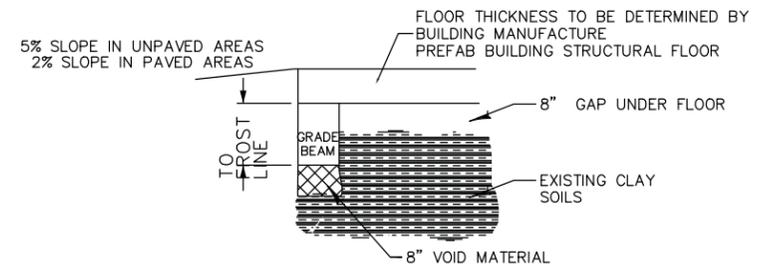


SECTION
FOUNDATION GRADE BEAM PLAN
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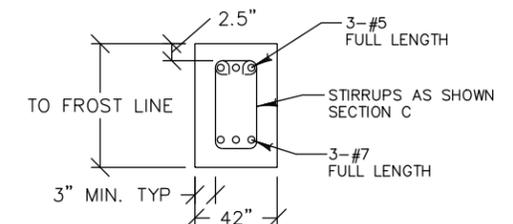
THIS FOUNDATION
PLAN IS FOR
INFORMATION
ONLY



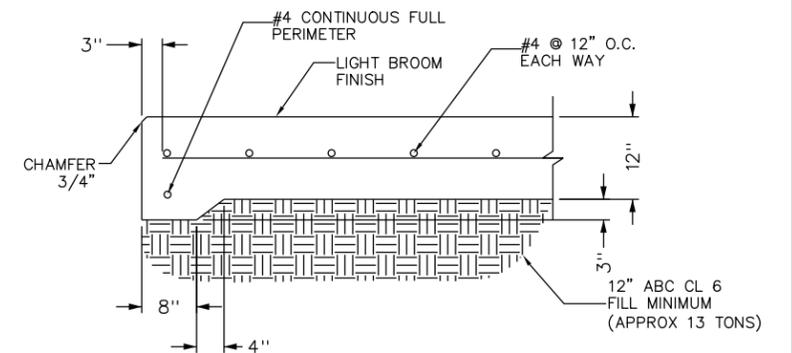
SECTION
GRADE BEAM REBAR
SCALE: NTS



SECTION
FILL SECTION
SCALE: NTS



SECTION
GRADE BEAM SECTION
SCALE: NTS



SECTION
GENERATOR FOUNDATION DETAIL
SCALE: NTS

NOTES:

- * Form void to be installed under grade beams
- * Building Manufacture shall perform a geotechnical study of the site.
- * The foundation design shall be provided by the building manufacture. All details here are for informational purposes only and illustrate similar designs used previously.
- * Concrete for Generator slab shall be class B.
- * Concrete for Grade Beams shall be class D.
- * Concrete for Caissons shall be class BZ.

Kimberly Garber 1:33:03 PM P:\Projects\160227 CDOT 1-70 East\CADD\DET45_Node Foundation.dgn

Print Date: 1/29/2016	0000
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Colorado Department of Transportation

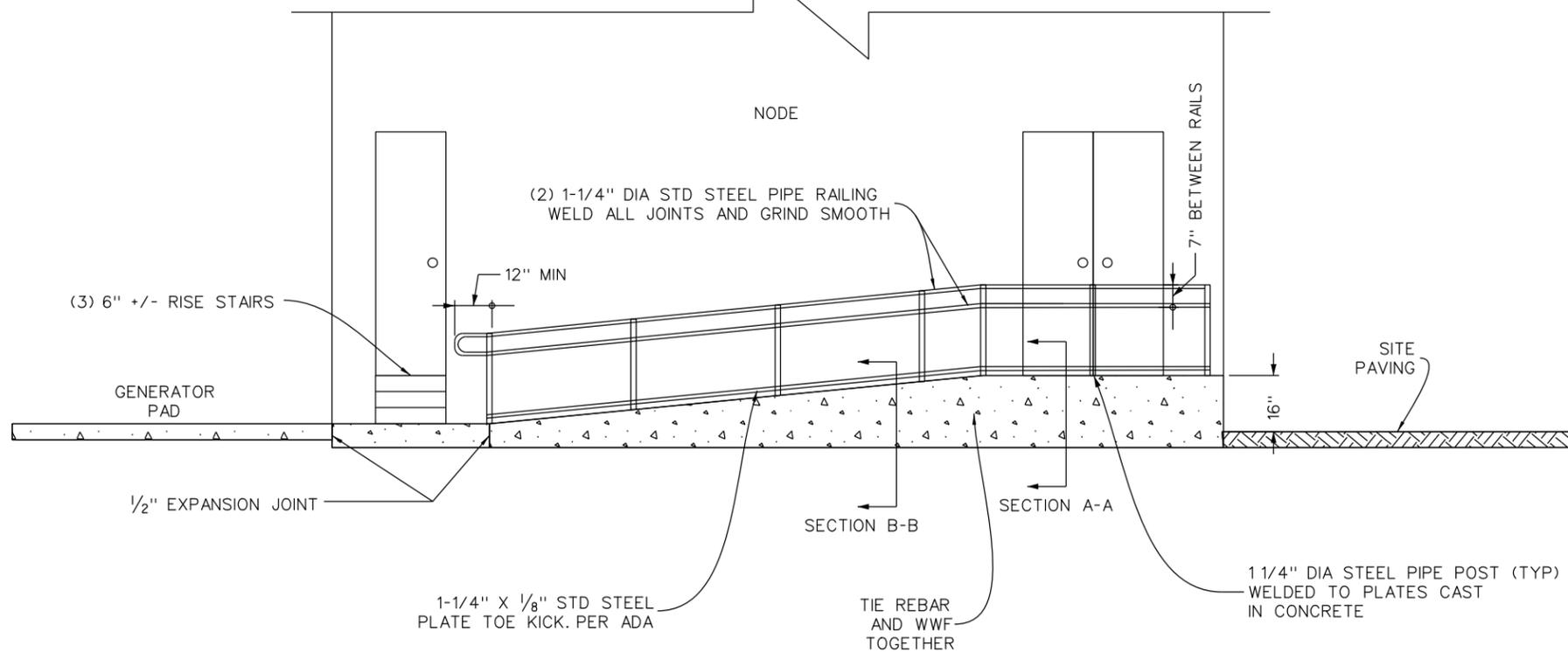
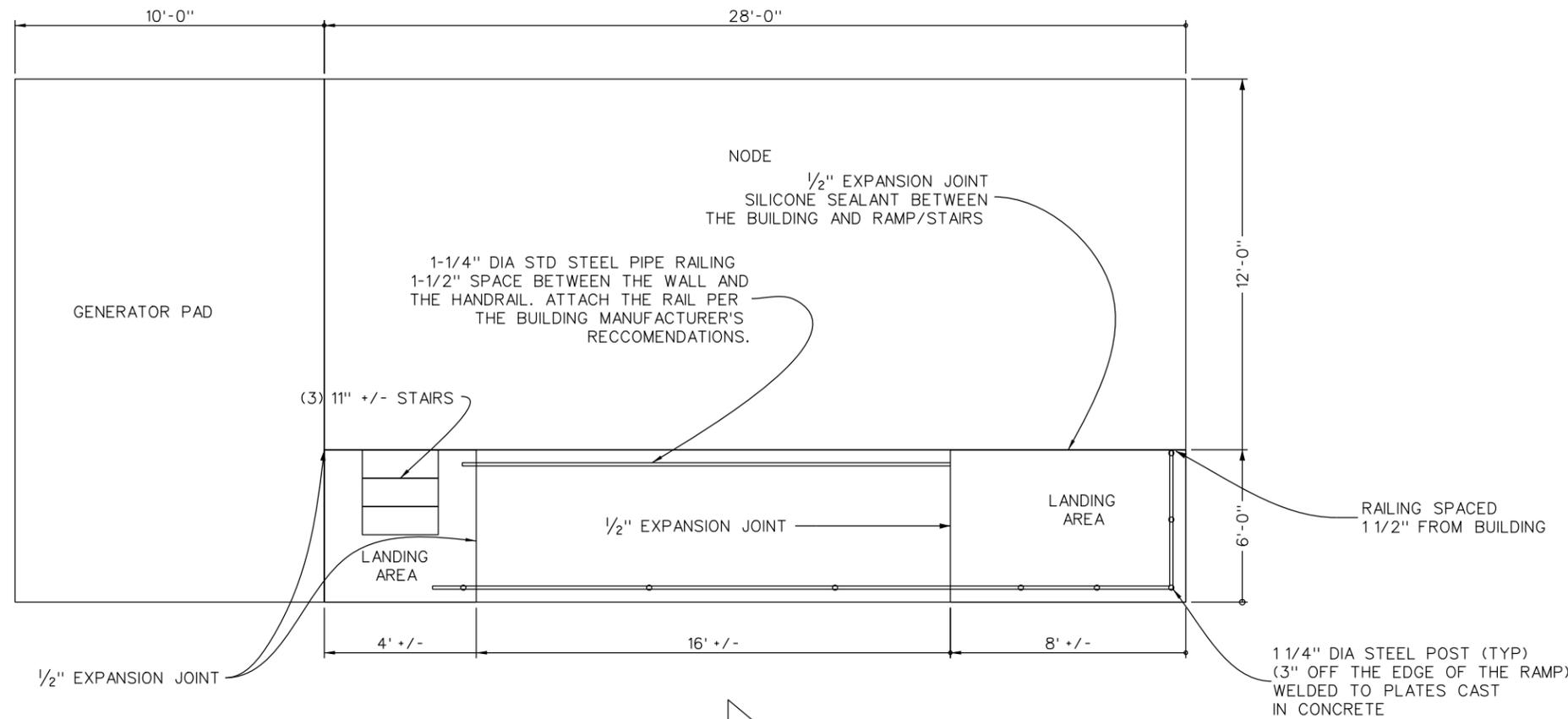
425 C Corporate Circle
Golden, CO 80401
Phone: 303-512-5801 Fax: 303-512-5878

HQ ITS BRANCH JKS

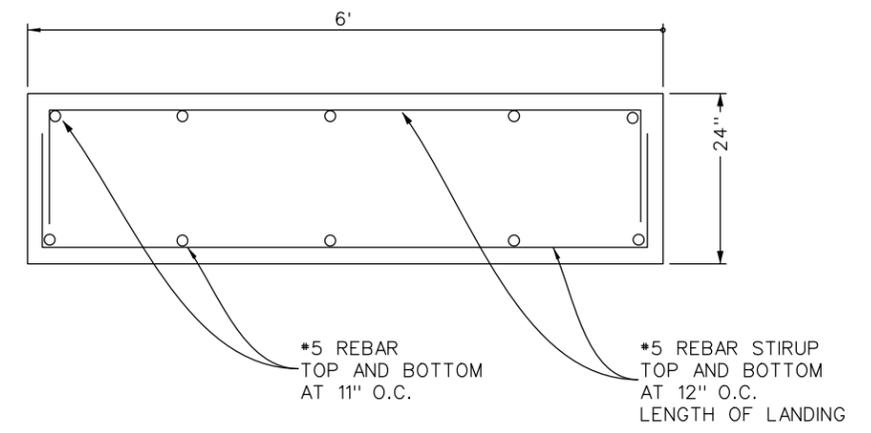
As Constructed
No Revisions:
Revised:
Void:

NODE FOUNDATION			
Designer:	CDOT	Structure	
Detailer:	CDOT	Numbers	
Sheet Subset:	ITS	Subset Sheets:	of

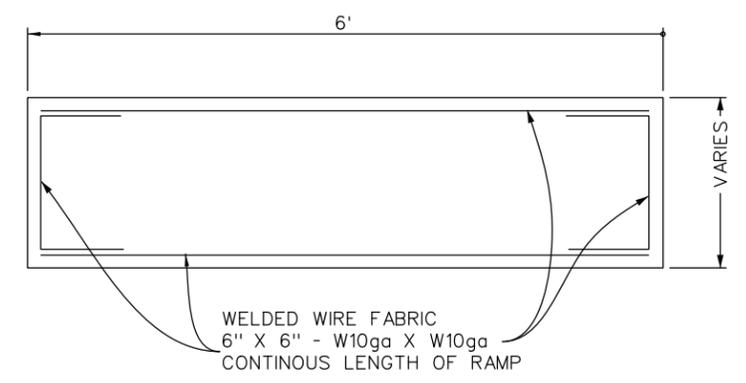
Project No./Code
Sheet Number 46



NOTE:
 -GENERATOR PAD AND HANDICAP RAMP SHALL BE CLASS B CONCRETE.
 -REINFORCING FOR HANDICAP RAMP AND EXPANSION JOINT MATERIALS SHALL NOT BE MEASURED AND PAID FOR SEPERATELY BUT INCLUDED IN THE CONC. CLASS B UNIT PRICE.
 -HAND RAILING(S) PAINTED BLACK.



SECTION A - A



SECTION B - B

THIS ENTRANCE RAMP PLAN IS FOR INFORMATION ONLY

Kimberly Garber 1:33:03 PM P:\Projects\160227 CDOT 1-70 East\CADD\DET46_Node Entrance Ramp.dgn

Print Date: 1/29/2016	0000
File Name: DET46_Node Entrance Ramp.dgn	
Horiz. Scale: NTS Vert. Scale: As Noted	
JKS	

Sheet Revisions		
Date:	Comments	Init.

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 Golden, CO 80401
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As Constructed
No Revisions:
Revised:
Void:

ENTRANCE RAMP			
Designer:	CDOT	Structure Numbers	
Detailer:	CDOT	Subset Sheets:	of
Sheet Subset:	ITS		

Project No./Code
Sheet Number 47